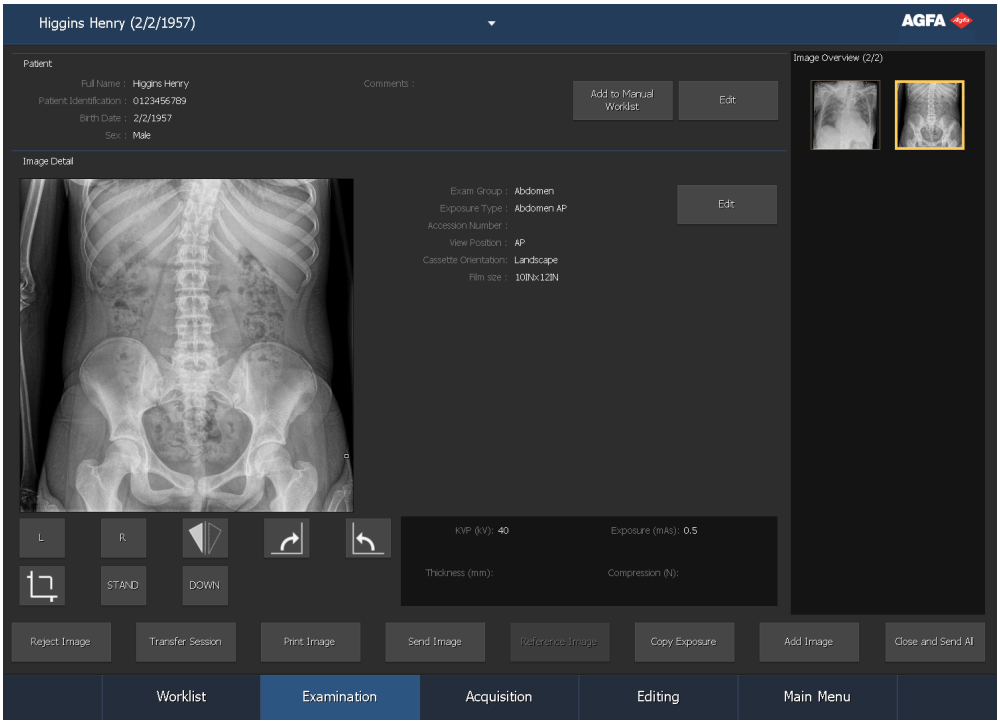
MUSICA Acquisition Workstation

NX 3.0

NX 4.0

User Manual



Contents

Legal Notice

CE 2862

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UK	RP

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For more information on Agfa products, please visit agfaradiologysolutions.com.

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Introduction to this manual

Scope of this Manual

This manual contains information for the safe and effective operation of the MUSICA Acquisition Workstation software.

This manual applies to two versions of the software: NX 3.0 and NX 4.0. NX 4.0 is available only on DR systems that support dynamic imaging.

The software is further referred to as "NX" and the pc on which it runs the "NX workstation".

About the safety notices in this document

The following samples show how warnings, cautions, instructions and notes appear in this document. The text explains their intended use.

DANGER: A danger safety notice indicates a hazardous situation of direct, immediate danger for a potential serious injury to a user, service engineer, patient or any other person.

Warning: A warning safety notice indicates a hazardous situation which can lead to a potential serious injury to a user, service engineer, patient or any other person.

Caution: A caution safety notice indicates a hazardous situation which can lead to a potential minor injury to a user, service engineer, patient or any other person.

An instruction is a direction which, if it is not followed, can cause damage to the equipment described in this manual or any other equipment or goods and can cause environmental pollution.

A prohibition is a direction which, if it is not followed, can cause damage to the equipment described in this manual or any other equipment or goods and can cause environmental pollution.

Note Notes provide advice and highlight unusual points. A note is not intended as an instruction.

Disclaimer

Agfa assumes no liability for use of this document if any unauthorized changes to the content or format have been made.

Every care has been taken to ensure the accuracy of the information in this document. However, Agfa assumes no responsibility or liability for errors, inaccuracies or omissions that may appear in this document. To improve reliability, function or design Agfa reserves the right to change the product without further notice. This manual is provided without warranty of any kind, implied or expressed, including, but not limited to, the implied warranties of merchantability and fitness for a particular purpose.

Note In the United States, Federal law restricts this device on order of a physician for prescription use only.

Introduction to NX

Intended Use

The NX software runs on a CR/DR Modality Workstation, supporting the CR/DR radiology workflow and diagnosis inclusive image processing. The application will run on off-the-shelf PC’s based on the Windows operating system.

Clinical benefit

The NX software does not provide a direct clinical benefit to the patient in terms of a patient measurable outcome. Clinical benefits of NX stem from its support in general and specific CR/DR radiological workflow and the ability to transform raw x-ray images into images for further diagnostic usage. The NX software provides the interface for generation, processing and final visualization of the radiographic image.

The XRDI software does not provide a direct clinical benefit to the patient either but allows the integration of the NX software with radiography hardware and allows to control this hardware.

Indications for Use

NX Modality Workstation

- Agfa's NX software, staged on a NX workstation, is indicated for use in general projection radiographic applications for the display of diagnostic quality radiographic images of human anatomy for adult, paediatric and neonatal examinations captured from DR and CR systems. The NX software in combination with the DR detectors and CR digitizers may be used wherever conventional screen-film systems, CR or DR systems may be used.
- The NX software is also indicated for use in mammography applications in combination with specific cleared CR mammography digitizers and DR detectors.
- NX software supports the CR/DR radiology workflow for image acquisition, identification, image processing and image transmission of digital images received from an Agfa digitizer or Agfa validated DR Panel.
- The primary use of the NX software is quality monitoring. With the additional diagnostic monitor, images are displayed with diagnostic quality. There is however no extensive toolset for softcopy reading available.
- NX software is intended for linking patient and study data to CR/DR images and for preparing these images for diagnostic use and sending them to a printer, an archive or a diagnostic station or burning them on CD/DVD.
- Study- and patient data are retrieved from a RIS or entered manually. Study- and patient data can be edited.
- Identification is done using well defined identification procedures.
- NX software provides XRG connectivity for setting and getting of XRG parameters.
- NX software provides tools to improve image quality of the medical images and to predefine image processing settings.
- NX software is not intended to be used as an archive.
- NX software can be used in mixed environments which include CR/DR General Radiology and CR/DR Mammography environments.

Note All functionality is available depending on regional or country-releases and compliance to local regulations.

NX Central Monitoring System

- NX Central Monitoring System (CMS) supports CR/DR workflow with image processing and image transmission of digital images created on NX software, which is staged on a NX workstation.
- The primary use of the NX Central Monitoring System is quality monitoring. With the additional diagnostic monitor, images are displayed with diagnostic quality. There is however no extensive toolset for softcopy reading available.
- NX Central Monitoring System is intended for preparing images for diagnostic use and sending them to a printer, an archive or a diagnostic station or burning them on CD/DVD.
- NX Central Monitoring System can be used to view and improve the images acquired and processed by NX Modality Workstations
- NX Central Monitoring System can be used to monitor CR/DR imaging from a central location.
- Study- and patient data can be edited.
- NX Central Monitoring System provides tools to improve image quality of the medical images and to predefine image processing settings.
- NX Central Monitoring System is not intended to be used as an archive.

NX Office Viewer

- NX Office Viewer is a software application for viewing digitized images acquired and processed by an NX Modality Workstation. The application can be installed on any PC complying with the minimum requirements.
- Display image quality depends on the connected monitor. With the additional diagnostic monitor images are displayed with diagnostic quality, however no extensive toolset for softcopy reading is foreseen.
- With NX Office Viewer you can change the presentation of images but these changes cannot be saved.
- NX Office Viewer can be used to print images on an office type printer in non-diagnostic quality.
- NX Office Viewer can be used to export images to hard disk in non-diagnostic quality.
- NX Office Viewer is not intended to be used as an archive.

Note All functionality is available depending on regional/country releases and/or compliance to local regulations.

Veterinary applications

NX software can also be used for veterinary applications.

Availability of mammography in the U.S.A.

Mammography is not available in the U.S.A. for DR and fluoroscopic imaging applications.

Intended User

This manual is written for trained users of Agfa products and trained diagnostic X–Ray clinical personnel.

Users are considered as the persons who actually handle the equipment as well as the persons having authority over the equipment.

Before attempting to work with this equipment, the user must read, understand, note and strictly observe all warnings, cautions and safety markings on the equipment.

Before attempting to work with this equipment, the user must thoroughly read and fully understand this manual and any release notes delivered with the software media pack, paying particular attention to all warnings, cautions and notes.

Configuration

An NX workstation can be part of two types of configurations:

- An NX workstation can act as a stand-alone workstation for in-room identification of examinations and quality control of examinations. In this situation, an ID Tablet and/or an in-room Fast ID Digitizer are connected to the NX workstation. The NX configuration can include one or more DR detectors, connected to the NX workstation.
- An NX Workstation can also be part of a Central Monitoring System configuration. In that case, the in-room configuration is extended in such way that a number of in-room NX workstations are connected to one or more Central Monitoring Systems.

It is possible to view the images on the NX workstations from any other PC using the NX Office Viewer software.

Operation Controls

NX is designed to perform sequential tasks in four different environments (the **Worklist**, **Examination**, **Acquisition** and **Editing** environment), following the hospital workflow of identifying examinations, performing examinations and performing additional editing tasks:

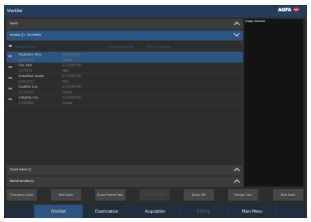


Figure 1: Worklist environment

The user can:

- Control the identification workflow in the radiology department.
- Identify examinations using RIS-based worklists.
- Perform multiple exams at the same time.
- Perform emergency exams, without selecting RIS data for identification.

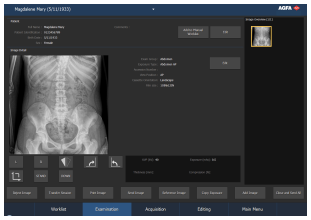


Figure 2: Examination environment

The user can:

- Define examinations you want to perform (select exposures for an examination, edit patient data).
- Judge if the images are taken correctly.
- Take steps to prepare the images for diagnosis.
- Control the flow of examinations to other external components (such as an archive).

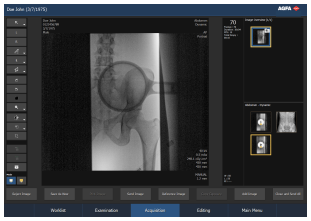


Figure 3: Acquisition environment

The user can:

- View a real-time fluoroscopy image while positioning a patient before performing an exposure.
- Acquire a set of static and dynamic images for diagnosis.
- Review dynamic images and prepare them for diagnosis.

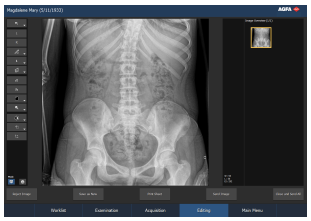


Figure 4: Editing environment

The user can use an extensive range of image processing functions, including annotations and applying manual collimation.

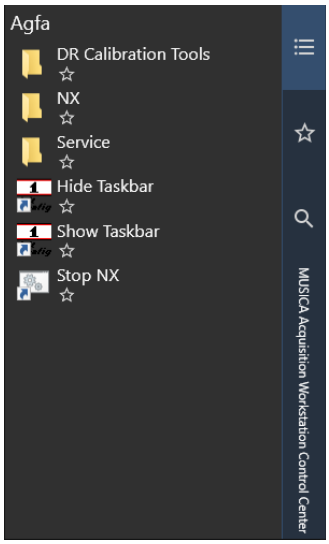
Other features:

- NX offers the possibility to re-process images which have been associated with wrong study parameters during identification. This feature eliminates the need to retake exposures.
- NX offers automatic processing functions including automatic image processing (Agfa MUSICA(2) processing), automatic window/level adjustment and automatic collimation border detection.
- MUSICA Acquisition Workstation Control Center on page 25

MUSICA Acquisition Workstation Control Center

The **MUSICA Acquisition Workstation Control Center** is a menu that contains a set of tools for controlling the software, e.g. starting and stopping the NX application.

To open the menu, go to the Windows taskbar and click the **MUSICA Acquisition Workstation Control Center**.



The visibility of the Windows taskbar can be configured using the options **Hide Taskbar** and **Show Taskbar**. This setting apply to the logged in user only.

System Documentation

The user documentation consists of the following manuals:

- MUSICA Acquisition Workstation User manual (this manual) (document 4420).
- MUSICA Acquisition Workstation Key User manual (document 4421).
- Central Monitoring System user manual (document 4426).
- Getting started with MUSICA Acquisition Workstation (document 4417).
- MUSICA Acquisition Workstation Getting Started Sheets (document 4424).
- MUSICA Acquisition Workstation Problem Solving Sheets (document 4425).
- CR Mammography System User manual (document 2344).
- CR Full Leg Full Spine User manual (document 4408).
- Office Viewer Installation Manual (document 4429).
- Getting Started with Office Viewer (document 4430).
- OrthoGon 1.0 User Manual (document 0150).
- OrthoGon 1.0 for veterinary applications User Manual (document 0155).
- MUSICA Acquisition Workstation online help documentation.

The user documentation for integrated AI modules is also part of the documentation:

- Lunit INSIGHT CXR (pathology detection)

The documentation is delivered on a USB flash drive together with the MUSICA Acquisition Workstation software and is accessible on the system in an online help system.

The documentation of other components of the DR system can be made available on the MUSICA Acquisition Workstation online help documentation if it has the option to install the documentation.

The documentation shall be kept with the system for easy reference. Technical documentation is available in the product service documentation that is available from your local support organization.

- Opening the NX help system on page 26

Opening the NX help system

1. Go to the **Main Menu** window.
2. Click the **Help** action button.

   The NX help Welcome screen appears:

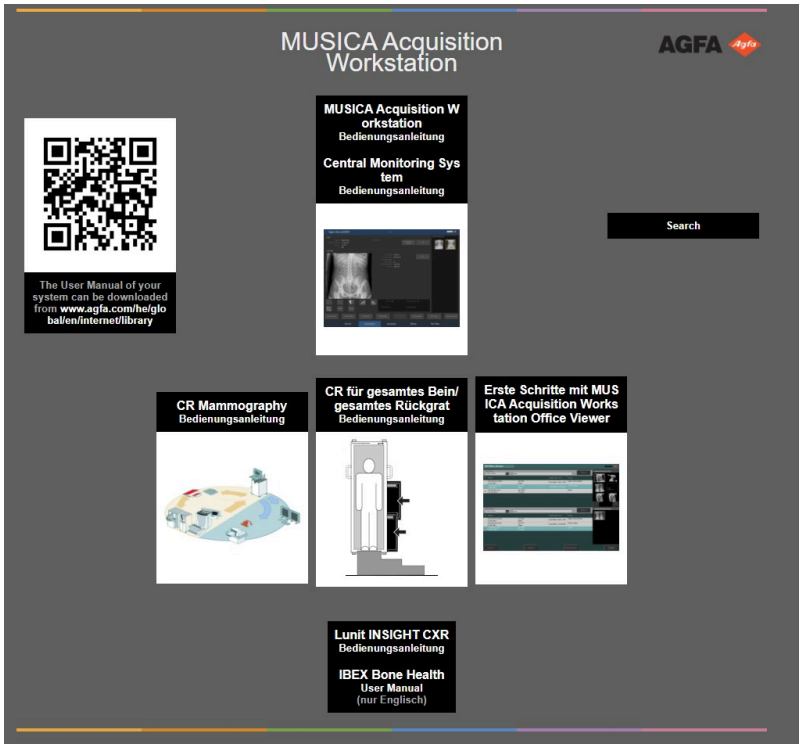


Figure 5: NX Online help Welcome screen

Options and Accessories

Optional licenses can hide or show certain functionality, depending on if they are enabled or not.

NX has a base license (of which the main goal is to identify cassettes and view the images) with several additional product licenses, adding functionality like advanced annotation tools or advanced quality assurance tools.

Training

The user must have received adequate training on the safe and effective use of the software before attempting to work with it. Training requirements may vary from country to country. The user must make sure that training is received in accordance with local laws or regulations that have the force of law. Your local Agfa representative can provide further information on training.

The user must note the following information in the previous section of this manual:

- Intended Use.
- Intended User.
- Safety Directions.

Product Complaints

Any health care professional (for example a customer or a user) who has any complaints or has experienced any dissatisfaction with the quality, durability, reliability, safety, effectiveness, or performance of this product must notify Agfa.

For a patient/user/third party in the European Union and in countries with identical regulatory regimes (Regulation 2017/745/EU on Medical Devices); if, during the use of this device or as a result of its use, a serious incident has occurred, please report it to the manufacturer and/or its authorised representative and to your national authority.

Contact address:

Agfa Service Support - local support addresses and phone numbers are listed on www.agfa.com

Agfa - Septestraat 27, 2640 Mortsel, Belgium

Agfa - Fax +32 3 444 7094

Compatibility

NX must only be used in combination with other equipment, components or software that have been expressly recognized by Agfa as compatible.

Any change or addition to the equipment can only be done after prior formal approval of Agfa. Changes or additions to the equipment must only be carried out by persons authorized to do so by Agfa. Such changes must comply with the best engineering practice and all applicable laws and regulations that have the force of law within the jurisdiction of the customer.

Any changes or additions to the equipment without the approval of Agfa falls under the sole responsibility of the customer and Agfa cannot guarantee proper functionality of the third party software or the Agfa software after installation. The customer shall hold harmless and indemnify Agfa for and against any loss, liability, costs, claims and expenses asserted against Agfa or incurred by Agfa arising out of or in connection with this addition.

Any upgrade of Agfa software may impact the behaviour of third party software.

Compliance

NX has been designed in accordance with Regulation (EU) 2017/745 on medical devices (MDR) and UK MDR 2002.

This Agfa product has been designed in accordance with IEC 62304: Medical device software - Software life cycle processes.

Both the workstation console and the ID Tablet comply with the following safety standards:

- IEC 62368-1
- IEC 60950-1
- CAN/CSA 22.2 No. 60950-1-07

The equipment bears the CE mark and fully complies with the CE Directive 2014/30/EU, the UKCA mark and fully complies with UK MDR 2002 and with the federal code of the United States, bearing on:

- For emissions the equipment complies with EN 55011 class A (CISPR 11). This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.
- Emissions according to 47 CFR part 15 subpart B, Class A. This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the Instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.
- Radio-parameters according to ETSI 300 330.

Performance

NX is designed to meet the following performance requirement:

- The maximum storage capacity of an NX workstation is 16 800 18x24cm images or 30 000 images using extended storage. Depending on cassette sizes and the digitizer type, this can be less. The number of images stored can be limited by local configuration. Increasing the number of images stored will increase searching time for images.
- The maximum throughput of an NX system is 180 images/hour. Depending on Digitizer type and image size this can be less.

Connectivity

The NX workstation requires a TCP/IP network to exchange information with a number of other devices. The recommended minimum network performance is 100 Mbit for wired ethernet and IEEE 802.11 g for wireless network. NX is provided with a mechanism to prevent data loss on network failure.

Caution: A wireless network operating on variable speed or having interruptions will cause delays on the NX workstation.

Note NX Central Monitoring System and NX Office Viewer do not support wireless network.

NX communicates with other devices in the hospital network using one of the following protocols:

NX is Service Class User of these DICOM SOP Classes:

SOP Class
Verification SOP Class
Storage Commitment Push Model SOP Class
Modality Performed Procedure Step Sop Class
Computed Radiography Image Storage
Digital X-Ray Image Storage – For Presentation
Digital X-Ray Image Storage – For Processing
Digital mammography X-Ray Image Storage - For Presentation
Digital mammography X-Ray Image Storage - For Processing
Grayscale Softcopy Presentation State Storage SOP Class
Modality Worklist Information Model – FIND
X-Ray RadioFluoroscopic (XRF) image SOP class
Basic Grayscale Print Management Meta SOP Class • Basic Film Session SOP Class • Basic Film Box SOP Class • Basic Grayscale Image Box SOP Class
X-Ray Radiation Dose SR
Printer SOP Class
Optional print SOP classes: • Print Job SOP Class • Presentation LUT SOP Class
Visual Light Image Storage SOP Class
Secondary Capture Image Storage SOP Class

Note Dose records can be stored and sent out using DICOM. For exposures with very low dose (below the sensitivity of the DAP meter), the dose record may be empty or absent.

IHE:

Integration Profiles Implemented	Actors Implemented	Options Implemented
ITI - IT Infrastucture Domain		
ATNA - Audit Trail and Node Authentication	Secure Application	none
CT - Consistent Time	Time Client	none
RAD - Radiology Domain		
CPI - Consistent Presentation of Images	Acquisition Modality	none
	Evidence Creator	none
	Print Composer	none
EV - Evidence Documents	Acquisition Modality	none
MAMMO - Mammo Integration Profile	Acquisition Modality	none
PDI - Portable Data for Imaging	Portable Media Creator	none
PIR - Patient Info Reconciliation	Acquisition Modality	none
REM - Radiation Exposure Monitoring	Acquisition Modality	none
SWF - Scheduled Workflow	Acquisition Modality	• Broad Worklist Query • PPS Exception Management • Billing and Material Management

Installation

Installation responsibilities

NX installation and configuration is performed by Agfa. A limited number of configuration tasks can also be performed by the customer after an Agfa training course has been provided. Contact your local support organization for more information.

Installation and configuration is described in the NX Service Documentation, which is available to the support personnel of Agfa.

The user is responsible for anti-malware software installed on the PC. A list of supported anti-malware software is in the service documentation.

Installation of the NX Office Viewer software is performed by the user. Installation instructions are available in NX Office Viewer Installation Manual (doc 4429).

Installing automatic software updates

The MUSICA Acquisition Workstation can be configured to automatically download and install software updates for the Windows operating system (hotfixes) and for the NX software.

Details on the setup of automatic software updates can be found in the service documentation which is available to Agfa service personnel.

1. To check for software updates manually, go to the **MUSICA Acquisition Workstation Control Center** > **NX** and click **Check for Software updates**.

   The system can be configured to check for software updates automatically, e.g. every week at a fixed day and time.

   - If the user is logged in with non-administrator rights, a message window shows the details, but software installation cannot be started.

Figure 6: Non-administrator user cannot install software updates

   The user must inform somebody with administrator rights, who has to check once again for updates.

   - If the user is logged in with administrator rights, a message window shows the details, and the user can install the available updates.

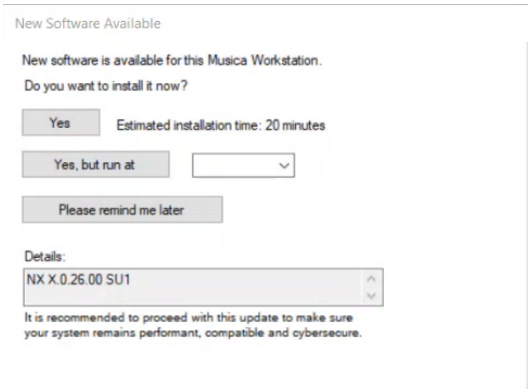


Figure 7: Administrator user can install software updates

2. Choose when the software can be installed.

   - **Install immediately.**

     Click **Yes** on the question "Do you want to install it now?"

     Note the full installation time needed can range from 10 minutes to several hours. It will take longer in case hotfixes are involved. In that case, the PC cannot be used for several hours.

     The download and installation is started.

     A message is displayed with an instruction to stop NX.

Figure 8: Stop NX

Go to the **MUSICA Acquisition Workstation Control Center** and click **Stop NX** and confirm the procedure by pushing enter in the command window.

The tool detects that NX is completely stopped and starts the download and installation.

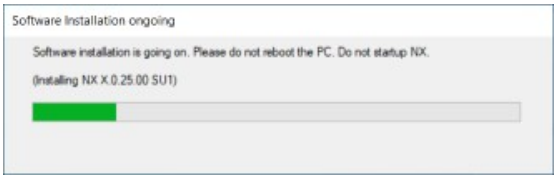


Figure 9: Installing software updates

- **Install at a scheduled time when the PC is not in use.**

  Select from the drop down menu the time when the PC is not in use.

  Click the **Yes, but run at ...** button.

  Note Do not reboot or shutdown the PC. The user should not sign out, but should lock the PC.

  Note For mobile users: make sure the PC is connected to a mains power source.

  The installation is executed at the scheduled time and requires no interaction from the user.

  In case the PC is still in use at the scheduled time, a dialog is displayed 15 minutes before the scheduled time and again when installation starts, allowing the user to postpone or cancel the scheduled installation.
- **Postpone the installation.**

  Click the **Please remind me later** button.

After the installation, the PC reboots and NX starts up again.

Patient environment

The MUSICA Acquisition Workstation complies with the IEC 60950-1 and IEC 62368-1 standards. This means that, although it is absolutely safe, patients may not come into direct contact with the equipment. Therefore, the workstation must be placed outside a radius of 1.5 m (EN) or 1.83 m (UL/CSA) around the patient (according to the local valid regulation).

Licensing dongle

Depending on your configuration, the availability of the MUSICA Acquisition Workstation software requires a license dongle to be connected to the PC. This configuration applies mostly to older systems. If the system has a dongle, Agfa advises not to remove the dongle, even if the MUSICA Acquisition Workstation software is not being used, because this will consume the “license grace period”. The grace period is a limited period of time during which you can continue working if the dongle is accidentally removed or lost.

To remove the dongle without consuming this license grace period, open the License Manager tool (**MUSICA Acquisition Workstation Control Center** > Service > License Manager) and disable the option “Enable grace functionality”. This may be useful if the MUSICA Acquisition Workstation software is installed on a laptop, used for other purposes. To use the software, the dongle must be plugged in. If the dongle gets broken or lost, the licenses will be immediately blocked and you must open the License Manager tool and click “Enable grace functionality” to continue working for a limited period of time, during which the dongle can be replaced.

Related information

MUSICA Acquisition Workstation Control Center on page 25

Messages

Under certain conditions NX will show a dialog box in the middle of the screen containing a message. This message will tell that either a problem has occurred or that a requested action cannot be performed.

The user must read these messages carefully. They will provide information on what to do from then on. This will be either performing an action to resolve the problem or to contact the Agfa service organization.

Details on the contents of messages can be found in the service documentation which is available to Agfa service personnel.

Labels

NX has an About box, showing information on version and release of NX.

Mention this version number if you contact Agfa for support.

- Consulting the About box on page 42

Consulting the About box

1. Click **About NX...** in the Tools section of the Main Menu window.

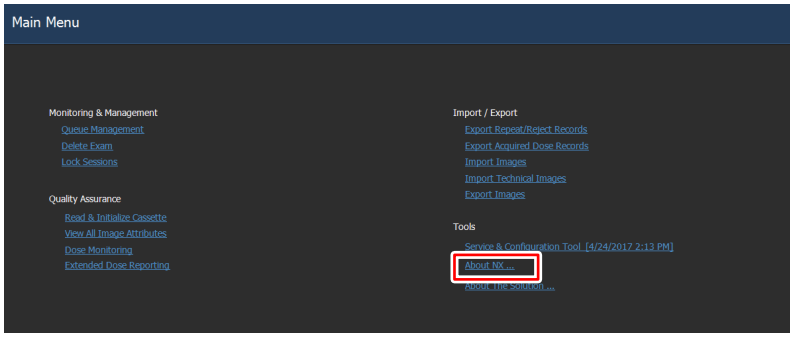


Figure 10: Main Menu window.

This will open the About box showing the current release and version details of NX in the lower right corner.

Figure 11: Example of the NX About box (model/version 4.0; build number may be different).

Figure 12: NX About box (model/version 3.0; build number may be different).

Note Always quote these details when you discuss any issues with Agfa service personnel.

2. Click on the dialog to close it.

Patient data security

It is the responsibility of the hospital to ensure that the patients' legal requirements are met and that the security of the patient records is:

- maintained and tested,
- audited,
- administered locally to cover risks from third party access and
- how the availability of the services is to be maintained in the event of disaster.

It is the responsibility of the hospital to ensure that types of access are identified and classified and that reasons for access are justified.

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- Increased security: HIPAA on page 46
- Requirements on the operating environment on page 47

System hardening

A license-based option can be activated to implement system hardening on the MUSICA Acquisition workstation.

Systems hardening is a collection of tools, techniques, and best practices to reduce the vulnerability and security risk of the system.

The system hardening includes the implementation of a set of STIGs (Security Technical Implementation Guides), as defined by DISA (USA Defense Information Systems Agency).

- The Server Message Block (SMB) v1 protocol must be disabled on the system.

  Third party components, e.g. RIS Client, which rely on the use of shared folders could be affected.
- Windows 10 account lockout duration must be configured to 15 minutes or greater.

  A value of "0" is set, which is also acceptable as a fix, requiring an administrator to unlock the account.
- The number of allowed bad logon attempts must be configured to 3 or less.

  Account logout is activated after 3 bad logon attempts
- The password history must be configured to 24 passwords remembered.

  Same password cannot be reused; 24 passwords are remembered.
- The maximum password age must be configured to 60 days or less.

  Local users must change their password after a maximum of 60 days.
- The minimum password age must be configured to at least 1 day.

  Local users cannot change their password more than one time per day.
- Run as different user must be removed from context menus.

  "Run as different user" is not available in context menus.
- Downloading print driver packages over HTTP must be prevented.

  Prevents the computer from downloading print driver packages over HTTP.
- Printing over HTTP must be prevented.

  Prevents the computer from printing over HTTP.

Increased security: HIPAA

Within the healthcare industry, several standardization efforts are ongoing as a response to Privacy and Security legislation and regulations. The purpose of this standardization for hospitals and vendors is to enable information sharing, interoperability and to support the workflow of hospitals in a multiple vendor environment.

In order to allow hospitals to comply to HIPAA regulations (Health Insurance Portability and Accountability Act) and meet the IHE standards (Integrated Healthcare Enterprise) security features are included in NX:

- User authentication using Windows login. The administrator can configure different user accounts. Each account consists of a user name and a password. Refer also to “Patient data security”. However, the system login is used for user authentication and identification. No application login is required.
- User authentication using a user authentication tool. The administrator can configure different user accounts. Each account consists of a user name and a password and optionally alternative means for authentication, e.g. RFID keys. Refer also to “Patient data security”. The application login is used for user authentication and identification.
- Audit logging. This implies logging to a central log server of specific NX ‘actions’, e.g. start-up/shutdown and user authentication failures. The logging tool is not part of NX. The customer should provide it.
- Node authentication, using certificates. Working with TLS (Transport Layer Security) allows secure communications on an insecure network. TLS is the security layer on top of TCP/IP.

Note Configuring security settings is done in the NX Service and Configuration Tool. Refer to the Key user manual for more information.

Requirements on the operating environment

These operating environment requirements for information security and privacy (ISP), set in compliance with point 17(4) and 18(8) of Annex I of the EU Medical Device Regulation 2017/745, must be implemented and used in connection with the use of the Agfa medical device by the Customer (User). These are minimum requirements and designed to protect against unauthorised access that could hamper the device from functioning as intended.

Although Agfa has defined these ISP Operating Environment Requirements for implementation by the Customer, Agfa makes no warranties, expressed or implied regarding those ISP Operating Environment Requirements.

Agfa disclaims all liability if a security incident would occur despite the implementation of these ISP Operating Environment Requirements by the Customer.

Agfa reserves the right to revise these ISP Operating Environment Requirements and to make changes to them at any time. Possible revisions of the ISP Operating Environment Requirements will only be available in an electronic form, on request, via our website, by using the user documentation request form https://www.agfa.com/he/global/en/internet/library.

The information presented herein is sensitive and is company confidential. Without written authority from Agfa, further distribution outside the company is not allowed.

- Perimeter firewalls shall be in place and appropriately configured in order to ensure that communications between medical devices and external resources are either denied or restricted to just the communications that are essential for the medical devices to properly function.
- Network Intrusion Detection/Prevention Systems (NIDS/NIPS) shall be in place at the perimeter and appropriately configured, in order to provide early warning of an attack attempt or successful compromise of a medical device as well as to attempt to prevent compromise of medical devices.
- A Network Time Protocol Server shall be configured in the medical devices in order to synchronize the time in the audit logs with the time on the NTP server.
- Medical devices shall be on an isolated network segment that restricts communication of the medical devices to the systems that are required for the device to function.
- Internal firewalls shall be put in place to improve upon network segmentation and to further restrict communications of medical devices to the systems (internal and external) that they need to interact with.
- Medical device configurations shall be backed up in a secure separate device.
- Security controls shall be put in place to ensure that physical access to medical devices is limited only to authorized individuals and that physical theft of the device is prohibited.
- An incident response plan detailing responsibilities and how to react and recover from incidents, shall be in place. Staff involved in the incident response plan shall be trained to respond appropriately and effectively.
- A formal user provisioning and de-provisioning process shall be implemented to enable the appropriate management of access rights to medical devices.
- Users shall be assigned unique accounts to medical devices.
- User access rights to medical devices shall be reviewed for appropriateness and corrected as needed, at regular intervals not exceeding once a year.

Maintenance

Automatic storage management

NX is equipped with an automatic storage management system. The number of days examinations remain on disk can be configured. If there is less space available than required for storing 200 images, the oldest examinations are deleted until there is enough capacity for at least 200 images.

Only closed examinations can be deleted, with an exception of locked examinations and examinations created in the last 24 hours.

Preventive maintenance indicator

An NX Workstation that is part of a DR system can be configured to indicate to the user when preventive maintenance of the DR system is required, after a specific time interval or a number of DR exposures. The message is displayed at the bottom right corner of the screen and can be clicked away. Contact your local support organization for more information.

Approved disinfectants

Refer to the Agfa website for specifications on the disinfectants that have been found compatible with the cover material of the device and can be used on the outer surface of the device.

https://www.agfa.com/he/global/en/internet/library/overview.jsp?ID=41651138

Safety Directions

Warning: Safety is only guaranteed when an Agfa certified field service engineer has installed the product.

Warning: Diagnosis cannot be performed on NX if the workstation has no appropriate diagnostic monitor.

Warning: To perform diagnosis on NX, additional diagnostic input may be required.

Warning: The user is responsible for judging image quality and controlling environmental conditions for diagnostic softcopy or print viewing.

Warning: A software algorithm error leading to an image processing failure can cause loss of diagnostic information.

Warning: A configuration error leading to an image processing failure can cause loss of diagnostic information.

Warning: The user must follow the hospital quality assurance procedures for covering the risks resulting from errors in the image processing

Warning: The user must be aware when selecting patient data and identifying cassettes. Mistakes may lead to incorrect patient/study relation or bad image quality.

Warning: The following actions may lead to serious risk of injury and damage to the equipment as well as making the warranty void:

Changes, additions or maintenance to the Agfa products carried out by persons without appropriate qualifications and training.

Using unapproved spare parts

Warning: Improper changes, additions, maintenance or repair of the equipment or the software can lead to personal injury, electrical shock and damage to the equipment. Safety is only guaranteed when changes, additions, maintenance or repairs are carried out by an Agfa certified field service engineer. A non certified engineer performing a modification or service intervention on a medical device, acts on his own responsibility and makes the warranty void.

Caution: Strictly observe all warnings, cautions, notes and safety markings within this document and on the product.

Caution: All Agfa medical products must be used by trained and qualified personnel.

Caution: Always check the exposure parameters on the X-ray system console before making an exposure.

Caution: Use special care when imaging patients outside the typical adult size range.

Caution: Oldest examinations will be deleted automatically by the automatic storage management system. The NX Workstation may not be used as an archive.

Caution: Automatic adjustment of image density may hide occasional or systematic overexposure.

Caution: The image processing masks systematic over-exposure. Use correct exposure settings and do not rely on the image appearance to judge exposure level.

Caution: To avoid images being lost due to a power failure, the workstation and the Digitizer have to be connected to uninterruptable power supply (UPS) or an institutional standby

generator. In case of a power failure, the UPS will allow to finalize exposed images that are being scanned.

Caution: Do not position the NX workstation so that it is difficult to disconnect the mains power connection.

Note Every reasonable precaution has been taken during the manufacturing of NX to safeguard the health and safety of persons who will operate this system. Cautions, warnings and notes must be observed at all times.

- Safety precautions concerning identification on page 52
- Safety precautions concerning Full Leg Full Spine functionality on page 53

Safety precautions concerning identification

For configurations with ID Tablet following safety precaution applies:

Pull the power plug out of the equipment prior to cleaning the equipment.

Safety precautions concerning Full Leg Full Spine functionality

The composite, stitched image which results from the image stitching process of the Full Leg Full Spine option is compressed. Furthermore, technical acquisition factors vary greatly with Full Leg Full Spine imaging; for example, a Full Leg Full Spine image may be intentionally acquired with low dose or no anti-scatter grid to reduce exposure to a pediatric patient.

The resulting image quality is generally suboptimal for most skeletal studies when compared to normal computed radiographic techniques. The composite, stitched image is created to allow accurate softcopy measurement of distances and angles by qualified medical practitioners. Any incidental clinical findings that are seen on the source or stitched images, beyond the scope of measurements of angles and distances between skeletal entities, should be verified or further evaluated by additional diagnostic methods.

Unless a calibration is applied to the stitched image, the plane in which measurements are made is the stitching grid. This behaviour is different compared to other images, including the original images of a Full Leg Full Spine exposure, for which the plane in which measurements are made is the cassette or detector.

The Full Leg Full Spine stitching function cannot be used if the Full Leg Full Spine exposure type is not selected for a certain image. Another prerequisite is an activated Full Leg Full Spine license.

Selecting the Full Leg Full Spine exposure type for identifying images helps reducing the width of the stitching gap for composed images. If images come in with this exposure type and the images are stitched to a Full Leg Full Spine image, they can benefit of this feature. Also participating in reducing the stitching gap is the use of FLFS cassettes.

The presence of a white stitching line however has no influence on the accuracy of the measurements performed on the stitched image. Yet this can influence the visibility of reference measurement points, therefore Agfa advises the use of FLFS cassettes together with the activation of the FLFS mode.

The 'reduced stitching gap'-feature is not available when using Fast ID for identifying images, except for DX-S and CR30-X Digitizers.

For information on the cassette holder, refer to the CR Full Leg Full Spine option for NX Workstations User Manual.

Operating NX

Starting NX

Depending on the account that you use to log in, you will be able to perform fewer or more actions in the application (‘user roles’).

A certain feature or feature set (‘operation’) will only be available (and visible) to a user, if this is explicitly granted by the role to which the user is assigned.

To start the MUSICA Acquisition Workstation:

1. Switch on the computer.

   Together with Windows, NX starts automatically.

   The **Welcome to Windows** window appears. Press CTRL-ALT-DEL.

   A Caution window appears, warning the user that the system may only be used by authorized persons.
2. Click **OK**.

   The Windows log in window appears.
3. Enter the user name and password.

   If a user authentication tool is installed, e.g. for authentication using RFID keys, the Windows login is for a generic user and a lock screen appears with instructions how to authenticate as an individual user using the authentication tool.

   Perform the required authentication steps.

The MUSICA Acquisition Workstation **About** box appears if the application wasn't started yet.

Figure 13: Example of the MUSICA Acquisition Workstation About box

Note An optional window can appear, showing an overview of demo licenses and their status (valid, in grace period, expired). Check the information and click **OK** to close the window.

As a result:

- The **Worklist** environment is selected.
- The items are sorted as defined in the configuration (no item is selected).
- The examinations which are still open are available in the **Examination** or **Editing** environment.

NX environments

Worklist window

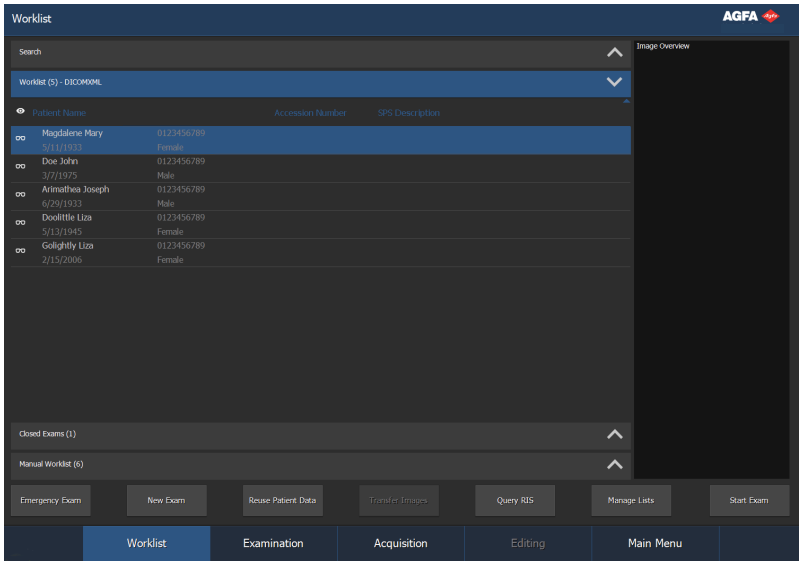


Figure 14: Worklist Window

In the **Worklist** window, you can view and manage the exams that are scheduled and that have been performed.

Related information

About Worklist on page 122

Examination window

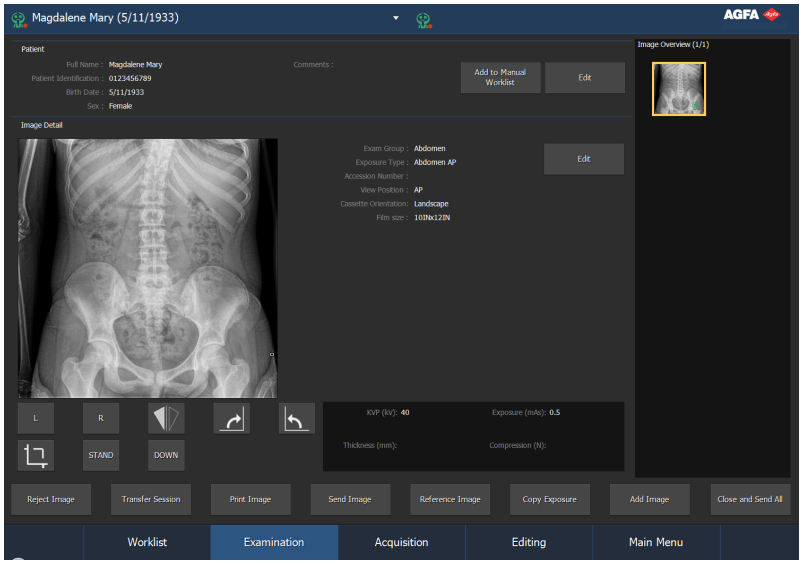


Figure 15: Examination window

In the **Examination** window, you can view and manage the details of a specific examination. The drop-down list in the title bar of the window shows the name of the patient for which the examination is performed. You can select another name from the list to display the examination of the patient. Also the most important tools to prepare the images for diagnosis are available here.

Related information

About Examination on page 147

Acquisition window

The acquisition window is available only on DR systems that support dynamic imaging.

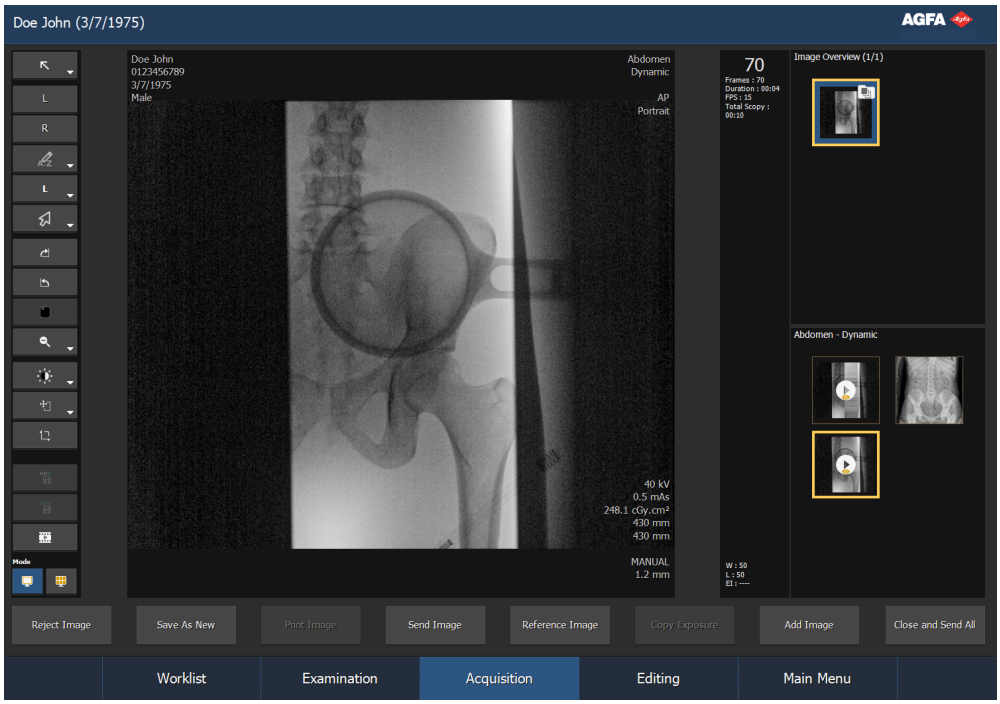


Figure 16: Acquisition window

In the **Acquisition** window, you can view a real-time fluoroscopy image while positioning a patient before performing an exposure. You can also perform examinations that result in a set of static and dynamic images. You can review dynamic images and prepare them for diagnosis.

Related information

About Acquisition on page 191

Editing window

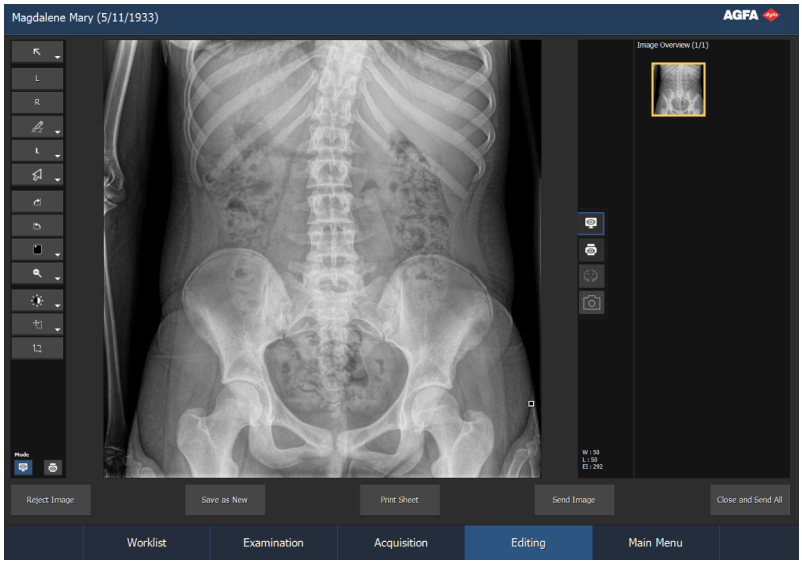


Figure 17: Editing window

In the **Editing** window, you can perform in-depth operations on an image. In this window, you can also prepare the image for printing.

Related information

About Editing on page 217

Main Menu window

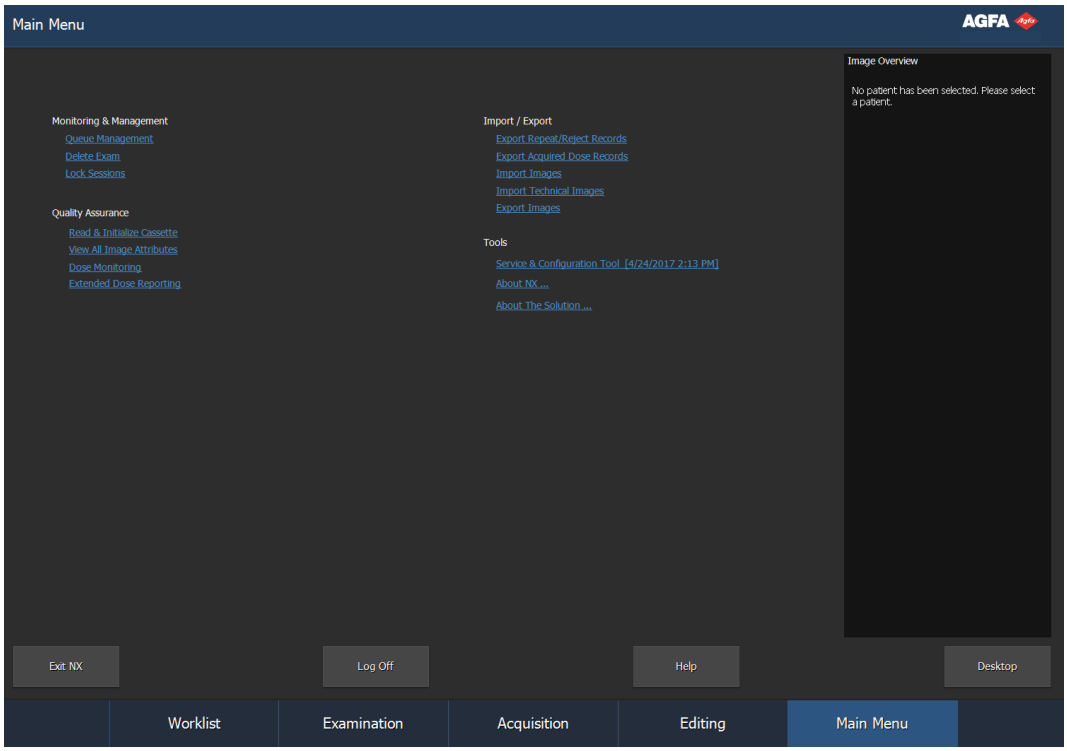


Figure 18: Main Menu window

In the **Main Menu** window, you can manage certain aspects of the workflow which do not belong to the daily workflow.

Related information

About the Main Menu on page 303

DR workflow

1. Open a patient from the RIS or enter patient data manually.

   When a new patient comes in, define the patient info for the exam.
2. Selecting the examinations.

   Set the exposure instructions for the exam.
3. Perform X-Ray exposures.
4. Performing quality control.

   Assess the image quality and prepare the images for diagnosis. Send the images to a hardcopy printer or PACS (Picture Archiving and Communication System).

   Note Next to this main workflow, you have a wide number of image processing tools in the Editing window.

Related information

DR workflow on page 70

CR workflow

1. Open a patient from the RIS or enter patient data manually.

   When a new patient comes in, define the patient info for the exam.
2. Selecting the examinations.

   Set the exposure instructions for the exam.
3. Identifying the cassettes.

   Identify the cassette that carries the exam. You are free to perform X-Ray exposures before or after identification.
4. Digitizing the images.

   The Digitizer sends the images to NX.
5. Performing quality control.

   Assess the image quality and prepare the images for diagnosis. Send the images to a hardcopy printer or PACS (Picture Archiving and Communication System).

Related information

CR workflow on page 108

Stopping NX

Stopping NX by logging out of Windows

Procedure:

1. Go to the Main Menu.
2. Click the Log Off button.

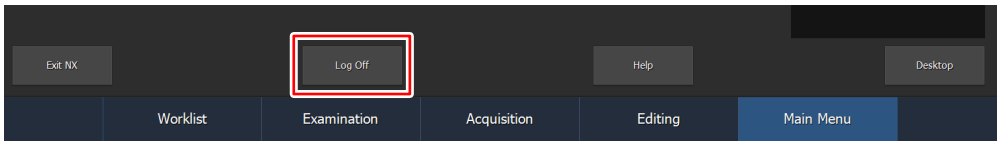


Figure 19: Log Off button

As a result:

- NX is closed.
- Refer to “Starting NX” to start NX again.

Note If the NX Service and Configuration tool is open, this tool will not automatically be closed.

Related information

Starting NX on page 55

Stopping NX without stopping Windows

Procedure

1. Go to the Main Menu.
2. Click the Exit NX action button.

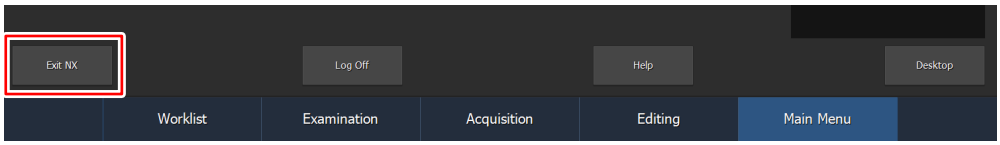


Figure 20: Exit NX button

NX is stopped but Windows remains active.

To start NX again, go to the **MUSICA Acquisition Workstation Control Center** > **NX** and click **Start NX Viewer** or click the **Start NX Viewer** icon on the desktop.

Related information

MUSICA Acquisition Workstation Control Center on page 25

Switching to Windows without stopping NX

To switch to the Windows environment without stopping NX

1. Go to the Main Menu.
2. Click the Show Desktop action button.

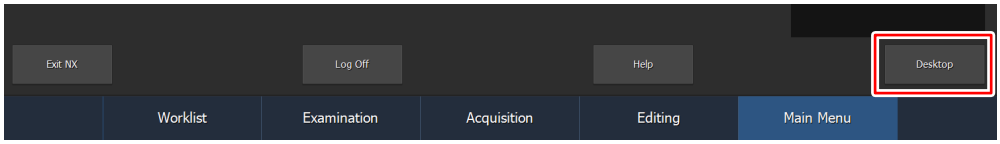


Figure 21: Desktop button

The Windows desktop is shown, you can go back to NX by clicking NX in the Windows task bar.

Note Alternatively, press Windows logo key + D. This key combination minimizes all windows and shows the Desktop.

Note Pressing Windows logo key + D again, opens all windows and takes you right back to where you were.

Change user

To switch to a different user account:

- Using Windows user login:

  Stop NX by logging out of Windows and then enter the user name and password of the new user.
- If a user authentication tool is installed, e.g. for authentication using RFID keys:

  Read the other user's RFID key to switch to that user account.

  The name of the active user is displayed in the title bar.

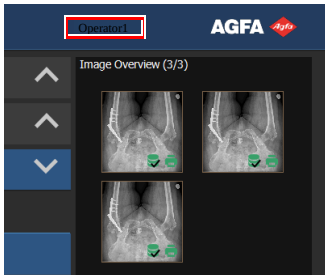


Figure 22: User name in the title bar

Getting started with NX

In this chapter, you will learn how to work with the NX workstation.

Note Depending on your hospital workflow, steps can be not applicable.

DR workflow

The MUSICA Acquisition Workstation can be used with a DR system.

For this situation, there is a dedicated workflow to perform exposures.

Procedure:

1. Add a DR exposure to the **Image Overview** pane.
   a) In the **Examination** window, click **Add Image**.

      The **Add Image** window appears.

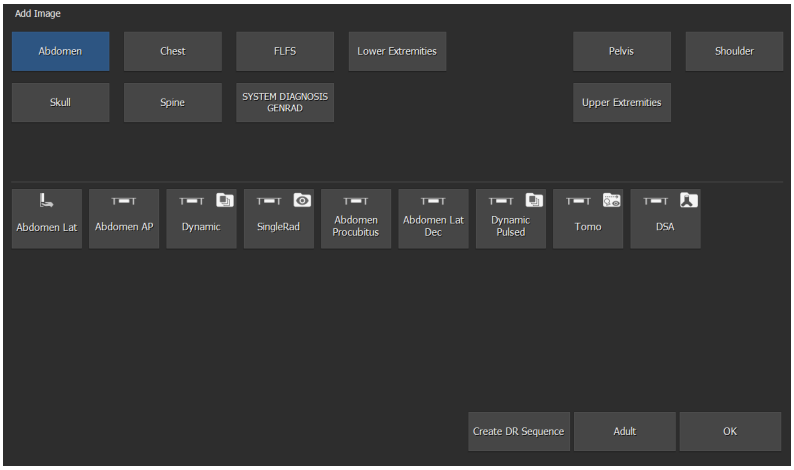


Figure 23: Add Image

   b) Specify the exam group and exam type by clicking on the buttons.
   c) Select an exam type that is configured as a DR exposure and click **OK**.

The empty image thumbnail is added to the **Image Overview** pane.

Figure 24: Thumbnail for a DR exposure

2. Select the thumbnail for the exposure in the **Image Overview** pane of the **Examination** window.

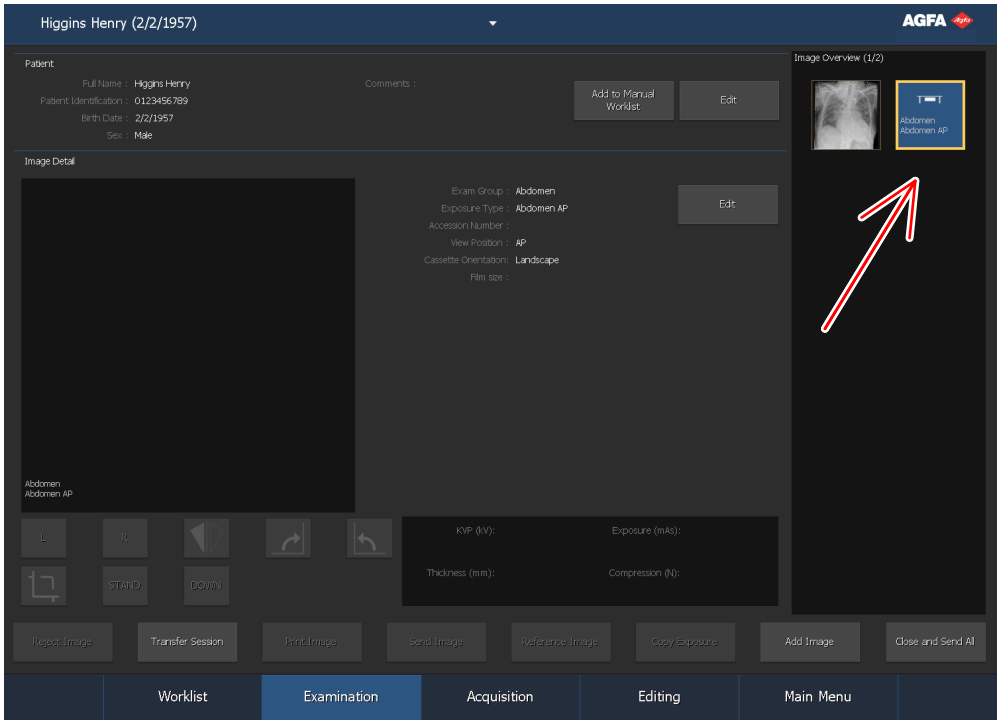


Figure 25: Examination Window with image thumbnail highlighted

The selected DR detector is activated.

The default X-Ray exposure parameters for the selected examination or exposure are sent to the modality.

Note that:

- If another thumbnail is selected before making the exposure, the newly selected DR detector is activated and the default X-Ray exposure parameters for that examination are sent to the modality, overruling the parameters sent previously.

If configured, the **Forced Operator Identification** window appears.

Figure 26: Forced Operator Identification window

If configured, the **Pause and Check** window appears.

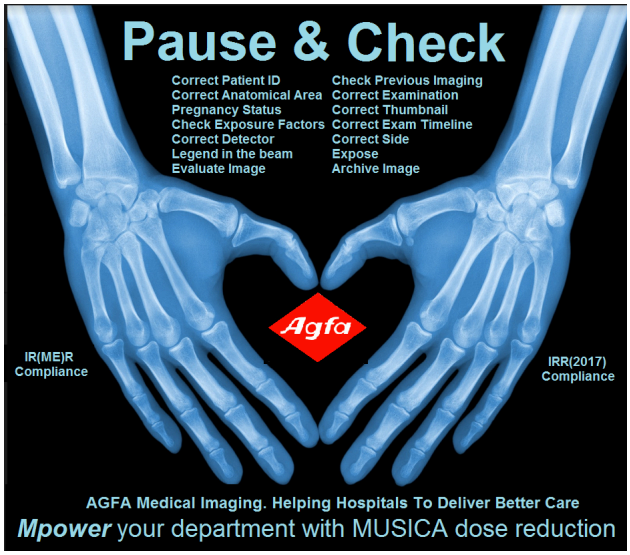


Figure 27: Pause and Check window (example)

3. In the **Forced Operator Identification** window, select a name from the list or enter your name and click OK.

   The images in the examination are linked to the operator that was identified when selecing the first thumbnail, either by forced operator identification, or by logging in.

   If an examination is performed by several operators, you can adapt the “Operator” field in the **Edit Image Detail** pane (if this is configured). Refer to “Changing specific image settings”.
4. In the **Pause and Check** window, perform the prescribed checks and close the window by clicking **OK**.
5. Check the exposure settings.
   a) Check if the exposure settings displayed on the X-Ray System console are suitable for the exposure.
   b) If other exposure values are required than those defined in the examination, use the X-Ray System console to overwrite the default defined exposure settings.

   Note The default X-Ray exposure parameters can be used as a guide but the user must check and correct them if needed. The default X-Ray exposure parameters are defined in the **NX Service and Configuration Tool**. Refer to the Key User Manual for more information.

   Note You cannot change the X-Ray exposure parameters on the MUSICA Acquisition Workstation software. This can only be done on the X-Ray System console.

   Refer to "Suggested Radiographic References and User Guides" for more information on determining default exposure parameters based on Target Exposure Index and desired image quality.
6. Position the patient and make the exposure.

   Caution: Do not select another thumbnail until the preview image is visible in the active thumbnail. The acquired image may be linked to the wrong exposure.

   Note The X-Ray exposure parameters before, during and after the exposure are displayed on the X-Ray System console.

   Note The X-Ray system position parameters before, during and after the exposure are displayed on the X-Ray System console or can be read from the X-Ray system controls.

   After the exposure is made, the Examination window looks as follows:

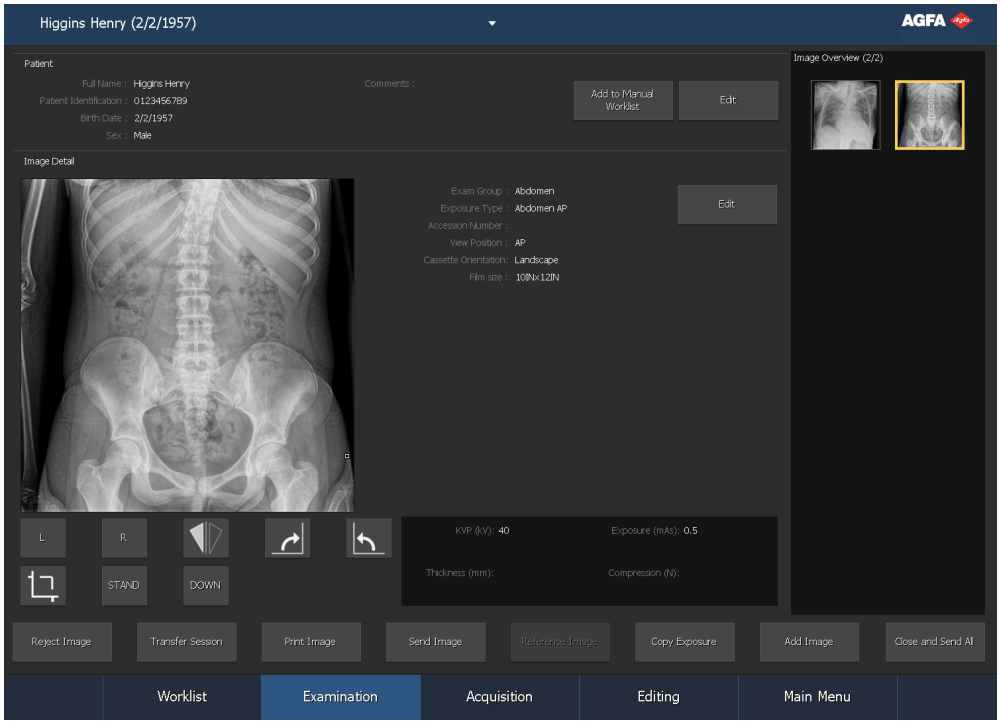


Figure 28: Examination window after making exposure on a DR Detector.

As a result:

- The image is acquired from the DR detector and displayed in the thumbnail.
- If configured, a patient positioning photo is obtained during the exposure, using the collimator camera. The image can be displayed in the **Acquisition** or **Editing** window.
- If tube collimation is applied, the image is automatically cropped at the collimation borders.
- If automatic image rotation is activated for the exposure type, the image is rotated to the required orientation. The system must be equipped with an automatic image rotation option (SmartRotate™)
- The actual X-Ray exposure parameters are received from the modality.

  The X-Ray exposure parameters (such as kV, mAs or DAP) are shown in the **Image Detail** pane of the **Examination** window. The list of shown parameters is to be configured.
- If configured, a pathology detection report is generated. The status of the pathology detection is visible on the image thumbnails and depending on the configuration, warning messages are displayed.

7. The parameters are stored with the image.

   Parameters can be sent with the image to the archive or printed with the image. They can also be sent out via MPPS.
8. Perform quality control.
9. If all images in the examination are OK, click **Close and Send All**.

   If pathology detection has been performed on the images and pathologies have been detected that have not yet been acknowledged by the operator, the system navigates to the pathology detection screens for each image, before closing the exam.

   If configured, the image is sent to the printer and/or PACS archive. The exam is placed in the **Closed Exams** pane.

Related information

Changing specific image settings on page 174

Suggested Radiographic References and User Guides on page 354

DR workflow with fluoroscopy for positioning

This workflow is available only on DR systems that support dynamic imaging.

Fluoroscopy can be used as a guide for positioning the patient before performing the planned exposure.

To use fluoroscopy for positioning:

1. Add a fluo group to the **Image Overview** pane.

   If a fluo group has already been added based on data from the RIS, this step can be skipped.

   a) In the **Examination** window, click **Add Image**.

   The **Add Image** window appears.

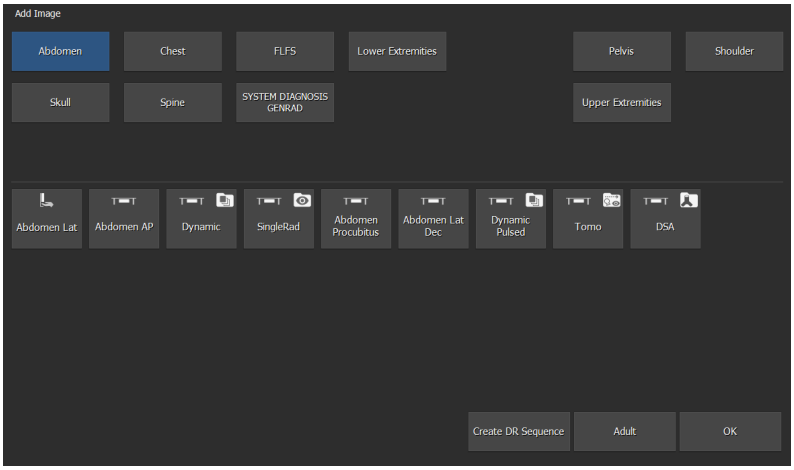


Figure 29: Add Image

   b) Specify the exam group and exam type by clicking on the buttons.
   c) Select an exam type that is configured as a fluo group and click **OK**.

   The fluo group thumbnail is added to the **Image Overview** pane.

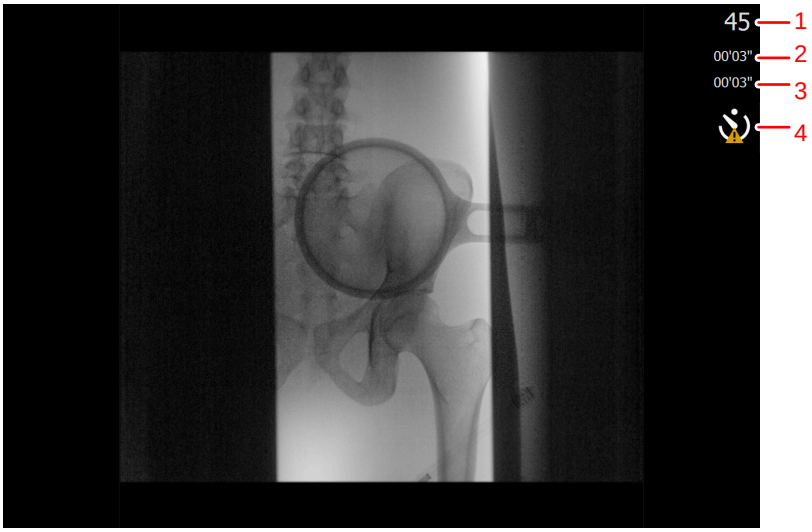
   A fluo group thumbnail is indicated with an icon in the top right corner of the thumbnail.

Figure 30: Thumbnail for a fluo group

2. Select the thumbnail for the fluo group in the **Image Overview** pane of the **Acquisition** window.
   The selected DR detector is activated. The default X-ray exposure parameters and X-ray system position for the selected examination are sent to the modality.
3. Move the X-ray system to the right position.
4. Check the exposure settings.

   The fluo group contains settings for fluoroscopy and for the static image.
5. Position the patient and verify the patient position using fluoroscopy.
   a) Press and hold down the fluoroscopy pedal to view a real-time fluoroscopy image in the **dynamic image screen**.

   Information about the dynamic image is displayed next to the image.



1. Current frame number
2. Duration up till now of the current fluoroscopy exposure
3. Total duration up till now of all fluoroscopy exposures in this examination
4. Warning sign for delay on real-time imaging

Figure 31: Dynamic image screen

A warning sign can be displayed if the real-time imaging is not guaranteed.

b) Release the fluoroscopy pedal to stop the fluoroscopy exposure.

The fluo sequence is stored and displayed as a fluo sequence thumbnail in the lower half of the **Image Overview** pane. The last image of the sequence is visible in the thumbnail.

A fluo sequence thumbnail is indicated with a transparant **Play** icon in the center.

Figure 32: Thumbnail of a fluo sequence

If required, multiple fluo sequences can be made.

6. After stopping a dynamic exposure, the **dynamic image screen** remains visible and the acquired sequence is played continuously.

Table 1: Buttons in the dynamic image screen after stopping the exposure

Button	Function
	Display the dynamic image in full screen mode for further editing.
	Return to the **Acquisition** window.

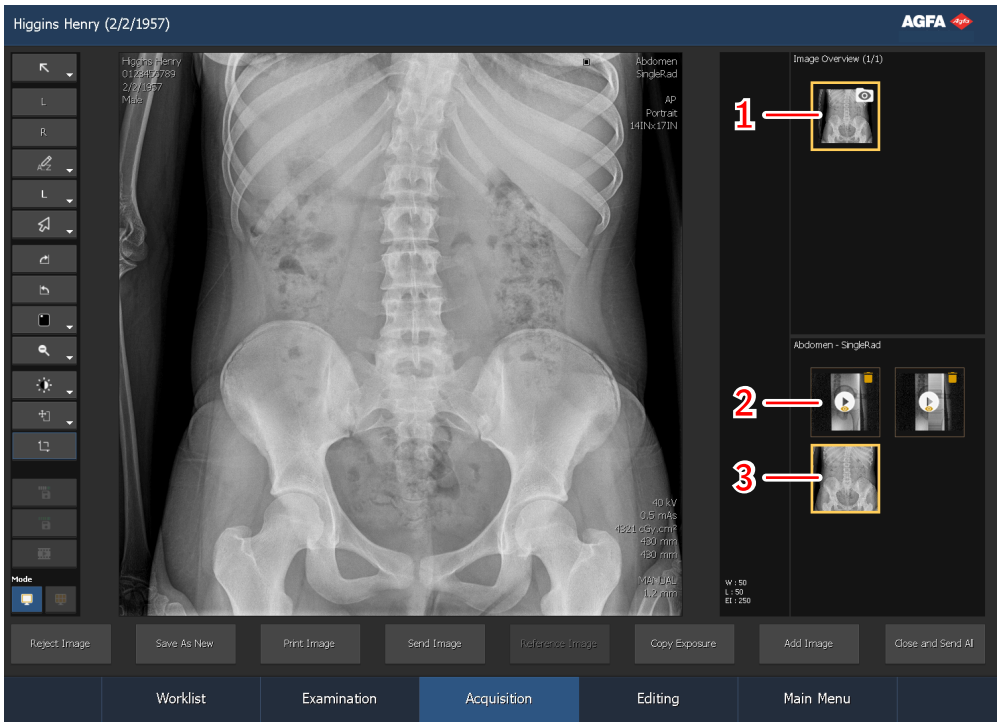
Depending on the configuration, this step is skipped and the screen returns to the **Acquisition** window right after stopping the exposure.

7. Make the exposure.

Use the exposure button or the radiography pedal to make the planned exposure.

The image is acquired from the DR detector and displayed in a new thumbnail in the lower half of the Image Overview pane.

After the exposure is made, the Acquisition window looks as follows:



1. Fluo group thumbnail
2. Fluo sequence thumbnail
3. Image thumbnail

Figure 33: Result of the exposure

After making the exposure, no more fluo sequences or static images can be added to the fluo group.

8. Perform quality control.
9. If all images in the examination are OK, click **Close and Send All**.

   If configured, the image is sent to the printer and/or PACS archive. The exam is placed in the **Closed Exams** pane.

   Fluo sequences are by default deleted after the examination is closed and not stored and not sent to a PACS archive. This is indicated by the yellow icon in the top right corner of the fluo sequence thumbnail. To store and archive a selected fluo sequence, click the **Store Sequence** button before clicking **Close and Send All**.

Figure 34: Icon indicating that the fluo sequence will not be saved

Related information

About Acquisition on page 191

DR workflow for dynamic images

This workflow is available only on DR systems that support dynamic imaging.

To acquire a set of fluo sequences, rapid sequences and static images for diagnosis:

1. Add a dynamic group to the **Image Overview** pane.

   If a dynamic group has already been added based on data from the RIS, this step can be skipped.

   a) In the **Examination** window, click **Add Image**.

   The **Add Image** window appears.

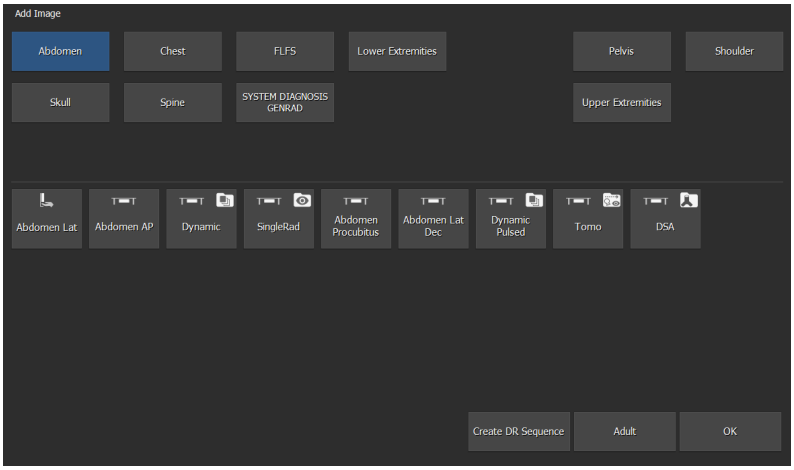


Figure 35: Add Image

   b) Specify the exam group and exam type by clicking on the buttons.

   c) Select an exam type that is configured as a dynamic group and click **OK**.

   The dynamic group thumbnail is added to the **Image Overview** pane.

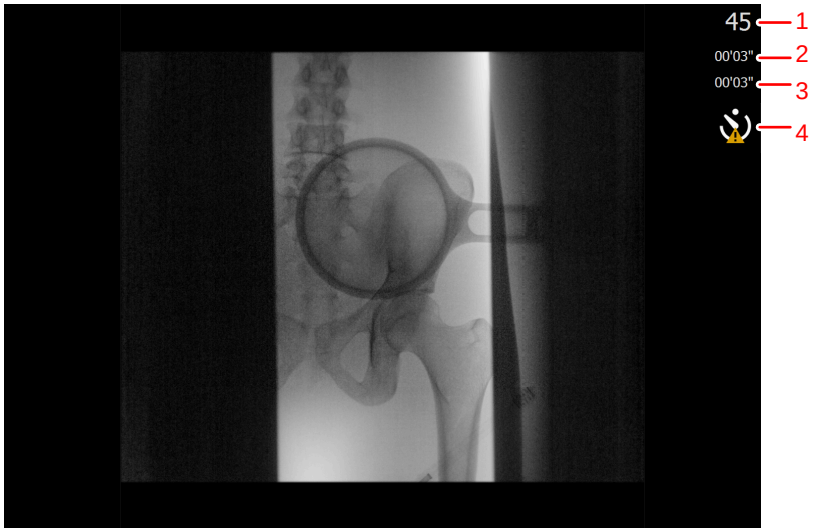
   A dynamic group thumbnail is indicated with an icon in the top right corner of the thumbnail.

Figure 36: Thumbnail for a dynamic group

2. Select the thumbnail for the dynamic group in the **Image Overview** pane of the **Acquisition** window.
   The selected DR detector is activated. The default X-ray exposure parameters and X-ray system position for the selected examination are sent to the modality.
3. Move the X-ray system to the right position.
4. Check the exposure settings.

   The dynamic group contains settings for fluoroscopy, for rapid sequence and for a static image.
5. Position the patient.
6. Acquire a set of fluo sequences, rapid sequences and static images.

   Information about the dynamic image is displayed next to the image.



1. Current frame number
2. Duration up till now of the current fluoroscopy or rapid sequence exposure
3. Total duration up till now of all fluoroscopy exposures in this examination
4. Warning sign for delay on real-time imaging

Figure 37: Dynamic image screen

A warning sign can be displayed if the real-time imaging is not guaranteed.

7. Acquire a fluo sequence.
   a) Press and hold down the fluoroscopy pedal to view a real-time fluoroscopy image in the **dynamic image screen**.
   b) Release the fluoroscopy pedal to stop the fluoroscopy sequence.

      The fluo sequence is stored and displayed as a fluo sequence thumbnail in the lower half of the **Image Overview** pane. The last image of the sequence is visible in the thumbnail

      A fluo sequence thumbnail is indicated with a transparant **Play** icon in the center.

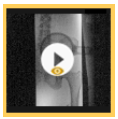


Figure 38: Thumbnail of a fluo sequence

8. Acquire a rapid sequence.
   a) Select the rapid sequence mode in the **software console**.

Figure 39: Rapid sequence mode

   b) Press and hold down the exposure button or the radiography pedal to make a rapid sequence exposure.
   c) Release the exposure button or the radiography pedal to stop the rapid sequence.

      The rapid sequence is stored and displayed as a rapid sequence thumbnail in the lower half of the **Image Overview** pane. The last image of the sequence is visible in the thumbnail.

      A rapid sequence thumbnail is indicated with a white **Play** icon in the center.

Figure 40: Thumbnail of a rapid sequence

Warning: In exceptional occasions the last image of a rapid sequence may not be of appropriate quality due to an uncompleted exposure. In this case the user can choose to keep or or disregard this image on the NX workstation and use the second last image instead.

9. After stopping a dynamic exposure, the **dynamic image screen** remains visible and the acquired sequence is played continuously.

Table 2: Buttons in the dynamic image screen after stopping the exposure

Button	Function
	Display the dynamic image in full screen mode for further editing.
	Return to the **Acquisition** window.

Depending on the configuration, this step is skipped and the screen returns to the **Acquisition** window right after stopping the dynamic exposure.

10. Acquire a static image.

a) Select the static image mode in the **software console**.

Figure 41: Static image mode

b) Press and hold down the exposure button or the radiography pedal to make an exposure to acquire a static image.

The image is stored and displayed as a thumbnail in the lower half of the **Image Overview** pane.

Figure 42: Thumbnail of a static image

If required, multiple static images can be made.

11. Perform quality control.

12. If all images in the examination are OK, click **Close and Send All**.

If configured, the static images and rapic sequences are sent to the printer and/or PACS archive. The exam is placed in the **Closed Exams** pane.

Depending on the configuration, fluo sequences may not be stored and not be sent to a PACS archive. This is indicated by the yellow icon in the top right corner of the fluo sequence thumb-

nail. To store and archive a selected fluo sequence, click the **Store Sequence** button before clicking **Close and Send All**.

Related information

About Acquisition on page 191
Viewing dynamic images on page 203
Viewing dose information of dynamic images on page 204
Editing dynamic images on page 205
Dynamic image player on page 197

DR workflow for digital tomosynthesis

This workflow is available only on DR systems that support digital tomosynthesis.

The result of a digital tomosynthesis examination is an acquisition sequence and a reconstruction sequence.

The acquisition sequence is a sequence of static images that is acquired during the tomographic movement of the X-ray tube around the center of the region of interest. The images of the acquisition sequence are not of diagnostic quality. The acquisition sequence is the input for calculating the reconstruction sequence.

The reconstruction sequence is a set of slices, representing the 3D volume of the examined body-part within a specified region of interest.

To perform a digital tomosynthesis examination:

1. Add a digital tomosynthesis group to the **Image Overview** pane.

   If a digital tomosynthesis group has already been added based on data from the RIS, this step can be skipped.

   a) In the **Examination** window, click **Add Image**.

   The **Add Image** window appears.

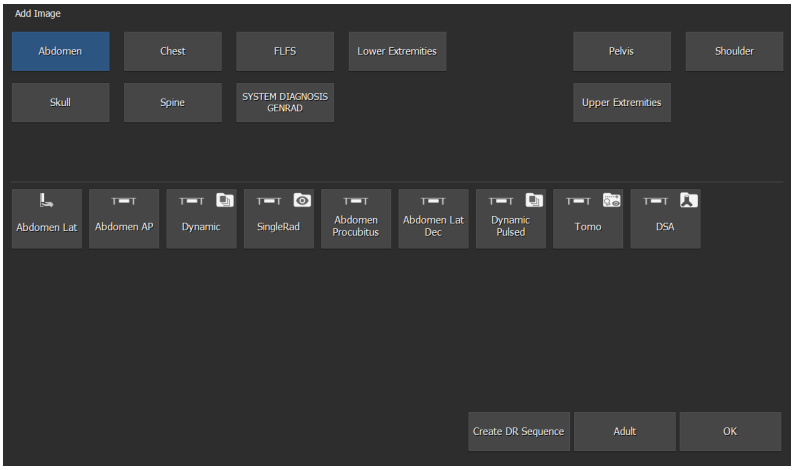


Figure 43: Add Image

   b) Specify the exam group and exam type by clicking on the buttons.
   c) Select an exam type that is configured as a digital tomosynthesis group and click **OK**.

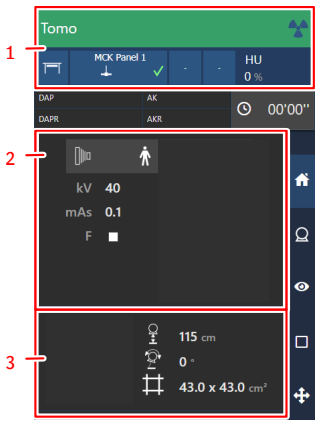
   The digital tomosynthesis group thumbnail is added to the **Image Overview** pane.

   A digital tomosynthesis group thumbnail is indicated with an icon in the top right corner of the thumbnail.

Figure 44: Thumbnail for a digital tomosynthesis group

2. Select the thumbnail for the digital tomosynthesis group in the **Image Overview** pane of the **Acquisition** window.

   The selected DR detector is activated. The default X-ray exposure parameters and X-ray system position for the selected examination are sent to the modality. The software console displays these settings in the examination overview.



   1. X-ray modality settings
   2. Generator settings for the static image
   3. Automatic position

   Figure 45: Examination overview

   a) Check the X-ray modality settings.

   Figure 46: X-ray modality controls on the software console

   b) Check the exposure settings.

   Figure 47: Generator controls for static images

   a) Check the digital tomosynthesis settings.

   The digital tomosynthesis group contains X-ray modality settings to control the X-ray system movement, the X-ray exposure parameters and the image processing for the reconstruction.

   Figure 48: Digital tomosynthesis controls

3. Move the X-ray system to the right position.

   a) Check if a correct automatic position is selected.

   Figure 49: Positioning controls on the software console

   b) Move the X-ray system to the selected automatic position.
   The actual and target position parameters are displayed on the software console. When the target position is reached, the movement stops.

c) Adjust the position using the position controls.

4. Position the patient.

   The patient position can be verified using the collimator camera.

   Warning: Warn the patient that the X-ray tube will perform a sweeping movement during the examination. Give instructions to avoid that the patient looses balance and to avoid injuries in patient hands or fingers.

5. On the collimator, switch on the light localizer. Apply collimation.
6. Acquire a static image.

   If a reference image is required, acquire a static image. The images of the acquisition sequence should not be used to replace a static image.

   Press and hold down the exposure button or the radiography pedal to make an exposure to acquire a static image.

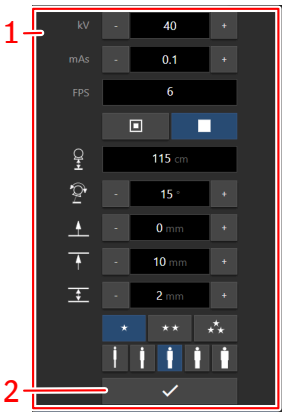
   The image is stored and displayed as a thumbnail in the lower half of the **Image Overview** pane.

Figure 50: Thumbnail of a static image

   If required, multiple static images can be made.

   Depending on the configuration, the acquisition of static images during a DR workflow for digital tomosynthesis may not be possible.

7. In the digital tomosynthesis screen of the software console, click the button to start the digital tomosynthesis workflow.



1. Digital tomosynthesis screen of the software console
2. Button to start the digital tomosynthesis workflow

Figure 51: Button to start the digital tomosynthesis workflow

   If the X-ray system position is not suitable to perform the examination, the button is disabled. Try adjusting the X-ray system to enable the button.

8. Position the X-ray tube vertically with respect to the table.

   If the X-ray tube tilting angle is not at 0°, use the automatic position controls to change the X-ray tube tilting angle to the required position.

9. Press and hold down the exposure button in prep mode.
   The X-ray tube is moved to the start position of the digital tomosynthesis exposure.

10. Press and hold down the exposure button to make a digital tomosynthesis acquisition sequence.

    Hold the exposure button pressed until three beeps are heard to indicate that the examination has finished.

    Together with the auditory signal, messages are displayed on the software console to indicate that the examination has finished.

    When the exposure button is released before the movement has finished, the exposure sequence is aborted and the reconstruction may fail.

    The acquisition sequence is stored and displayed as an acquisition sequence thumbnail in the lower half of the **Image Overview** pane.

    The last image of the sequence is visible in the thumbnail. An acquisition sequence thumbnail is indicated with a white **Play** icon in the center.

Figure 52: Thumbnail of an acquisition sequence for digital tomosynthesis

The image processing to create the reconstruction sequence is started automatically and may take up to a minute.

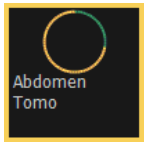


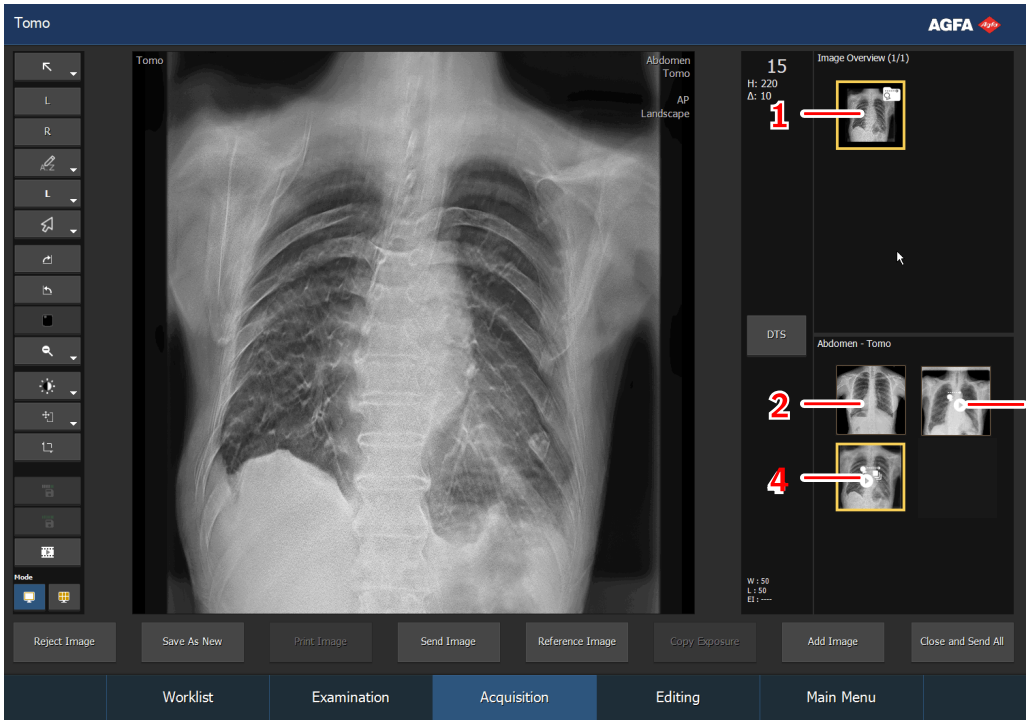
Figure 53: Progress indicator for the image processing to create the reconstruction sequence

The reconstruction sequence is displayed as a reconstruction sequence thumbnail in the lower half of the Image Overview pane.

The middle slice of the sequence is visible in the thumbnail. An acquisition sequence thumbnail is indicated with a white **Play** icon in the center.

Figure 54: Thumbnail of the reconstruction sequence

After the reconstruction sequence becomes available, the Acquisition window looks as follows:



1. Digital tomosynthesis group thumbnail
2. Image thumbnail (if a reference image is acquired)
3. Acquisition sequence
4. Reconstruction sequence

Figure 55: Result of the exposure

After making the digital tomosynthesis exposure, no more static images or digital tomosynthesis sequences can be added to the digital tomosynthesis group.

11. Perform quality control.

    The reconstruction sequence can be viewed in the Acquisition window as a dynamic image. The slices of the reconstruction sequence are the frames of the dynamic image. The first frame is the lowest slice (closest to the tabletop).

    In the dynamic image player, a dynamic image is played that is composed of all slices.

    In the mosaic viewer all slices are displayed as separate images.

12. If all images in the examination are OK, click **Close and Send All**.

    If configured, the static images and reconstruction sequence are sent to the printer and/or PACS archive. The exam is placed in the **Closed Exams** pane.

    Acquisition sequences are not sent to a PACS archive. To archive a selected acquisition sequence, click the **Store Sequence** button before clicking **Close and Send All**.

Related information

DR workflow with fluoroscopy for positioning on page 75
Dynamic image player on page 197
Adjusting the reconstruction settings for digital tomosynthesis on page 215

DR workflow for digital subtraction angiography (DSA)

This workflow is available only on DR systems that support digital subtraction angiography (DSA).

The result of a DSA examination is a DSA sequence. Also roadmapping sequences, fluo sequences and static images can be acquired during a DSA examination.

The DSA sequence consists of a rapid sequence exposure. Right after the start of the exposure, a first set of frames is used to generate a mask image. Then a contrast medium is injected. Subsequent frames from the same exposure are displayed after subtraction of the mask image. Blood vessels that contain the contrast medium, become clearly visible without the interference of bones or dens soft tissue in the environment.

To perform a DSA examination:

1. Add a DSA group to the **Image Overview** pane.

   If a DSA group has already been added based on data from the RIS, this step can be skipped.

   a) In the **Examination** window, click **Add Image**.

   The **Add Image** window appears.

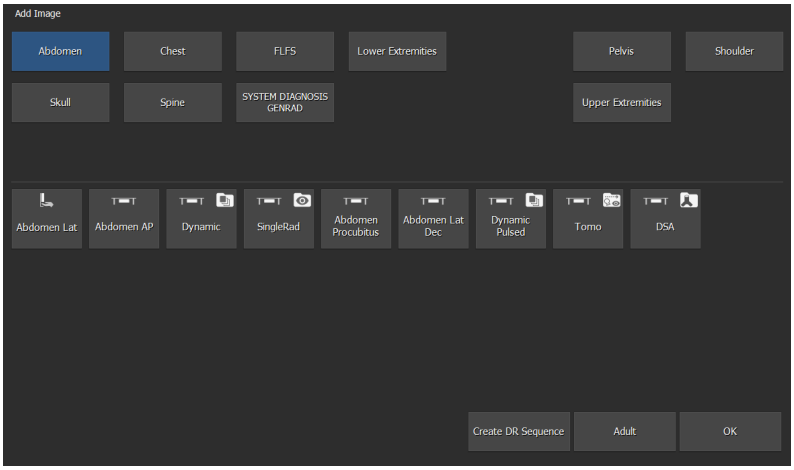


Figure 56: Add Image

   b) Specify the exam group and exam type by clicking on the buttons.
   c) Select an exam type that is configured as a DSA group and click **OK**.

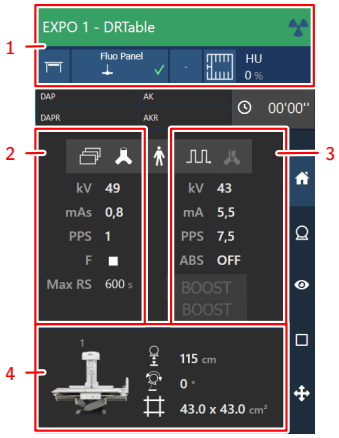
   The DSA group thumbnail is added to the **Image Overview** pane.

   A DSA group thumbnail is indicated with an icon in the top right corner of the thumbnail.

Figure 57: Thumbnail for a DSA group

2. Select the thumbnail for the DSA group in the **Image Overview** pane of the **Acquisition** window.

   The selected DR detector is activated. The default X-ray exposure parameters and X-ray system position for the selected examination are sent to the modality. The software console displays these settings in the examination overview.



1. X-ray modality settings
2. Generator settings for DSA image acquisition
3. Generator settings for fluoroscopy or for roadmapping image acquistion (roadmapping is not part of this workflow)
4. Automatic position

Figure 58: Examination overview

a) Check the X-ray modality settings.

Figure 59: X-ray modality controls on the software console

b) Check the exposure settings.

The DSA acquisition group contains settings for fluoroscopy, for static images and for DSA exposures (based on rapid sequence).

Figure 60: Generator controls for static images and for DSA

Figure 61: Generator controls for fluoroscopy and for roadmapping

Warning: Higher pulse rates (PPS) for DSA lead to shorter examination times until the heat limit is reached. Lower frame rates are recommended where applicable, especially in combination with thicker or more absorbing body parts

3. Move the X-ray system to the right position.

a) Check if a correct automatic position is selected.

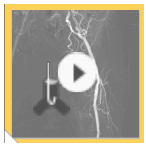
Figure 62: Positioning controls on the software console

b) Move the X-ray system to the selected automatic position.
The actual and target position parameters are displayed on the software console. When the target position is reached, the movement stops.

c) Adjust the position using the position controls.

4. Position the patient.
   Use patient fixations available to avoid patient movement during interventional procedures.
   The patient position can be verified using the collimator camera.
5. On the collimator, switch on the light localizer. Apply collimation.
6. Acquire a set of DSA sequences, roadmapping examinations, fluo sequences and static images.
   Any number of DSA sequences, roadmapping examinations, fluo sequences or static images can be acquired, in any order.

Table 3: Supported workflows

Image type	Settings	Step 1: activate	Step 2: start exposure	Result
Roadmapping		 After the final exposure, finish the workflow using the same button: 	fluoroscopy pedal	Roadmapping mask:  One or more roadmapping sequences 
DSA			exposure button or radiography pedal	
Static image			exposure button or radiography pedal	
Fluoroscopy		not needed	fluoroscopy pedal	

The workflow for acquiring a DSA sequence is explained in the next steps. The other workflows are explained in other sections in this manual.

7. Select the DSA mode in the software console.

Figure 63: DSA mode

Warning: The DSA image processing relies on absence of movement. Do not change the position of the table, X-ray tube or collimator during the DSA examination.

8. Press and hold down the radiography pedal or the exposure button.

   A first set of frames is used to compose the mask image. The subsequent frames are displayed with the mask image subtracted. The syringe icon indicates that the mask image has been created.

Figure 64: Icon indicating that injection of the contrast medium can start

9. Start injecting the contrast medium when the syringe icon is shown.

   Blood vessels that contain the contrast medium, become clearly visible.

10. Release the radiography pedal or the exposure button to stop the exposure.

    The DSA sequence is stored and displayed as a DSA sequence thumbnail in the lower half of the **Image Overview** pane. The last image of the sequence is visible in the thumbnail

    A DSA sequence thumbnail is indicated with a transparant **Play** icon in the center.

Figure 65: Thumbnail of a DSA sequence

11. Perform quality control.

    DSA sequences can be post-processed to change the mask image, to apply pixel shift to correct for movement in the subtracted image, or to apply landmarking by making anatomical background as visible as desired.

    By modifying the MUSICA settings of the image, the presentation of the DSA sequences can be fine-tuned.

12. If all images in the examination are OK, click **Close and Send All**.

    If configured, the static images and DSA sequences are sent to the printer and/or PACS archive. The exam is placed in the **Closed Exams** pane.

    Fluo sequences are not sent to a PACS archive. To archive a selected acquisition sequence, click the **Store Sequence** button before clicking **Close and Send All**.

Related information

Editing a DSA sequence on page 212
Creating a minimum/maximum opacity derived image on page 214
Interactively adjusting the MUSICA2/MUSICA3 image processing parameters on page 294

DR workflow for DSA roadmapping

This workflow is available only on DR systems that support digital subtraction angiography roadmapping.

The roadmapping examination is performed as part of a DSA examination. The result of a roadmapping examination is a roadmapping sequence. Also DSA sequences, fluo sequences and static images can be acquired in the same session, before or after the roadmapping examination.

First a roadmapping examination produces the roadmapping mask by acquiring a fluo sequence during injection of a contrast medium. The roadmapping mask is displayed as a subtracted image in which the blood vessels are filled with contrast medium. If the maximum opacity functionality is enabled, the blood vessels are visualized with maximum opacity.

The last image of this first sequence is used as a mask to subsequent fluoroscopy exposures during the same roadmapping session. Blood vessels become clearly visible (as a roadmap), as well as catheters or guide wires that are moved through the vessels.

Warning: The user has to finish the roadmapping workflow completely before performing any other actions. This means that e.g. checking or selecting previous (reference) images should be done upfront, prior to starting a roadmapping workflow. Otherwise these actions may cause the roadmapping workflow to be closed and the whole procedure has to be restarted.

To perform a roadmapping examination:

1. Add a DSA group to the **Image Overview** pane.

   If a DSA group has already been added based on data from the RIS, this step can be skipped.

   a) In the **Examination** window, click **Add Image**.

   The **Add Image** window appears.

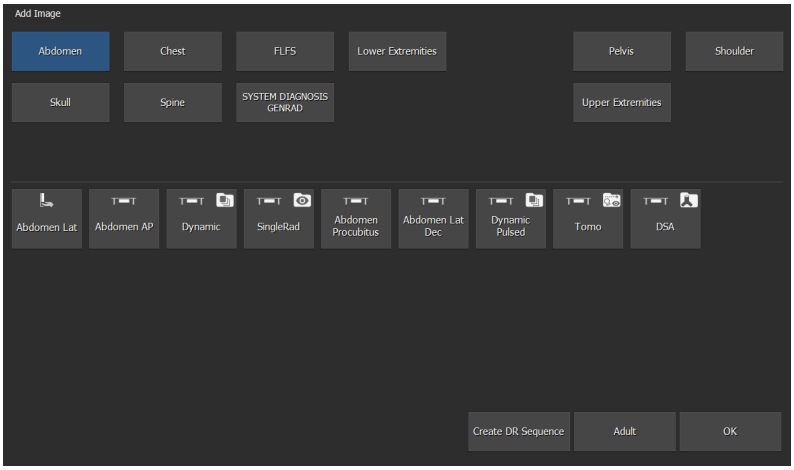


Figure 66: Add Image

   b) Specify the exam group and exam type by clicking on the buttons.
   c) Select an exam type that is configured as a DSA group and click **OK**.

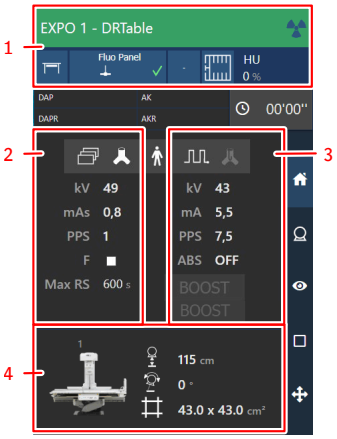
   The DSA group thumbnail is added to the **Image Overview** pane.

   A DSA group thumbnail is indicated with an icon in the top right corner of the thumbnail.

Figure 67: Thumbnail for a DSA group

2. Select the thumbnail for the DSA group in the **Image Overview** pane of the **Acquisition** window.

   The selected DR detector is activated. The default X-ray exposure parameters and X-ray system position for the selected examination are sent to the modality. The software console displays these settings in the examination overview.



1. X-ray modality settings
2. Generator settings for DSA image acquisition (DSA is not part of this workflow)
3. Generator settings for fluoroscopy or for roadmapping image acquistion
4. Automatic position

Figure 68: Examination overview

a) Check the X-ray modality settings.

Figure 69: X-ray modality controls on the software console

b) Check the exposure settings.

   The DSA acquisition group contains settings for fluoroscopy, for static images, for DSA exposures (based on rapid sequence) and for roadmapping (based on fluoroscopy).

Figure 70: Generator controls for static images and for DSA

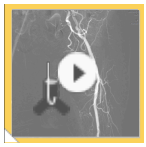
Figure 71: Generator controls for fluoroscopy and for roadmapping

3. Move the X-ray system to the right position.
   a) Check if a correct automatic position is selected.

Figure 72: Positioning controls on the software console

   b) Move the X-ray system to the selected automatic position.
   The actual and target position parameters are displayed on the software console. When the target position is reached, the movement stops.
   c) Adjust the position using the position controls.
4. Position the patient.
   Use patient fixations available to avoid patient movement during interventional procedures.
   The patient position can be verified using the collimator camera.
5. On the collimator, switch on the light localizer. Apply collimation.
6. Acquire a set of roadmapping examinations, DSA sequences, fluo sequences and static images.
   Any number of roadmapping examinations, DSA sequences, fluo sequences or static images can be acquired, in any order.

Table 4: Supported workflows

Image type	Settings	Step 1: activate	Step 2: start exposure	Result
Roadmapping		 After the final exposure, finish the workflow using the same button: 	fluoroscopy pedal	Roadmapping mask:  One or more roadmapping sequences 
DSA			exposure button or radiography pedal	
Static image			exposure button or radiography pedal	
Fluoroscopy		not needed	fluoroscopy pedal	

The workflow for performing a roadmapping examination is explained in the next steps. The other workflows are explained in other sections in this manual.

7. In the fluoroscopy screen of the software console, click the button to start the roadmapping workflow.

Figure 73: Roadmapping workflow is started

Warning: The roadmapping image processing relies on absence of movement. Do not change the position of the table, X-ray tube or collimator during the roadmapping examination.

8. Press and hold down the fluoroscopy pedal to start the fluo sequence for generating the roadmapping mask.

A first set of frames is used to compose a mask image. The subsequent frames are displayed subtracted. The syringe icon indicates that the contrast medium can be injected to create the roadmapping mask.

Figure 74: Icon indicating that injection of the contrast medium can start

9. Start injecting the contrast medium when the syringe icon is shown.

Warning: Roadmapping does not work with negative contrast media.

The blood vessels gradually fill with contrast medium and become visible on the screen. If the option **max opacity** is enabled, the blood vessels stay visible, even if the contrast medium has moved on.

10. Release the fluoroscopy pedal when the blood vessels are sufficiently filled with contrast medium.

The roadmapping mask is stored and displayed as a thumbnail in the lower half of the **Image Overview** pane.

Figure 75: Thumbnail of the roadmapping mask

11. Press and hold down the fluoroscopy pedal to start a roadmapping exposure.

The previously acquired roadmapping mask is subtracted from the live fluo sequence to visualize the blood vessels, as well as catheters or guide wires that are moved through the vessels.

12. Release the fluoroscopy pedal to stop the exposure.

The roadmapping sequence is stored and displayed as a roadmapping sequence thumbnail in the lower half of the **Image Overview** pane. The last image of the sequence is visible in the thumbnail.

A roadmapping sequence thumbnail is indicated with a transparant **Play** icon in the center.

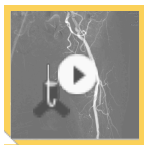


Figure 76: Thumbnail of the roadmapping sequence

13. Make as many roadmapping exposures as desired, using the same roadmapping mask, by pressing the fluoroscopy pedal.
14. Click the roadmapping button in the software console to finish the roadmapping workflow.

Figure 77: Roadmapping workflow is ended

The current roadmapping mask cannot be used any more to perform another roadmapping examination.

15. To perform another roadmapping examination, using a new mask, start another roadmapping workflow in the software console.

    If multiple roadmapping workflows are performed, a filled or hollow triangle at the bottom of the thumbnails provides a visual link between roadmapping sequences that have been acquired using the same mask.
16. Perform quality control.

    Roadmapping sequences can be post-processed to apply landmarking and to adjust brightness and contrast.
17. If all images in the examination are OK, click **Close and Send All**.

    If configured, the static images, roadmapping sequences and DSA sequences are sent to the printer and/or PACS archive. The exam is placed in the **Closed Exams** pane.

    Fluo sequences are not sent to a PACS archive. To archive a selected acquisition sequence, click the **Store Sequence** button before clicking **Close and Send All**.

Automated DR full screen sequence

A predefined sequence of DR exposures can be performed without having to return to the NX Workstation for each new exposure. During the automated workflow, the acquired images and the DR detector status are displayed full screen.

To start an automated DR full screen sequence:

1. In the **Examination** window, click **Add Image**.

   The **Add Image** window appears.

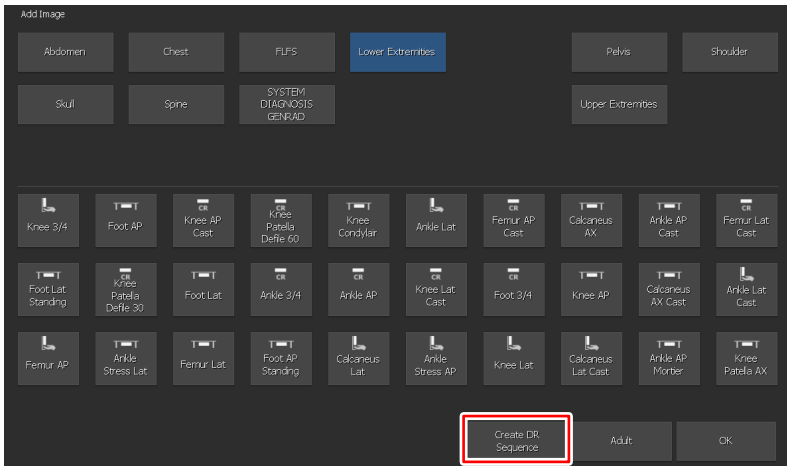


Figure 78: Create DR Sequence button

2. In the **Add Image** window, click the **Create DR Sequence** button.

   Note A predefined automated DR full screen sequence can be set up using the NX Service and Configuration Tool. Refer to the Key user manual for more information.

3. Add the exposures in the required order.

   Images in a sequence are indicated with a small triangular mark in the lower left hand corner of the thumbnail. If an examination contains more than one sequence, the mark is alternating white and black to distinguish the sequences.

4. Select the thumbnail for the first exposure in the Image Overview pane and follow the normal DR workflow.

   If configured, patient positioning guidance information is displayed.

   After acquiring each image, the image is displayed in full screen mode and the next thumbnail is selected automatically. The color of the DR detector symbol indicates the status of the DR detector.

Figure 79: Examination window in full screen mode

5. After acquiring the last image, click the close button to leave full screen mode.

Figure 80: Close button

- DR detector status on page 98
- Rejecting an image during an automated DR full screen sequence on page 99

Related information

Patient positioning pre-exposure quality assurance (SmartPositioning QA™) on page 170

DR detector status

Image	Description
	Grey: The image is planned and the DR detector is in sleep mode. On a thumbnail that is not selected, the status indication is always grey.
	Green: The DR detector is ready to acquire the exposure on the selected acquisition system. Green flashing: The exposure has been performed and the acquisition is ongoing.
	Orange: DR detector is initializing for exposure. The exposure is ongoing.
	Red: The DR detector is out of order. Red flashing: The selected acquisition system is starting up.

Rejecting an image during an automated DR full screen sequence

The acquired image is displayed in full screen mode.

To reject this image:

1. Click the reject button.

Figure 81: Reject button

   The **Reject Reason** dialog box opens.
2. Select a reason to reject the image.

The acquired image is rejected and a new thumbnail is added to the sequence. The new thumbnail is selected for repeating the exposure.

Related information

Rejecting an image on page 178

DR full leg full spine

DR full leg full spine examinations with automated workflow

The automated workflows use a full leg full spine grid, positioned between the patient and the detector to automatically stitch the partial images.

Automated workflows are described in detail in the user documentation that is supplied with the X-ray modality.

- DR Full Leg Full Spine User Manual (document 0179) describes the workflow on an X-ray modality with automatic movement using the DR full leg full spine stand or the full leg full spine horizontal overlay.
- DR 800 User Manual (document 0392) describes the workflow on the DR 800 X-ray system using the full leg full spine overlay.
- DR Full Leg Full Spine Mobile System User Manual (document 0166) describes the workflow on a mobile X-ray system using the mobile full leg full spine detector slot.
- Full Leg Full Spine DR Retrofit System User Manual (document 0326) describes the workflow on a generic X-ray modality using the full leg full spine wall stand and external collimator.

Procedure:

1. Add the Full Leg Full Spine (DR FLFS) exposure set to the exam.
2. Select the thumbnail for the exam and click Start FLFS.
3. Perform the guided workflow to acquire a series of adjoining images and repositioning the X-ray system between the exposures.
4. After the last image is received on the Workstation, an extra image is created in the exam, containing the stitched FLFS image.
5. If there is a problem with the stitched image, refer to section “Manually adjusting a DR Full Leg Full Spine image”. Here you can read how the stitching process can be fine-tuned.

If DAP values are received with the partial images, the DAP value that is stored with the stitched FLFS image equals the sum of the DAP values of the partial images.

Related information

Safety precautions concerning Full Leg Full Spine functionality on page 53
Manually adjusting a DR Full Leg Full Spine image on page 104

DR full leg full spine examinations with anatomic stitching

The anatomic stitching workflow automatically aligns the partial images by interpreting the anatomic structures in the images to create a full leg full spine image.

The use of a stand or a ruler or other visual means is recommended to assist in correctly aligning subsequent partial images.

Procedure:

1. Add the Full Leg Full Spine (DR FLFS) exposure set to the exam.
2. Select the thumbnail for the exam and click Start FLFS.
3. Create a series of adjoining images that span the examined anatomy, by rotating the X-ray tube. Do not change the vertical position of the X-ray tube.

   For optimal performance of the automatic alignment, partial images should have an overlap region of 7 cm. To limit the X-ray dose received by the patient, do not make the overlap region larger than necessary.

   The partial images should be acquired with a similar transversal collimation.
4. After the last image is received on the Workstation, an extra image is created in the exam, containing the stitched FLFS image.
5. If there is a problem with the stitched image, refer to section “Manually adjusting a DR Full Leg Full Spine image”. Here you can read how the stitching process can be fine-tuned.

If DAP values are received with the partial images, the DAP value that is stored with the stitched FLFS image equals the sum of the DAP values of the partial images.

Related information

Safety precautions concerning Full Leg Full Spine functionality on page 53
Manually adjusting a DR Full Leg Full Spine image on page 104

DR full leg full spine examinations with manual stitching

The manual stitching workflow allows the user to create a full leg full spine image by visually aligning partial images.

Procedure:

1. Start an examination and acquire the partial images.

   A full leg full spine image can be created from maximum four static images, acquired with the same type of DR detector.

   Create a series of adjoining images that span the examined anatomy, by rotating the X-ray tube. Do not change the vertical position of the X-ray tube.

   Partial images should have an overlap region of 7 cm to visually align the images. To limit the X-ray dose received by the patient, do not make the overlap region larger than necessary.

   The partial images should be acquired with a similar transversal collimation.
2. Check the orientation of the partial images.

   Use the editing tools to rotate the images into a correct orientation for stitching.
3. Select the partial images in the **Image Overview** pane.

   A selection of more than one image can be made in two ways.

   - Click the image thumbnails one by one, while holding the CTRL key.
   - Check the checkbox in the header of the **Image Overview** pane and then click the image thumbnails one by one.
4. Right click on one of the images.
   A context menu is displayed containing the actions that can be performed on the selected images.
5. Select **Stitch Images**.

   The **Stitch Images** dialog opens. In this dialog, you can see all the selected FLFS images.

   When partial images have varying exposure parameters or image quality, a selected partial image may be invisible in the Stitch Images dialog. To make sure that all partial images are displayed in the Stitch Images dialog, click the Crop/uncrop button to turn the cropping off and apply cropping on the stitched image.

   Figure 82: Crop/uncrop button
6. To manually align the partial images, refer to section “Manually adjusting a DR Full Leg Full Spine image”.
7. Click **Accept**.

   The stitched image is saved as a new image in the exam.

No DAP value is stored with the stitched FLFS image.

Related information

Safety precautions concerning Full Leg Full Spine functionality on page 53
Manually adjusting a DR Full Leg Full Spine image on page 104

Manually adjusting a DR Full Leg Full Spine image

The availability of these functions depends on the workflow that is applied.

Stitching a set of partial images

1. In NX, go to the **Examination** window.
2. In the Image Overview pane, select the thumbnail of one of the partial images.
3. Click **Stitch Images**.

   The Stitching pane is displayed.

   Stitching is applied based on grid markers in the stitching grid and a correction is applied based on the alignment of the anatomical information in the image.

   The area of the image where two partial images are stitched together is indicated by the stitching tools displayed on the right side of the image. In this area, the two partial images slightly overlap. If the anatomical structures in the overlapping area are not aligned, stitching can be adjusted manually.

Rotating all partial images

Rotate all partial images

- Click the following button to rotate 90° clockwise:

  Figure 83: Rotate clockwise
- Click the following button to rotate 90° counterclockwise:

  Figure 84: Rotate counterclockwise

Aligning the partial images based on their projection on the stitching grid

Click **Grid**.

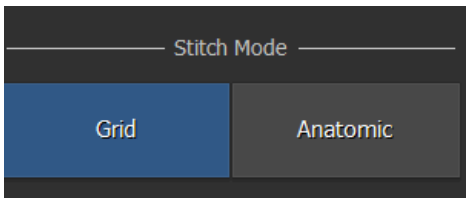


Figure 85: Stitch mode: grid

The anatomical structure in the partial images may not be aligned, due to patient movement during the examination.

The values of the horizontal and vertical correction are set to zero. Next to the stitching areas the following label is displayed.

Figure 86: Stitching tools: align partial images

Aligning the partial images based on the analysis of the anatomical information in the image

Click **Anatomic**.

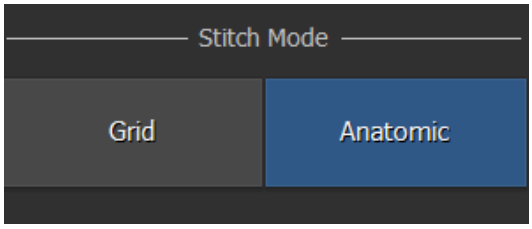


Figure 87: Stitch mode: anatomic

The anatomical structures in the overlapping areas are aligned by automatically shifting the partial images in vertical and horizontal direction.

The new alignment is applied to each stitching area. Next to the stitching areas this label is displayed, as well as the vertical and horizontal relative position of the partial images.

Figure 88: Stitching tools: align partial images (via anatomical information)

Swapping position of two partial images

Click the **Swapping** button.

Figure 89: Swapping button

Manually aligning two partial images

1. Click the **Alignment** button.

Figure 90: Alignment button

A detail of the overlapping area is displayed.

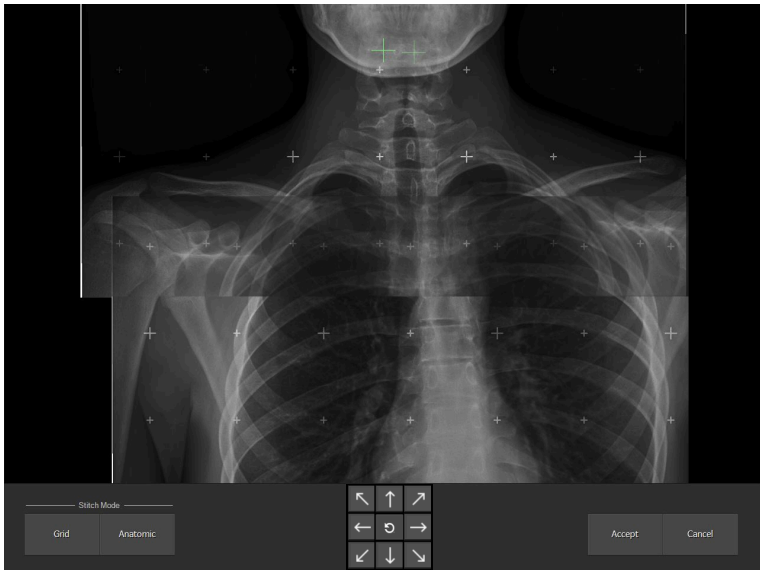


Figure 91: Detail overlapping area

2. Align the two partial images:

Table 5: Manual alignment

Adjusting the position of the lower image	Right click-hold the image and drag the mouse arrow to any direction. Press the SHIFT or CTRL button while dragging the mouse arrow to adjust the vertical or horizontal alignment only. Use the arrow keys on the keyboard. Click the arrow buttons on the screen.
Roaming over the images	Left click-hold the image and drag the mouse arrow to any direction.
Zooming in/out on the images	Use the scroll wheel on the mouse.
Restoring the original alignment	Click the **Revert** button.  **Figure 92: Revert button**

The relative position of the partial images, compared to their initial relative position, is illustrated by two crosshairs displayed in the image, each of which is locked to the position of one of the partial images.

3. If the anatomical structures in the partial images are aligned, click **Accept** to confirm.

Next to the stitching areas this label is displayed, as well as the vertical and horizontal relative position of the partial images.

Figure 93: Stitching tools: manual alignment

Turning the black borders or cropping on or off

Click the following icon:

Figure 94: Crop/uncrop button

Saving the stitched image

Click Accept.

The DR Full Leg Full Spine image is available in the examination. Depending on the configuration settings, the stitching parameters are added to the image as a text annotation.

Note After saving, the DR Full Leg Full Spine image cannot be adjusted. The same set of partial images can be used to create another DR Full Leg Full Spine image.

CR workflow

1. Identifying the cassettes on page 109
2. Digitizing the images on page 111

Identifying the cassettes

NX can be configured in such a way that different workflows are followed when identifying cassettes. You can configure NX to use one of these workflows in the NX Service and Configuration Tool.

- Identify a cassette using the ID Tablet. In short, the workflow goes as follows: selecting the thumbnail, inserting the cassette in the tablet and then clicking **ID**.
- Identify automatically using the ID Tablet ('Auto ID'). In short, the workflow goes as follows: selecting the thumbnail and inserting the cassette in the tablet. The ID label will automatically be added to the image and the thumbnail. Refer to the Key user manual, Device Configuration, section ID Tablets.
- Identify in the Digitizer ('Fast ID'). In short, the workflow goes as follows: selecting the thumbnail, inserting the cassette in the Digitizer and then clicking **ID**. Refer to the Key user manual, Device Configuration, section Digitizers.

Procedure:

1. Insert a cassette in the ID Tablet.
2. In the **Examination** window, select the right thumbnail in the Image Overview.

   In the example below, there is only one thumbnail which is automatically selected. If there are more than one thumbnails, the selected one is not necessarily the one that will be performed first; you can select another thumbnail.
3. Click **ID** or press **F2**.

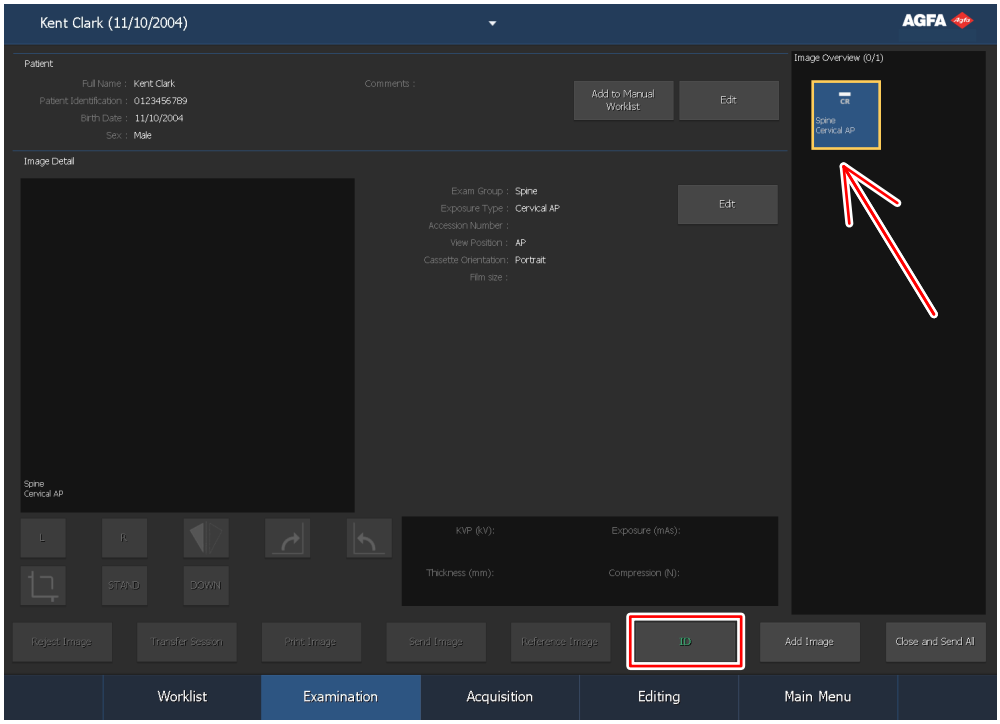


Figure 95: Examination window with thumbnail selected and ID button highlighted (cassette workflow).

If NX is configured in that way, the **Forced Operator Identification** window appears.

Figure 96: Forced Operator Identification window

If NX is configured in that way, the **Pause and Check** window appears.

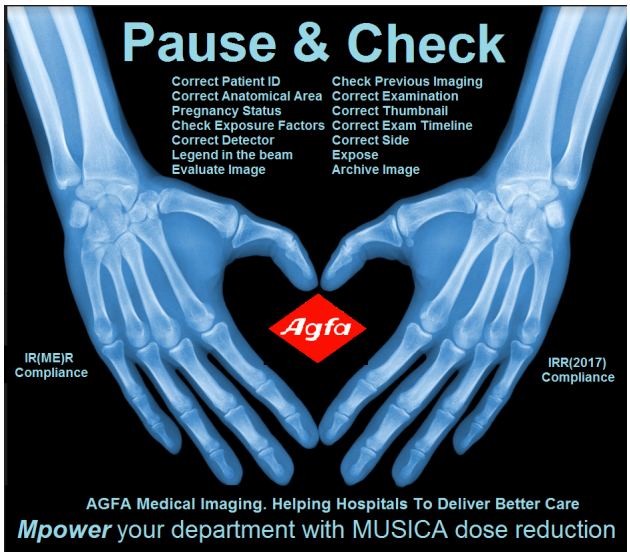


Figure 97: Pause and Check window (example)

4. In the **Forced Operator Identification** window, select a name from the list or enter your name and click **OK**.

   The images in the examination are linked to the operator that was identified when selecing the first thumbnail, either by forced operator identification, or by logging in.

   If an examination is performed by several operators, you can adapt the “Operator” field in the **Edit Image Detail** pane (if this is configured). Refer to “Changing specific image settings”.
5. In the **Pause and Check** window, perform the prescribed checks and close the window by clicking **OK**.
6. The thumbnail is labelled with the code ‘ID’. The patient data is written to the cassette.

   Depending on the configuration, the next exposure thumbnail to be identified is now selected.

   Note The identification of the cassette can be performed before or after the X-Ray exposure. Refer to “Identifying a cassette” for alternative identification procedures.

   Note You can also identify cassettes in the Add image window.

Related information

Changing specific image settings on page 174

Digitizing the images

Procedure:

1. Insert the cassette in the Digitizer.
2. The image will appear in the **Image Overview** pane of the **Examination** window.

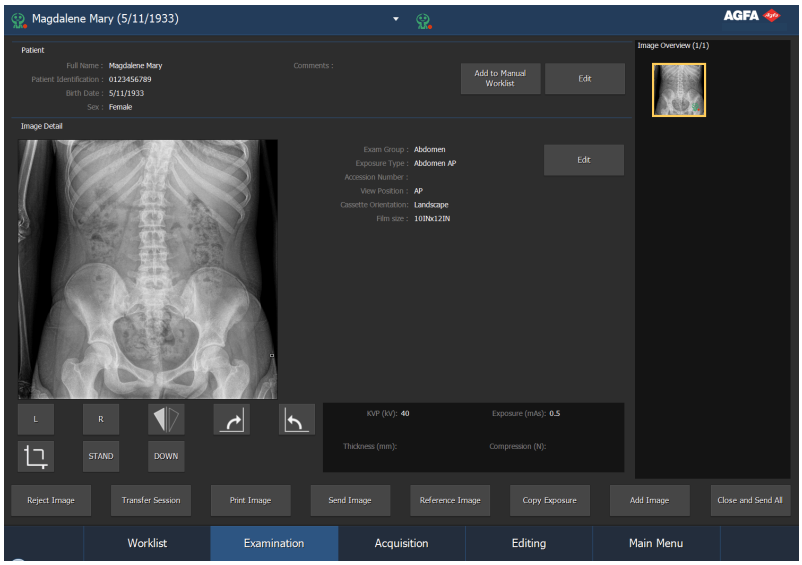


Figure 98: Image appears in Examination window

As a result:

- If tube collimation is applied, the image is automatically cropped at the collimation borders. This functionality depends on the digitizer model.
- If automatic image rotation is activated for the exposure type, the image is rotated to the required orientation. The system must be equipped with an automatic image rotation option (SmartRotate™)

CR workflow with X-Ray generator control

The NX Workstation can be connected to the X-Ray System Generator to exchange X-Ray exposure settings. This functionality is license-dependent. For this situation, there is a dedicated workflow: identification of the cassettes is performed each time after making the exposure. The other aspects of using the Examination window remain the same as described elsewhere in this chapter.

This workflow also applies when performing a CR exposure on an NX Workstation that is part of a DR system.

Procedure:

1. Select the thumbnail for the exposure in the Image Overview pane of the Examination window.

   The default X-Ray exposure parameters for the selected examination or exposure are sent to the modality.

   Note that:

   - If another thumbnail is selected before making the exposure, the default X-Ray exposure parameters for that examination are sent to the modality, overruling the parameters sent previously.
2. Check the exposure settings.
   a) Check if the exposure settings displayed on the X-Ray System console are suitable for the exposure.
   b) If other exposure values are required than those defined in the NX exam, use the X-Ray System console to overwrite the default defined exposure settings.

   Note The default X-Ray exposure parameters can be used as a guide but the user must check and correct them if needed. The default X-Ray exposure parameters are defined in the NX Service and Configuration Tool. Refer to the Key User Manual for more information.

   Note You cannot change the X-Ray exposure parameters on the NX Software. This can only be done on the X-Ray System console.

   Note Refer to "Suggested Radiographic References and User Guides" for more information on determining default exposure parameters based on Target Exposure Index and desired image quality.
3. Insert the cassette in the modality, position the patient and make the exposure.

   As a result:

   - The actual X-Ray exposure parameters are sent back from the modality to the NX Workstation.
   - The X-Ray exposure parameters (such as kV, mAs or DAP) are shown in the Image Detail pane of the Examination window (1). The list of shown parameters is to be configured.
   - A green OK mark appears on all thumbnails for which the exposures are made and for which exposure settings are sent back to the NX Workstation (2).
4. Insert the cassette in the digitizer or in the ID Tablet and click ID in the Examination window.

   Caution: Do not select another thumbnail until the preview image is visible in the active thumbnail. The acquired image may be linked to the wrong exposure.

   Note The X-Ray exposure parameters before, during and after the exposure are displayed on the X-Ray System console.

   Note The X-Ray system position parameters before, during and after the exposure are displayed on the X-Ray System console or can be read from the X-Ray system controls.

5. The parameters are stored with the image.

   Parameters can be sent with the image to the archive or printed with the image. They can also be sent out via MPPS.

   Note You cannot change the default parameters on the NX Workstation.This can only be done on the console. Also, after the exposure is made, parameters cannot be changed on the NX Workstation. They can only be consulted in the Examination window.

- Making multiple exposures on a single cassette on page 113

Related information

Suggested Radiographic References and User Guides on page 354

Making multiple exposures on a single cassette

If an image thumbnail is configured for multiple exposures on a single cassette, another set of thumbnails is shown in the image detail pane. Now you have to select one of these thumbnails to send the proper default X-Ray exposure parameters to the modality for each exposure.

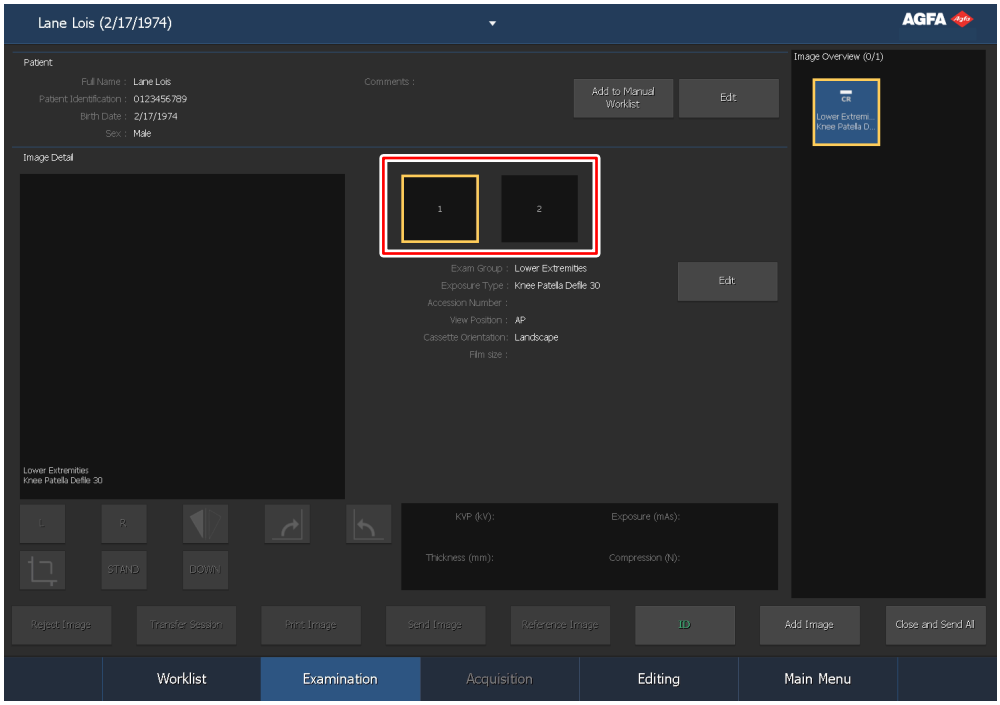


Figure 99: Multiple Exposures on same cassette shown in Examination window.

Caution: Incomplete exposure parameters (kV, mAs) are transmitted to Archive for multiple sub-exposures on one cassette. Only the exposure parameters for one sub-exposure are transmitted. Don't use multiple sub-exposures when the exposure parameters are interpreted by the Archive.

Mammography CR workflow with a connection to the X-Ray generator

The NX Workstation can be connected to the Mammography X-Ray System Generator to exchange X-Ray exposure settings. This functionality is license-dependent.

For this situation, there's a dedicated workflow to identify cassettes: ID one by one workflow is the workflow custom to users that use an ID camera connected to the modality in a film/screen environment.

Procedure:

1. Insert the cassette into the modality, position the patient and make the exposure.
2. Remove the cassette from the table and insert the next cassette.
3. Select the correct thumbnail in the exam overview pane
4. Insert the cassette in the Tablet and click ID in the Examination window. This will link the received exposure settings to the image.
5. Insert the cassette in the Digitizer.
6. Reposition the patient.
7. Make the next exposure.
8. Repeat from 2 until all exposures are made.

- Estimated Radiographic Magnification Factor (ERMF) on page 114

Estimated Radiographic Magnification Factor (ERMF)

Mammography images are calibrated based on the Estimated Radiographic Magnification Factor. The calibration factor is received together with the X-Ray generator parameters.

Modifying the Estimated Radiographic Magnification Factor is only possible if the Source Image Distance (SID) is received together with the X-Ray generator parameters.

Related information

Adding annotations to an image on page 245
Adding an Estimated Radiographic Magnification Factor (ERMF) on page 268

Mammography CR workflow with manual entry of X-Ray exposure parameters

The NX workstation can be used to enter X-Ray exposure data manually in a mammography workflow.

This functionality is license-dependent. It cannot be used in combination to the X-Ray Device exchanging exposure settings.

The key user has to configure NX so that the X-Ray parameter fields are visible in the NX Image Detail pane.

Note X-Ray parameters can be updated before the image is archived, printed, sent or rejected.

Procedure:

1. Insert the cassette into the table and position the patient.
2. Make the exposure.
3. Remove the cassette from the table and insert the next cassette.
4. Select the correct thumbnail in the exam overview pane.
5. In the Image Detail pane, enter the X-Ray parameters.
6. Insert the cassette in the Tablet and click ID in the Examination window. This will link the entered exposure settings to the image.
7. Insert the cassette in the Digitizer.
8. Reposition the patient.
9. Make the next exposure.
10. Repeat from 3 until all exposures are made.

- Estimated Radiographic Magnification Factor (ERMF) on page 115

Estimated Radiographic Magnification Factor (ERMF)

To apply a calibration based on the Estimated Radiographic Magnification Factor

1. Enter the Source Image Distance (SID) in the X-Ray generator parameters.
2. Enter the distance between the plane in which measurements are to be made and the detector.

Related information

Adding an Estimated Radiographic Magnification Factor (ERMF) on page 268

CR full leg full spine

CR full leg full spine examinations with automated workflow

The automated workflow uses a cassette holder that contains a full leg full spine grid, positioned between the patient and the cassettes, to automatically stitch the partial images.

More details on the use of the cassette holder are described in the "CR Full Leg Full Spine User Manual" (document 4408).

Procedure:

1. Add the full leg full spine (FLFS) exposure set to the exam.
2. Identify the cassettes top-down.
3. Put the cassettes in the digitizer.
4. After the last image is received on the workstation, an extra image is created in the exam, containing the stitched image.
5. If there is a problem with the stitched image, refer to section “Manually adjusting a CR full leg full spine image”. Here you can read how the stitching process can be fine-tuned.

If DAP values are received with the partial images, the DAP value of the first partial image is stored with the stitched FLFS image.

Related information

Manually adjusting a CR full leg full spine image on page 119

CR full leg full spine examinations with manual stitching

Refer to "DR full leg full spine examinations with manual stitching".

Related information

DR full leg full spine examinations with manual stitching on page 103

Manually adjusting a CR full leg full spine image

Before you begin, read the chapter “Safety precautions concerning full leg full spine functionality” very carefully.

Partial images are acquired using a cassette holder that contains a full leg full spine grid. You can manually create a full leg full spine image and save it as a new image in the exam by taking the following steps:

Procedure:

1. Select one of the partial images.
2. Click **Stitch Images**.

   The **Stitch Images** dialog opens. In this dialog, you can see all the partial images that are part of the exposure.

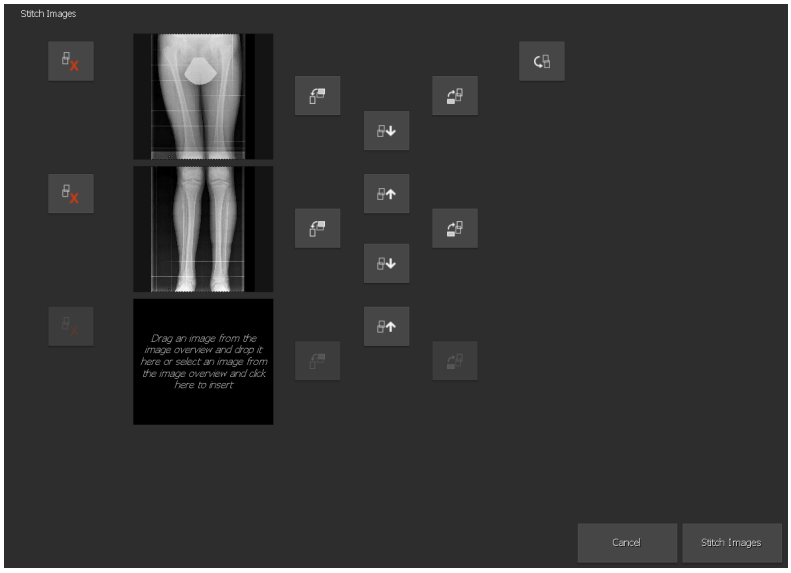


Figure 100: Stitch Images dialog box

3. Use one of the buttons to perform an action on the image.

	Removes the image from the exposure.
	Rotates the image to the left or right.
	Moves the image up or down.
	Rotates all images 180°.

4. To remove a wrong image from the **Stitch Images** dialog, click the remove button next to the image or drag it to the **Image Overview** pane. The image box becomes empty.
5. To add an image that is part of the FLFS exposure and that does not appear in the **Stitch Images** dialog, first select the thumbnail of the image in the **Image Overview** pane and then click the empty image box in the FLFS stitching screen. You can also drag it to the **Stitch Images** dialog.
6. Once the orientation of the images is correct, click **Stitch Images**.

   The second **Stitch Images** dialog opens, where the images are stitched together.

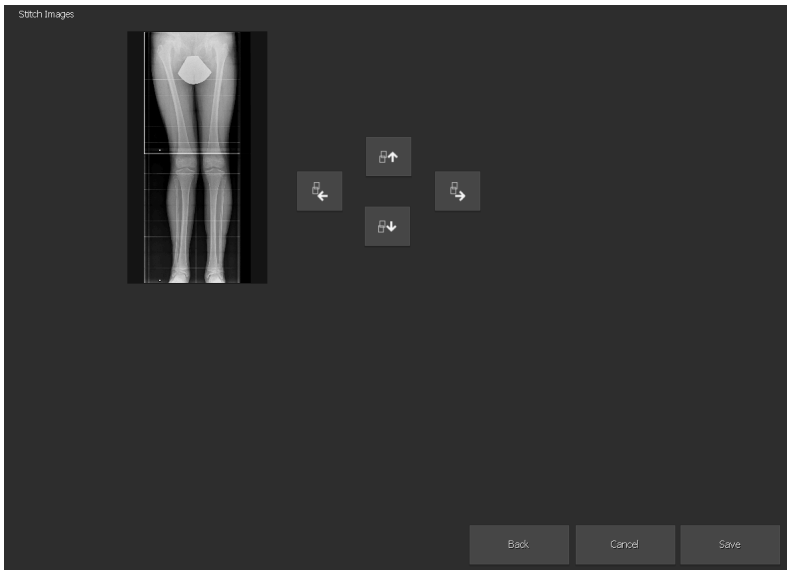


Figure 101: Second Stitch Images dialog

Note The top FLFS cassette should be identified first. When using the FLFS cassette holders as it is intended, stitching and exposing will be correct, so no repositioning will be needed.

7. Use the arrow buttons to place the images in the correct position.
8. Click **Save**.

   The stitched image is saved as a new image in the exam.

Related information

Safety precautions concerning Full Leg Full Spine functionality on page 53

Worklist

About Worklist

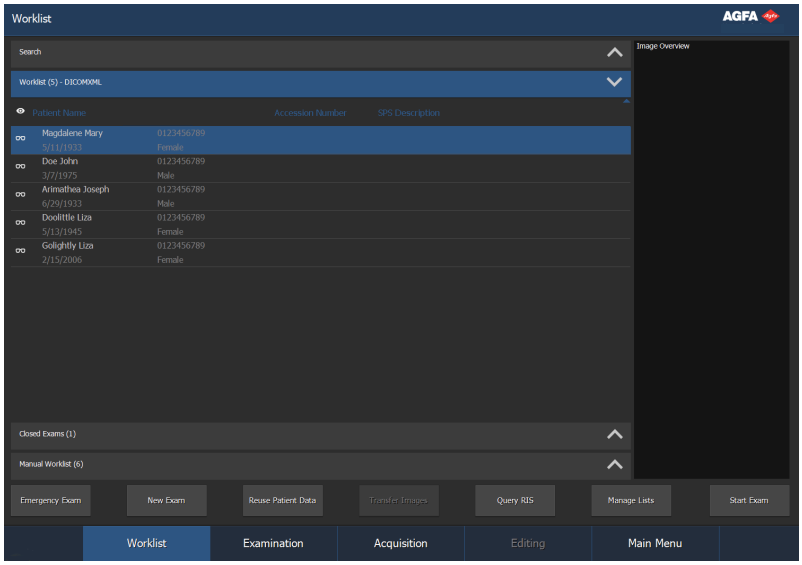


Figure 102: Worklist Window

The Worklist window is designed to be used by touch screen, simply touch the active area of the screen to activate a function or to perform a selection.

In the **Worklist** window, you can view and manage the exams that are scheduled via the Worklist pane.

The **Worklist** window has five panes. The **Image Overview** pane is always visible on the right side of the application. To open one of the other panes, click the title bar of the pane.

- Search pane: search for an exam
- Worklist pane: a list of planned exams
- Closed Exams pane: a list of closed exams
- Manual Worklist pane: a manually created local list of patient data
- Image Overview pane: a thumbnail overview of the images that are included in the selected exam.

At the bottom of the window, you can also find several action buttons to perform specific actions.

- Browsing through the lists on page 123
- Search pane on page 124
- Worklist pane on page 125
- Closed Exams pane on page 127
- Manual Worklist pane on page 129
- Action buttons on page 130

Related information

Using Worklist on page 131
Image Overview pane on page 153

Browsing through the lists

There are several possibilities to browse through the **Worklist**, **Closed Exams** or **Manual Worklist**:

- You can scroll in the list with the scroll buttons on the right side of the pane:

Scroll Button	Functionality
	Move to the top of the list.
	Move the list up one entry at a time.
	Move the list down one entry at a time.
	Move to the bottom of the list.

- You can sort a list alphabetically or by number by clicking on the column header. A small arrow will appear. Click once to arrange the list, click twice to reverse the order. A third click will return to the default sort criteria.
- You can also search by typing in the selected list. Type one or more letters on the keyboard; as a result the first entry starting with these letters will be highlighted in the column that is used for sorting the list.

Search pane

Figure 103: Search pane

In this pane, you can search for exam data.

Related information

Searching the worklist on page 139

Worklist pane

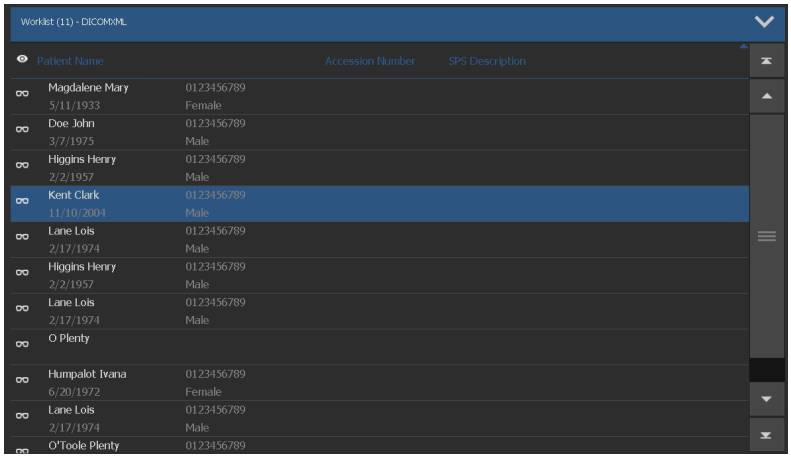


Figure 104: Worklist pane

The **Worklist** pane shows the list of planned exams and exams that are still in progress. The exams are imported from the RIS (if available).

The total number of entries in the list is shown in the title bar. If NX is configured to work with more than one RIS, the available RIS systems are grouped in a drop down list next to the title field of the title bar.

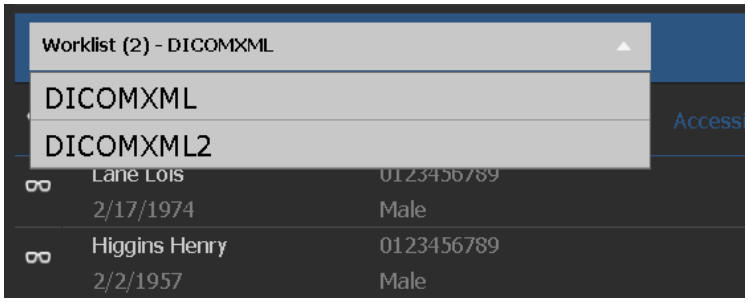


Figure 105: Title bar showing number of entries

In a standard configuration, the following parameters are displayed for each exam in the list:

Parameter	Explanation
	This icon is displayed when the exam is open in the Examination window.
	This icon appears next to the examination in the worklist if the same examination is being looked at on an NX Central Monitoring System.
	This icon shows that status of the pathology detection reports for the images in the exam. A blinking status icon indicates that the exam contains images with a pathology to be acknowledged. The title bar shows the status of the pathology detection of the latest exam in the list.

Parameter	Explanation
Patient Name	The name, unique ID, birth date and gender of the patient. When several exams are planned for the same patient at the same time, this is indicated by a '+' sign. Click the '+' sign to view all planned exams for that patient.
Accession Number	The reference number of the exam.
SPS Description	A short description of the exam types. SPS stands for Scheduled Procedure Step.

Note The available parameters depend on the configuration in the NX Service and Configuration Tool. Refer to the Key user manual for more information.

In this pane, you can:

- Browse through the list
- Sort on each parameter
- Start an exam

Related information

Pathology detection status information on page 156

Closed Exams pane

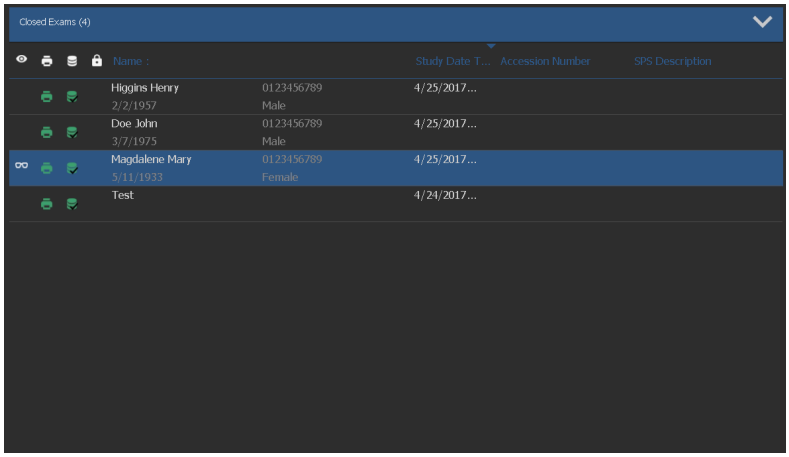


Figure 106: Closed Exams pane

The **Closed Exams** pane shows the list of closed exams.

The total number of entries in the list is shown in the title bar. In a standard configuration, the following parameters are displayed for each closed exam in the list:

Parameter	Explanation
	Indicates the print was successful.
	Indicates the send action to an archive was successful.
	Indicates if the exam is locked. A key user can lock an exam if he wants to prevent it from being deleted. For more information, refer to “Lock Examinations”.
	This icon appears next to the examination in the **Closed Exam** list if the same examination is being looked at on an NX Central Monitoring System.
	Indicates if an image was successfully written to CD/DVD.
	Indicates the dose report is successfully sent to the configured destination(s).
	This icon shows that status of the pathology detection reports for the images in the exam.
Name	The name and unique ID of the patient.
Accession number	The reference number of the exam.
SPS Description	A short description of the exam type.

The title bar shows the status of the pathology detection of the latest exam in the list. A blinking status icon indicates that the exam contains images with a pathology to be acknowledged.

Note The available parameters depend on the configuration in the NX Service and Configuration Tool. Refer to the Key user manual for more information.

In this pane, you can:

- Browse through the list
- Sort on each parameter
- Reopen a closed exam

Related information

Closing the exam and sending all images on page 181
Lock Examinations on page 309
Pathology detection status information on page 156

Manual Worklist pane

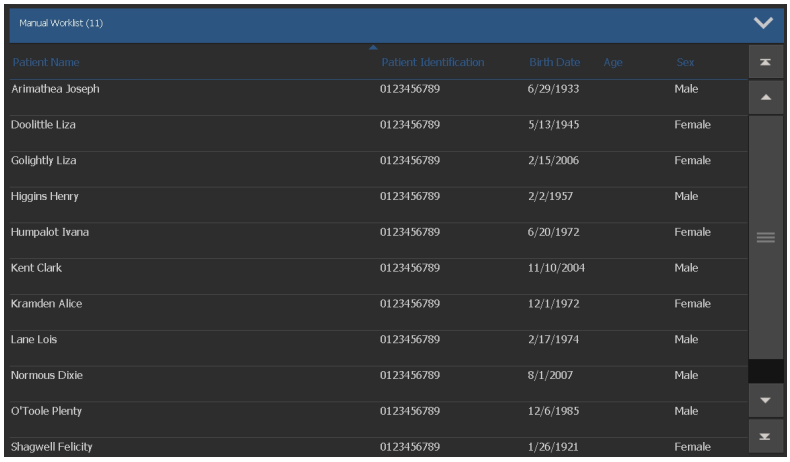


Figure 107: Manual Worklist pane

If NX is configured in such a way that the manual worklist tab is visible, you can manage a manually created local list of patient data in the **Manual Worklist** pane. Patients in the Manual Worklist are kept in this list, even when their exams are closed and sent to a destination.

This can be useful when you do not have a RIS available and you have an intensive care unit where patients need a chest scan every day and patient data need to be accessible easily.

The **Manual Worklist** shows basic patient information, without preview of the images. It has no connection with the other list panes (**Worklist** and **Closed Exams**).

Note The available panes depend on the configuration in the NX Service and Configuration Tool. Refer to the Key user manual for more information.

For each patient in the list, the following information is displayed:

- **Patient name**
- **Patient Identification**: the unique ID of the patient
- **Birth Date**
- **Age**
- **Sex**

You can add patients from the **Examination** window.

You can sort a list alphabetically or by number by clicking on the column header. A small arrow will appear. Click once to arrange the list, click twice to reverse the order. A third click will return to the default sort criteria.

Related information

Adding a patient to the Manual Worklist on page 173

Action buttons

The **Worklist** has several action buttons to perform specific actions. The following table gives a short description of their functionality.

Button	**Description**
Emergency Exam	Start an exam for an emergency patient
New Exam	Start an exam by manual entry
Reuse Patient Data	Copy patient data into a new exam
Query RIS	Refresh the information in the Worklist
Manage Lists	Manage the information in the Manual Worklist or manage the DICOM worklist query.
Transfer Images	Transfer images from one exam to another
Start Exam	Start an exam from the Worklist. Reopen a closed exam.
Open application, folder or file	Open an external application, folder or file.

Related information

Starting an emergency exam on page 138
Copying patient data into a new exam on page 141
Refreshing the information in the Worklist on page 133
Managing the worklists on page 142
Transferring images from one exam to another on page 140
Reopening a closed exam on page 137
Opening an application, folder or file on page 145

Using Worklist

Selecting a RIS

If NX is configured to work with more than one RIS, the available RIS systems are grouped in a drop-down list under the Title field of the Title bar. Press the icon next to the title and select a RIS.

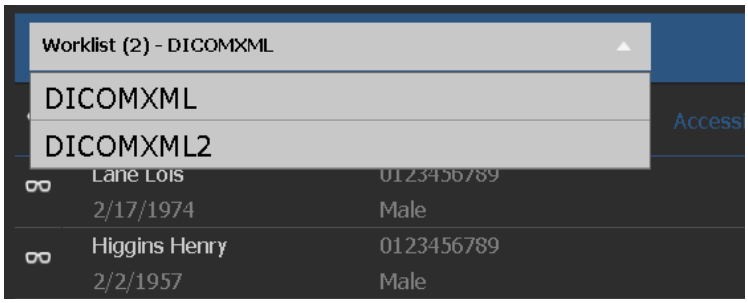


Figure 108: Selecting a RIS

Refreshing the information in the Worklist

When beginning your working day the worklist might be empty. In order to search for the necessary exam data in the **Worklist** you need to update it with recent changes first. To do so, click **Query RIS** or press **F5**.

Note The update can also happen automatically at certain intervals if NX is configured in that way.

Starting an exam from the Worklist

You can start an exam for an existing patient in the **Worklist** pane by taking the following steps:

Procedure:

1. In the **Worklist** window:
   - Select an exam from the list (1) and click Start Exam (2).
   - Press the displayed thumbnail.
   - Double-click an exam in the list.

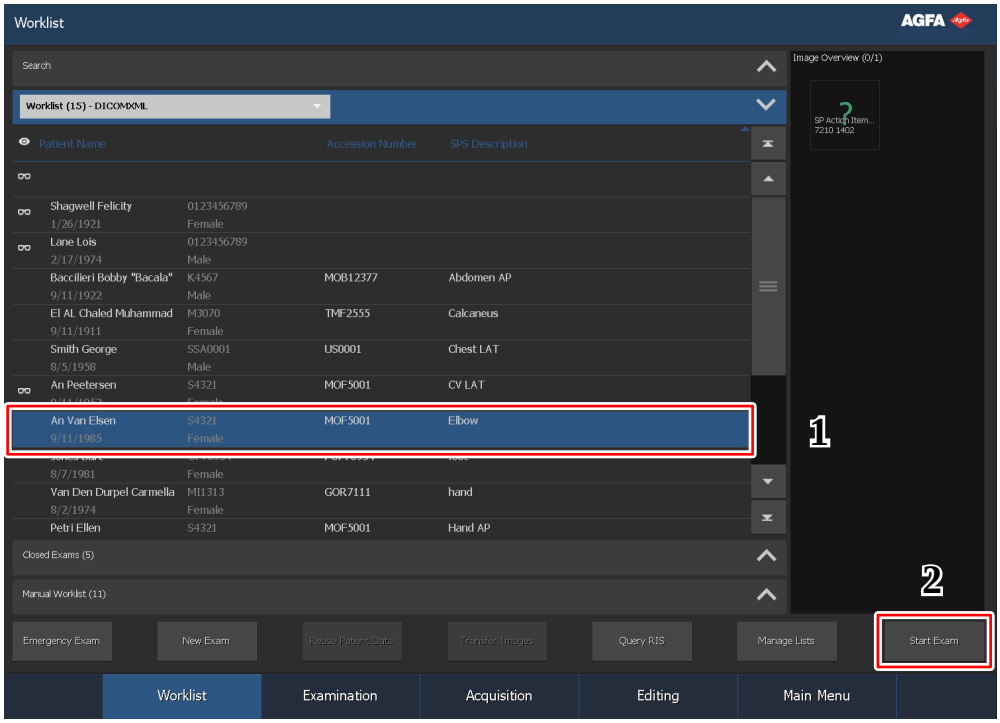


Figure 109: Starting an Examination actions in Worklist window

2. The patient and exam details are displayed in the **Examination** window.
3. Define the exam type.

Related information

Using Examination on page 160

Starting an exam by scanning a barcode

A barcode reader can be configured in two modes:

1. Keyboard emulation.

   In this mode, scanning a barcode is like typing a series of characters on the keyboard.

   To search for an exam:

   a) Open the **Search** pane in the **Worklist** window.
   b) In the drop-down lists, select the parameter for which you want to search and the list where you want to search in.
   c) Scan the barcode.

      The search key is entered in the text field.
   d) Click **Search**.

      The search result is displayed.
   e) Open the exam by double-clicking it.

2. COM-port emulation.

   In this mode, scanning a barcode activates a search in the worklist and opens the retrieved exam.

   a) Open the **Worklist** pane in the **Worklist** window.
   b) Scan the barcode.

      The worklist is searched for the search key and the matching exam is opened.

Refer to the Agfa website for specifications of supported barcode readers.

https://www.agfa.com/he/global/en/internet/library/overview/?ID=80502528

Starting an exam by manual entry

Next to the patients that are registered through a worklist, it is possible to create and perform a new exam directly for a patient (for example when the RIS is not available).

To add a new exam, take the following steps:

1. In the **Worklist** window, click the **New Exam** button.

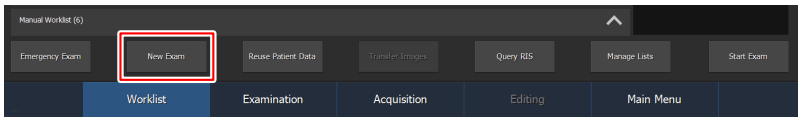


Figure 110: Manually Entering patient data

The **Examination** window opens, where you have to fill in the patient information:

2. Enter all the information that is needed for the exam.

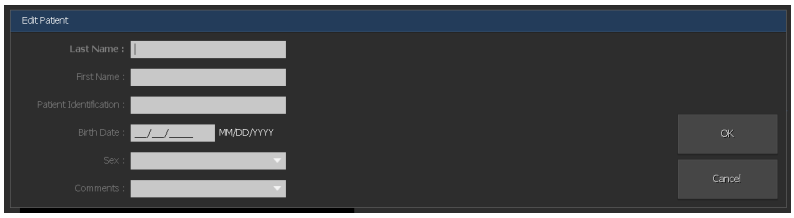


Figure 111: Edit patient pane

Once you have filled in a field, you can use the Tab key on your keyboard to go to the next one. All fields with an asterisk on the right side are mandatory and must be filled in to be able to continue.

3. Click **OK**.

In case no birth date or age was provided in the patient information, an additional dialog appears asking to select the patient's category.

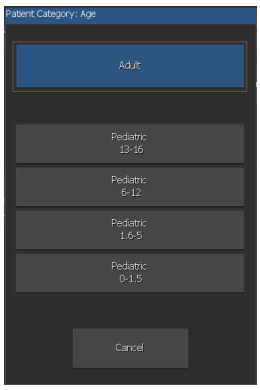


Figure 112: Patient category dialog

4. Select the patient's category and click **OK**.

On systems equipped with a collimator camera and configured for asking the patient for consent before taking patient positioning photos or patient identification photos, a dialog appears asking if the patient allows taking a webcam photo.

5. Ask the patient for consent and confirm the choice in the dialog.

The **Add Image** window opens, where you can add the necessary images.

Related information

Using Examination on page 160
Patient categories on page 158

Reopening a closed exam

You can reopen an exam that is already in the **Closed Exams** list by taking the following steps:

Procedure:

1. In the **Closed Exams** list:
   - Select an exam from the list and click Start Exam.
   - Press the displayed thumbnail.
   - Double-click an exam in the list.

   The exam is reopened in the **Examination** window.
2. Make the changes that you want to make and click **Close and Send All**.

   The exam is closed again.

Related information

About Examination on page 147

Starting an emergency exam

Note The available patient data fields and exams depend on the configuration in the NX Service and Configuration Tool. Refer to the Key user manual for more information.

Next to the exams that are registered through a worklist, it is possible to create and perform a new exam directly for an emergency patient.

To create an emergency exam, take the following steps:

1. Click the **Emergency Exam** button.

   The **Examination** window opens, with default patient data and preconfigured exams:

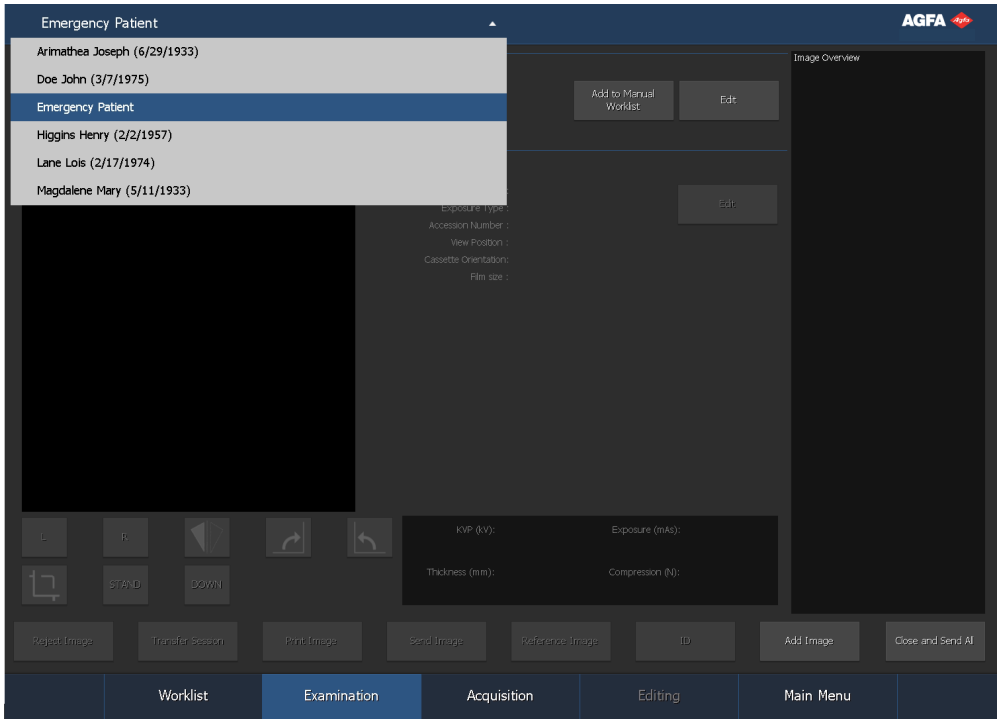


Figure 113: Emergency Exam in Examination window

2. Enter all the information that is needed for the exam.
3. When the images are made, finalize the exam.

Related information

Using Examination on page 160

Searching the worklist

The Search pane in the Worklist window allows you to search for the exam data you need within the worklist in different ways:

1. From the **Search By** drop-down list, select the parameter for which you want to search. This can be:
   - Patient Name
   - Patient ID
   - Accession Number
   - Session Date
   - Exam group

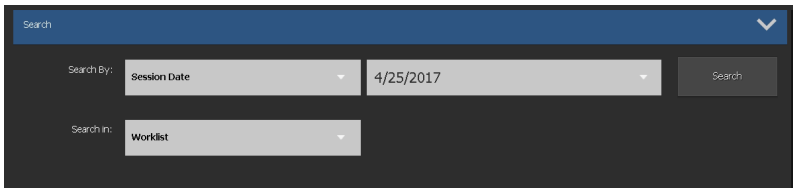


Figure 114: Search pane

2. From the **Search In** drop-down list, select the list where you want to search in. This can be:
   - Worklist
   - Closed Exams
3. Fill in the search term in the text field and click **Search**. The search result is displayed.

   Filling in first part of the search term will show all results starting with that part. Use * as wild-card in front of the Patient name and Patient ID to search without knowing the first part of the name/ID.

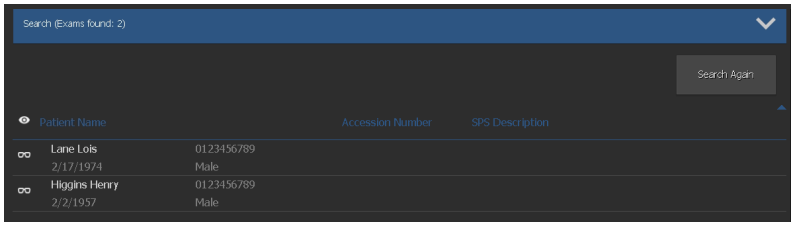


Figure 115: Search results in Search pane

4. Open the exam by double-clicking it.

   Refer also to “Starting an exam from the Worklist”.

   The exam is displayed in the Examination window.

Note To perform another search, click Search Again.

Related information

Starting an exam from the Worklist on page 134
About Examination on page 147

Transferring images from one exam to another

Procedure:

1. In the **Worklist** window, select the exam from which you want to transfer the images. The images are displayed in the **Image Overview** pane.
2. Click **Transfer Images**.

   The **Transfer Images** wizard opens:

Figure 116: Transfer Images wizard view 1

3. In the **Image Overview** pane, select the image(s) that you want to transfer.

   The image is displayed in the wizard.
4. Click **Continue**.
5. In the **Worklist** pane, select the exam to which the image should be transferred.

   The patient data is displayed in the wizard.
6. Click **Continue**.

   A transfer overview is displayed to check if all information is correct.

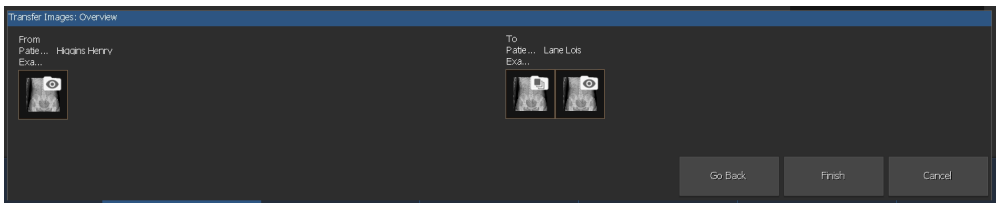


Figure 117: Transfer Images wizard view 2

7. Click **Finish**.

   The image is transferred.

Related information

Transferring all images from one exam to another on page 189

Copying patient data into a new exam

Note This is useful for sites without a RIS, when you want to create several separate studies of the same patient.

You can create a new exam for a patient that has already had a previous exam by taking the following steps:

1. Select an exam of the patient in the Worklist window.
2. Click the **Reuse Patient Data** button.

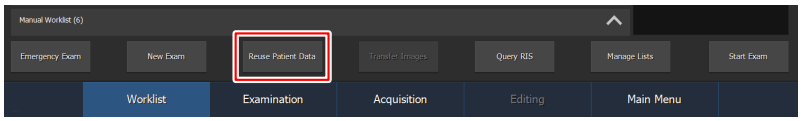


Figure 118: Reuse Patient Data in Examination window

The **Examination** window opens, with the patient information already completed, but with blank exam data:

3. Enter all the information that is needed for the exam.
4. When the images are made, finalize the exam.

Note The accession number will not be copied as this is related to the examination.

Related information

Using Examination on page 160

Managing the worklists

Note The available worklists depend on the configuration in the NX Service and Configuration Tool. Refer to the Key user manual for more information.

You can manage the worklists by clicking the **Manage Lists** button. The **Manage Lists** window opens:

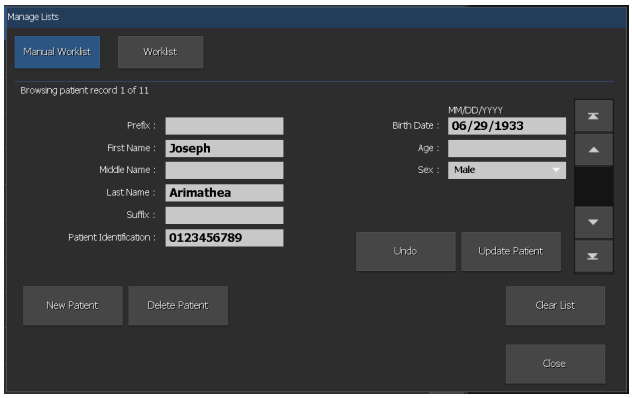


Figure 119: Managing Lists window

Depending on the configuration, you have the choice between:

- Managing the Manual worklist
- Managing the RIS-based worklist

Managing the Manual worklist

Procedure:

Press the **Manual Worklist** button on the top left of the screen.

The window shows the first record of the list. You can scroll in the list with the scroll buttons on the right side:

Scroll Button	Functionality
	Move to the top of the list.
	Move up the list one entry.
	Move down the list one entry.
	Move to the bottom of the list.

Related information

About Examination on page 147

Changing information of a record

1. In the Manage Lists window, browse to the patient record that you want to change.
2. Change the information in the text fields.
3. Click **Update Patient**.
4. Click **Close**.

   The information in the **Manual Worklist** is updated.

Creating a new patient

1. Click **New Patient**.

   A new record is created.

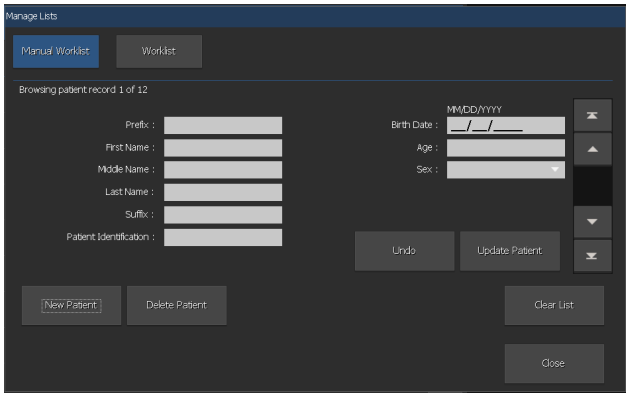


Figure 120: Creating a new patient

2. Enter the patient information in the text fields.
3. Click **Close**.

   The new patient is added to the patient list.

Deleting a patient

1. In the Manage Lists window, browse to the patient record that you want to delete.
2. Click **Delete Patient**.
3. Click **Close**.

   The patient is removed from the **Worklist**.

Clearing the entire Worklist

1. In the Manage Lists window, click **Clear List**.
2. Click **Close**.

   The **Worklist** is empty.

Managing the RIS-based worklist

Procedure:

1. Press the **Worklist** button on the top left of the screen.
2. Enter the criteria to which the RIS entries should match that are listed in the NX Worklist.

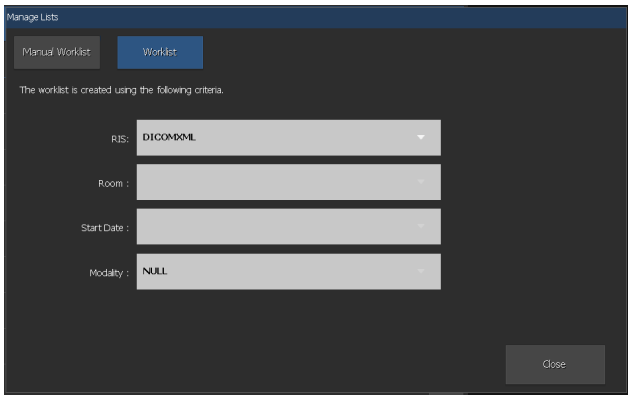


Figure 121: Manage Lists window

3. Click **Update Worklist**.
4. Click the **Close** button.

Opening an application, folder or file

In every NX environment, you can open an external application, folder or file with an action button for that purpose. The application, folder or file can be configured differently for each environment.

To open an application, folder or file:

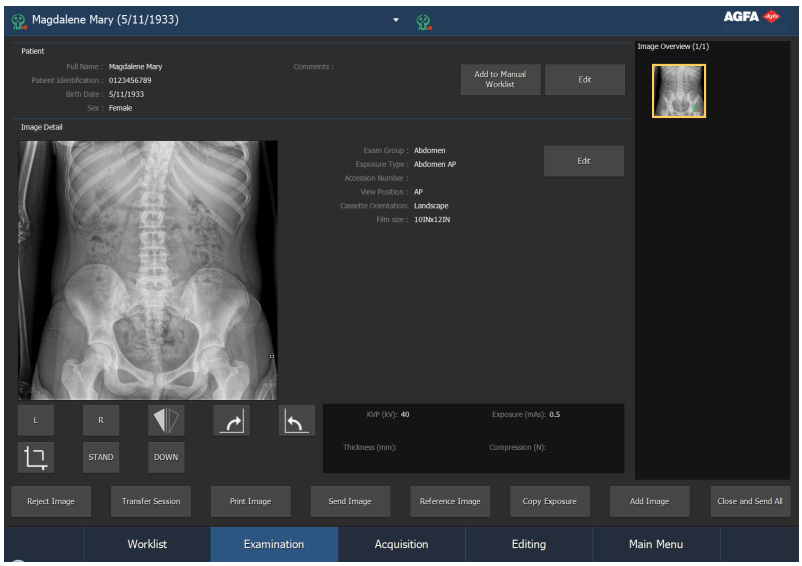
Click the Open application, folder or file action button.

Note This button can have any caption. The caption and the object to be opened are configured in the NX Service and Configuration Tool.

Examination

About Examination

Figure 122: Examination window



In the **Examination** window, you can view and manage the details of a specific exam. This window is designed to be used by touch screen, simply touch the active area of the screen to activate a function or perform a selection.

The drop-down list in the title bar of the window shows the name of the patient for which the exam is performed. If there is another exam open, you can select another name from the list to display the exam of the patient.

	If this icon is displayed next to the patient name in the drop-down, the same examination is being looked at on an NX Central Monitoring System. If someone else is making changes to the same image or exam data, at the same time, some of your changes may be undone by the other user.
	A pathology detection status icon is displayed in the drop-down list of open exams and gives a summary of the status of the images in the exam. A pathology detection status icon with a red dot is displayed next to the drop-down list if one of the open exams contains images with a pathology to be acknowledged. A blinking status icon indicates that the exam contains images with a pathology to be acknowledged.

Note The image will be displayed as it will appear on the print sheet. In case of true size printing, the edges of the image may not be visible. In order to see the full image, use the zoom tools in the editing screen.

Note There may be a short delay between making changes to an image/exam on the In-room NX workstation and seeing these changes on Central Monitoring System and vice-versa.

The **Examination** window has three panes:

- **Patient** pane: a list of general information about the patient.

- **Image Detail** pane: a detailed image with a list of information. This pane also allows you to perform basic operations on the image.
- **Image Overview** Pane: a thumbnail overview of the images that are included in the exam.

At the bottom of the window, you can also find several action buttons to perform specific actions.

The available buttons depend on the configuration in the NX Service and Configuration Tool. Refer to the Key user manual for more information.

- Patient pane on page 149
- Image Detail pane on page 150
- Image Overview pane on page 153
- Patient categories on page 158
- Action buttons on page 159

Related information

Using Examination on page 160

Patient pane

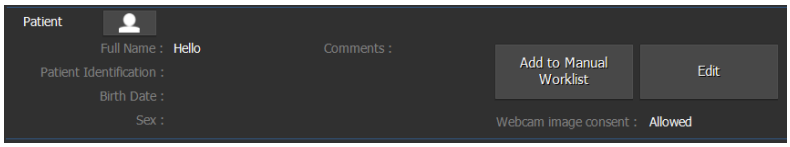


Figure 123: Patient pane

The **Patient** pane displays the general information about the patient:

- The **Patient Name**
- The unique **Identification** of the patient
- The **Birth Date** and **Sex**
- Additional **Comments**

The **Comments** text box can be clicked to display its complete contents. Click the X-button to return to the normal view.

The **Patient** pane can be configured to display 8 fields in total.

On systems equipped with a collimator camera and configured for taking patient identification photos, an icon indicates if a patient identification photo is available.

	No patient identification photo has been added.
	The patient identification photo is available.

Click the icon to display the photo.

In the dialog box that displays the photo, buttons are available to rotate or to remove the photo:

	Rotate the patient identification photo 90 degrees clockwise
	Remove the patient identification photo

In the **Patient** pane, the following actions are possible:

- “Editing patient data”.
- “Adding a patient to the Manual Worklist”.

Note The available action buttons depend on the configuration in the **NX Service and Configuration Tool**. Refer to the Key user manual for more information.

Related information

Editing patient data on page 168
Adding a patient identification photo on page 172

Image Detail pane

Figure 124: Image Detail pane

The **Image Detail** pane displays detailed information about the images of an exam. When you select an image in the **Image Overview** pane, the image is displayed in the **Image Detail** pane with detailed data.

The way the image is displayed depends on the status of the exam.

Before the exposure	The image is planned. A small description is displayed. If configured, patient positioning guidance information is displayed. On systems equipped with a collimator camera, the live camera image can be displayed.
Right after the exposure	The image is being acquired. A preview image is displayed.
After the exposure	The image is acquired. The processed image is displayed.

For each image, a number of descriptive fields are displayed, depending on the configuration. As an example, the following fields can be displayed:

- **Exam Group, Type**: the body part and exam type.
- **Accession Nr.**: the reference number of the exam.
- **View Position**: the position of the patient relative to the modality.
- **Cassette Orientation**: the orientation of the digitizer cassette.
- **Image Comment**: additional comments on the image.

Note The available fields depend on the configuration in the NX Service and Configuration Tool. Refer to the Key user manual for more information.

Related information

Image thumbnail status information on page 154
Changing specific image settings on page 174
Viewing live camera image (LiveVision™, SmartPositioning™) on page 169

Modifying Dose Monitoring Statistics on page 314
Patient positioning pre-exposure quality assurance (SmartPositioning QA™) on page 170

Dose deviation bar

The **Image Detail** pane can display the dose deviation bar. If the dose level is higher than the reference, the horizontal bar will extend to the right from the middle of the scale, and a lower level causes the bar to extend from the middle to the left. Tick marks are positioned at intervals that indicate a change in dose of a factor two. A deviation indication on the first tick mark to the right means twice the reference dose. A deviation indication on the first tick mark to the left means half the reference dose.

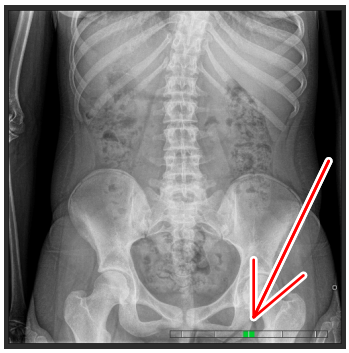


Figure 125: Image with Dose Deviation bar in the lower right corner.

DAP reference value

The **Image Detail** pane can display the DAP value in the lower left corner of the image.

If the DAP value is below the reference value, it is displayed in green.

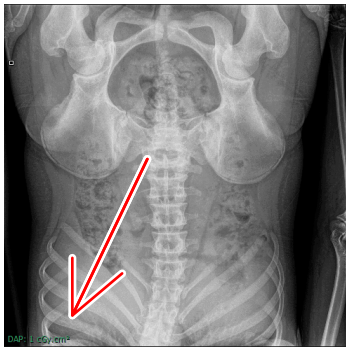


Figure 126: DAP value

If the DAP value exceeds the reference value, it is displayed in yellow and accompanied by a warning icon.

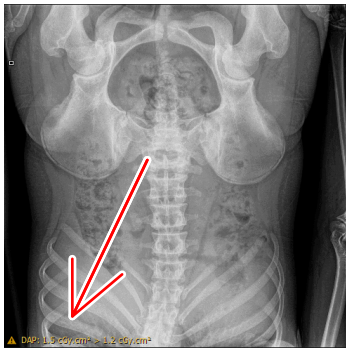


Figure 127: Exceeding DAP value

NX can be configured to require a reason for an inconsistency in the DAP value. This is indicated by a red warning sign.

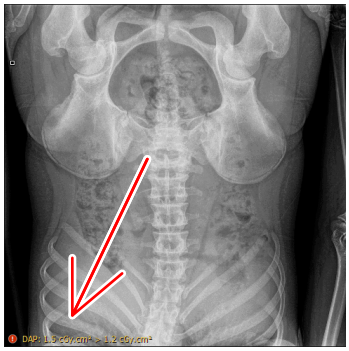


Figure 128: Exceeding DAP value with requirement to provide a reason

To provide the reason for an inconsistent DAP value, click the DAP value in the **Image Detail** pane and select a reason in the **DAP inconsistency reason** dialog box. Providing a reason for an inconsistent DAP value is enforced when closing the exam.

Image Overview pane

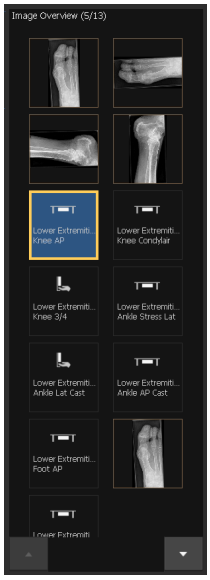


Figure 129: Image Overview pane

In the **Image Overview** pane, an overview of the images in the exam is displayed when an exam is selected in the **Worklist** or **Closed Exams** pane.

The title indicates the number of images taken and the total number of images in the exam.

A colored border highlights the selected image thumbnail.

A blue background on the selected image thumbnail indicates that the image for the next exposure will appear to this thumbnail and that the default X-ray exposure parameters for that examination are sent to the modality.

The order of the images in the exam can be changed by dragging an image thumbnail to a new position.

If the exam consists of more than 12 images then the following buttons will be displayed at the bottom of the pane. They can be used to navigate through the thumbnails.

The images are displayed in several ways, as shown in the next table:

Image	Description
	The image is planned, but not yet treated by the modality. A small description is displayed.
	The cassette is identified (exam data are written to cassette).

Image	Description	
	The preview image is visible in the thumbnail. The eye icon disappears as soon as the processed image is displayed.	
	The image is taken and is waiting to be approved and printed.	
	The status icons indicate that an image was successfully sent out.	
		the image is written to CD/DVD
		the image is sent to an archive
		the dose report is sent to the configured destination(s)
		the image is printed
	Depending on your workflow (CD/DVD, print or archive oriented), one or more of the icons will appear. They appear after a **Close and Send All** action, writing the image to CD/DVD, or if you have manually printed or sent images from an open exam.	

Note The border of partial full leg full spine thumbnails, of both the image and the exposure, is dashed.

Image thumbnail status information

Problem statuses are displayed as shown in the table beneath:

Image	Description
	The RIS provided a protocol code that cannot be automatically translated into planned images by NX. Usually, this means that the code is unknown to NX, but it could also occur when the patient's birth date is not known. Clicking this thumbnail will immediately take you to the Examination window where you are asked to add an image, in order to resolve the planned image.
	The image was sent to an archive and storage has been committed.

Image	Description
	The image was sent to an archive and a printer but both failed.
	The image is rejected.
	The image is not assigned to a sheet.

Modality statuses are displayed as shown in the table beneath:

Image	Description
X-Ray modality settings	
	The exposure has been performed and NX has received the exposure parameters from the X-Ray modality.
DR system - indication of selected acquisition system	
	The image is planned for the radiographic wall stand using the DR bucky.
	The image is planned for the radiographic table using the DR bucky.
	The image is planned for the radiographic wall stand using the catapult bucky for CR cassettes.
	The image is planned for the radiographic table using the catapult bucky for CR cassettes.
	The image is planned as a free exposure using a CR cassette.
	The image is planned for the Portable DR Detector inserted in the radiographic wall stand bucky.

Image	Description
	The image is planned for the Portable DR Detector inserted in the radiographic table bucky.
	The image is planned as a free exposure using the Portable DR Detector.

Depending on the configuration, the planned image thumbnails have a color indication to easily distinguish exposures for the different modality positions: table, wall stand and free exposure. The software console and tube head display contain the same color indication for the modality position of the selected image thumbnail.

Linked images:

Image	Description
	Images that belong together are indicated with a small triangular mark in the lower left hand corner of the thumbnail. If an examination contains more than one sets of related images, the mark is alternating white and black to distinguish the sequences.This applies to e.g. automated DR full screen sequences.

Pathology detection status information

Status information for pathology detection is displayed on the image thumbnails as shown in the table beneath.

A pathology detection status icon is displayed in the list of open exams and in the worklist and gives a summary of the status of the images in the exam.

A blinking status icon indicates that the exam contains images with a pathology to be acknowledged.

The full pathology detection report is available in the **Acquisition** or **Editing** window.

Status icon	Description	
	The image is not configured for automatic processing. Click the **AI pathology detection** button to generate a report. 	
	The report is available. The dot reflects the status of the findings.	
		No pathology found.
		A pathology has been found. No alarm raised.

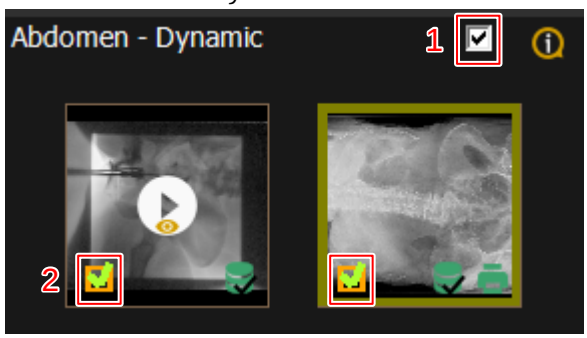
Status icon	Description	
		A pathology has been found and an alarm has been raised.
		A pathology has been found and the alarm has been acknowledged by the operator.
	Pathology detection is ongoing (waiting in the queue)	
	Pathology detection is ongoing (processing has started)	
	An error has occurred. No pathology detection report can be generated.	

Related information

Reviewing the pathology detection report on page 221

Selecting more than one image in the Image Overview pane

1. A selection of more than one image can be made in two ways.
   - Click the image thumbnails one by one, while holding the CTRL key.
   - Check the checkbox in the header of the **Image Overview** pane and then click the image thumbnails one by one.



   1. Checkbox in the header of the Image Overview pane
   2. Checkboxes to select multiple image

   Figure 130: Image Overview pane

2. Right click on one of the images.
   A context menu is displayed containing the actions that can be performed on the selected images.
3. Select the action to be performed on all selected images.
   The images can be saved, printed, sent, rejected, unrejected,...
4. Undo the selection by unchecking the checkbox in the header of the **Image Overview** pane.

Patient categories

The NX Workstation can use patient categories based on patient age and patient weight to apply unique image processing, display settings and exposure parameters.

If patient data like age, birth date or weight are available, a default category is selected automatically. If insufficient patient data are available, the patient category window is displayed when adding images.

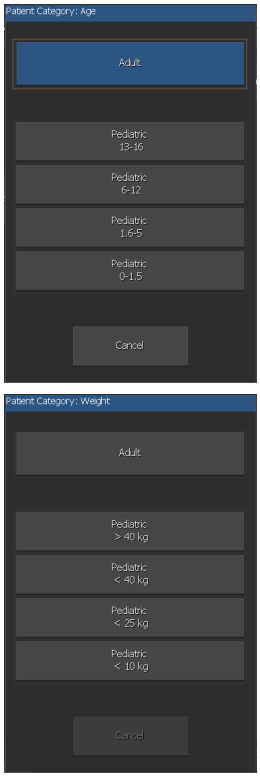


Figure 131: Patient category dialogs for age and for weight

Related information

Patient Categories on page 357

Changing patient age or weight

During the examination the patient age or weight data can be manually changed. This may affect the patient category that is applied when adding new images.

The patient category for images that were already in the exam will not be changed.

Action buttons

Examination has several action buttons to perform specific actions. The following table gives a short description of their functionality:

Button	Functionality
Reject Image	Rejects or unrejects an image
Prior Images	Go to previous examinations.
Print Image	Prints specific exam images
Send Image	Archives specific exam images
ID	Identifies a cassette
Copy Exposure	Copies exposure settings into a new exposure
Add Image	Define additional images manually
Transfer Session	Transfer all images from one exam to another
Close and Send All	Closes the exam and sends all images to a printer or to a PACS archive
Open application, folder or file	Open an external application, folder or file

Related information

Rejecting an image on page 178
Go to the prior images of a patient on page 180
Printing a specific image before the examination is completed on page 184
Archiving a specific image before the examination is completed on page 187
Identifying a cassette on page 167
Adding exposures on page 161
Transferring all images from one exam to another on page 189
Closing the exam and sending all images on page 181
Opening an application, folder or file on page 145

Using Examination

Adding exposures

If protocol codes are not provided by the RIS, images need to be added manually. It is up to you as a radiographer which images need to be done.

Adding exposures manually can be needed in many situations:

- You can add images to an existing exam, for example when those enforced by the RIS are not sufficient.
- You might need to add all images for an exam manually, for example when protocol codes were not sent by the RIS.
- You can add images for a new patient or emergency patient.
- When no RIS is available or when it is down.

1. Select the exam in which you want to add images manually.
2. Click **Add Image**.

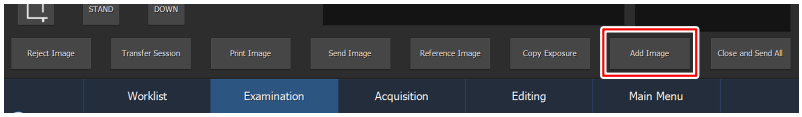


Figure 132: Examination window with Add Image button highlighted

Note If your system is configured to interpret protocol codes, the images may be preselected. In that case, the images are automatically added when you click Start Exam.

In case no birth date or age was provided in the patient information, an additional dialog pops up asking to select the patient's category.

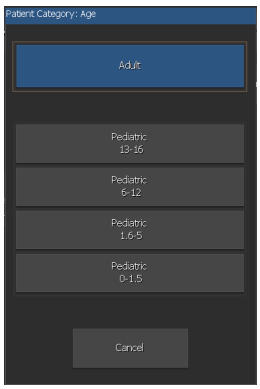


Figure 133: Patient category dialog

Note The patient category is automatically selected based on age, calculated from the patient's birth date or on the patient weight, depending on the configuration. Only in exceptional cases, you should change the patient category.

3. Select the patient's category and click **OK**.

   On systems equipped with a collimator camera and configured for asking the patient for consent before taking patient positioning photos or patient identification photos, a dialog appears asking if the patient allows taking a webcam photo.
4. Ask the patient for consent and confirm the choice in the dialog.

   The **Add Image** window opens, where you can add the necessary images.

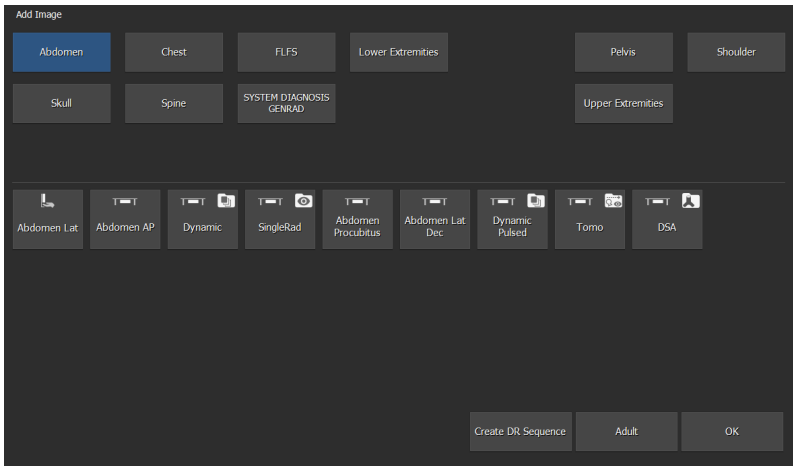


Figure 134: Add Image window

Depending on the configuration, the exposure type buttons have a color indication to easily distinguish exposures for the different modality positions: table, wall stand and free exposure.

5. Specify the exam type by first selecting a group, followed by an exposure type.
6. Click **OK**.

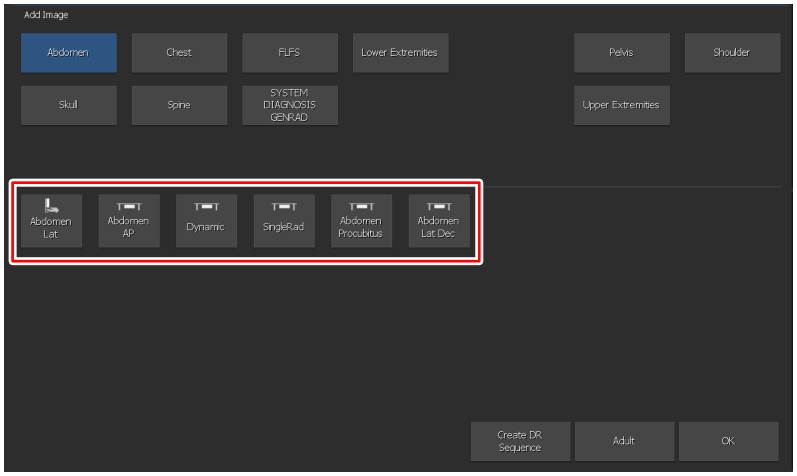


Figure 135: Select Exposure Type in Add Image window

The exposure is added to the exam and is displayed in the **Exam Overview** pane.

On a DR system the exam types indicate on which acquisition system the exposure is planned:

Image	Description
	Radiographic table using the catapult bucky. for CR cassettes.
	Radiographic wall stand using the catapult bucky for CR cassettes.

Image	Description
	Free exposure using a CR cassette.
	Radiographic table using the DR bucky.
	Radiographic wall stand using the DR bucky.
	Portable DR Detector inserted in the radiographic table bucky.
	Portable DR Detector inserted in the radiographic wall stand bucky.
	Free exposure using Portable DR Detector.

Selecting a different patient cateogry

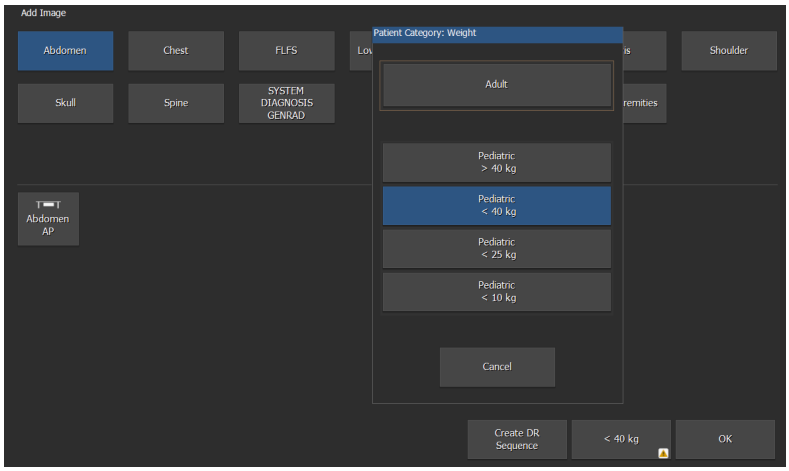
If for a specific patient the default category does not define appropriate image processing, display settings or exposure parameters, another category can be selected while adding the image.

In the **Add Image** window, the patient category button displays the default category.

To select a different patient category:

1. Click the patient category button.

   The patient category dialog appears. A green border indicates if the patient belongs to the categories for adults or for paediatrics, according to the patient data.



2. Select the category that is appropriate for the specific patient.

   The patient category button displays the new category. New images have settings that correspond to the new category.

To make the user aware while adding images that settings will be applied that do not correspond to the patient age or weight entered in the patient data, a small warning sign is displayed in the patient category button and in the **Add Image** button.

Related information

Patient categories on page 158

Copying DR exposure settings into a new exposure

1. Select the exam in which you want to add an image by copying exposure settings.
2. Select the correct thumbnail in the Exam Overview pane.
3. In the Examination window, click Copy Exposure

   The exposure is added to the exam and is displayed in the Exam Overview pane.

Copying CR exposure settings into a new exposure

Identify a cassette using an exposure that is already identified or acquired.

Identifying a cassette

The procedure for selecting and performing X-Ray exposures depends on the configuration settings of the NX, the digitizer and the connectivity to the X-Ray modality.

Editing patient data

To edit the information of a patient, take the following steps:

1. With the information of the patient you want to edit displayed, click **Edit**.

   The **Edit patient pane** opens on top.

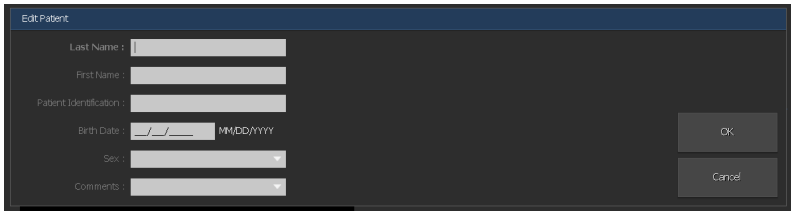


Figure 136: Edit patient pane

2. Change the information in the text fields and click **OK**.

   Note The comments text box can be double-clicked to display and edit its complete contents. Click the V-button to confirm the changes and return to the normal view.

   Note This list of editable fields depends on the configuration of NX.

On systems equipped with a collimator camera and configured for taking patient positioning photos or patient identification photos, the **edit patient** pane contains a field to select if the patient consents to taking a webcam photo. Depending on the configuration, entering the patient consent can be mandatory.

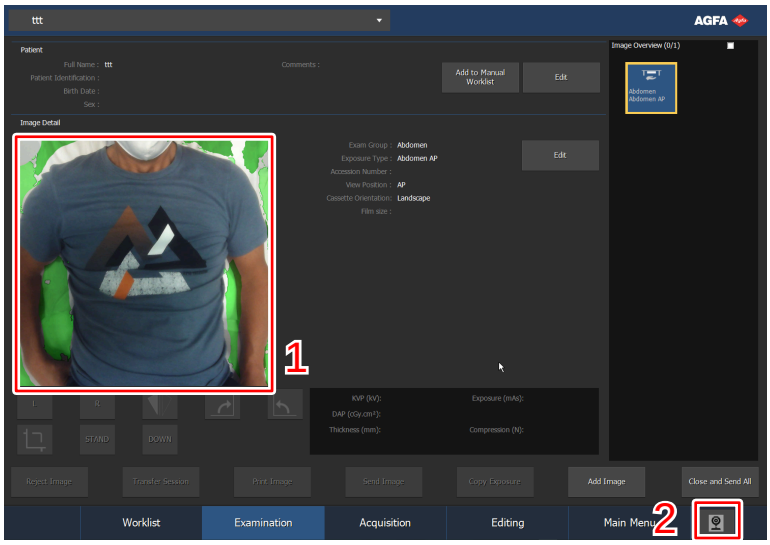
If patient consent is withdrawn during the examination, the patient identification photo and patient positioning photos in the exam are deleted.

Viewing live camera image (LiveVision™, SmartPositioning™)

The collimator can be equipped with a camera to visualize the anatomical region of interest. The system must be equipped with an option to view the live camera image (LiveVision™) or to preview the position of the collimation area and the AEC fields (SmartPositioning™).

The live camera image is visible on the tube head display or on the MUSICA Acquisition Workstation in the **Examination** window, the **Acquisition** window and the **Editing** window.

Press the **camera** button.



1. Live camera image
2. Camera button

Figure 137: Live camera image on the Examination window

The live camera image is displayed.

Patient positioning pre-exposure quality assurance (SmartPositioning QA™)

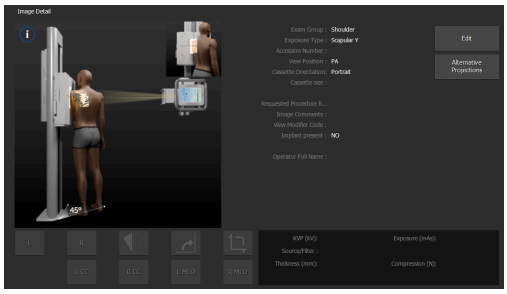


Figure 138: Patient positioning quality assurance screen in the Examination window

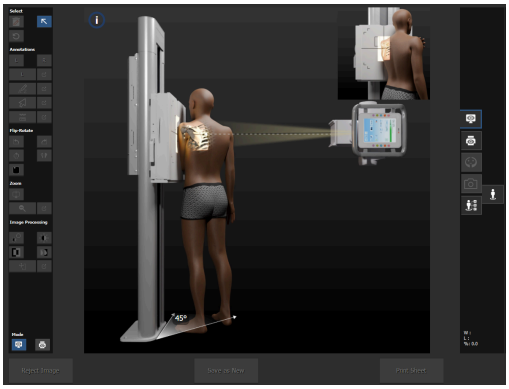


Figure 139: Patient positioning quality assurance screen in the Editing window

On systems that have the patient positioning quality assurance option (SmartPositioning QA™) configured, the **Image Detail** pane contains graphical instructions for positioning the patient.

Depending on the configuration, either the live camera image or the patient positioning instructions are displayed. Use the **camera** button to toggle between the camera and the patient positioning instructions.

The patient positioning instructions are also visible in the image area on the **Editing** and **Acquisition** windows.

Once the image is acquired, the patient positioning instructions are not visible anymore. To apply patient positioning post-exposure quality assurance, the acquired image can be compared to reference X-ray images in the **patient positioning post-exposure quality assurance** screen on the **Editing** and **Acquisition** windows.

The patient positioning quality assurance scenarios can be customized:

- Link a scenario to exposure types.
- Make a variant of a preconfigured scenario, customizing images, graphical instructions and alternative projections.
- Create scenarios for a new body part.

The customization is done in the **NX Service and Configuration Tool** and in the **SPQA Config Tool** and is license-dependent. Refer to the Key user manual for more information.

Related information

Patient positioning post-exposure quality assurance (SmartPositioning QA™) on page 226

Selecting an alternative projection

Different patient positioning can be applied to acquire the same diagnostic data.

1. To display a list of exposure types with alternatives for the current patient positioning instructions:
   - In the **Examination** window, click the **Alternative Projections** button.

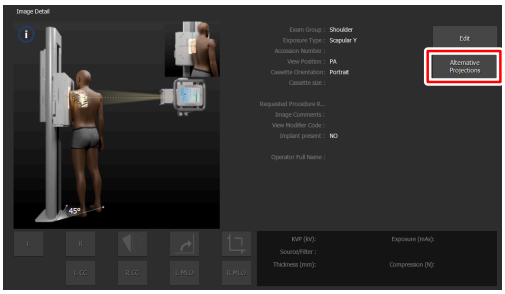


Figure 140: Examination window

   - In the **Editing** or **Acquisition** window, click the **Alternative Projections** button.

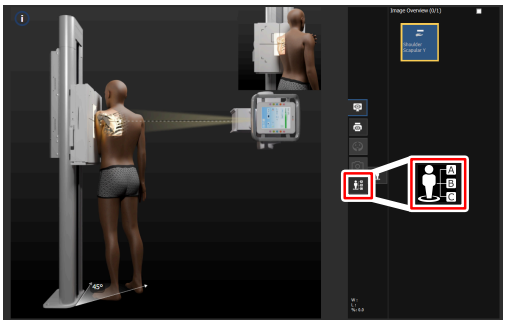


Figure 141: Editing window

   The alternative projections are listed in the **Examination** window.
2. Select an alternative exposure type from the list.

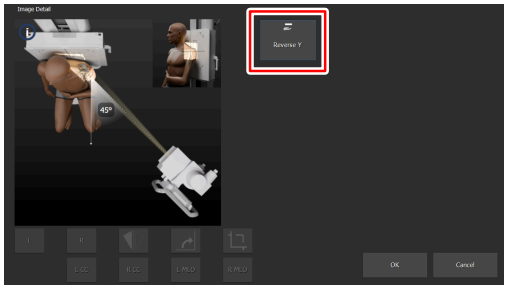


Figure 142: Alternative projections

The exposure type for the exam is updated. The patient positioning instructions for the new exam are displayed.

Adding a patient identification photo

On systems equipped with a collimator camera, the operator can take a snapshot photo of the patient. The photo is used as an extra means to identify the patient.

If the system is configured for asking the patient for consent, a dialog appears when starting the exam, asking if the patient allows taking a webcam photo. The user must ask the patient for consent and confirm the choice in the dialog.

The patient identification photo can be archived.

If a patient identification photo is mandatory, a reminder will be displayed if the exam is closed without adding a patient identification.

To add a patient identification photo:

1. Position the patient and the modality so that the patient's face is visible on the live camera image.

   The live camera image is visible on the tube head display or on the software console. The live camera image is also visible on the **Examination** window.
2. Press the **rotate** button on the tube head display or on the software console to adjust the image orientation.

   Figure 143: Rotate the camera image
3. Press the camera button on the tube head display or on the software console to take a photo.

   Figure 144: Camera button to take a photo using the collimator camera

   The patient identification photo is displayed for 5 seconds. In the **Patient** pane the button is activated that can be used for viewing the patient identification photo.

   Pressing the camera button again will take a new photo and overwrite the original photo.

Rejecting the X-ray image will also reject the patient positioning photo.

Adding a patient to the Manual Worklist

To add a patient to your personal Manual Worklist, select the patient and click **Add to Manual Worklist**. The patient is then automatically added.

Note A record in the Manual Worklist is not unique. This means that you can add a patient to the list several times. If you want to add a patient, check whether the patient is already in the list.

Related information

Manual Worklist pane on page 129

Changing specific image settings

Image settings can be changed. The list of editable fields depends on the configuration of NX.

Most settings can be changed before or after acquisition of the image, to apply exposure settings that are different from the default settings. Examples:

- Exposure type
- View position
- Image laterality
- Cassette orientation

Some settings can only be changed before identification of the cassette. Examples:

- Speed class of a cassette
- Scan resolution

To edit the image details, take the following steps:

1. Make sure the image you want to edit is selected.
2. Click **Edit**.

   The **Edit Image Detail** pane opens on top.

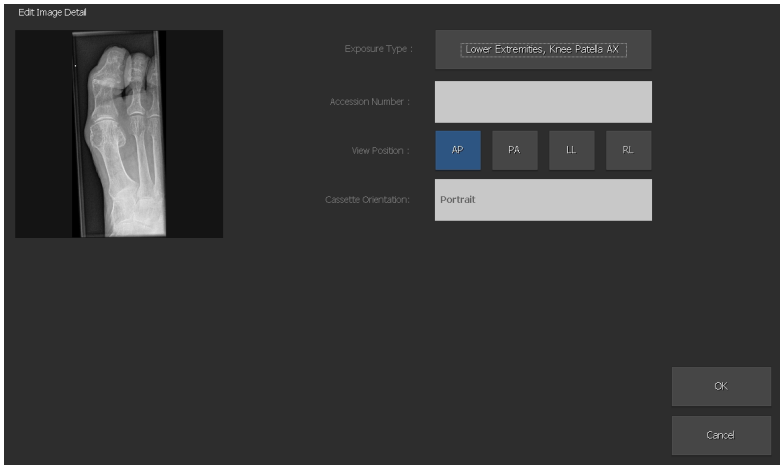


Figure 145: Edit Image Detail pane

3. Edit the settings in the displayed fields.
4. Click **OK** to apply the changes.

Note If you change the View Modifier Code of a Mammography image, the image processing is not changed. Also select the right Exposure Type for the image.

Note The available buttons depend on the configuration in the NX Service and Configuration Tool. Refer to the Key user manual for more information.

Applying collimation and cropping in the Image Detail pane

1. Draw the collimation area on the image on the **Image Detail** pane by clicking and dragging the mouse pointer from one corner of the collimation area towards the opposite corner.

   On a touch screen, touch and drag to draw the collimation area.

   While drawing the collimation area, the operation can be canceled by dragging the mouse pointer outside of the image area.
2. To adjust the collimation, use the manual collimation functions in the **Editing** screen.
3. To undo the collimation, use the **Revert to Original** image button.

   The **Revert to Original** image button is available in the **Editing** screen and can be configured in the set of buttons available in the **Image Detail** pane in the **Examination** window.

Applying collimation to DR images or CR 10-X images has an extra effect of cropping to the outer border of the collimation area.

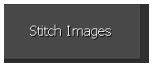
Related information

Applying collimation and cropping manually on page 285
Reverting to the original image on page 233
Performing quality control on the image on page 176

Performing quality control on the image

The **Image Detail** pane has a set of buttons to perform basic operations on an image. The following table explains the functionality of each button. Which buttons are available, is configurable.

Button	**Functionality**
 **Figure 146: Left Marker button**	Adds a left marker. Click the button, and then click the image where you want to place the marker. To remove the marker, select it and then press the **Delete** button.
 **Figure 147: Right Marker button**	Adds a right marker. Click the button, and then click on the image where you want the place the marker. To remove the marker, select it and then press the **Delete** button.
Note: L-R markers can be changed to your local language, but they must be used to indicate 'Left' and 'Right', as it can impact other settings, because adding a left or right marker on an image with laterality 'both' changes the laterality of the image to 'left' respectively 'right'. **Note**: Once the laterality of the image has been set, deleting the marker or adding another marker will not affect the laterality. Change laterality in the Edit Image Detail Pane.	
 **Figure 148: Flip button**	Flips the image from left to right.
 **Figure 149: Rotate Counterclockwise button**	Rotates the image counterclockwise.
 **Figure 150: Rotate Clockwise button**	Rotates the image clockwise.
 **Figure 151: Freehand rotate button**	Rotates the image by an arbitrary angle.
 **Figure 152: Black Border button**	Masks non-relevant areas of the image with black borders. Click the button to apply black borders. Turns on or off the cropping of the non-relevant image areas of DR images or CR 10-X images.

Button	Functionality
 **Figure 153: Stitch button**	NX allows you to combine the separate images of a full leg or a full spine study into a continuous composite image. The software automatically corrects for any distortion or misalignment and calculates a composite image with geometric continuity of body parts. If necessary, you can manually fine-tune the automatically calculated composite image. The composite image can be saved as a new image. Remember, full leg full spine images are shown with a dashed border in the Image preview pane.
 **Figure 154: Full Screen button.**	Switches the active image to full screen mode.
 **Figure 155: High Priority Marker button.**	Enables you to put a high priority marker on the image. The image gets the highest priority in the printing and archiving queues and a high priority DICOM attribute that can be used to make a selection on the archiving station.
 **Figure 156: Revert button**	Click this icon to revert the image to its original state.

Note You can use more extensive tools to prepare the image for diagnosis in the **Editing** window.

Related information

About Editing on page 217

Rejecting an image

By rejecting an image you indicate that the image is not suitable for diagnosis and that a retake is needed. Rejecting an image does not remove the image from the exam.

1. Select the image in the **Image Overview** pane.

   The image is displayed in the **Image Detail** pane.
2. Click **Reject Image**.
3. The **Reject Reason** dialog box opens where you can select a reason to reject the image.

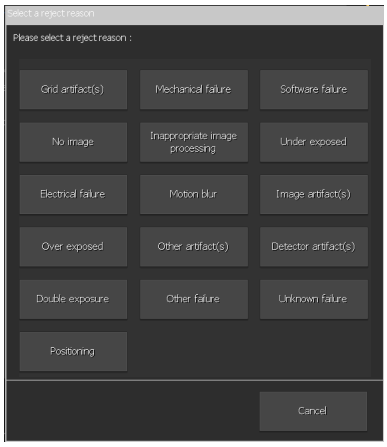


Figure 157: Reject Reason dialog box

Note You can only indicate a reject reason if the Reject Analysis license is activated.

A status icon is displayed on the image and the thumbnail.

Figure 158: Status icon on rejected image

The **Reject Image** button changes to **Unreject Image**.

Images that are derived from the rejected image automatically get the rejected status as well. Copies of the image created using the **Save as new** option are not rejected.

A new image thumbnail is created for repeating the exposure.

Related information

Selecting more than one image in the Image Overview pane on page 157

Unrejecting an image

Unrejecting an image lets you recall your decision to reject the image (e.g. after consulting a radiographer).

1. Select the image in the **Image Overview** pane.

Figure 159: Status icon on rejected image

The image is displayed in the **Image Detail** pane.

2. Click **Unreject Image**.

The status icon is removed. The **Unreject Image** button changes to **Reject Image**.

Note Rejected images will not be sent to the configured destination (printer or PACS) when you click 'Close and Send All'.

Related information

Selecting more than one image in the Image Overview pane on page 157

Go to the prior images of a patient

Procedure:

Click **Prior Images**.

A web browser will be opened and the Web 1000 interface will be shown. There you can browse to the prior images of the patient.

Closing the exam and sending all images

When an exam is closed, the images are sent to a printer or to a PACS archive if configured in the NX Service and Configuration tool. Which destination will be chosen, can be set in the NX Service and Configuration Tool. For more information, refer to the NX Key User Manual.

To close an exam, take the following steps:

1. Select the exam that you want to close from the title bar of the **Examination** window.
2. Click **Close and Send All**.

   The examination is placed in the **Closed Exam** pane. Images which have not yet been sent manually are sent to the destination.

Related information

Closed Exams pane on page 127

Selecting the correct examination after the image has been received

Image data can be edited even before the image is digitized and processed by the assigned exposure parameters. To do this, select the image thumbnail.

To edit image data:

1. Make sure the image you want to edit is selected.
2. In the **Image Detail** pane, click **Edit**.

   The **Edit Image Detail** pane opens on top.

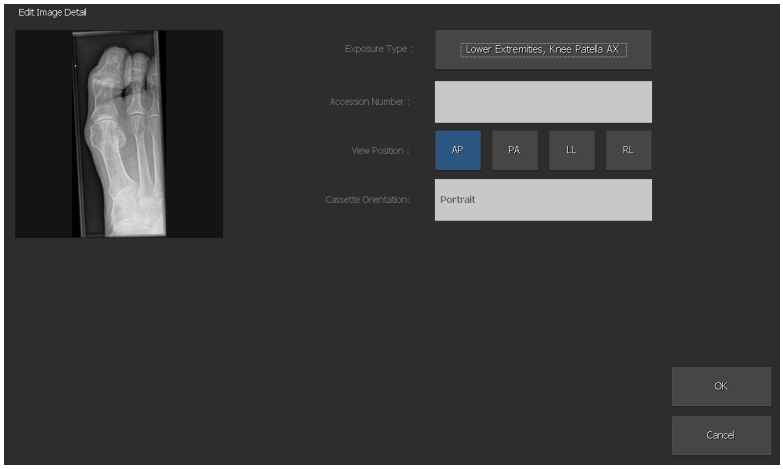


Figure 160: Edit Image Detail pane

3. To change the **Exposure Type**, click the button displaying the exam/exposure name.

   This brings up the **Add Image** pane where you can select the new exam/exposure type.

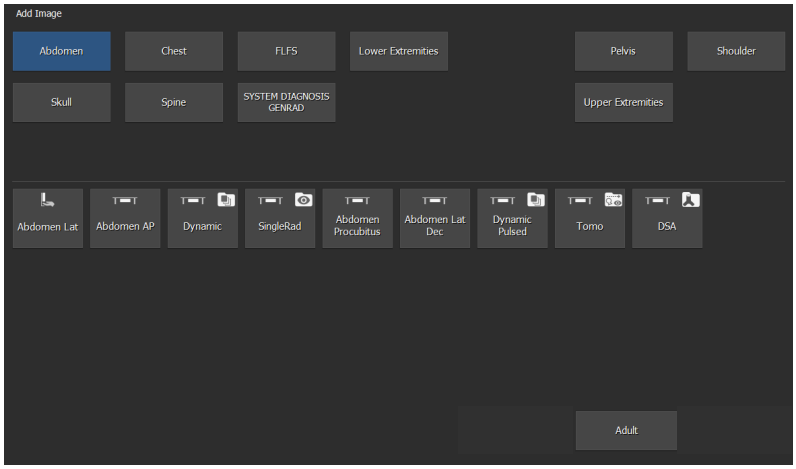


Figure 161: Add Image pane

   Depending on the configuration, the exposure type buttons have a color indication to easily distinguish exposures for the different modality positions: table, wall stand and free exposure.

4. First select the Examination group.
5. Select an exposure. This will bring you back to the **Image Detail** pane.
   Changing the exam/exposure type will change all associated parameters: MUSICA processing, default W/L, view position, etc.

The Escape button can be used to return to the **Edit Exposure** pane without changing the exposure type.

If the exposure has been identified for a mammography cassette type, only mammography examinations can be selected.

In exceptional cases the **Add Image** pane will not contain any exposures. The Escape button can be used to return to the **Edit Exposure** pane.

Related information

Changing specific image settings on page 174

Printing a specific image before the examination is completed

1. Select the image that you want to print by clicking it in the **Image Overview** pane.
2. Click **Print Image**.

   The image is printed. A printer icon appears on the image in the **Exam Overview** pane.

Related information

Selecting more than one image in the Image Overview pane on page 157

Printing all images of an examination in one go

Press **F7** on the keyboard.

All images of the current examination will be printed.

The exam status will not change (open examinations remain open).

Note You can also print a complete exam with the Close and Send All button.

Related information

Closing the exam and sending all images on page 181

Printing images of different exams on one sheet

1. Press **F6** on the keyboard.

   The Multi Exam Sheet window opens.

Figure 162: Multi Examination Print Sheet.

2. Select the Print layout you want to use for printing the sheet.
3. Select an image from any environment and drag and drop it on a cell in the print sheet.
4. Select another image from any environment or any examination and drag and drop it on another cell in the print sheet.
5. If you have finished the composition, press **Print**.

Note You can open the Multi Exam Sheet from any environment. Just press F6 to open the window.

Related information

Changing the layout you want to print on on page 298

Archiving a specific image before the examination is completed

1. Select the image that you want to archive by clicking it in the **Image Overview** pane.
2. Click **Send Image**.

   The image is archived.

Note You can also archive and close a complete exam with the Close and Send All button.

Note You can send images to a destination of your choice in the Editing window.

Related information

Closing the exam and sending all images on page 181
Archiving images on page 237
Selecting more than one image in the Image Overview pane on page 157

Archiving all images of an examination in one go

Press F8 on your keyboard.

All images of the current examination will be archived.

The exam status will not change (open examinations remain open).

Note You can also archive a complete exam with the Close and Send All button.

Related information

Closing the exam and sending all images on page 181

Transferring all images from one exam to another

1. Open the exam in the **Examination** window.
   The images are displayed in the **Image Overview** pane.
2. Click **Transfer Session**.

   The **Transfer Images** wizard opens. All images of the exam are displayed in the wizard. The **Worklist** window is displayed.
3. In the **Worklist** pane, select the exam to which the image should be transferred.

   The patient data is displayed in the wizard.

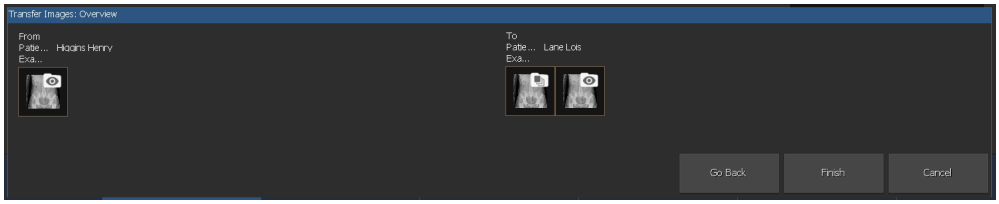


Figure 163: Transfer Images wizard

4. Click **Continue**.

   A transfer overview is displayed to check if all information is correct.
5. Click **Finish**.

   The images are transferred.

Related information

Transferring images from one exam to another on page 140

Acquisition

The acquisition window is available only on DR systems that support dynamic imaging.

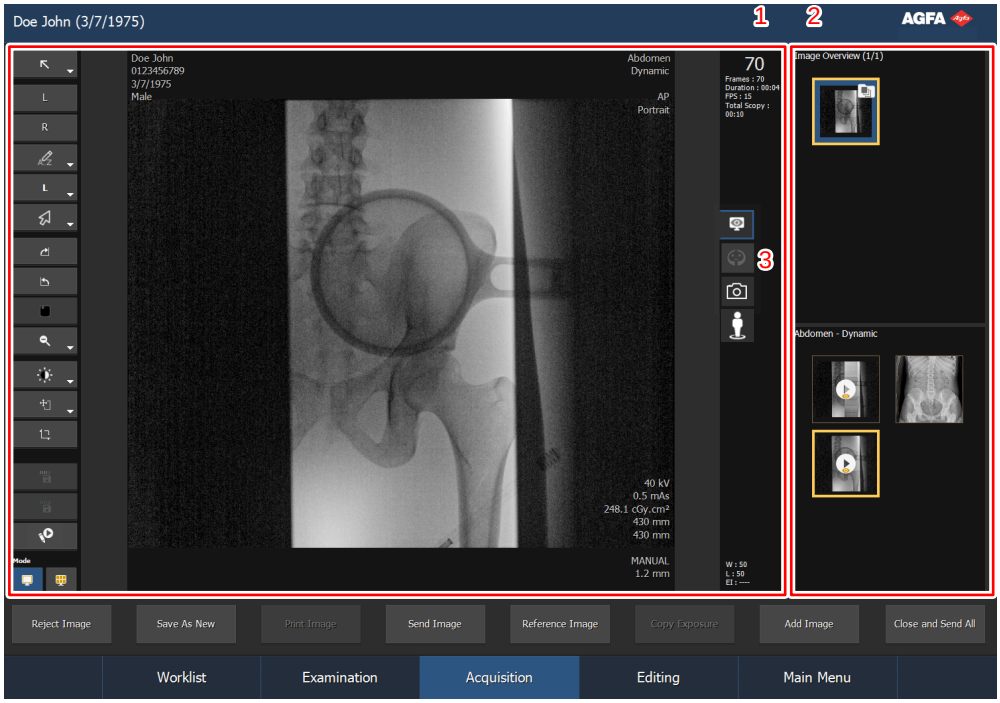
About Acquisition

In the **Acquisition** window, you can view a real-time fluoroscopy image while positioning a patient before performing an exposure. You can also perform examinations that result in a set of static and dynamic images. You can review dynamic images and prepare them for diagnosis. You can perform in-depth operations on an image.

Note If the  icon is displayed next to the patient name, the same examination is being looked at on an NX Central Monitoring System. If someone else is making changes to the same image or exam data, at the same time, some of your changes may be undone by the other user. There may be a short delay between making changes to an image/exam on the In-room NX workstation and seeing these changes on Central Monitoring System and vice-versa.

The Acquisition window has four panes.

- **Dynamic Image** pane: view the real-time or the stored dynamic image and the information about the patient.
- The **dynamic image player** plays dynamic images as a movie. It has controls for adjusting speed and direction, for creating sub-sequences and for editing DSA sequences.
- The **Mosaic Viewer** displays each frame of a dynamic image as a separate image in a grid. It has controls for creating sub-sequences.
- **Image Overview** pane: a thumbnail overview of the images that are included in the exam. Dynamic images are contained in a group. The upper half of the image overview pane contains a thumbnail for the group. The lower half of the image overview pane contains the static and dynamic images that are contained in the group.



1. Dynamic image pane
2. Image overview pane

3. Buttons to switch between acquisition mode, pathology detection, patient positioning photo and patient positioning quality assurance

Figure 164: Acquisition window panes

Extra screens can be accessed that are associated to the current image:

	Acquisition
	Pathology detection
	Patient positioning photo
	Switch to the **Examination** window to select alternative projections for the patient positioning pre-exposure quality assurance image.
	Reference X-ray images for patient positioning post-exposure quality assurance

The extra screens are described in the section about the **Editing** window.

At the bottom of the window, you can also find several action buttons.

Note The available buttons depend on the configuration in the NX Service and Configuration Tool. Refer to the Key user manual for more information.

The **Acquisition** window is not available on an NX Central Monitoring System.

- Dynamic Image pane on page 193
- Fluo groups and rapid sequence groups on page 194
- Digital tomosynthesis groups on page 195
- DSA groups on page 196
- Dynamic image player on page 197
- Controls for editing DSA sequences on page 198
- Controls for creating a minimum/maximum opacity derived image on page 199
- Mosaic viewer on page 200
- Action buttons on page 201

Related information

Managing dynamic images and DSA on page 202
Managing digital tomosynthesis images on page 215
AI Pathology detection screen (CriticalScan™) on page 221
Patient positioning photo (SmartPatientView™) on page 225
Patient positioning pre-exposure quality assurance (SmartPositioning QA™) on page 170
Patient positioning post-exposure quality assurance (SmartPositioning QA™) on page 226
Image Overview pane on page 153

Dynamic Image pane

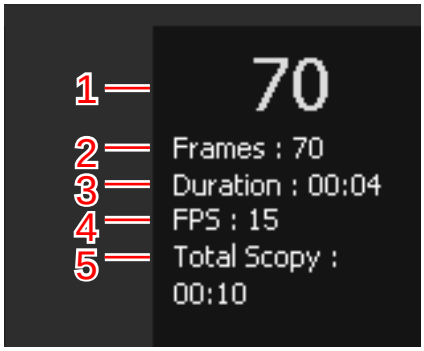
The Dynamic Image pane allows you to select an image of an exam in the Image Overview Pane, view static and dynamic images and make modifications.

Figure 165: Dynamic image pane

Information about the patient, the exposure type and the actual exposure parameters is displayed in the corners of the image.

The information can be hidden or shown by clicking the button to toggle demographics.

Information about the dynamic image is displayed at the right side of the image.



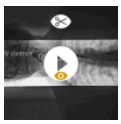
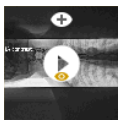
1. Current frame number
2. Total number of frames
3. Duration of the dynamic image
4. Number of frames that were acquired per second
5. Total duration of all fluoroscopy exposures in this examination

Figure 166: Information about the dynamic image

Fluo groups and rapid sequence groups

Dynamic images are part of a fluo group or a rapid sequence group, depending on the application. To display groups, the **Image Overview** pane is split in two halves. The group can be selected in the top half and the contents of the group is displayed in the bottom half of the **Image Overview** pane.

Table 6: Thumbnails for dynamic images

Image	Description	
	Fluo group	
	Rapid sequence group	
	Fluo sequence	
		The status icon indicates that the fluo sequence is not stored and not sent to a PACS archive when clicking **Close and Send All**.
	Rapid sequence	
	The sequence is derived from another sequence	
	The sequence is the concatenation of two or more other sequences	

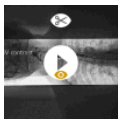
Related information

Image Overview pane on page 153

Digital tomosynthesis groups

Digital tomosynthesis images are part of a digital tomosynthesis group. To display groups, the **Image Overview** pane is split in two halves. The group can be selected in the top half and the contents of the group is displayed in the bottom half of the **Image Overview** pane.

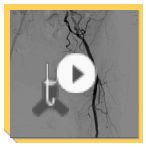
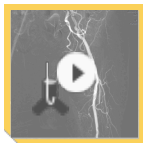
Table 7: Thumbnails for digital tomosynthesis images

Image	Description
	Digital tomosynthesis group
	Digital tomosynthesis group with fluoroscopy for positioning
	Acquisition sequence
	Reconstruction sequence
	The sequence is derived from another sequence

DSA groups

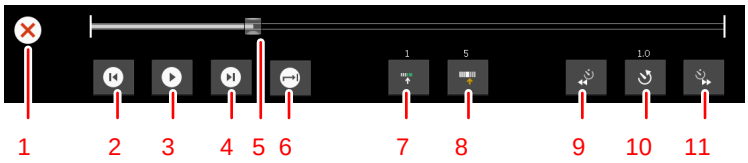
Digital subtraction angiography (DSA) sequences and roadmapping sequences are part of a DSA group. To display groups, the **Image Overview** pane is split in two halves. The group can be selected in the top half and the contents of the group is displayed in the bottom half of the **Image Overview** pane.

Table 8: Thumbnails for DSA images

Image	Description
	DSA group
	DSA sequence
	Roadmapping mask
	Roadmapping sequence If multiple roadmapping workflows are performed, the white triangle at the bottom of the thumbnails provides a visual link between roadmapping sequences and the applied roadmapping mask.

Dynamic image player

The **dynamic image player** plays dynamic images as a movie. It has controls for adjusting speed and direction and for creating sub-sequences.



1. Close the dynamic image player
2. Previous frame
3. Start playing

   Pause playing
4. Next frame
5. Progress indicator

   The current frame number is indicated.
6. Continuous playing

   Stop playing at the end of the sequence.
7. Set the current frame as start of a sub-sequence.

   The start frame number of the selected sub-sequence is indicated.
8. Set the current frame as end of a sub-sequence.

   The end frame number of the selected sub-sequence is indicated.
9. Lower the player speed
10. Reset the player speed.

    The player speed is indicated as a number. Play backward for negative numbers. Play slow for numbers close to 0. Play fast for numbers higher than 1. The original playing speed is indicated as 1.
11. Increase the player speed

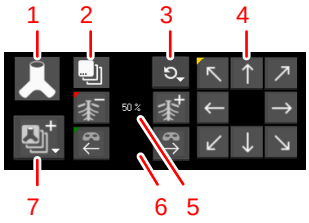
Figure 167: Dynamic image player

Related information

Displaying images in full screen mode on page 277

Controls for editing DSA sequences

The **dynamic image player** and the full screen mode offer extra controls for DSA sequences.



1. Toggle between displaying of the frames with DSA mask image subtracted and displaying of original frames
2. Set the scope for applying new modifications:
   a. applying to the current frame and all following frames (default)

      A new modification will not overlap with an existing modification.
   b. applying to the current frame only
3. Undo the modifications that were applied at this frame
   a. **All** undo all modifications
   b. **Shift** undo the pixel shift modification
   c. **LM** undo the landmarking modification
   d. **Mask** undo the mask modification
4. Apply a pixel shift modification, shifting the mask image relative to the current frame.
5. Apply a landmarking modification, increasing the visibility of the anatomical background for guidance. This can be done by clicking the arrows or by typing in the desired landmarking percentage.
6. Apply a mask modification, selecting another set of frames or a single frame as a mask. This can be done by clicking the arrows or by typing in the frame number(s) to be used
7. Create derived image with minimum/maximum opacity

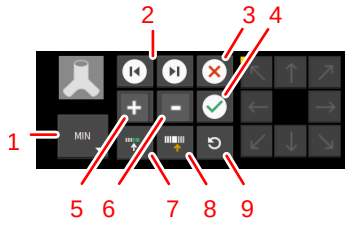
Figure 168: Controls for editing DSA sequences

Related information

Editing a DSA sequence on page 212

Controls for creating a minimum/maximum opacity derived image

The **dynamic image player** and the full screen mode offer extra controls for DSA sequences.



1. Select opacity mode
   a. **MIN** Create a derived image containing the lowest opacity value for each pixel, typically when a negative contrast media has been used during the acquisition of the DSA sequence
   b. **MAX** Create a derived image containing the highest opacity value for each pixel, typically when a positive contrast media has been used during the acquisition of the DSA sequence
2. Navigate through the frames without modifying the selection
3. Cancel creating a derived image
4. Create the derived image
5. Add the current frame to the selection and show the next frame
6. Remove the current frame from the selection
7. Set the current frame as start of a sub-sequence that will be added to the selection
8. Set the current frame as end of a sub-sequence and add the sequence to the selection
9. Remove all frames from the selection

Figure 169: Controls for creating a minimum/maximum opacity derived image

Related information

Creating a minimum/maximum opacity derived image on page 214

Mosaic viewer

Figure 170: Mosaic viewer

The mosaic viewer displays each frame of a dynamic image as a separate image in a grid.

A sub-sequence is selected by clicking the thumbnail for the start frame and the end frame. Undo the selection by clicking one of the selected thumbnails.

A sub-sequence consisting of a set of non-consecutive frames, is selected by clicking the thumbnails for the frames one by one, while holding the CTRL key.

Select all frames by clicking CTRL + A on your keyboard.

The selected frame numbers are indicated in the header:

`[(1) 2...3/4]`

1. Number of frames in the sub-sequence
2. Start frame number of the selected sub-sequence
3. End frame number of the selected sub-sequence
4. Total number of frames in the sequence

Figure 171: Mosaic viewer

Action buttons

Acquisition has several action buttons to perform specific actions. The following table gives a short description of their functionality:

Button	Description
Reject	Rejects or unrejects an image
Prior Images	Go to previous examinations
CATH	Adds a copy of the image to the exam with a dedicated processing applied to enhance visibility of catheters
Save as New	Saves an image as new
Print Image	Prints specific exam images
Send Image	Archives specific exam images
Reference Image	View the current image on a second monitor until the end of the examination
ID	Identifies a cassette
Add Image	Define additional images manually
Close and Send All	Closes the exam and sends all images to a printer or to a PACS archive
Open application, folder or file	Open an external application, folder or file

Related information

Rejecting an image on page 178
Go to the prior images of a patient on page 180
Saving a processed image as new image with enhanced visibility of catheters on page 234
Saving a processed image as new image on page 235
Printing a specific image before the examination is completed on page 184
Archiving a specific image before the examination is completed on page 187
Viewing a reference image on a separate monitor on page 211
Identifying a cassette on page 167
Adding exposures on page 161
Closing the exam and sending all images on page 181
Opening an application, folder or file on page 145

Managing dynamic images and DSA

Viewing dynamic images

1. In the **Image Overview** pane, select a group that contains dynamic images.
2. In the lower half of the **Image Overview** pane, select a dynamic image.

   The dynamic image is displayed in the image page and the sequence is played once at original speed.

   You have following options for viewing the dynamic image:

   - Click the **Play** or **Pause** icon on the thumbnail.

   - Click the image. Push the CTRL key while scrolling the mouse wheel to view the frames.
   - Click the button to display the **Dynamic Image Player**.

   - Click the button to display the **Mosaic Viewer**.

   - Alternatively, go to the **Editing** or the **Acquisition** window and click the **Full Screen** button in the **Zoom** section of the left tool bar. The controls that are available in the **Dynamic Image Player** are also available in full screen mode.

Related information

Dynamic image player on page 197
Mosaic viewer on page 200

Viewing dose information of dynamic images

In the title bar of the bottom half of the **Image Overview** pane, the **Dose Information** button is available.

Figure 172: Dose Information button

1. Click the **Dose Information** button.
   A dialog is displayed containing the X-ray dose information for the images in the dynamic group.
2. Click the **Copy to clipboard** button.
   The information can be pasted in another application.
3. Click **Close** to close the dialog.

Editing dynamic images

Many of the tools that can be applied to static images can also be applied to dynamic images. Tools that are not applicable are grayed out.

Saving the last frame as a derived image

1. In the **Image Overview** pane, select a group that contains dynamic images.
2. Inside the dynamic group, select a rapid sequence or a fluo sequence.
3. Click the **Last Image Hold (LIH)** button to save the last frame of the sequence.

The last frame of the sequence is added as a derived image to the dynamic group and displayed as a new thumbnail in the lower half of the **Image Overview** pane. The thumbnail of a derived image is marked by an icon.

The derived image contains a text annotation specifying that it is a last image hold.

Saving a frame as a derived image

1. In the **Image Overview** pane, select a group that contains dynamic images.
2. Inside the dynamic group, select a rapid sequence or a fluo sequence.
3. Select a frame.
   Use the **dynamic image player** or the **mosaic viewer**.
4. Click the button to save the selected frame.

The selected frame is added as a derived image to the dynamic group and displayed as a thumbnail in the lower half of the **Image Overview** pane. The thumbnail of a derived image is marked by an icon.

The derived image contains a text annotation specifying that it is a saved frame.

Related information

Dynamic image player on page 197
Mosaic viewer on page 200

Saving a sub-sequence

1. In the **Image Overview** pane, select a group that contains dynamic images.
2. Inside the dynamic group, select a rapid sequence or a fluo sequence.
3. Select a sub-sequence.
   Use the **dynamic image player** or the **mosaic viewer**.
4. Click the button to save the selected sequence.

The selected sub-sequence is added as a new sequence to the dynamic group and displayed as a thumbnail in the lower half of the **Image Overview** pane. The thumbnail of a derived sequence is marked by an icon.

Figure 173: Derived sequence

Figure 174: Derived sequence consisting of a set of non-consecutive frames

Related information

Dynamic image player on page 197
Mosaic viewer on page 200

Merging sequences

Fluo sequences, rapid sequences or derived sequences can be merged into a new sequence.

1. In the **Image Overview** pane, select a group that contains dynamic images.
2. Inside the dynamic group, select a sequence and drag it to the bottom of the screen.

   The **Concatenate Sequences** wizard opens, showing the thumbnail of the selected sequence.

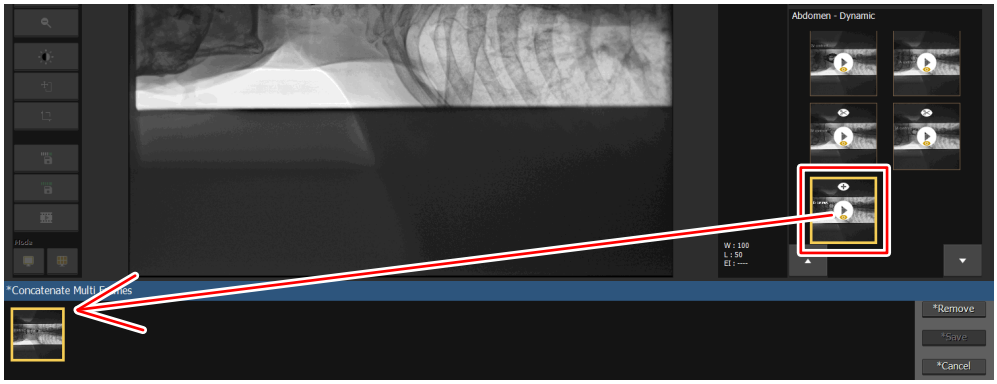


Figure 175: Concatenate sequences

3. Add more sequences by dragging them to the list.

   The sequences must be of the same type.
4. Click **Save**.

A new sequence is added to the dynamic group, consisting of a concatenation of the selected sequences. The thumbnail of a merged sequence is marked by an icon.

Previewing Collimation

After acquisition of a dynamic image, collimator adjustments can be previewed on the acquired image.

1. In the **Image Overview** Pane, select a dynamic group.
2. Acquire a rapid sequence or a fluo sequence or a static image.
   The acquired image is displayed.
3. Adjust the setting of the collimator.
   A set of lines is drawn on the image, providing a preview of how the collimation area will look like when a next exposure is made without repositioning the patient. Collimation borders that exceed the frame size of the dynamic image are drawn orange.

Note For oblique exposures, the previewed collimation area may be smaller than the actually collimation area.

Viewing a reference image on a separate monitor

1. In the **Image Overview** pane, select a dynamic group.
2. Acquire one or more images or sequences.
3. Select the thumbnail for one of the acquired images or sequences.
4. Click the **Reference Image** button.

The selected image or sequence is displayed on the separate monitor for as long as the examination remains open and no other examination is selected.

The reference image window can be resized to occupy half of the screen, to leave room for another application.

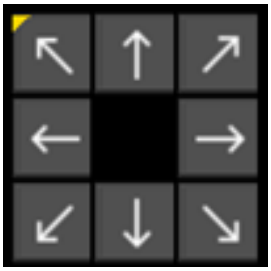
Editing a DSA sequence

1. In the **Image Overview** pane, select a DSA group.
2. Inside the group, select a DSA sequence.
3. Click the button to display the **Dynamic Image Player**.

   The **Dynamic Image Player** is displayed.
4. Set the scope of the modification.
   - Apply the modification to this frame and all following unmodified frames.

     
   - Apply the modification to this frame only.

     
5. Apply one or more modifications to the DSA sequence.
   - Apply a **pixel shift** modification, shifting the mask image relative to the current frame.

     A yellow dot above the progress indicator shows on which position in the sequence the pixel shift modifcation has been applied. If the modification applies to the following frames, a yellow line is drawn from the dot.

     
   - Apply a **landmarking** modification, increasing the visibility of the anatomical surroundings of the blood vessels.

     A red dot inside the progress indicator shows on which position in the sequence the landmarking modifcation has been applied. If the modification applies to the following frames, a red line is drawn from the dot.

     
   - Apply a **mask** modification, selecting another set of frames to compose the mask image.

A green dot below the progress indicator shows on which position in the sequence the mask modifcation has been applied. If the modification applies to the following frames, a green line is drawn from the dot.

If a modification needs adjustment, go to the frame on which it is applied and adjust the applied settings.

If a modification must be removed, go to the frame on which it is applied and click the **undo** button and select from the menu the modification that must be removed.

Figure 176: Undo button with menu to select modification

- **All** undo all modifications
- **Shift** undo the pixel shift modification
- **LM** undo the landmarking modification
- **Mask** undo the mask modification

If a modification is applied to a single frame and you want to apply it to all following frames, move to the frame that follows directly after the modfied frame and remove the modification at that location.

The modified sequence is stored.

Related information

Interactively adjusting the MUSICA2/MUSICA3 image processing parameters on page 294

Creating a minimum/maximum opacity derived image

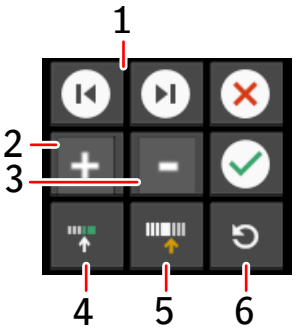
1. In the **Image Overview** pane, select a DSA group.
2. Within this group, select a DSA sequence.
3. Click the button to display the **Dynamic Image Player**.

   The **Dynamic Image Player** is displayed.
4. Click the **Minimun/Maximum Opacity** button and select the correct mode.

   - **MIN** Create a derived image containing the lowest opacity value for each pixel, typically when a negative contrast media has been used during the acquisition of the DSA sequence.

   - **MAX** Create a derived image containing the highest opacity value for each pixel, typically when a positive contrast media has been used during the acquisition of the DSA sequence.

   The controls for creating a minimum/maximum opacity derived image are displayed.
5. Select the frames that will be used to compose the derived image.



   1. Navigate through the frames without modifying the selection
   2. Add the current frame to the selection and show the next frame
   3. Remove the current frame from the selection
   4. Set the current frame as start of a sub-sequence that will be added to the selection
   5. Set the current frame as end of a sub-sequence and add the sequence to the selection
   6. Remove all frames from the selection

   Figure 177: Controls for creating a minimum/maximum opacity derived image
6. Confirm the selection and create the derived image.

The derived image is added to the dynamic group and displayed as a thumbnail in the lower half of the Image Overview pane. The thumbnail of a derived image is marked by an icon.

The derived image contains a text annotation specifying that it is a minimum or maximum opacity image.

Managing digital tomosynthesis images

Adjusting the reconstruction settings for digital tomosynthesis

An acquisition sequence can be used to create more than one digital tomosynthesis reconstruction. Different reconstruction parameters can be used than those used for the initial reconstruction, e.g. to adjust the region of interest or the processing quality.

1. In the **Image Overview** pane of the **Examination** window or of the **Acquisition** window, select a digital tomosynthesis group.
2. Inside the digital tomosynthesis group, select the acquisition sequence.
   The **DTS** button is displayed.
3. Click the **DTS** button.

   The **DTS Parameters** dialog is displayed.

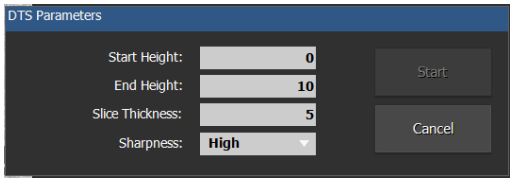


Figure 178: DTS Paramters

4. Fill in the parameters for the reconstruction.

Table 9: DTS Parameters

Start Height (cm)	The height of the first slice of the reconstruction sequence, relative to the tabletop.
End Height (cm)	The height of the last slice of the reconstruction sequence, relative to the tabletop.
Slice Thickness (mm)	The thickness of the slides.
Sharpness	Increasing the sharpness will improve the quality of the image but the image processing will take longer

5. Click **Start**

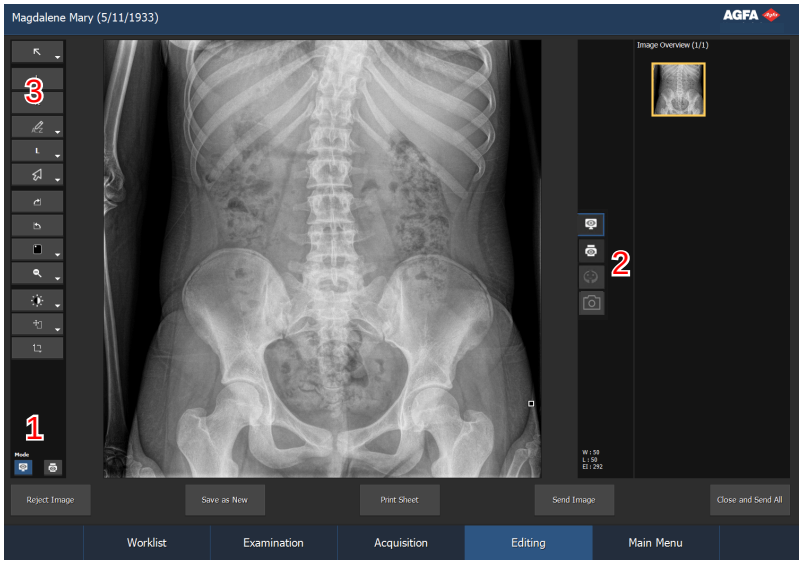
A new reconstruction sequence is added to the digital tomosynthesis group.

Editing

About Editing

In the **Editing** window, you can perform in-depth operations on an image. The left toolbar can be configured for use by mouse pointer or by touch screen. For annotations that require precise positioning on the image, the use by mouse pointer is the most efficient.

Note If the  icon is displayed next to the patient name, the same examination is being looked at on an NX Central Monitoring System. If someone else is making changes to the same image or exam data, at the same time, some of your changes may be undone by the other user. There may be a short delay between making changes to an image/exam on the in-room NX workstation and seeing these changes on Central Monitoring System and vice-versa.



1. Buttons to switch between normal mode and print mode
2. Buttons to switch between normal mode, print mode, pathology detection, patient positioning photo and patient positioning quality assurance
3. Toolbar

Figure 179: Editing window in Normal mode

The **Editing** window has two modes:

	Normal mode: In this mode Print tools are not available, it is focussed on softcopy users.
	Print mode: In this mode print tools are added to the tool pallet, images are displayed in a WYSIWYG print preview.

The following tool sets are available in both modes. The tools are displayed in several task-specific sections:

- **Select**: general tools to manage the images.
- **Annotations**: add annotations to images.
- **Flip-Rotate**: change the geometry of images.
- **Zoom**: change the view of an image.
- **Image Processing**: tools to process images.

The **Print** mode has an additional tool set to prepare the image for printing.

In normal mode, extra screens can be accessed that are associated to the current image:

	Pathology detection screen
	Patient positioning photo
	Switch to the **Examination** window to select alternative projections for the patient positioning pre-exposure quality assurance image.
	Reference X-ray images for patient positioning post-exposure quality assurance

An overview of all the images in an exam is always displayed on the right side of the window, in the **Image Overview** pane.

Depending on the mode you are in, when selecting an image in the **Image Overview** pane, the image will be displayed in the display area (Normal Mode) or the print area (Print Mode).

At the bottom of the window, you can also find several action buttons.

Note The available buttons depend on the configuration in the NX Service and Configuration Tool. Refer to the Key user manual for more information.

- Normal mode on page 219
- Print Mode (P) on page 220
- AI Pathology detection screen (CriticalScan™) on page 221
- Patient positioning photo (SmartPatientView™) on page 225
- Patient positioning post-exposure quality assurance (SmartPositioning QA™) on page 226
- Action buttons on page 229

Related information

Managing images on page 230
Rotating or flipping an image on page 239
Adding annotations to an image on page 245
Using the measurement tools on page 264
Zooming in or out on an image on page 275
Processing images on page 282
Printing images on page 297
Image Overview pane on page 153
Selecting an alternative projection on page 170

Normal mode

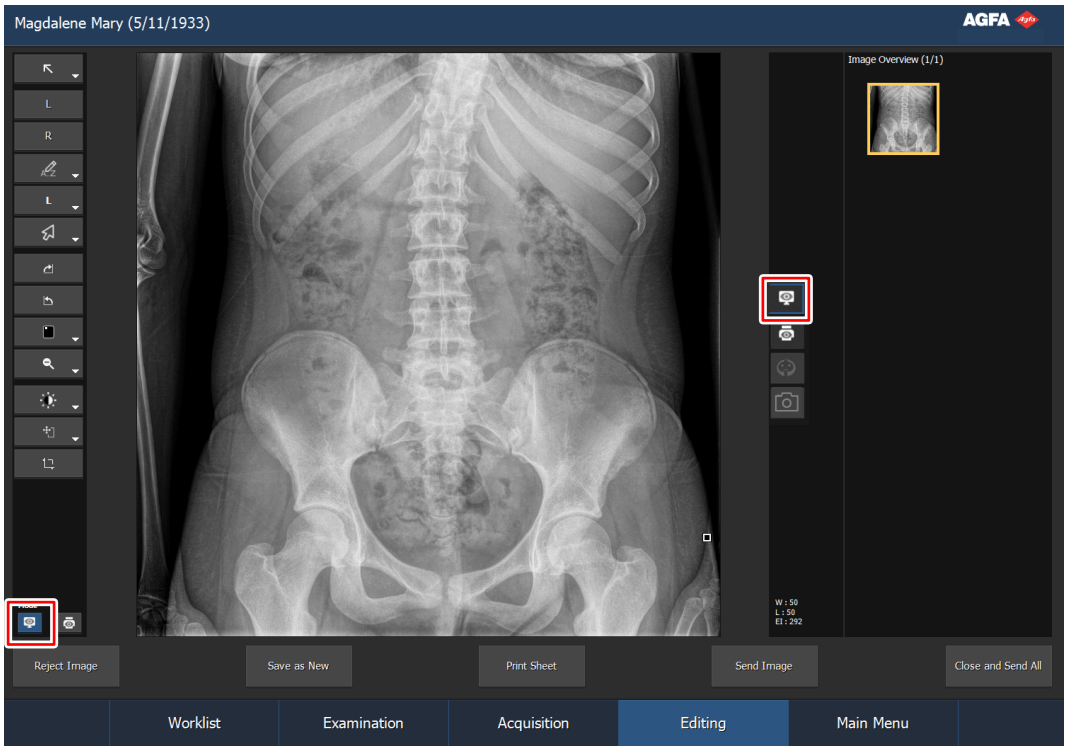


Figure 180: Editing Window in Normal mode

The **Normal** mode allows you to select an image of a study in the Image Overview Pane, display it in detail and make modifications to it.

It contains three main parts:

- A set of tools to perform advanced processing on an image. The tools are grouped in several task-specific sections:
- • Selecting images
  • Adding annotations to an image and using the measurement tools
  • Rotating or flipping an image
  • Zooming in or out on an image
  • Processing images
- An area where the selected image is displayed.
- The **Image Overview** pane, where you select the image that will be displayed.

Print Mode (P)

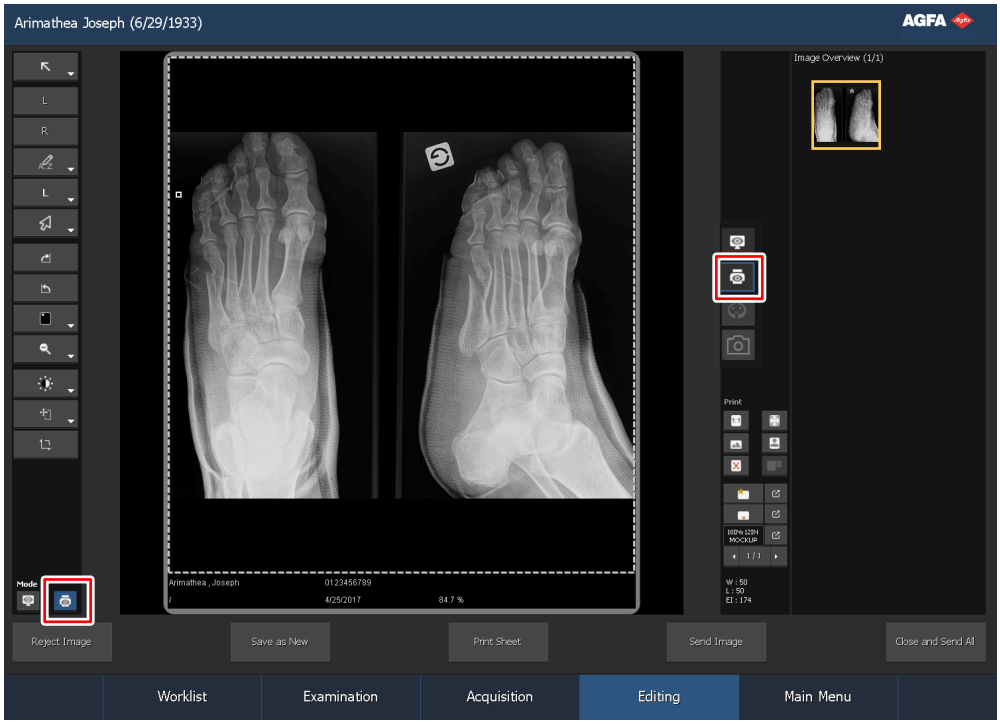


Figure 181: Editing window in Print Mode

The **Print** mode allows you to select an image of a study in the **Image Overview** Pane, display it to the print area and make modifications to prepare it for printing.

It contains four main parts:

- A set of tools to perform advanced processing on an image. The tools are grouped in several task-specific sections:
  - Selecting images
  - Adding annotations to an image and using the measurement tools
  - Rotating or flipping an image
  - Zooming in or out on an image
  - Processing images
- A print area where images are displayed on the print sheet. Multiple images can be displayed on one sheet. You can browse between the sheets with the arrow buttons below the print tool section.
- A set of specific print tools to define the printing settings of the images.
- The **Image Overview** pane, where you click the image that you want to print and drag it to the print area. For more information, see below.

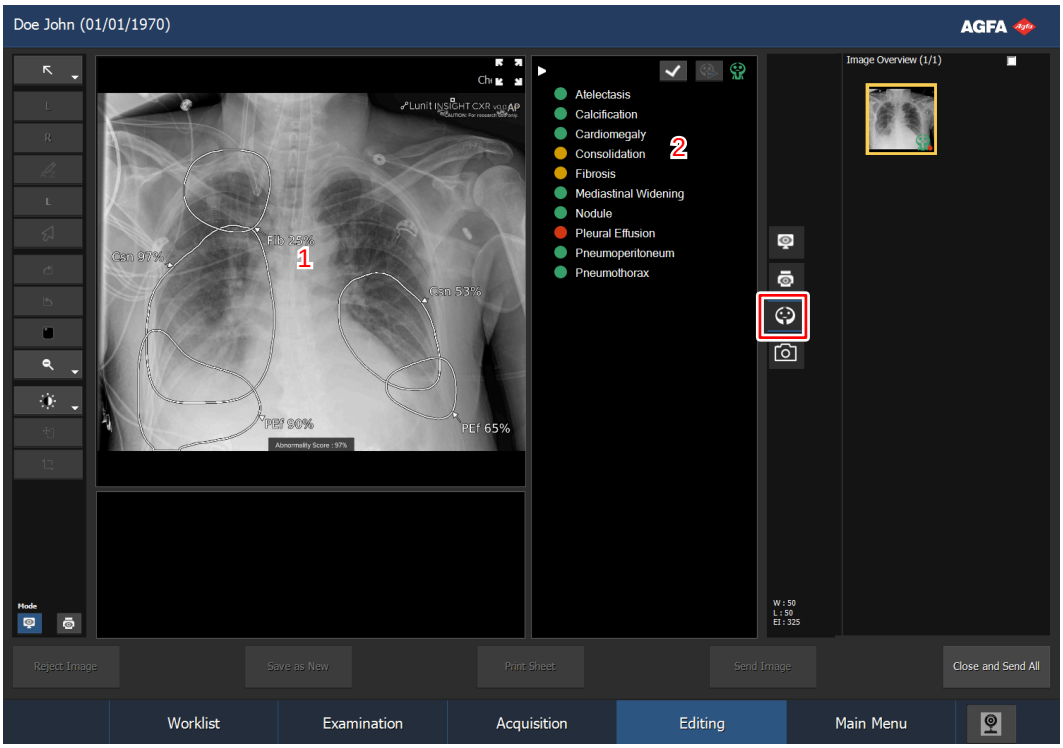
Note The image will be displayed as it will appear on the print sheet. In case of true size printing, the edges of the image may not be visible. In order to see the full image, use the zoom tools in the editing screen.

Note Thumbnails can be dragged from the Image Overview pane to an image cell.

Related information

Printing images on page 297

AI Pathology detection screen (CriticalScan™)



1. Pathology detection image
2. Pathology detection report

Figure 182: Pathology detection screen

On systems equipped with an AI Pathology Detection option (CriticalScan™), a report is generated that contains a list of findings and a derived X-ray image. The derived image is stored in the exam and linked to the X-ray image. The derived image can be displayed in the **Editing** and **Acquisition** windows.

The derived image can be archived. Changes applied to derived images for pathology detection are not burnt into the image, but saved separately in a DICOM Grayscale Softcopy Presentation State object, if supported by the archive.

Related information

Reviewing the pathology detection report on page 221
Pathology detection status information on page 156

Reviewing the pathology detection report

Exams and image thumbnails that are configured for pathology detection are marked with status icons.

The icons represent Liv, a brand for intelligent radiology solutions.

Figure 183: Liv

Following statuses require the special attention of the operator:

Table 10: Statuses of AI pathology detection that require attention from the operator

	The image has not been processed. Pathology detection must be started by the user.
	The report is available. A pathology has been found and an alarm has been raised, that must be acknowledged by the operator. A blinking pathology detection status icon is displayed if there's an exam that contains images with a pathology to be acknowledged: • in the **Examination** window in the drop-down list with open exams and also next to the drop-down list if one of the open exams contains images with a pathology to be acknowledged • in the **Worklist** window in the **Worklist** pane or the **Closed exams** pane
	An error has occurred. No pathology detection report can be generated.

If one or more pathologies are configured to raise an alarm, a message is displayed as soon as the pathology detection report is available and if one of the configured pathologies is found. The message has a button to open the AI pathology detection screen.

Pathology detection depends on a correct exposure type setting and correct image orientation. It is advised to activate automatic rotation when images are automatically submitted for pathology detection. If the image is modified after the pathology detection report has been generated (e.g. rotated) or if the exposure type is modified, the pathology detection report is deleted.

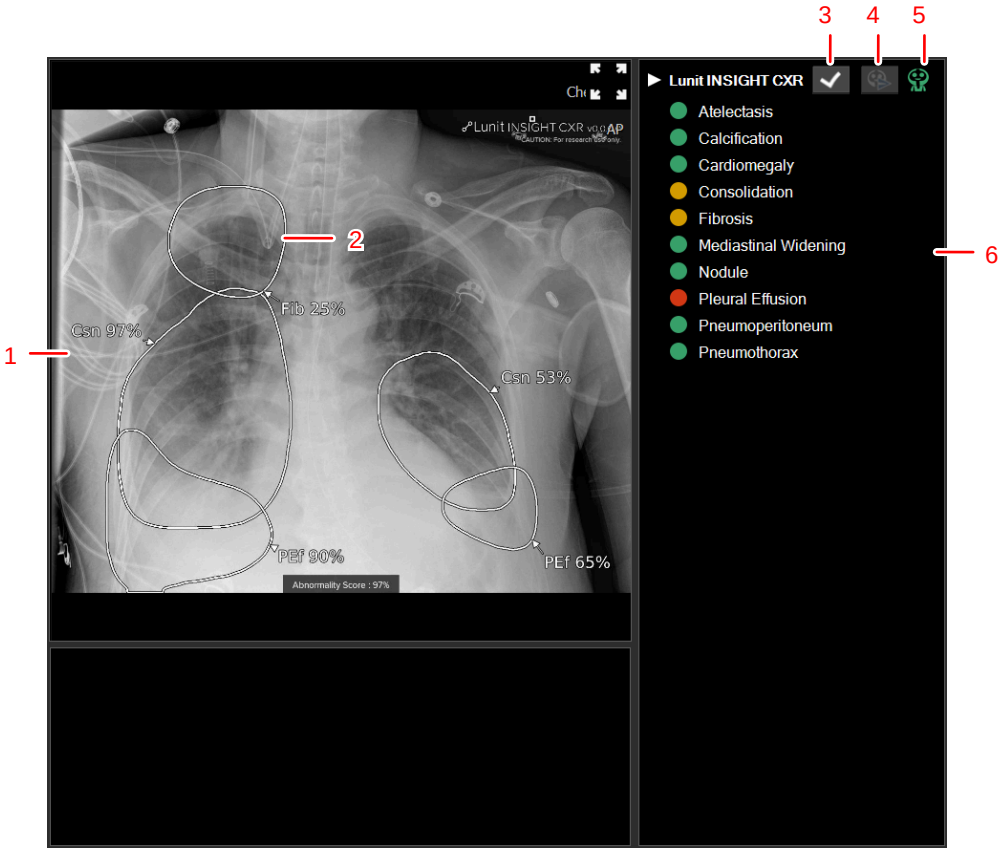
To review the pathology detection report:

1. Open the image in the **Acquisition** or **Editing** window.
2. Navigate to the **pathology detection** tab.

The **pathology detection** screen is displayed.

3. If pathology detection has not yet been performed, click the **AI pathology detection** button to manually start processing the image.

4. Review the list of detectable pathologies.



1. Pathology detection image
2. Annotations on the image indicating the location and type of the detected pathologies.
3. Button to acknowledge all pathologies marked with a red dot
4. Button to start processing the image if it is not started automatically
5. Status of AI pathology detection of the open image
6. Pathology detection report; pathologies marked with a red dot must be acknowledged

The derived image is displayed, visualizing the detected pathologies.The suspicious areas for chest abnormalities are indicated.

Detected pathologies are indicated in the list of detectable pathologies using status icons.

Table 11: Status of detectable pathologies in the open image

	No pathology found.
	A pathology has been found. No alarm raised.
	A pathology has been found and an alarm has been raised.
	A pathology has been found and the alarm has been acknowledged by the operator.

5. Acknowledge the detected pathologies marked with a red dot, by clicking the pathology in the list.

   Acknowledge all detected pathologies by clicking this button:

   If the exam is closed while there are detected pathologies that have not yet been acknowledged by the operator, the system navigates to the pathology detection screens for each image, before closing the exam.

Related information

Pathology detection status information on page 156
Lunit INSIGHT CXR on page 362

Patient positioning photo (SmartPatientView™)

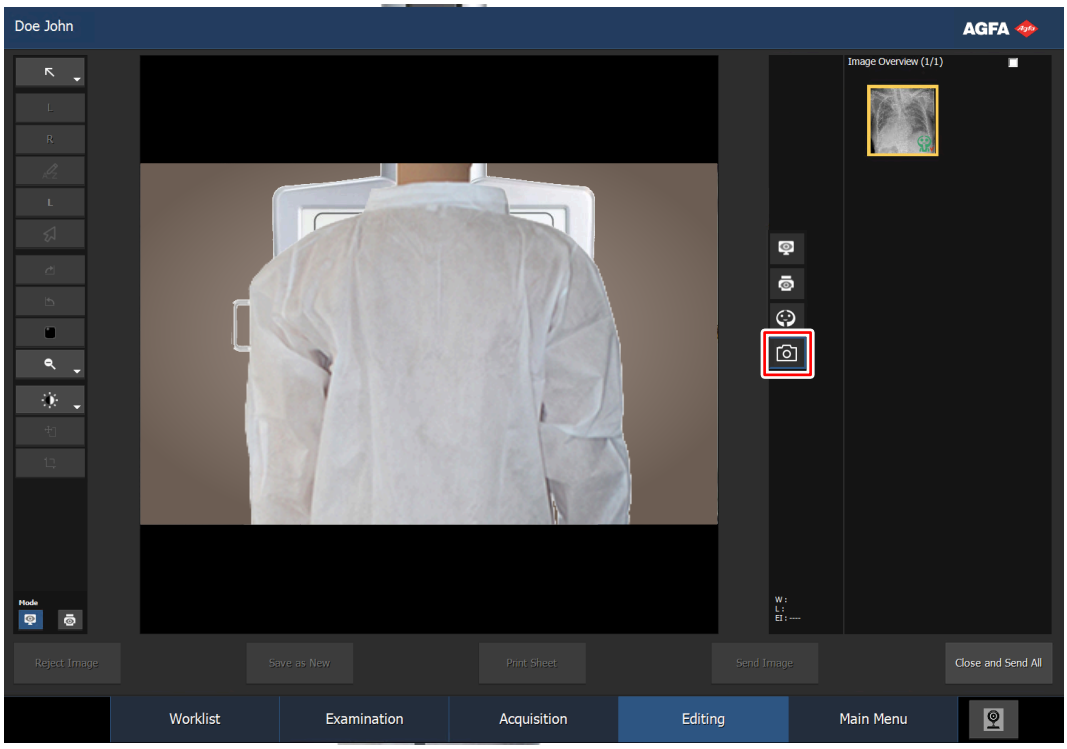


Figure 184: Patient positioning image

On systems equipped with a collimator camera and a patient positioning photo option (SmartPatientView™), a snapshot photo of the patient is taken at the moment of the exposure. The photo is used as a reference to the patient's position. The positioning photo is stored in the exam and linked to the X-ray image. The positioning photo can be displayed in the **Editing** and **Acquisition** windows.

If the system is configured for asking the patient for consent, a dialog appears when starting the exam, asking if the patient allows taking a webcam photo. The user must ask the patient for consent and confirm the choice in the dialog.

The positioning photo can be archived.

Rejecting the X-ray image will also reject the positioning photo.

To erase the positioning photo, open the **Edit patient** pane in the **Examination** window and withdraw the patient consent. All positioning photos in the current exam will be erased, as well as the patient identification photo.

Patient positioning post-exposure quality assurance (SmartPositioning QA™)

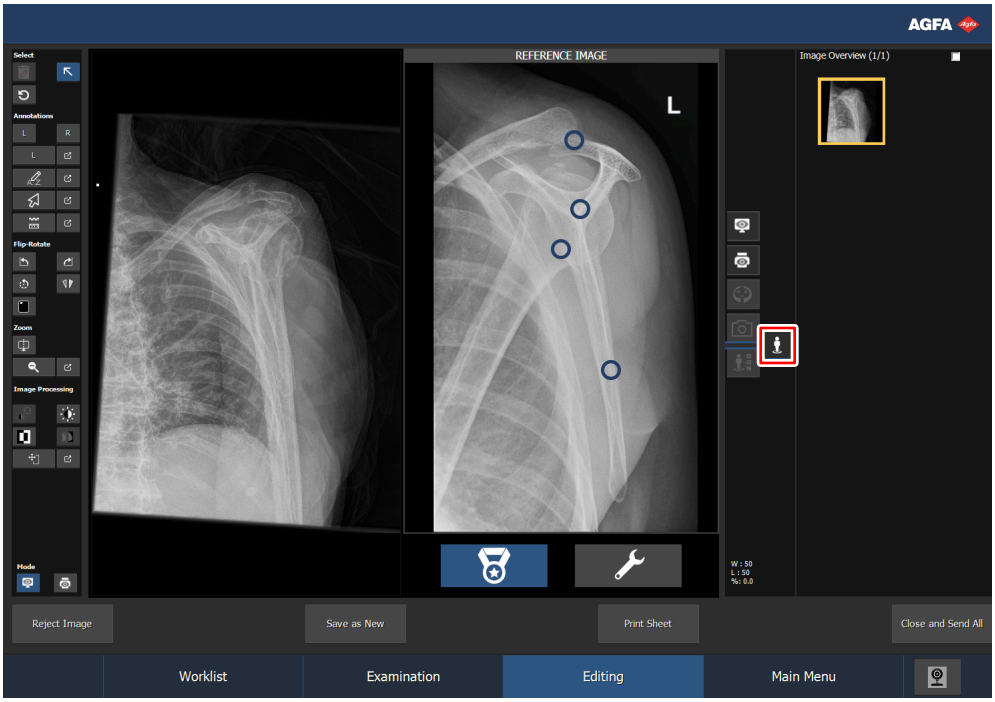


Figure 185: Patient positioning quality assurance screen

On systems equipped with a patient positioning quality assurance option (SmartPositioning QA™), a set of reference X-ray images can be consulted. The reference images are displayed side by side with the acquired image and visually highlight quality criteria to help performing quality control on the acquired image. A set of reference images and quality points is called a scenario and is linked to one or more body parts and examinations. The patient positioning quality assurance screen can be displayed in the **Editing** and **Acquisition** windows

The patient positioning quality assurance scenarios can be customized:

- Link a scenario to exposure types.
- Make a variant of a preconfigured scenario, customizing images and quality points.
- Create scenarios for a new body part.

The customization is done in the **NX Service and Configuration Tool** and in the **SPQA Config Tool** and is license-dependent. Refer to the Key user manual for more information.

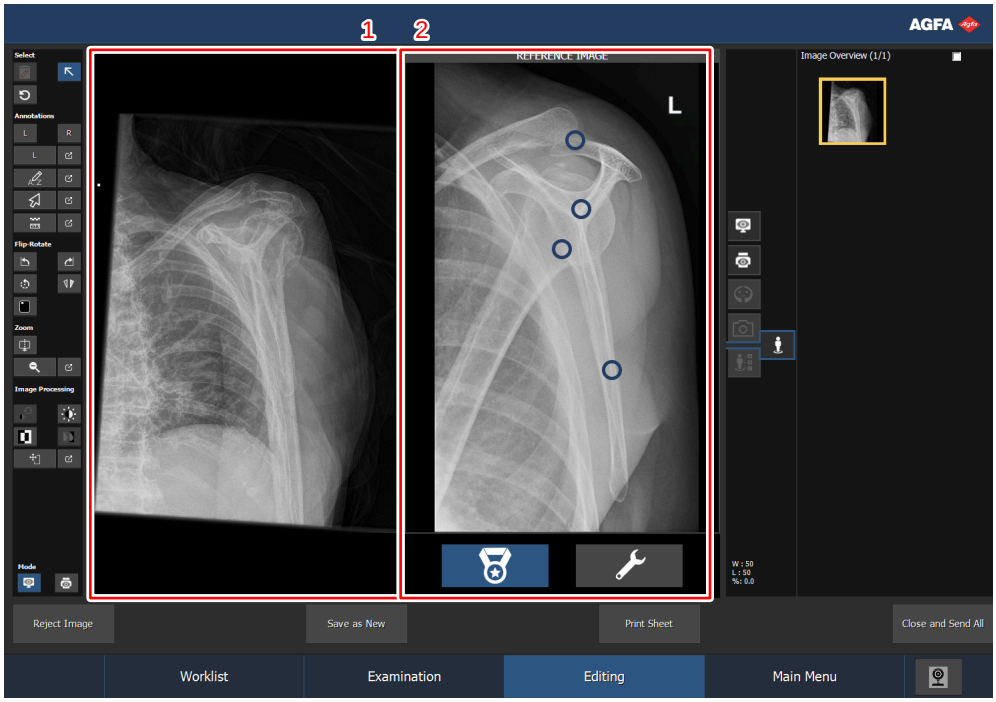
Related information

Patient positioning pre-exposure quality assurance (SmartPositioning QA™) on page 170

Using the reference images for patient positioning post-exposure quality assurance

1. Open the image in the **Editing** or **Acquisition** window.
2. Navigate to the patient positioning post-exposure quality assurance tab.

The image pane is split in half. On the left, the acquired X-ray image is displayed and on the right the reference images can be navigated for patient positioning quality assurance.



1. Acquired X-ray image
2. Reference images for patient postitioning quality assurance

Figure 186: Patient posititioning post-exposure quality assurance screen

Two types of reference images are available:

Table 12: Types of reference images

	Reference image
	Common error images

3. Check the reference X-ray image.

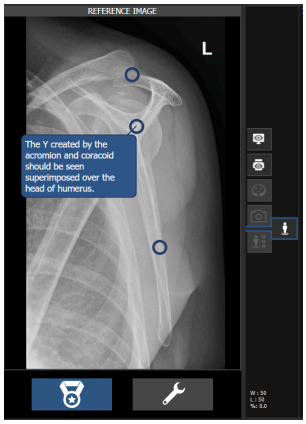


Figure 187: Reference image

4. Move the mouse over the highlighted quality point to show the instruction for each quality check.

   On a touch screen, touch the quality point to show the instruction and touch again to hide.

Figure 188: Quality point

5. Check the common error images

Figure 189: Common error images

The images can be navigated using the arrow buttons.

A common error image may contain embedded images or instructions that can be viewed by clicking the **info** button.

Figure 190: Info button

Action buttons

Editing has several action buttons to perform specific actions. The following table gives a short description of their functionality:

Button	Description
Reject	Rejects an image
CATH	Adds a copy of the image to the exam with a dedicated processing applied to enhance visibility of catheters
Save as New	Saves an image as new
Print Sheet	Prints the image
Send Image	Places the image in an archive
Close and Send All	Closes the exam and sends all images to a printer or to a PACS archive
Open application, folder or file	Open an external application, folder or file

Related information

Rejecting an image on page 178
Saving a processed image as new image with enhanced visibility of catheters on page 234
Saving a processed image as new image on page 235
Printing the images of a print sheet on page 236
Archiving a specific image before the examination is completed on page 187
Closing the exam and sending all images on page 238
Opening an application, folder or file on page 145

Managing images

Selecting an object on the image

Figure 191: Select button

To select an object on an image (for example: an annotation):

1. Select an image in the **Image Overview** pane.
2. Click on the following icon.

3. Click on the object to select it.

Removing image objects

Figure 192: Remove button

To remove an object (for example: an annotation) from an image:

1. Select an image in the Image Overview pane.
2. Select the object.
3. Click on the icon or press the Delete button.

   The object is now removed.

Reverting to the original image

Figure 193: Revert button

Click this icon to revert the image to its original state.

Note When pressing the **Revert To Original** image button, all changes to the image will be lost. Operations that change the settings in the **Edit Image Detail** pane, are not undone (e.g. flipping the image is not undone, because it changes the view position). Automatic rotation is also kept.

Saving a processed image as new image with enhanced visibility of catheters

The ‘CATH’ option allows you to create a copy of the image with a dedicated processing applied to enhance visibility of catheters.

Note The availability of this option depends on the exposure type and on the configuration in the NX Service and Configuration Tool. Refer to the Key user manual for more information.

To save a processed image as a new image with enhanced visibility of catheters:

1. Select an image in the **Image Overview** pane.
2. Click **CATH** (a copy is created with dedicated processing).

   The new image contains a marker and a comment to indicate that a dedicated image processing is applied.

   Warning: These images should only be used for the purpose of enhanced viewing of catheters.

Saving a processed image as new image

The ‘Save as new’ option allows you to create copies of the same image, e.g. one processed for soft tissue, another processed for bone structure.

To save a processed image as a new image:

1. Select an image in the **Image Overview** pane.
2. Click **Save as New** (a copy is created).
3. Select the copy.
4. Reprocess the image.

Printing the images of a print sheet

To print all images of a print sheet:

1. Open the exam in **Print** mode.
2. Select the image of your choice by browsing through the print sheets of the exam with the arrow buttons below the printing tool section.

   The image is displayed in the print area.
3. Click **Print Sheet**.

   The sheet is printed. A printer icon will appear on the images in the **Exam Overview** pane.

Note You can also print a complete exam with the Close and Send All button.

Note Printing all images of an exam or printing images from multiple exams on one sheet is also possible. Refer to “Printing images”.

Related information

Print Mode (P) on page 220
Closing the exam and sending all images on page 181
Printing images on page 297

Archiving images

You can archive images by sending them to an archiving device. When sending only one image of an exam, the exam will not be closed.

To archive a specific image of an exam, take the following steps:

1. Click **Send Image**.

   The **Select a destination** window opens.

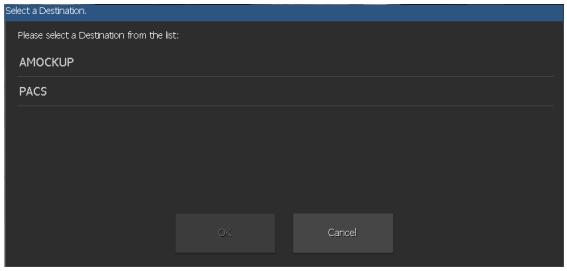


Figure 194: Select Destination window

2. Select the **Archive Device** from the list and click **OK**.

   The image is archived.

Note You can also archive and close a complete exam with the Close and Send All button.

Related information

Closing the exam and sending all images on page 181

Closing the exam and sending all images

Note The destinations to which images are sent depend on the configuration in the NX Service and Configuration Tool. Refer to the Key user manual for more information.

When an exam is closed, the images are sent to a printer or to a PACS archive (if configured).

To close an exam, take the following steps:

Click **Close and Send All**.

The images are sent to the printer or PACS archive. The exam is placed in the **Closed Exams** pane.

Related information

Closed Exams pane on page 127

Rotating or flipping an image

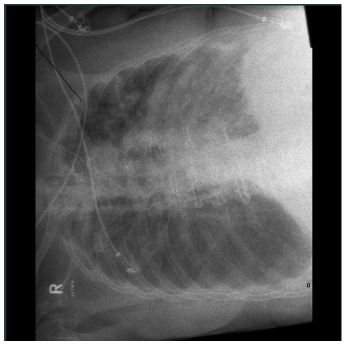
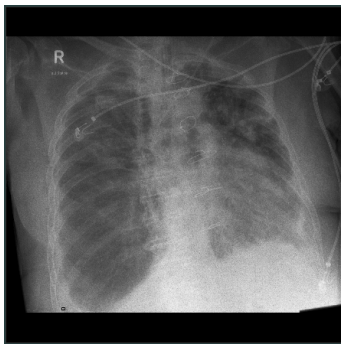
You can access the rotating and flipping functions in the **Flip-Rotate** section of the left tool bar.

Rotating an image clockwise

Figure 195: Rotate button

You can rotate an image 90° clockwise.

The following table displays the effect of the rotation:

	
Original position	Image rotated clockwise

Procedure

1. Select an image in the **Image Overview** pane.
2. Click on the following icon.

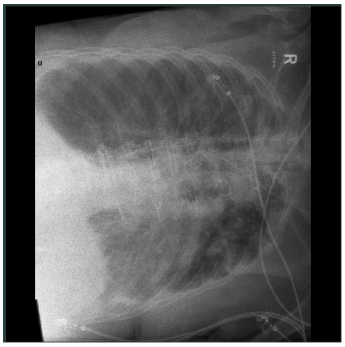
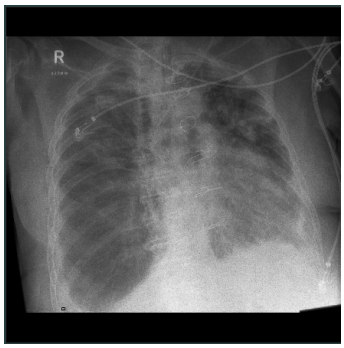
   The image is rotated.

Rotating an image counterclockwise

Figure 196: Rotate Counterclockwise button

You can rotate an image 90° counterclockwise.

The following table displays the effect of the rotation:

	
Original position	Image rotated counterclockwise

Take the following steps:

1. Select an image in the **Image Overview** pane.
2. Click on the following icon.

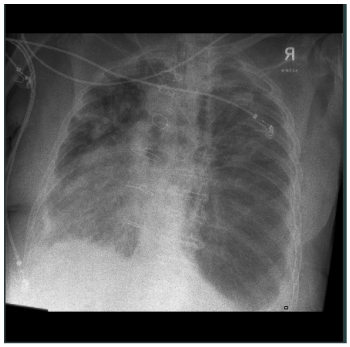
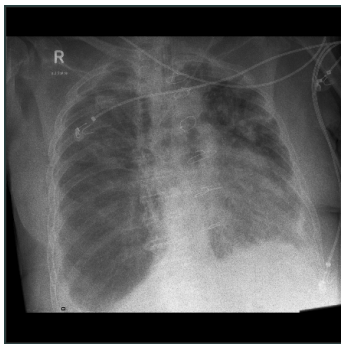
   The image is rotated.

Flipping the image from left to right

Figure 197: Flip button

You can flip an image around the vertical axis.

The following table displays the effect of the flip operation:

	
Original position	Image flipped from left to right

Take the following steps:

1. Select an image in the **Image Overview** pane.
2. Click on the following icon.

The image is flipped.

Caution: When flipping of an image manually is done incorrectly, diagnostic information on the image can be lost.

Note Flipping an image changes the view position of an AP image to PA and vice versa.

Showing/hiding the square marker

The square marker is automatically placed in top left hand corner of all non-mammo images. As it rotates and flips with the image, it gives the radiologist an indication that something has manually been changed, so extra attention is required.

This function toggles between showing and hiding the square marker. This can be necessary to hide the marker if it is positioned on top of diagnostic information.

Procedure

1. Select an image in the **Image Overview** pane.
2. Click the square marker button to toggle between showing and hiding the square marker.

The square marker is shown or hidden.

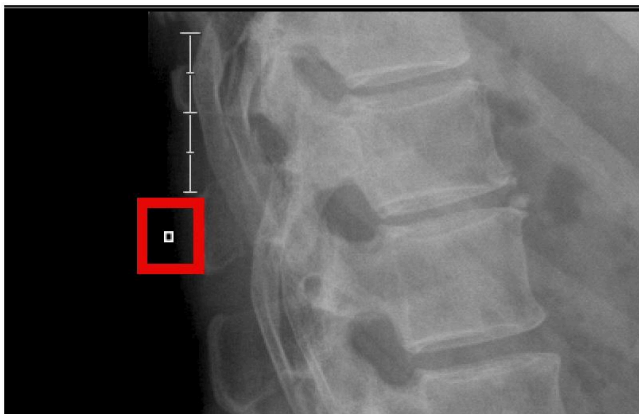


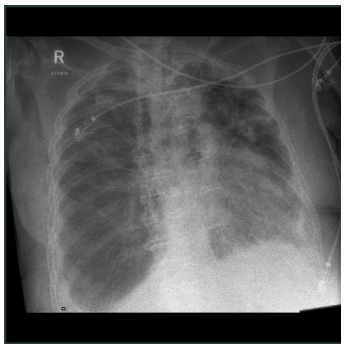
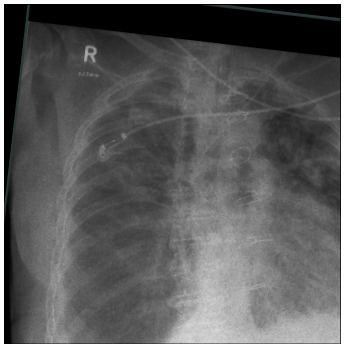
Figure 198: Square marker

Rotating an image by an arbitrary angle

Figure 199: Freehand rotate button

You can rotate an image by an arbitrary angle.

The following table displays the effect of the rotation:

	
Original position	Image rotated by approximately 5° clockwise

Note All annotations are deleted by rotating an image by an arbitrary angle. Rotate the image before adding annotations to the image.

Take the following steps:

1. Select an image in the **Image Overview** pane.
2. Click on the following icon.

   The image is dispayed full screen and a circle is displayed on top of the image.
3. Click-Hold the image and drag the mouse arrow to any direction.
   The image is rotated and the reference lines on the circle indicate the angle of rotation.
4. Click **Accept** to apply the rotation to the image.

Adding annotations to an image

You can access the annotation functions in the **Annotations** section of the left tool bar.

After you have added an annotation, you can also edit or delete it.

Adding a Left or Right marker

Figure 200: Left Marker button

Figure 201: Right Marker button

You can add a Left or Right marker to indicate which body side is displayed in the image by taking the following steps:

1. Select an image in the **Image Overview** pane.
2. Select the marker type:

Marker type	
L	Left marker. Click on the L-icon or select it from the following drop-down list in the Annotations tool section.
R	Right marker. Click on the R-icon or select it from the drop-down list in the Annotations tool section.

3. Click on the image where you want to place the marker.

   The marker appears on the image.

   Caution: Left-right markers can be misleading and can cause diagnosis to an incorrect patient area.

Adding a custom marker

To add a custom marker:

1. Select an image in the **Image Overview** pane.
2. From the following drop-down list in the **Annotations** tool section, select the marker.
3. Click on the image where you want to place the marker.

   The marker appears on the image.

   Caution: Overlapping markers can cause loss of diagnostic information.

Adding a high priority marker

A high priority marker is a marker type reserved for pointing images needing high priority attention. The image gets the highest priority in the printing and archiving queues and a high priority DICOM attribute that can be used to make a selection on the archiving station.

To put a high priority marker on an image:

1. Select an image in the **Image Overview** pane.
2. From the Marker drop down list, select the HPM marker button.

Figure 202: High Priority Marker button.

3. Click the location on the image where you want to place the marker.

   The marker is put on the image.

Figure 203: Image with High Priority marker on it.

Note The text of the caption of the high priority marker and the contents of the marker can be configured in the NX Service and Configuration tool.

Adding a freehand text

1. Select an image in the **Image Overview** pane.
2. From the text-annotation drop-down list in the **Annotations** tool section, select the freehand text button.

Figure 204: Freehand text button

3. Click on the image where you want to add the text.

   A text box is displayed.
4. Type the text and click anywhere with the primary mouse button or press Enter.

   The text is displayed on the image.

Adding predefined text

1. Select an image in the **Image Overview** pane.
2. From the text-annotation drop-down list in the **Annotations** tool section, select a predefined text.
3. Click on the image where you want to add the text.

   The text is automatically displayed.

Adding a time-text marker

A time-text marker (TTM) is a text marker that contains by default the time when the image was acquired.

To put a time-text marker on an image:

1. Select an image in the **Image Overview** pane.
2. From the Marker drop down list, select the TTM marker button.

   Figure 205: Time-text Marker button.

   A dialog is displayed that contains the time when the image was acquired.
3. If needed, modify the text and click **OK**.
4. Click the location on the image where you want to place the marker.

   The marker is put on the image.

Drawing an arrow

1. Select an image in the **Image Overview** pane.
2. From the drop-down list above in the **Annotations** tool section, select the following icon.

3. Click once to define the shaft of the arrow, move the pointer, and click again to define the tip.

   After the last click a text box is shown via which the user can add text.

Drawing a rectangle

1. Select an image in the **Image Overview** pane.
2. From the drop-down list above in the **Annotations** tool section, select the following icon.

3. Click once to define the first corner.
4. Move the pointer and click to define the opposite corner.

Drawing a circle

1. Select an image in the **Image Overview** pane.
2. From the drop-down list above in the **Annotations** tool section, select the following icon.

3. Click twice on the circumference of the circle you want to draw.

   The circle appears on the image, with an indication of its diameter and its area.
4. To define the position of the circle, move the pointer and click.

Drawing a polygon

1. Select an image in the **Image Overview** pane.
2. From the drop-down list above in the **Annotations** tool section, select the following icon.

3. Click once to define the starting point.
4. Move the pointer and click to define each corner.
5. To close the polygon, click the starting point.

   The shape appears on the image, with a measurement of its area.

Drawing a custom shape

1. Select an image in the **Image Overview** pane.
2. From the drop-down list above in the **Annotations** tool section, select the following icon.

3. Click once to define the starting point.
4. You can click as often as you need to approximate the shape you want to create.
5. To close the shape, click the starting point.

   The shape appears on the image, with a measurement of its area.

Drawing a perpendicular line:

1. Select an image in the **Image Overview** pane.
2. From the shape-annotation drop-down list in the **Annotations** tool section, select the following icon.

3. Click once to define the starting point of the base line, move the pointer, and click again to define the end.

   The perpendicular line appears.
4. To define the position of the perpendicular line, move the pointer and click.

Drawing a straight line

1. Select an image in the **Image Overview** pane.
2. From the shape-annotation drop-down list in the **Annotations** tool section, select the following icon.

3. Click once to define the starting point of the line, move the pointer, and click again to define the end.

Note You can snap the line to angles of 15 degrees using the CTRL key. Position the pointer on one end of the measurement, push CTRL and move the mouse up or down.

Changing the color of an annotation

Color will only be communicated to the PACS archive when GSPS is configured and supported. On a printer and non-GSPS PACS archives, the different colors will only be visible as grey scale variations.

You can change the color of shapes or text annotations by taking the following steps:

Procedure

1. Click an annotation.
2. From the following drop-down list of the **Annotations** tool section, select the color of your choice.

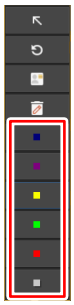


Figure 206: Color toolbar

The annotation color is changed.

Moving an annotation

1. Click the annotation.

   As a result, the annotation is activated.
2. Drag the annotation to a new position.

Rescaling an annotation

1. Click the annotation.

   As a result, the annotation is activated.
2. Drag one of the handles to a new position.

   The annotation is rescaled.

Reshaping a shape

1. Select a shape.
2. Drag one of the handles to a new position.

Managing annotations with the right mouse button

When you want to edit an image in the Editing window you can choose to right click on the image. A context menu will be available with the functions shown in the screenshot below:

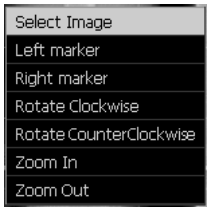


Figure 207: Edit image context menu

After you have added an annotation, you can use the right mouse button to modify (delete) the annotation or to change the annotation color:

Figure 208: Annotation context menu

Using the measurement tools

You can access the measurement functions in the **Annotations** section of the left tool bar.

After you have added an measurement, you can also edit or delete it.

Uncertainty of measurement

Warning: Uncalibrated measurements can lead to incorrect clinical conclusions.

The uncertainty associated with measurements made in the NX software is related to image-dependent factors such as:

- the presence of calibration objects in the image (such as a sphere or ruler);
- image resolution (pixel dimensions);
- the scaling factor used while displaying the image and performing the measurements (100% scaling meaning one pixel on screen maps to one pixel in the image).

Acquisition or user-dependent factors that are not taken into account but that may influence the uncertainty in the end result are:

- distortion of calibration instruments during acquisition (perspective distortion for example)
- magnification of the measured object (measurement points not lying in the plane of the calibration object)
- perspective foreshortening (measurement points lying in an oblique plane with regards to the detector plane)
- using X-ray images that are not taken according to standard, well-known and accepted X-ray procedures (resulting e.g. in bad positioning or lower image quality)
- ambiguity remaining in the positioning of points (even when performed according to the measurement method)

NX provides 3 measurements:

- Distance (= length)
- Angle
- Surface

Methods and acceptance criteria for these measurements:

- Distance shall be measured on an object with a length of 15.00 cm. Acceptance criterion: 95% of the length measurements on NX shall be within 15,00 cm ± 0.2 cm.
- Angle shall be measured on an object with an angle of 45º. Acceptance criterion: 95% of the angle measurements on NX shall be within 45º ± 1º.
- Surface shall be measured on a square object with sides of 15.00 cm. Acceptance criterion: 95% of the surface measurements on NX shall be within 225.00 cm2 ± 1.00 cm2.
- Where:
  - The average of measurements shall give an indication of accuracy.
  - The standard deviation shall give an indication of precision.
- Stability of measurements is inherently guaranteed by the NX software.

No calibrations are necessary to ensure the accuracy of measurements as defined in this requirement as long as we execute measurements in the plain of the detector and zoom the image maximally (maximum zoom factor is 1 on 1 with the pixel size of the monitor).

Nothing smaller than a pixel can be measured.

Calculating the scan average level or pixel value index within a region of interest (ROI)

1. Select an image in the **Image Overview** pane.
2. From the drop-down list above in the **Annotations** tool section, select one of the following icons.

The scan average level (SAL) or the pixel value index (PVI) or the Exposure Index (EI) of a default region of interest is displayed.

For mammography images two values are displayed: the PVI Log value and the PVIc Log value. The PVIc Log is the "offset corrected logarithmic pixel value index" and can be used to estimate the exposure level used for acquiring the image, by comparing it to a reference value. Refer to the mammography DR detector user documentation for more information.

You can move the region of interest or the SAL/PVI/EI label by dragging it. You can resize the region of interest or the SAL/PVI/EI label by dragging a sizing handle of the label.

Note The default region of interest corresponds to a square of 4 cm². The centre of the square is positioned at 6 cm left of the right border of the image (= chestwall of mammo images with laterality = Right) and vertically centred.

Adding calibration

Note If you have not calibrated the distance measurement using a reference object in the image, the measurement is referenced against the image plate dimensions.

Figure 209: Calibration tools

Procedure:

1. Click the Line or Circle Calibration button.

   The pointer is now a standard pointer and a ruler with a calibration bar.
2. For Line Calibration, click once to define the starting point of the calibration distance, move the pointer, and click again to define the end. For Circle Calibration, set three points on the circumference of the circle.

   The Calibration value window appears:

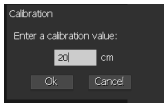


Figure 210: Calibration value window

3. Type the value for the distance which you will use as calibration distance and click **OK**.

   The calibration distance is displayed in the upper left corner of the image. You can move the distance label by dragging it. You can resize the distance label by dragging a sizing handle of the label. All distances which you will measure will be referenced against the calibration distance.

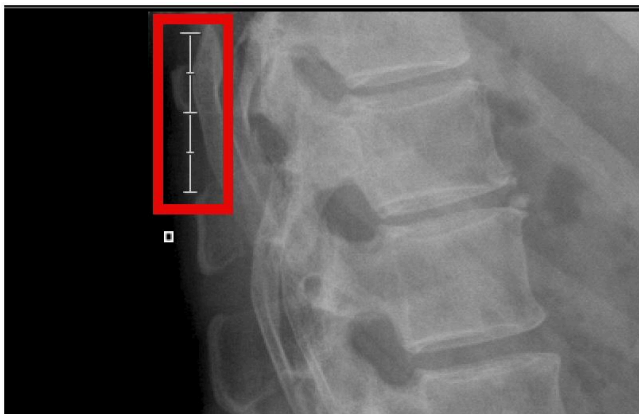


Figure 211: Calibration distance

For a calibrated image, the true scale printing factor in the status box will mention ‘CAL’ next to the scale factor. Also the scale factor in the film sheet text box will mention ‘CAL’.

Adding an Estimated Radiographic Magnification Factor (ERMF)

Figure 212: ERMF Calibration

Procedure:

1. Click the ERMF button.

   The **ERMF Calibration** dialog appears.

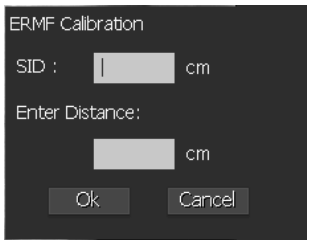


   Figure 213: ERMF Calibration dialog when SID is to be entered manually

2. Type the value for the Source Image Distance (SID) if requested. Type the value for the distance between the plane in which measurements are to be made and the detector and click **OK**

   All distances which you will measure will be corrected by applying the Estimated Radiographic Magnification Factor and ‘ERMF’ will be mentioned next to the measured distance.

   The true scale printing factor in the status box of the image will mention ‘ERMF’ next to the scale factor. The scale factor in the film sheet text box will mention ‘ERMF’.

Drawing a measurement grid

You can overlay the image with a grid. You can specify the distance between the grid lines. The distance is referenced against the calibration distance.

1. Select an image in the **Image Overview** pane.
2. From the drop-down list above in the **Annotations** tool section, select the following icon.

3. Click once to define the first corner.
4. Move the pointer and click to define the opposite corner.

The selected area of the image is overlayed with a grid.

Related information

Adding calibration on page 267

Specifying the distance between the grid lines

The distance between the grid lines is visible on the image in a text box at the top left side of the grid.

1. Double-click the text box.
   The contents of the text box can be edited.
2. Type the distance in cm and click anywhere with the primary mouse button or press Enter.
   The distance between the grid lines is set to the new value.

Measuring an angle

1. Select an image in the **Image Overview** pane.
2. From the measurement drop-down list in the **Annotations** tool section, select the following icon.

3. Click once to define the starting point of the first line, move the pointer, and click again to define the end.
4. Move the pointer to the starting point of the second line and click.
5. Move the pointer to the end point and click.

   As you move the pointer, the angles between the two lines are displayed. Both the inner and outer angle is shown.

   After you have clicked to define the end of the second line, the measured angle is displayed.

Measuring a distance

1. Select an image in the **Image Overview** pane.
2. From the measurement drop-down list in the **Annotations** tool section, select the following icon.

3. Click once to define the starting point of the measurement, move the pointer, and click again to define the end.

   As you move the pointer, the distance between the starting point and the pointer is displayed.

   After you have clicked to define the end of the measurement, the measured distance is displayed.

   Note You can snap the line to angles of 15 degrees using the CTRL key. Position the pointer on one end of the measurement, push CTRL and move the mouse up or down.

Related information

Adding calibration on page 267

Measuring a height difference

1. You can measure a height difference (e.g. between two legs) by taking the following steps:
2. Select an image in the **Image Overview** pane.
3. From the measurement drop-down list in the **Annotations** tool section, select the following icon.

4. Click once to define the starting point of the reference line, move the pointer, and click again to define the end point of the reference line.

   The pointer changes to a measuring line.
5. Move the pointer to the first point to be measured and click.
6. Move the pointer to the second point to be measured and click to finalize the measurement.

   After you have finalized the measurement, the measured height difference between the two measuring points is displayed.

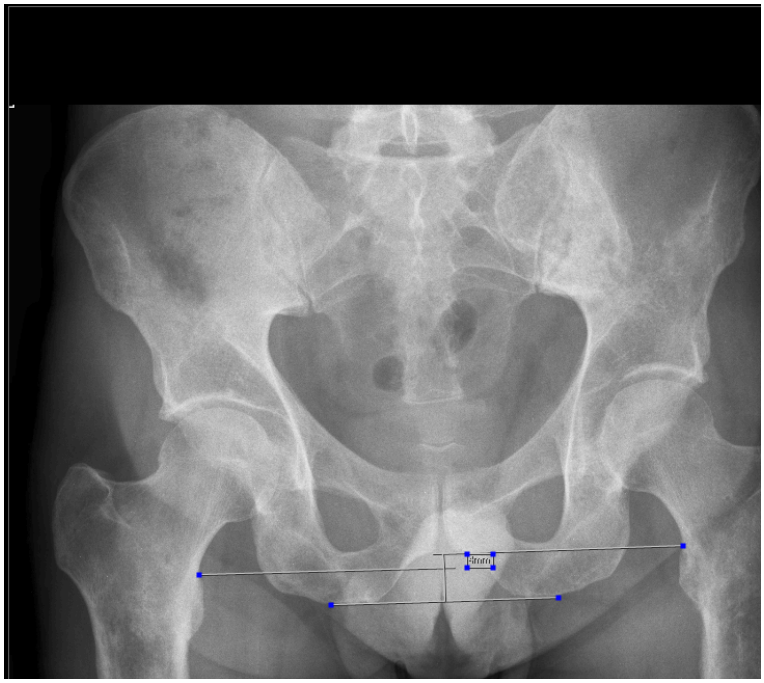


Figure 214: Reference line for height difference

The reference line is now only visible if the measurement is selected. You can always reallocate the reference line of measurement points by selecting the measurement and dragging the specific point.

Note The height difference measurement is only accurate if proper exposure techniques are used.

Related information

Adding calibration on page 267

Measuring scoliosis (Cobb-method)

1. Select an image in the **Image Overview** pane.
2. From the measurement drop-down list in the **Annotations** tool section, select the following icon.

3. Click once to define the starting point of the first reference line on the first vertebra.
4. Move the pointer to the end point and click.
5. Move your pointer to the starting point of the reference line on the second vertebra of the measurement and click.
6. Move the pointer to the end point and click.
7. Move the pointer to the position where you want to display the measurement and click to finish the measurement.

   The angle difference between the two reference lines is displayed in degrees.

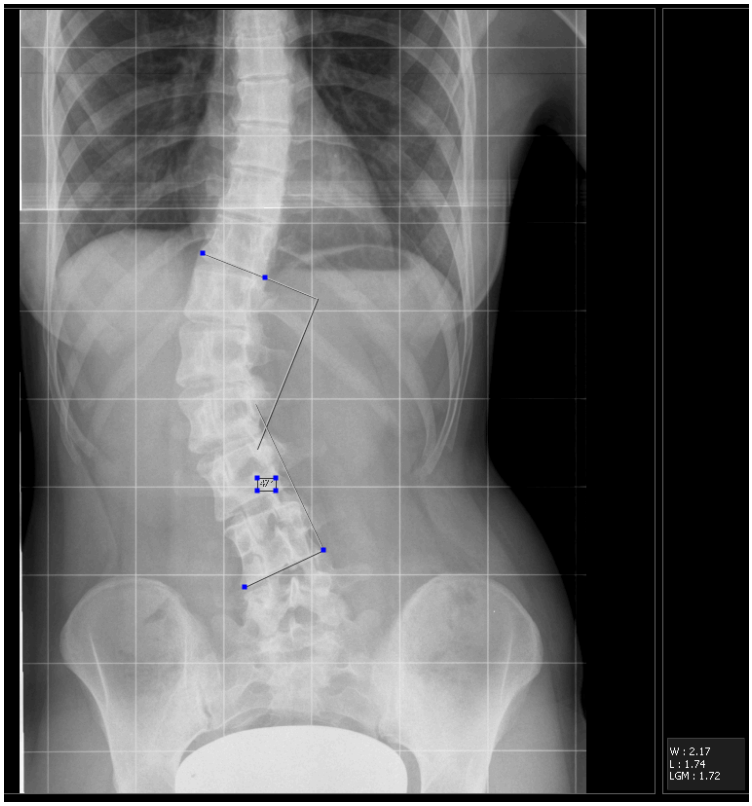


Figure 215: Measurement of scoliosis

You can always reallocate a reference line or measurement points by selecting the measurement and dragging the specific point.

Note If a calibration is applied after making length measurements, the values of the old measurements are not updated, but displayed between angle brackets.

Making measurements using measurement schemes

You can make measurements based on interactive 2D measurement schemes and compare against normative references.

1. Select an image in the **Image Overview** pane.
2. From the drop-down list above in the **Annotations** tool section, select the following icon.

   The OrthoGon tool is displayed.
3. Perform the measurement.

   Refer to the OrthoGon 1.0 User Manual (document 0150) for information how to perform measurements.

Two new images are added to the examination.

- The image containing the measurement annotations.
- The image containing the text report of the measurements.

Both images contain a marker to indicate the time when the measurement was applied.

Zooming in or out on an image

If you have a mouse with a scroll wheel, you can use it to zoom in and out. This can be handy to zoom without having to switch between tools. You can for example continue to apply annotations and zoom at the same time by scrolling the mouse wheel.

You can access the zoom functions in the **Zoom** section of the left tool bar.

- Zooming in/out on an image on page 276
- Displaying images in full screen mode on page 277
- Displaying images in split screen mode on page 278
- Magnifying part of an image on page 279
- Roaming over an image on page 280
- Applying shutters to an image on page 281

Zooming in/out on an image

Figure 216: Revert Zoom button

Figure 217: Zoom In button

Figure 218: Zoom Out button

To zoom in or out, take the following steps:

1. Select an image in the **Image Overview** pane.
2. From the drop-down list in the **Zoom** tool section, select the zoom tool of your choice:

Icon	Functionality
	To zoom in.
	To zoom out.

   The image is zoomed.
3. To reset the image to best fit, select the reset zoom button:

Note You can also zoom in or out on an image by scrolling the mouse wheel.

Displaying images in full screen mode

It is possible to display images in full screen mode. This functionality is license-dependent.

Procedure:

1. Select an image in the Image Overview pane.
2. In the Zoom section, click the **Full Screen** button.

Figure 219: Full Screen button.

Alternatively, press Ctrl + F on your keyboard.

As a result, the image is displayed in full screen mode.

The left tool bar is hidden. To display the left tool bar, move the mouse pointer to the left edge of the screen or on a touchscreen, swipe from the left edge of the screen towards the center.

For dynamic images, the controls that are available in the **dynamic image player** are also available in full screen mode, in the right tool bar.

3. To navigate through the images in the exam, click the left or right arrow button, press the up or down arrow key or on touchscreen swipe left or right.
4. To close the full screen view, click the **Close** button in the top right corner of the image.

Related information

Dynamic image player on page 197

Displaying images in split screen mode

With NX it is possible to display two images in Split screen mode. For mammography examinations, the position of the images shown in split screen mode is linked with the view code.

To display images in split screen mode:

1. Select an examination with images to split and open it.
2. Select the **Split Screen** button.

Figure 220: Split Screen button.

The images are displayed in Split Screen view.

Figure 221: Images in Split Screen view.

Magnifying part of an image

Figure 222: Magnify button

You can selectively magnify a specific rectangular part of an image by taking the following steps:

Procedure:

1. Select an image in the **Image Overview** pane.
2. From the drop-down list in the **Zoom** tool section, select the following icon.

3. Click once to define the starting point of the part that needs to be magnified, move the pointer, and click again the define the end point.

   The part of the image that was selected is magnified.

Roaming over an image

When you have zoomed in on an image or have used the magnification function, you can roam over the image in the following way.

To roam over an image:

1. Select an image in the Image overview pane.
2. Zoom in or perform the magnification action which is required.
3. Click-Hold the image and drag the mouse arrow to any direction.

Roaming vertically over a mammography image

Perform the procedure above, but press the Shift or Ctrl button while you Click-hold and drag the image.

Note Roaming within image cells is also possible. Select the image with the mouse and drag it around.

Applying shutters to an image

Figure 223: Apply Shutters button

You can mask non-relevant areas of the image with shutters.

Note Applying shutters does not in any way modify the image itself, even if you have saved the results. You can always retrieve the original by using the same procedure as described below.

Note The transparency of the shutters depends on the configuration in the NX Service and Configuration Tool. Refer to the Key user manual for more information.

Proceed as follows:

1. Select an image in the **Image Overview** pane.
2. From the first drop-down list in the **Zoom** tool section, select the following icon.

   A set of sizing handles is displayed.
3. Drag the sizing handles to mask the non-relevant areas of the image.

   The non-relevant areas are covered with black borders.

Processing images

Editing allows you to perform the following operations to process an image:

- Working with collimation
- Working with the contrast of an image
- Modifying the MUSICA settings of an image

You can access the above functions in the **Image Processing** section of the left tool bar.

- Working with collimation on page 283
- Working with the contrast of an image on page 288
- Modifying the MUSICA settings of an image on page 292

Working with collimation

NX is equipped with an automatic image collimation feature. With this feature you can define the diagnostic information on an image. All other information is then no longer taken into account: this results in optimal image quality.

To obtain a high accuracy of collimation, you have to take into account a number of rules.

NX automatically detects the collimated areas of the image and uses this information for processing and displaying the image.

Image processing:

- MUSICA image processing excludes the collimated areas from the image processing to achieve optimal image quality and depends on correct detection of the collimation.
- MUSICA2/MUSICA3 image processing does not depend on collimation and achieves optimal image quality even if collimation is not correct.

Image displaying:

- When black borders are enabled, the collimated areas of the image are darkened to improve visibility of the diagnostic information in the image.
- DR images and CR 10-X images are automatically cropped at the collimation borders.
- When a collimation border is configured, a white border is drawn around the collimation area to visualize the result of the auto collimation towards the operator.

When image processing fails, the image may be displayed incorrectly. Refer to “Window/Level setting is completely out of range” on page 298 to learn how to solve this problem.

Related information

Collimation rules for DR and CR on page 283
Window/Level setting is completely out of range on page 343

Achieving optimal image quality

1. Remove black borders and uncrop.
2. If needed apply manual collimation.

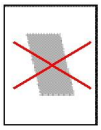
   NX offers the following collimation features:

   - Automatic image division detection for CR
   - Applying collimation and cropping manually
   - Inverting collimation areas
   - Black borders and cropping

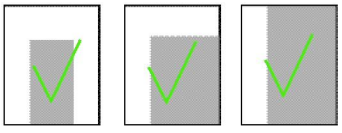
Collimation rules for DR and CR

- The edges of the collimated region should form a rectangle.

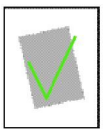
  In this example automatic collimation is not possible since the collimation region is not a rectangle:

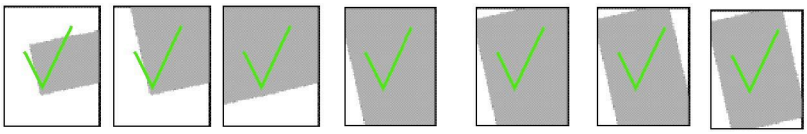
- One or more sides of a rectangle may lie outside the cassette or detector borders.

- The rectangle may be rotated with respect to the cassette or detector borders.

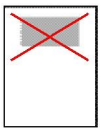


- One or more corners of a rotated rectangle may lie outside the cassette or detector borders.



- The rectangle should include the center of the collimated cassette part.

  In the example below automatic collimation is not possible as the collimation area does not include the center of the collimated cassette part:



- The size of each side of the collimation rectangle should be at least 30% of the size of the corresponding cassette part (not applicable when using DR detectors).
- For DR exposures, image processing may fail if the size of the exposed area is extremely small (e.g. fingers, nose). If image process fails, it is recommended to enlarge the exposed area.

Automatic image division detection for CR

Note Image division detection is not applicable for DR exposures.

NX is equipped with an automatic image division feature.

This means that a cassette may subsequently be exposed by parts. While one part of the cassette is exposed, another part is masked with lead plates. This process is known as image division or partitioning.

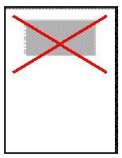
NX supports multiple (2, 3, 4,...) image division and you can permanently set a study on a certain image division configuration, e.g.: “2 division horizontal”.

Setting a certain image division configuration increases error-free division detection and reduces image processing time.

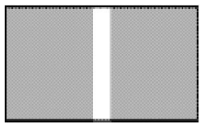
To obtain a high level of accuracy of the automatic image division detection, take the following rules into account (the examples show a 2 division horizontal setup):

- The partitioning sub-images must be approximately equal in size. This also implies that each image occupies no more than one half of the total cassette size.
- The sub-images must be parallel to each other, or one of the images must be parallel to the cassette border.

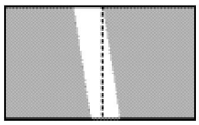
  In the example below, automatic image detection will not work correctly because the two rectangles are both not parallel with each other and with the image borders.



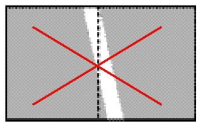
- The subsequently exposed parts may overlap each other or may have no overlap resulting in an overexposed or underexposed strip. So both an overexposed area as an underexposed area are allowed.



- The overexposed or underexposed strip may be oblique provided that this strip is wide enough to be split.

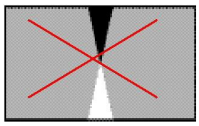
  

  In the following example, automatic image detection will be impossible, as the overexposed and underexposed strip are not wide enough to split the overlap strip:

- The overlap strip must have parallel edges. Moreover, the edges must be parallel with the cassette borders.

  In the following example, automatic image detection will be impossible, as there are no parallel borders.

- If you use lead letters, position them within the diagnostic region. This improves collimation.

Black borders and cropping

A collimated image can be displayed either with or without black collimation borders. Black collimation borders facilitate viewing images for diagnosis. DR images and CR 10-X images are automatically cropped at the collimation borders.

To turn the black borders or cropping on or off:

1. Select an image in the **Image Overview** pane.
2. From the first drop-down list in the **Image Processing** tool section, select the following icon.

Related information

Working with collimation on page 283

Applying collimation and cropping manually

Applying collimation to DR images or CR 10-X images has an extra effect of cropping to the outer border of the collimation area.

In manual collimation mode, you can add collimation shapes to the image. After pressing the Collimation button, these shapes are applied on the image.

Manual collimation is sometimes needed when the automatic collimation algorithm fails, mostly due to not following the rules or bad configuration.

You can manually indicate the collimation borders on an image and command the NX software to reprocess the image accordingly.

You can form two types of collimation areas: rectangular and polygonal. The area inside the collimation form will be used as collimation area. If for example, you wish to use a rectangular area, enclose this area in a rectangle.

Note Annotations that are not completely enclosed by the manual collimation borders, are removed.

Drawing a rectangular collimation area

1. Select an image in the **Image Overview** pane.
2. From the first drop-down list in the **Image Processing** tool section, select the following icon.

3. Click once to define one corner of the rectangle.
4. Move the pointer.
5. Click again to define the opposite corner.
6. To display the collimation area, select the following icon.

Drawing a polygonal collimation area

1. Select an image in the **Image Overview** pane.
2. From the first drop-down list in the **Image Processing** tool section, select the following icon.

3. Click to define the starting point.
4. Move the pointer and click to define each corner.
5. Click the starting point to close the polygon.
6. To display the collimation area, select the following icon.

Drawing a circular collimation area

1. Select an image in the **Image Overview** pane.
2. From the first drop-down list in the **Image Processing** tool section, select the following icon.

3. Click twice on the circumference of the circle you want to draw. The circle appears on the image, with an indication of its diameter and its area.
4. To define the position of the circle, move the pointer and click.
5. To display the collimation area, select the following icon.

Inverting collimation areas

Inverting collimation areas is a part of manual collimation. It is used to hide the white area created by lead radiation shielding.

You can invert a collimation area by taking the following steps:

1. Select an image in the **Image Overview** pane.
2. Draw a collimation area that covers the white area that must be darkened.
3. Draw a second collimation area that describes the region of interest of the image.
4. To display the inverted collimation area, select the following icon.

The part of the image within the collimation area is blackened out.

Related information

Working with collimation on page 283

Working with the contrast of an image

In NX, you can manually adjust the global contrast and the intensity of an image. NX offers you the following contrast features:

- Changing the global contrast and intensity of an image (window/level)
- Undoing contrast and intensity changes
- Copying and pasting window/level values
- Viewing the histogram of an image

Changing the global contrast and intensity of an image (window/level)

Note When you wish to adjust the global contrast and intensity, it is advised to turn on image saturation (burn), especially if you will print the image.

It is possible to configure 'burn' to automatically be switched on for all images. This allows you to easily check if diagnostic areas of the image are saturated due to less than perfect W/L.

Note Enabling burn automatically for all images is done in the configuration in the NX Service and Configuration Tool. Refer to the Key user manual for more information.

Related information

Applying burn to an image on page 295

Adjusting the global contrast and intensity using the mouse

1. Select an image in the **Image Overview** pane.
2. Select the following icon.

3. Use the mouse to adjust the global contrast and intensity:

	To	Do this
Contrast	Increase the global contrast	Move pointer to the left
	Decrease the global contrast	Move pointer to the right
Intensity	Increase the global intensity	Move the pointer up (or move the mouse away from you).
	Decrease the global intensity	Move the pointer down

The contrast and intensity are adjusted as you move the pointer.

Note By pressing CTRL or SHIFT the mouse can be locked in 1 direction (vertical or horizontal).

4. When the desired contrast and intensity have been reached, click in the image pane.

Adjusting the global contrast and intensity using a touch screen

1. Select an image in the **Image Overview** pane.
2. Select the global contrast and intensity icon.

3. Use the pointer to adjust the global contrast and intensity, as indicated in the table above.
4. When the desired contrast and intensity have been reached, click the global contrast and intensity icon again.

Undoing contrast and intensity changes

You can undo contrast and intensity changes by selecting the second icon from the **Image Processing** tool section.

The image will return to its original state.

Copying and pasting window/level values

If you work with QC images on NX, you have the possibility to copy the window/level values of one QC image and apply these values to an other QC image by pasting.

Procedure:

1. Open a QC image. Make sure you are in the Editing environment.
2. Right-click on the image.

   The context menu appears:

   Figure 224: Editing Context menu for QC images.
3. Select **Copy Window Level**.
4. Switch to an other QC image (by selecting the image thumbnail). This may be an image from another QC examination.
5. Right-click on this image.

   The context menu appears:

   Figure 225: Editing Context menu for QC images.
6. Click **Paste Window Level**.

   The window level values of the first image are applied to the second image.

Viewing the histogram of an image

A histogram is a graph of the gray scale distribution in an image. The horizontal axis indicates the gray scales, from light on the left to dark on the right. The vertical axis indicates the number of pixels per gray value.

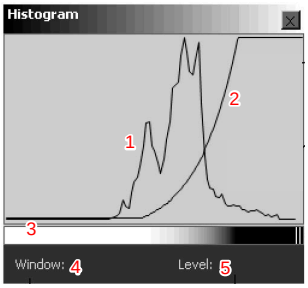
In NX, images are displayed as if they were printed on a specific film type. The corresponding sensitometric curve can be displayed in the **Histogram** window. This window also gives numeric values for the global contrast and intensity of the image.

Note Depending whether the image is processed using MUSICA parameters or MUSICA2/MUSICA3 parameters, the histogram may somewhat deviate in appearance.

To display the histogram and the sensitometric curve:

1. Select an image in the **Image Overview** pane.
2. Select the following icon.

The **Histogram** window is displayed.



1. Histogram
2. Sensitometric curve
3. Contrast and intensity indication
4. Global contrast value (Window)
5. Global intensity value (Level)

Figure 226: MUSICA histogram.

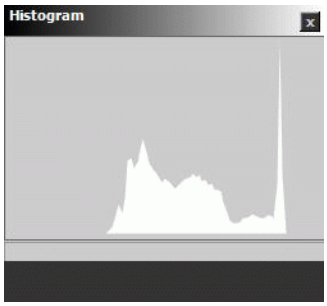


Figure 227: MUSICA2/MUSICA3 histogram.

The global contrast value (Window) of the image is given in the lower left corner of the window; the global intensity value (Level) in the lower right corner.

Note To change the sensitometric curve, see “Modifying the MUSICA settings of an image”.

Related information

Modifying the MUSICA settings of an image on page 292

Changing the global contrast and intensity of an image (window/level) on page 288

Modifying the MUSICA settings of an image

Via advanced MUSICA processing (MUSICA: Multi-Scale Image Contrast Amplification), you can fine-tune the contrast and intensity of an image.

Related information

About MUSICA on page 292

About MUSICA

NX is equipped with an automatic image processing feature. A number of advanced proprietary image processing algorithms enable optimal rendering of all captured X-ray information on high-quality film. This technology is called MUSICA, which stands for MUlti Scale Image Contrast Amplification.

These algorithms are automatically applied. This reduces postprocessing to an absolute minimum.

MUSICA image processing parameters

Name	This function enables the system to
MUSI-contrast	Enhance subtle contrast details on all scales in order to improve their visibility, regardless of the size of the detail.
Edge contrast	Enhance small scale details, including edges. As noise has a similar appearance, it will be enhanced as well and you might have to look for a balance.
Latitude reduction	Attenuate the larger scale intensity variations across the image in order to emphasize the medium and small scale details. This way, good visibility of features is obtained in those studies which typically exhibit an important brightness shift across the image, without causing saturation into white or black in large portions of the image.
Noise reduction	Attenuate fine grain detail contrast, thus reducing noise impression in those image regions where noise is more prominent, without significantly affecting the contrast of image features like spots, edges and textures.
Extend window right	Extend the Window to the right in order to use more lighter gray levels. Hence, images become lighter and have less contrast by default.
Extend window left	Extend the Window to the left in order to use more darker gray levels. Hence, images become darker by default, but have less contrast.
Window/Level calculation	Calculate the optimal contrast (Window) and intensity (Level) of an image and change these values interactively.
Sensitometry	Simulate an exposure on a given film by selecting a different sensitometric curve.

Note NX supports two variants of MUSICA image processing : MUSICA and MUSICA2/MUSICA3, each controlled by a specific set of processing parameters.

Interactively adjusting the MUSICA image processing parameters

To interactively adjust the image processing parameters:

1. Select an image in the **Image Overview** pane.
2. From the third drop-down list in the **Image Processing** tool section, select the following icon.

   The **Modify MUSICA settings** window is displayed.

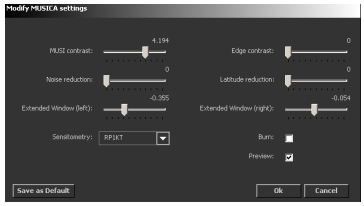
   

   Figure 228: Modify MUSICA settings window

3. Apply the MUSICA parameters according to your preferences:

To		Use
Fine-tune the contrast of all features		MUSI contrast slider
Fine-tune the contrast of short-range features, including edges.		Edge contrast slider
Reduce noise without affecting the contrast of short-range features such as edges and texture		Noise reduction slider
Fine-tune the contrast of long-range features		Latitude reduction slider
Fine-tune the intensity	Make the image darker	Extended Window (left) slider
	Make the image lighter	Extended Window (right) slider

   Note Enhancing edge contrast will also enhance noise and may cause artefacts in the image.

   Note Edge contrast and latitude reduction influence the dynamic range of the image. Reducing the dynamic range is useful prior to printing the image on a specific film.

4. To simulate exposure of the image on a specific film, click a film sensitometric curve in the **Sensitometry** list.
5. To turn on image saturation, select the **Burn** check box.
6. Click **OK** to apply the MUSICA processing parameters and close the window, click **Cancel** to quit without applying the parameters or click **Set Default** to save the current image processing settings as default for the exam in the exam tree.

   Note If you select the Preview button, the effect of the MUSICA processing is shown in real time in the Editing window.

Related information

Applying burn to an image on page 295

Interactively adjusting the MUSICA2/MUSICA3 image processing parameters

1. Select an image in the **Image Overview** pane.
2. In the **Image Processing** tool section, select the following icon.

The **Modify MUSICA settings** window is displayed.

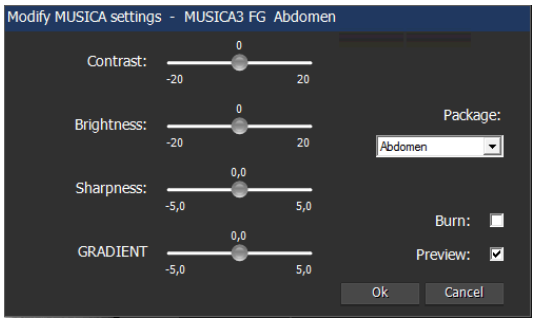


Figure 229: Example of the MUSICA2/MUSICA3 settings window

3. Apply the MUSICA parameters according to your preferences:

Function	Setting
Fine-tune the contrast of all features	**MUSI contrast** slider
Adjust the brightness interactively	**Brightness** slider
Change the sharpness of the image interactively	**Sharpness** slider
Fine-tune the gray scale differentiation between anatomical regions	**Gradient** slider
Enable burn	Enable **Burn** checkbox
Switch between MUSICA2/MUSICA3 packages	**Package** drop-down

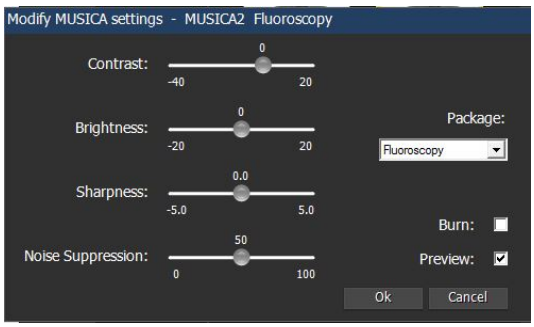


Figure 230: Example of the MUSICA settings window with fluo options

For fluo sequences, following parameter can be applied:

Function	Setting
Control the image noise	**Noise suppresion** slider

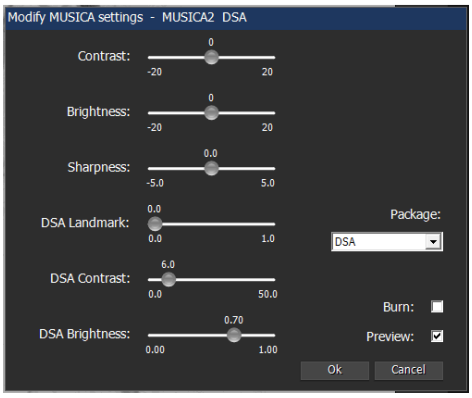


Figure 231: Example of the MUSICA settings window with DSA options

For digital subtraction angiography (DSA) sequences, following parameter can be applied:

Function	Setting
Change the visibility of the anatomical surroundings of the blood vessels. Not available if landmarking has been modified in the dynamic image player.	**DSA landmarking** slider
Increase or reduce the difference between light and dark structures in the subtracted image	**DSA contrast** slider
Adjust the brightness of the background color of the subtracted image	**DSA brightness** slider
Switch between DSA/roadmapping packages	**Package** drop-down

The available settings depend on the active licenses and packages.

Note Defining the standard MUSICA2/MUSICA3 parameters is done in the NX Service and Configuration Tool. Refer to the Key user manual for more information.

Related information

Applying burn to an image on page 295

Applying burn to an image

If you wish to adjust the global contrast of an image, it is useful to turn on image saturation (burn). Due to excessive adjustment of the contrast or the intensity or due to detector saturation by overexposure, some parts of the image can become saturated, i.e. 100% white or 100% black.

If burn is turned on, the saturated parts of the image will be inverted, i.e. white is displayed as black and vice versa. This allows you to easily see whether parts of the image are saturated due to contrast and intensity adjustment.

Note Because saturation shows up more distinctly on film, the burn function is especially useful if you are adjusting the global contrast of an image which you will print.

To turn on the burn function:

1. Select an image in the **Image Overview** pane.
2. Select the following icon.

Saturated parts of the image are inverted.

Inverting an image

You can display the active image inverted, i.e. white displayed as black, light gray values displayed as the corresponding dark gray values, and vice versa. Inverting an image often makes it easier to look at soft tissue areas, e.g. to find foreign objects in soft tissue.

NX can be configured to automatically invert all images of a specific exposure type.

To invert an image:

1. Select an image in the **Image Overview** pane.
2. Select the following icon.

The inverted image is displayed.

Enabling/disabling background darkening

NX has a license which performs background darkening during the processing of mammo images. If this license is active, images are processed in such way that they appear in NX with a darkened background. Inverting the image affects background darkening.

In the Editing environment, a button is available to disable the background darkening.

Note When changing the window/level on mammo images with background darkening applied, any saturated pixels in the breast area will also have background darkening applied to them. This is especially visible on inverted images.

Procedure to disable background darkening:

1. Select a mammography image which has been processed with background darkening.
2. Click the Background darkening toggle button.

As a result, background darkening is turned off.

To turn background darkening on, click the button again.

Printing images

You can access the print functions by pressing the button in the lower left corner of the window. Print mode will be opened and the printing tools will appear on the right of the print area.

Normally, new images reaching NX are automatically sent to the default printer and the default DICOM station. However, if e.g. the configured default printer is out of service, you can set another printer to temporarily be the default printer (“rerouting”).

Note Printing all images of an examination or printing images from multiple examinations on one sheet is also possible.

- Changing the layout you want to print on on page 298
- Managing print sheets on page 299
- Adding an image to an existing layout on page 300
- Inserting a patient photo on page 301

Related information

Printing a specific image before the examination is completed on page 184
Printing all images of an examination in one go on page 185
Printing images of different exams on one sheet on page 186
Print Mode (P) on page 220

Changing the layout you want to print on

To optimally prepare it for printing, you can configure the layout of an image on the print sheet.

Printing an image on true size

To print an image on the actual size without taking into account the print sheet borders, take the following steps:

1. Select an image in the **Image Overview** pane.
2. In the printing tool section, click on the following icon.

The image is resized to the actual size.

Caution: An incorrect line or circular calibration can lead to incorrect printing of an image.

Fitting an image to the image cell

To resize an image to fit it within the borders of the print sheet, take the following steps:

1. Select an image in the **Image Overview** pane.
2. In the printing tool section, click on the following icon.

The image is resized to the print sheet borders.

Defining the print sheet orientation (portrait/landscape)

To define the orientation in which the image will be printed, use the following buttons:

- To apply a landscape orientation, click:

- To apply a portrait orientation, click:

Managing print sheets

Related information

Print Mode (P) on page 220

Adding a print sheet

You can add an empty print sheet to an exam, and place images on the sheet. Take the following steps:

1. Open the exam in **Print** mode.
2. In the printing tool section, select a sheet layout from the first drop-down list.

   The sheet is added to the exam.
3. Drag the images that you want to display on the print sheet from the **Image Overview** pane in the print area.

Removing a print sheet

You can remove a print sheet from an exam by taking the following steps:

1. Open the exam in **Print** mode.
2. In the printing tool section, click on the following icon.

   The sheet is removed from the exam. The images on the sheet will not be printed.

Defining the position of the text box

To define the position of the text box that will be printed on a sheet, take the following steps:

1. Open the exam in **Print** mode.
2. In the printing tool section, select a text box position from the drop-down list.

   There are four possibilities:

Text box	Layout type
	Aligns the text box to the left.
	Aligns the text box to the right.
	Aligns the text box to the center.
	Hides the text box so that it will not be printed.

   The chosen layout is displayed accordingly (or hidden) on the print sheet.

Note Defining the layout and the content of print sheets is done in the configuration in the NX Service and Configuration Tool. Refer to the Key user manual for more information.

Adding an image to an existing layout

You can split an image layout on the print sheet in two to add another image.

This is not active for 1-on-1 layout. In this case, you simply need to select the new layout you need.

Proceed as follows:

1. Open the exam in **Print** mode.
2. Select the image cell you want to split.
3. In the printing tool section, click on the following icon.

   The image layout is split in two parts, where the upper (left) part contains the original image and the lower (right) part can be used for adding another image.

Inserting a patient photo

You can add an image (for example a patient photo) to the sheet text box. To be able to perform this task, you must have an appropriate photo available. Also, the layout of the print sheet text box must be configured in such way that it can contain a bitmap image.

You can also only insert a photo when you are in Print mode.

Procedure:

1. Right-click on the print sheet and select Add Patient Photo from the context menu.

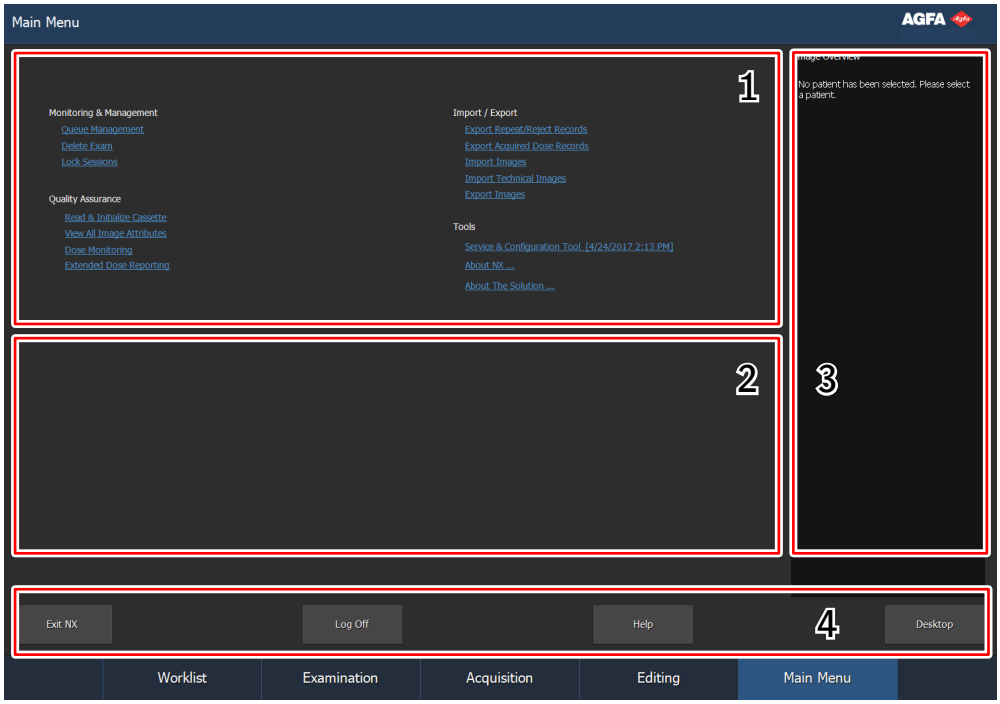
   A standard Windows Open dialog box is displayed.
2. Go to the location of the file, select it and click OK.
3. To remove the photo, right click on the print sheet and select Remove Patient Photo from the context menu. This action will remove the image from the print sheet and leave the image cell empty.

   After removing a photo, you will be able again to add a new photo.

   Note The ability of NX to insert a photo depends on the configuration. Refer to the Sheet Text Box configuration section in the Key user manual.

Using the Main Menu

About the Main Menu



1. Functionality Overview pane
2. Workspace
3. Image Overview pane
4. Action buttons

Figure 232: Main Menu window

In the **Main Menu** window, you can manage certain aspects of the NX Workflow which do not belong to the daily workflow.

The **Main Menu** window has three main areas:

- In the top segment of the Main Menu window is the Functionality Overview pane.
- In the middle of the screen is a workspace where, depending on a selection in the Functionality Overview pane, different actions can be done.
- On the right is the Image Overview pane. This is a thumbnail overview of the images included in the examination on which you want to perform certain actions.

At the bottom of the window, there are several Action buttons.

Note The appearance of the Main Menu depends on the role of the person who has logged in. When you are logged in as “user” some of the items in the Main Menu will not be visible.

Related information

Stopping NX without stopping Windows on page 66
Stopping NX by logging out of Windows on page 65
Switching to Windows without stopping NX on page 67
System Documentation on page 26
Opening an application, folder or file on page 145

Working in the Main Menu

Note The appearance of the Main Menu depends on the role of the person who has logged in. When you are logged in as “user” some of the items in the Main Menu will not be visible.

In the Functionality Overview pane of the Main Menu you have links to different configuration actions for NX:

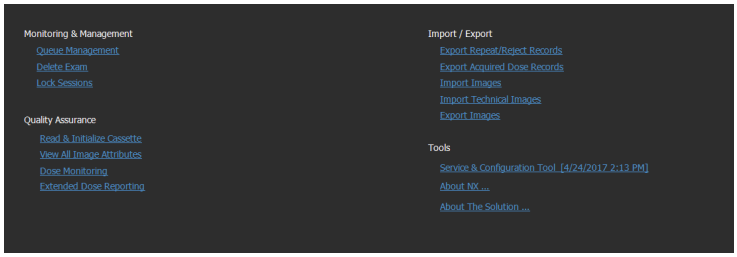


Figure 233: The Functionality Overview pane.

Monitoring and Management

Queue Management

To monitor the work queues using the Queue management tool:

1. Click **Queue management** in the Functionality Overview pane of the Main Menu window.

   The Queue Management pane is opened:

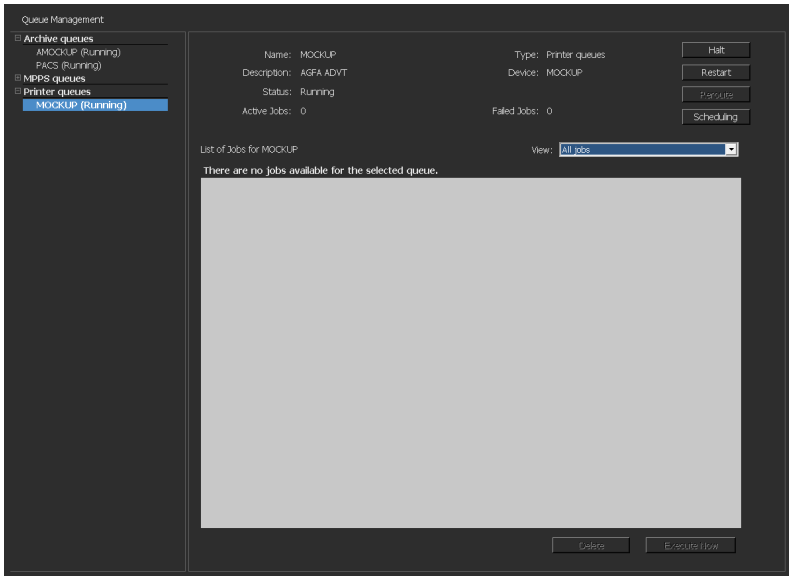


Figure 234: Main Menu window with Queue Management pane open.

2. If you are working on the Central Monitoring System, first select the NX Workstation of which you want to observe a queue. It is not possible to view the queues of all NX rooms at the same time.

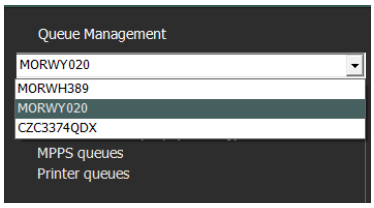


Figure 235: Selecting in-room NX Workstations for Queue management viewing.

3. In the tree view, select a destination type (archiving, printing or MPPS Reporting).
4. Select the name of a destination.

   In the main window, the destination parameters appear, together with the list of jobs for that particular destination. The main window also has a number of buttons for controlling the queue on the right side of the screen.

Button	Action
Halt	Use this button to stop the queue temporarily.
Restart	Use this button to restart the destination.
Reroute	Use this button to change destinations.
Scheduling	Use this button to define and schedule routing destinations.

Reroute to another destination

Procedure:

1. Select an archive or a print device.
2. Click the **Reroute** button.

   The Reroute Queue dialog box appears.

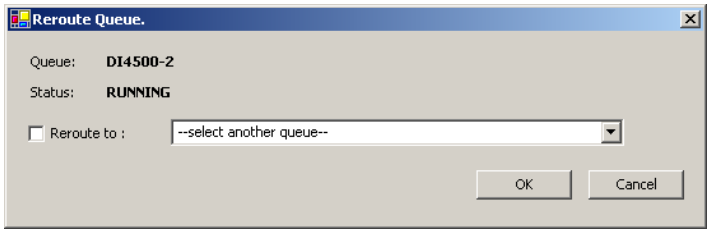


Figure 236: Reroute Queue window.

3. Check the reroute check box and select a destination.
4. Click **OK**.

Note When the user works with MPPS reporting, the Reroute button is disabled.

Schedule the selected queue

Procedure:

1. Click the **Scheduling** button.

   The Scheduling Overview dialog box appears.

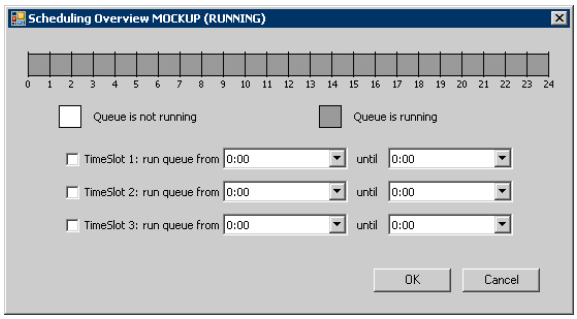


Figure 237: Schedule Queue window.

2. Define which and how many time slots must be used for the selected destination.
3. Click **OK**.

Note When the user works with MPPS reporting, the Scheduling button is disabled.

Sorting

In the main window, queues can also be sorted using a number of filters.

Procedure:

1. From the **View** drop down list, select the jobs you wish to see:
2. Click the header cell of the column that will be used for sorting.
3. Click the header cell again to reverse the sort order.

Musica MCE Engine archive

If NX is configured to perform Micro Calcification Enhancement (MCE) on mammography images, a special archive queue is listed, that is not intended to store images. The Musica MCE Engine archive queue manages the MCE image processing jobs. The processed images are stored on a PACS archive, managed by a normal archive queue.

Delete Examination

The Key user can select closed examinations and remove them.

Note The complete examination with all images will be deleted.

Note If you want to delete images on the Central Monitoring System, first perform a query in the Worklist Overview window. Only the search results will be displayed in the Delete Images pane.

To delete examinations from the history list exams:

1. Click **Delete Examination** in the Functionality Overview pane of the Main Menu window.

   The Delete Examination pane is opened:

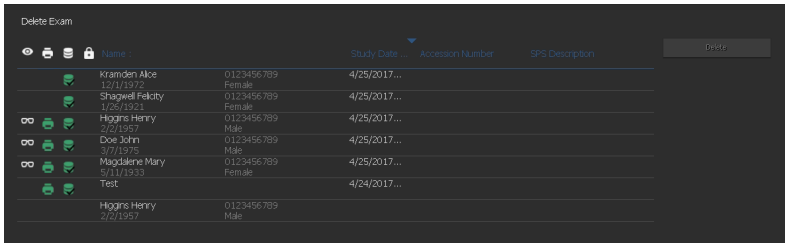


   Figure 238: Delete Images pane.

2. Select the examination you want to remove from the list.

   The images of the selected examination are displayed in the Image overview pane.

3. Click **Delete**.

   The selected examination is deleted.

Lock Examinations

To prevent exams from being deleted from the workstation, the user is able to lock them. A locked examination can be unlocked using a toggle mechanism.

Note If you want to lock exams on the Central Monitoring System, first perform a query in the Worklist Overview window. Only the search results will be displayed in the Lock Examinations pane.

To lock exams, proceed as follows:

1. Click **Lock Examinations** in the Functionality Overview pane of the Main Menu window.

   The Lock Examinations pane is opened:

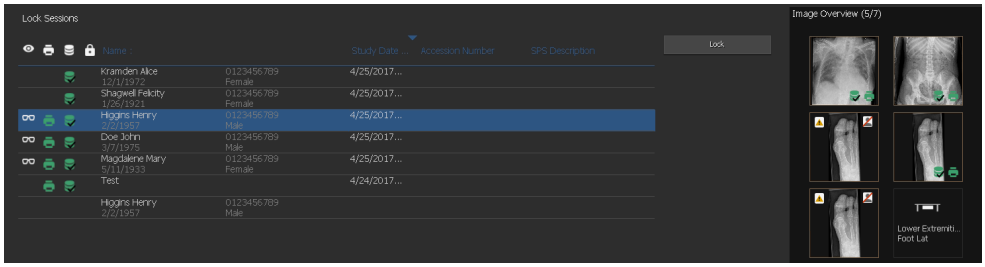


Figure 239: Lock Examinations pane.

2. Select an examination from the list and click **Lock**. A lock icon will appear next to the examination:

   To unlock an examination, select a locked examination and click **Unlock**.

Quality Assurance

Read and Initialize Cassette

Using the NX Main Menu you can read cassette information as well as initialize cassettes to be used together with DICOM Digitizers.

The workflow is different for two types of configuration:

- Configuration with ID Tablet
- Configuration with Fast ID

Note Cassettes for the DX-S Digitizer cannot be initialized using NX.

Initializing a cassette (write initial information on a cassette) in a configuration with ID Tablet

1. Click **Read and Initialize Cassette** in the Functionality Overview pane of the Main Menu window.

   The Read and Initialize Cassette pane is opened:

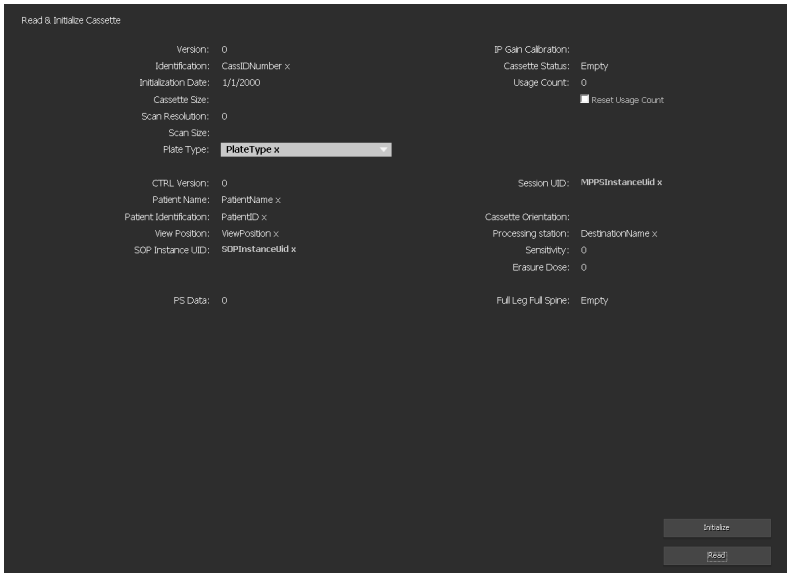


   Figure 240: Read and Initialize Cassette pane.

2. Insert a cassette in the ID Tablet.
3. Click **Read**.

   The Read and Initialize Cassette pane is filled with the details of the inserted cassette.

   Two attributes of the cassette can be changed here.

   - **Plate type.** This is the type of plate used in the cassette.
   - **Usage count.** This is the number of times the cassette has been scanned. You can reset this counter.

   The other attributes are read only.

   If the information is OK, you can proceed with initializing the cassette.

4. Click **Initialize**.

   The information is now written to the cassette.

   Once initialization has been completed, all fields are cleared so that the same procedure may be performed for subsequent cassettes.

Initializing a cassette (write initial information on a cassette) in a configuration with Fast ID

1. Click **Read and Initialize Cassette** in the Functionality Overview pane of the Main Menu window.

   The Read and Initialize Cassette pane is opened:

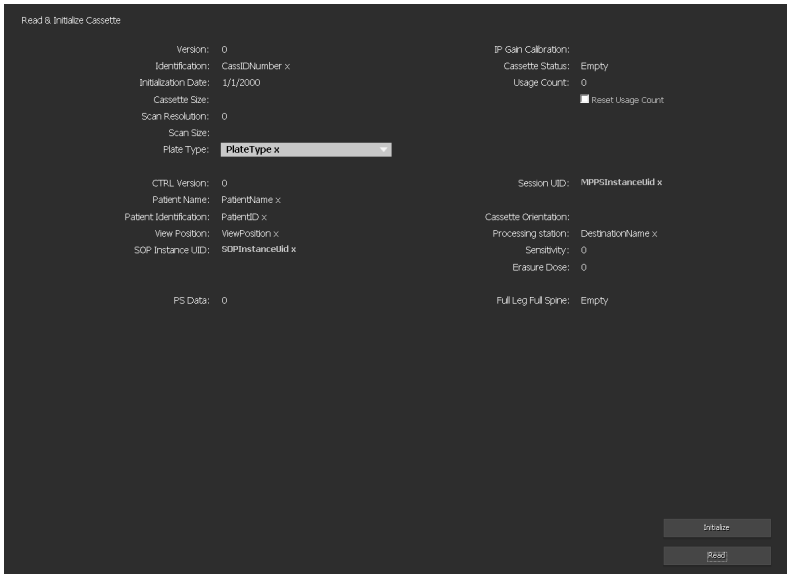


   Figure 241: Read and Initialize Cassette pane.

2. Click **Read**.

   A signal is now sent to the Digitizer, indicating that the next cassette is entered in order to read and change cassette attributes, not for digitizing images.

3. Insert the cassette in the Digitizer.

   The Read and Initialize Cassette pane is filled with the details of the inserted cassette.

   Two attributes of the cassette can be changed here.

   - **Plate type.** This is the type of plate used in the cassette.
   - **Usage count.** This is the number of times the cassette has been scanned. You can reset this counter.

   The other attributes are read only.

   If the information is OK, you can proceed with initializing the cassette.

4. Click **Initialize**.

   The information is now written to the cassette.

   Once initialization has been completed, all fields are cleared so that the same procedure may be performed for subsequent cassettes.

View all Image Attributes

The Key user can choose to view all image attributes of a selected image. These are then displayed (read only) in the task pane.

Procedure:

1. Click **View all image attributes** in the Functionality Overview pane of the Main Menu window.

   The View All pane is opened in the middle section of the Main Menu window:

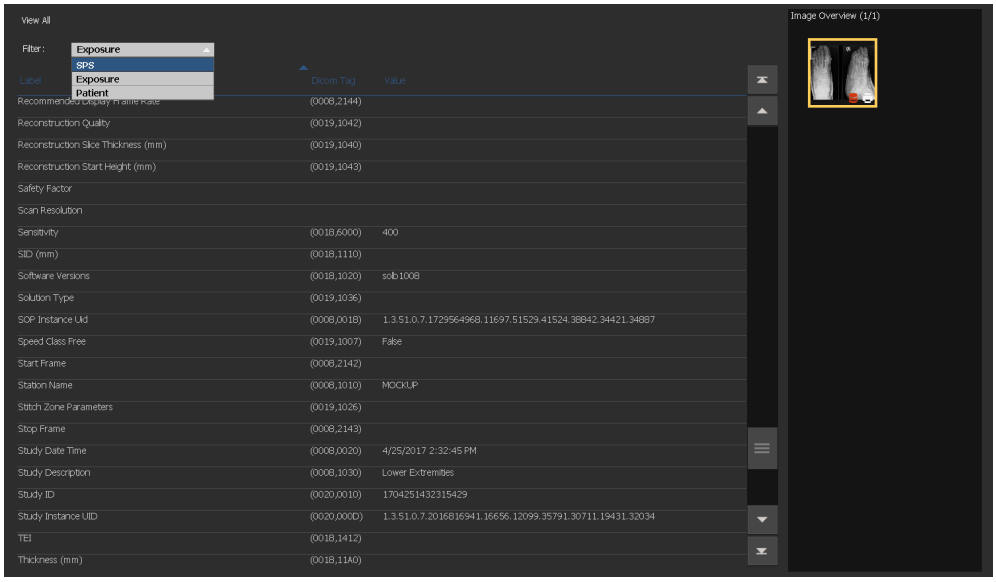
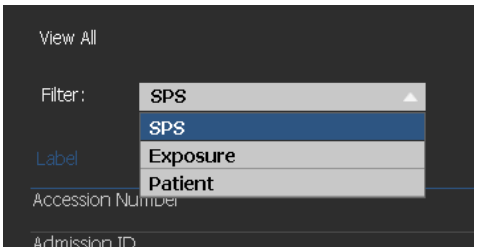


Figure 242: Main Menu window with View All pane.

2. You can filter the image attributes in the Filter drop down menu.

Name	Action
 Filter drop down menu.	Select a filter option from the drop down menu (SPS, Exposure or Patient).

3. Columns may be sorted in ascending order by clicking a column header once. Clicking twice will sort the data in descending order. A third click will restore the original order.

Modifying Dose Monitoring Statistics

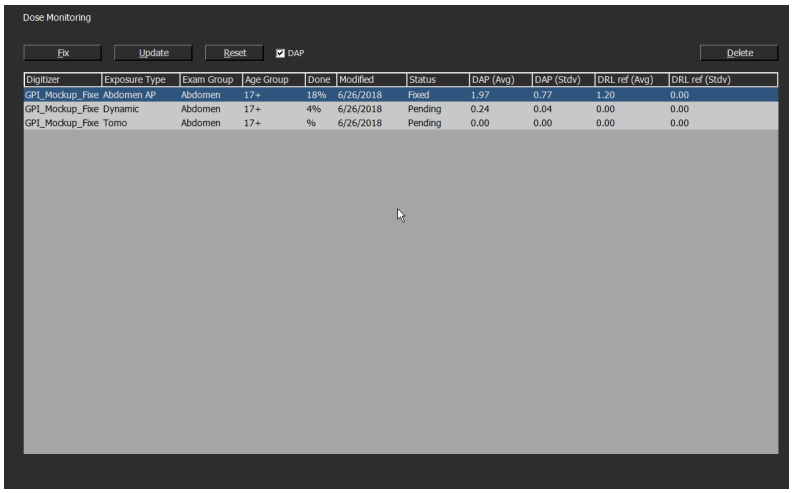


Figure 243: Main Menu window with Dose Monitoring pane.

Using Dose monitoring, on the Main Menu a list of all received exposure types per Digitizer technology and per speed class can be viewed.

For each entry in the dose reference value list, the median and standard deviation is calculated and the reference median and standard deviation is displayed.

LgM and EI values are derived from the pixel histogram of the image. DAP values are obtained from the X-ray modality. Toggle the DAP checkbox to display the relevant set of values.

For each exposure type it is possible to set a reference value or to update the reference value with the median and standard deviation of the 50 latest exposures or to remove exposure types.

An external dose consistency analysis program calculates several statistics with regard to doses, answering questions such as what sort of exposures are likely to be under- or overexposed.

Possible actions in the Dose Monitoring pane are:

- **Fixing reference values.**

  This is a reference LgM value (refLgM), reference Exposure Index (target Exposure Index, TEI) or DAP value which can be used as a guidance value when not enough statistics are available.
- **Updating reference values.**

  This is updating the fixed reference value with the average LgM, EI or DAP value when a proper average value is available.
- **Resetting reference values.**

  This is resetting the running average for the selected exposure type.
- **Delete exposure types.**

  This is removing all statistics for the selected exposure type from the NX workstation.

Fixing reference values

1. Select an exposure type by clicking the row of the exposure type.
2. Click the **Fix** button.

   The **Fix reference value** dialog box appears.
3. Enter a new value and click OK.

   The value is added to the refLgM (Avg), the TEI (Avg) or the DRL ref (Avg) column of the Dose Monitoring pane.

Updating reference values

1. Select an exposure type.
2. Click the **Update** button.

   The value of the refLgM (Avg), TEI (Avg) or DAP (Avg) column is updated with the calculated average value.

Resetting reference values

1. Select an exposure type.
2. Click the **Reset** button.

   The running average in the refLgM (Avg), TEI (Avg) or DAP (Avg) value is reset.

Deleting an exposure value

1. Select an exposure type.
2. Click the **Delete** button.

   The exposure type is deleted from the list.

Note The dose reference list will be empty if the room has no dose monitoring license.

Note If you want to modify dose monitoring statistics on the Central Monitoring System, you first have to select a room.

Dose monitoring

In computed radiography or direct radiography the image processing automatically adjusts the image density independently of the applied dose. In fact, this is one of the key advantages of the new technology. It helps to reduce the retake rate significantly, but at the same time this feature may hide occasional or systematic under- or overexposure.

While in conventional radiography or direct radiography the amount of exposure is directly related to average density, in computed radiography it determines the signal-to-noise ratio, not the image density. The higher the dose, the better the SNR. This is good news as such, but in the long term there is a risk of gradually drifting to higher doses, as the more exposed images tend to look better. For that reason Agfa has developed a quality control tool called Dose Monitoring Software.

Depending on the installation your workstation will be configured in such a way that the dose monitoring will make use of LGM (Logarithmic Median) values or Exposure Index (EI) values.

Both are derived from the pixel histogram and only apply to the Region of Interest (areas with direct radiation on the detector and collimated areas on the tube are left out). Manual collimation will affect these values, only the area within the collimated zone is taken into account.

LgM is a logarithmic value that will respond in a logarithmic way to changes in the detector dose, EI is a linear value that respond in a linear way to changes in detector dose.

The higher the value the higher the detector dose (relatively) was. Since the X-ray beam quality influences the values, this is not an absolute dose measuring tool, but a good relative dose indicator to monitor your applied doses.

Dose monitoring will compare the LgM or EI of a image with a “reference LgM” or a reference EI (“Target Exposure Index”: TEI) and calculates the deviation which will be kept into the statistics and can be visualized on the NX by means of a bar graph.

In case of LGM values the system stores a reference LGM and a standard deviation on this reference value.

In case of an EI the system stores a Target Exposure Index (TEI) and a standard deviation on this TEI. Besides the EI, a Deviation Index (DI) is calculated and displayed on the NX for every image. The DI expresses the deviation of the EI from its TEI.

To manage the reference values for dose monitoring, click Dose Monitoring in the Functionality Overview pane of the Main Menu window.

Refer to "Suggested Radiographic References and User Guides" for more information on determining Target Exposure Index values.

Related information

Modifying Dose Monitoring Statistics on page 314
Suggested Radiographic References and User Guides on page 354

Dose Statistics

NX stores records of the dose value (LgM or EI) and the deviation to the reference value for each exposure.

To export the dose record data, click **Export Acquired Dose Records** in the Functionality Overview pane of the Main Menu window. By default, only the records that have been added since the last export are exported.

To analyse the dose record data, click **Extended Dose Reporting** in the Functionality Overview pane of the Main Menu window. Extended Dose Reporting is available on installations configured to use Exposure Index (EI) values.

Related information

Exporting Acquired Dose Records on page 323
Extended Dose Reporting on page 317

Extended Dose Reporting

Using Extended Dose Reporting, you can analyse the records of the dose value (EI) and the deviation to the reference value and the records of the dose area product (DAP) values, that are stored for each exposure. Records can be filtered and grouped on a set of attributes, e.g. exposure type, patient category, modality, equipment, operator, date and time. Outliers can be analysed separately.

To analyse the dose records:

1. Click **Extended Dose Reporting** in the **Functionality Overview** pane of the **Main Menu** window.

   The **Extended Dose Reporting** window appears.
2. On the Central Monitoring System, select a room.
3. Limit the analysis by selecting specific values or by specifying a date range.
4. Select the type of values to be analyzed:
   - EI-DI Statistics: analyze EI and DI values for all selected exposures, grouped by exposure type and digitizer or detector type.
   - DAP Statistics: analyze DAP values for all selected exposures grouped by exposure type and digitizer or detector type.
   - DAP Statistics Protocol Code: analyze DAP values per protocol code for all selected exposures grouped by protocol code.
   - Outliers: analyze EI and DI values for all selected exposures for which the deviation of the dose value (EI) to the reference value corresponds to a specific overexposure or underexposure, grouped by exposure type and digitizer or detector type. The overexposure or underexposure is expressed by a minimum and maximum deviation index value (DI).
   - Exposure Info: list EI, DI and DAP values for each selected exposure.
5. Filter the data to be displayed by patient category, exam group, exposure type, operator, digitizer or detector type.
6. Click **Start Analysis**.

   The results of the analysis are displayed in the table.

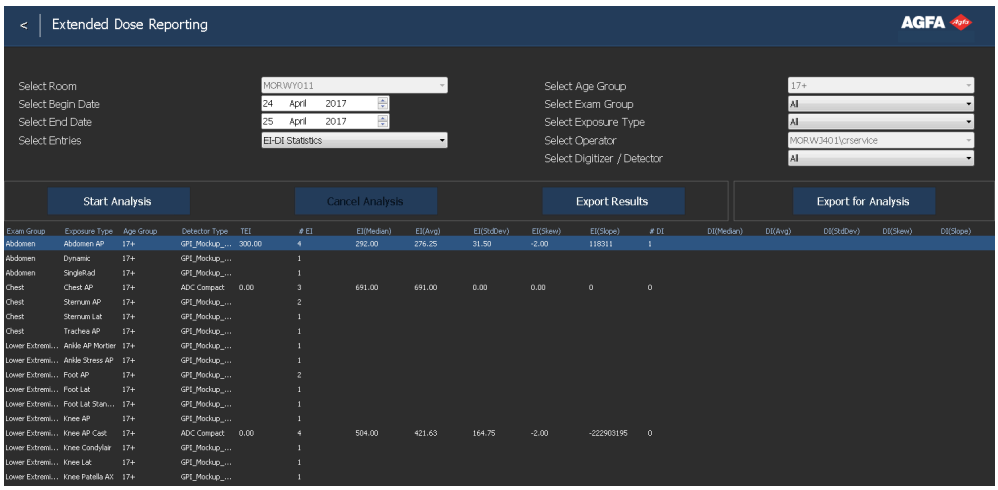
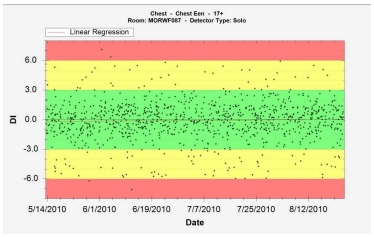
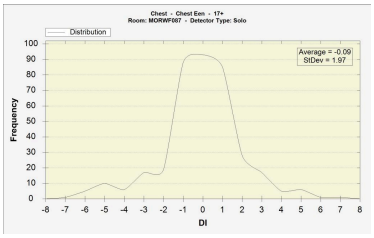


Figure 244: Analysis results

- TEI is the Target Exposure Index for the exposure type
- #EI is the number of exposures
- #DI is the number of exposures for which a deviation has been calculated
- EI is the Exposure Index
- DI is the Deviation Index

- DAP is the dose area product value
- #DAP is the number of exposures
- DRL is the diagnostic reference level. Click the table cell to enter a value. The DRL value will be visible in the trend and distribution charts.
- Median, Avg, StdDev; Skew and Slope indicate the statistic analysis results

7. Double-click a row to view basic trend and distribution charts. Charts can only be viewed in views containing statistical data and if sufficient data is available.

trend chart	distribution chart
	

Right-click the chart to save or print the chart. Click the chart to switch to the next chart or return to the Extended Dose Reporting window.

8. Click **Export Results** to export the results of the analysis.

   A Windows **Save As** dialog box appears. A default name and the format (xml) of the file are already displayed.

9. Select a location and click **Save**.

   The files can now be found in the destination folder. Two files are exported: an xml file and a html file. Use the html file to view the analysis results in a browser. Use the xml file to import the data in a third party software tool. The html file is automatically opened in a browser window.

   The html export can only be executed when the amount of records is less than 1000.

10. If the destination folder is a CD-writer drive, the following extra steps are required to perform the CD writing operation.
    a) The “Burn a Disk” window appears. Follow the instructions to write the file to CD/DVD.
    b) A dialog box may be displayed asking how the disk will be used. Depending on this choice, the disk may not be usable on other computers.

Extended Dose Reporting on another PC

To use Extended Dose Reporting on another PC, install the NX Offline Config tool on the PC first. The installer is available on the MUSICA StarterKit USB flash drive in the folder `Service Software`.

To analyse a dataset:

1. On the NX workstation, click **Extended Dose Reporting** in the Functionality Overview pane of the Main Menu window.
2. Click **Export for Analysis**.

   A Windows **Save As** dialog box appears. A default name and the format (xml) of the file are already displayed.

3. Select a location and click **Save**.

   The files can now be found in the destination folder. Three xml files are exported.

4. Transfer to the files to a folder on the other PC.
5. On the other PC, go to the **MUSICA Acquisition Workstation Control Center** > **NX** > **Offline Config Tool** and click **Dose (EDR) Analysis Tool**.

   The **Extended Dose Reporting** window appears.
6. Click **Open XML File**.

   A Windows **Open File** dialog box appears.
7. Navigate to the folder where the export files are stored, select the exported file and click **Open**.

   By default the dialog only lists files with a filename as proposed during the export. Only one of three export files must be selected, the other files are retrieved from the same folder automatically.

The dose records can now be analysed.

Related information

MUSICA Acquisition Workstation Control Center on page 25

Import/Export

Exporting Repeat / Reject statistics

The Key user can export the Repeat/Reject logging files. This information, stored in XML format, can then be easily imported into a 3rd party software tool (not provided by Agfa) for consultation, for example Microsoft Excel. Also a formatted HTML file is automatically created in the same folder.

Procedure:

1. Click **Export Repeat/Reject Statistics** in the **Functionality Overview** pane of the **Main Menu** window.

   A dialog is displayed to specify the filename for the logging files.

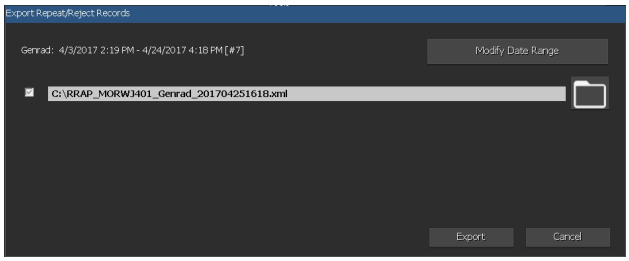


Figure 245: Export Reject Statistics

2. Check the checkboxes to export statistics for genrad or mammography exams or both.
3. To export data for a specific timeframe, click **Modify Date Range** and select a start and end date and time.

   By default, only the records that have been added since the last export are exported.

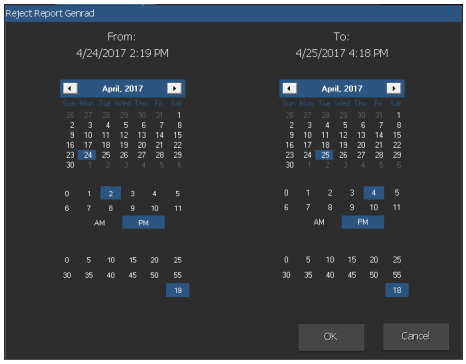


Figure 246: Start and end date and time dialog

4. For each file, click the folder button.

   A Windows **Save As**-dialog box appears; a default name and the format (xml) of the file are already displayed.
5. Select a location.
6. Click **Export**.

   The XML and HTML files can now be found in the destination folder.

   You can open the HTML by clicking it:

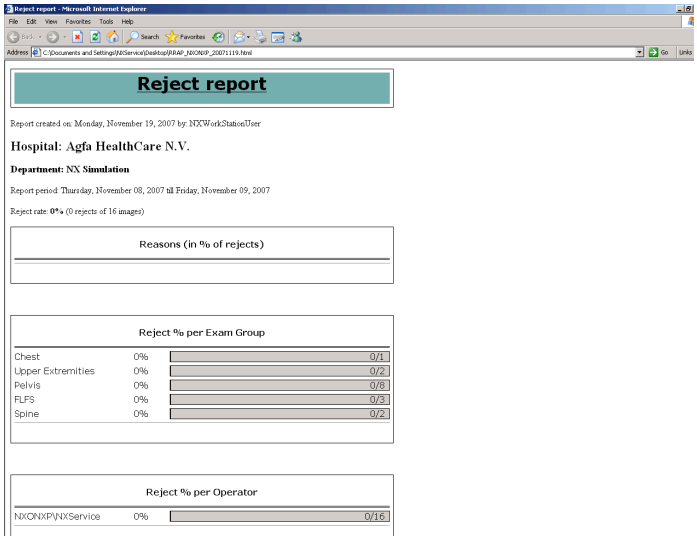


Figure 247: HTML report with Repeat/Reject statistics.

For printing the HTML report from your browser, it is advised to use landscape page orientation in the printer settings.

7. If the destination folder is a CD-writer drive, these extra steps are required to perform the CD-writing operation.
   a) The “Burn a Disk” window appears. Follow the instructions to write the file to CD/DVD.
   b) A dialog box may be displayed asking how the disk will be used. Depending on this choice, the disk may not be usable on other computers.

Exporting Acquired Dose Records

The Key user can export acquired dose records. This information, stored in XML format, can then be easily imported into a 3rd party software tool (not provided by Agfa) for consultation, for example Microsoft Excel.

To export acquired dose records:

1. Click **Export Acquired Dose Records** in the **Functionality Overview** pane of the **Main Menu** window.

   A dialog is displayed to specify the filename for the logging files.

Figure 248: Export Acquired Dose Records

2. To export data for a specific timeframe, click **Modify Date Range** and select a start and end date and time.

   By default, only the records that have been added since the last export are exported.

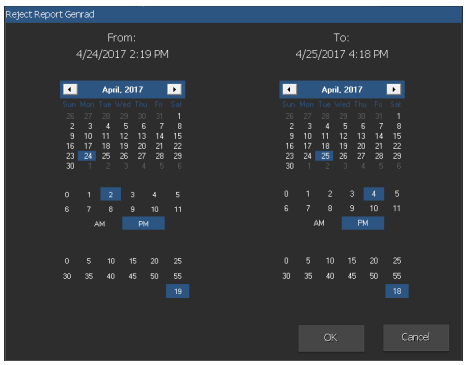


Figure 249: Start and end date and time dialog

3. Click the folder button.

   A Windows **Save As**-dialog box appears; a default name and the format (xml) of the file are already displayed.

4. Select a location.

5. Click **Export**.

   The XML files can now be found in the destination folder.

6. If the destination folder is a CD-writer drive, these extra steps are required to perform the CD-writing operation.

   a) The “Burn a Disk” window appears. Follow the instructions to write the file to CD/DVD.

   b) A dialog box may be displayed asking how the disk will be used. Depending on this choice, the disk may not be usable on other computers.

Importing Technical Images

Procedure:

1. Insert a CD (or other medium) containing technical images in DCM-format.
2. Click Import technical images in the Functionality Overview pane of the Main Menu window.

   A Windows **Import**-dialog box appears:

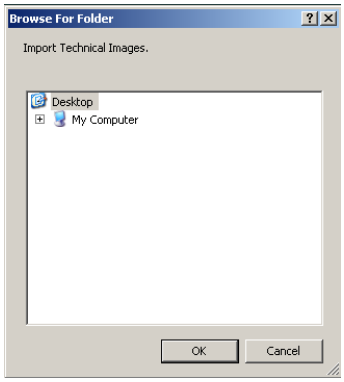


Figure 250: Import Technical Images dialog box.

3. Select the location of the files and click **OK**.

   The technical images are imported into the NX system. They can be retrieved in the Closed examinations list.

Note with this function it is possible to import AAPM TG 18 Test Patterns.

Exporting images

It is possible to export images from an examination to CD or DVD.

To export images

1. Go to the **Main Menu** window.
2. Click **Export images** in the **Functionality Overview** pane.

   The **Export Images** pane is opened.

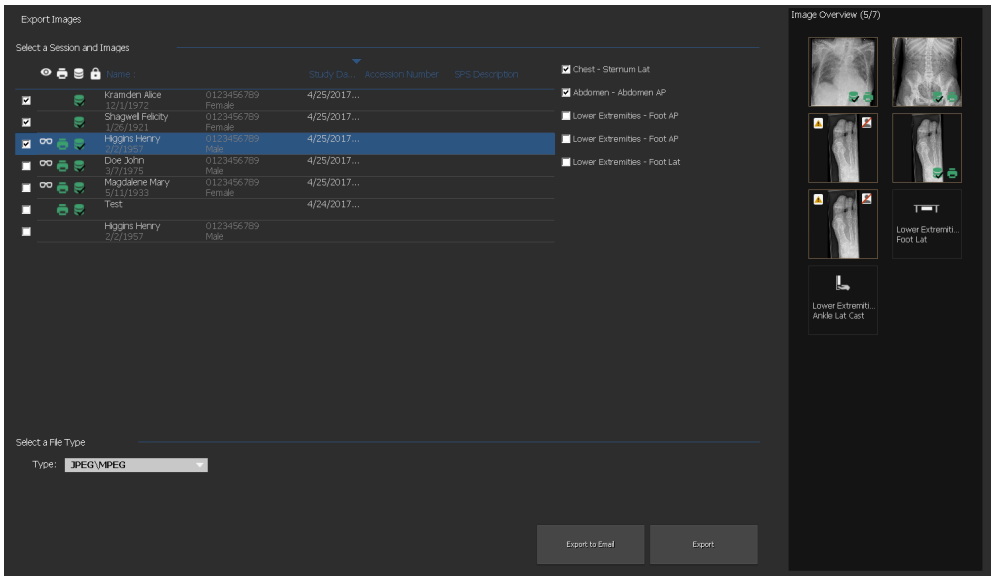


Figure 251: Export Images pane

3. Perform one of the following actions:

   - Select the checkboxes of the examinations you want to export (1) in the first column of the **Export Images** pane.
   - Decide to include or exclude images by selecting or deselecting the checkbox of the image in the **Image Selection** pane (2).
   - Select a file type in the **File Type** drop down box (3).

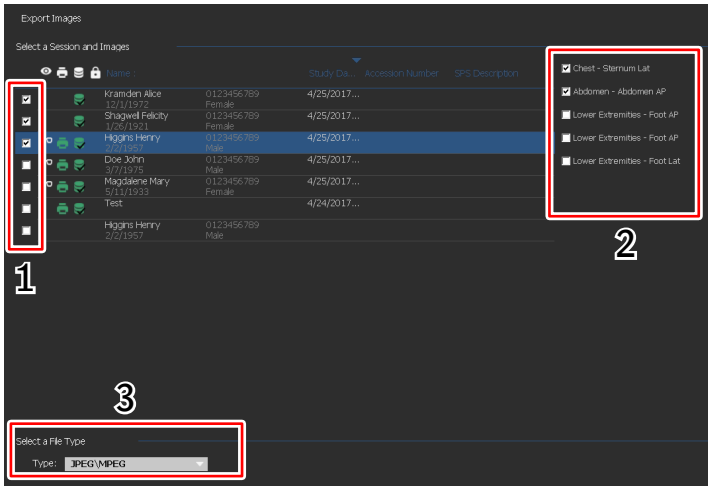


Figure 252: Export Images actions

If you choose **DICOM** or **Native** as export format, you have the option to include patient demographics, patient identification photos, patient positioning photos and derived images for pathology detection.

Changes applied to derived images for pathology detection are not burnt into the image, but saved separately in a DICOM Grayscale Softcopy Presentation State object.

Multiple DICOM export profiles can be configured. The DICOM export is IHE compliant only if the user or the RIS has provided a value for the **Patient ID** field.

If you choose **Native** as export format, you have the option to include derived images for pathology detection.

4. Click **Export**.
5. Select a destination folder.
6. Click **Save**.
7. Alternatively, click **Export to Email** to send the images by email.

   The message including the images as attachments is composed and opened in the default email client that is configured on the PC.
8. Fill in the destination address and send the email.

Exporting automatically

NX can be configured to write all images to file or to CD or DVD. The images are put in a queue and at any moment you can start writing the images. Alternatively, when the hard disk space for buffering the images is full, you will be prompted to write the images.

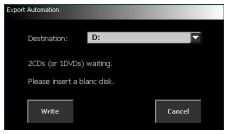
To write images

1. Go to the Main Menu.

   Under **Import/Export**, you will see the line **Export Automation** along with the message that data is waiting. The line is visible from the moment there are images ready to be written.

2. Click the **Export Automation** line.

   The **Export Automation** dialog box opens. In this dialog box you can select the path where the files must be written or the CD/DVD writer drive.



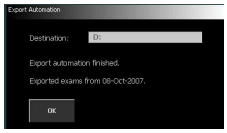
3. When writing to CD or DVD, insert a disk.
4. Click **Write** to start writing.

   The progress of the writing is shown next to the **Export Automation** line.

5. If there are more images than fit on a CD or DVD, the Export Automation dialog box will reappear and prompt you to select a destination and enter a new CD/DVD. Click **Write** again to continue writing.

   After all images are written, a new dialog will appear with the message that writing is finished. The actual date is also shown. The operator can write this date on a label.

   If images are written to file, they are contained in one or more folders indicating the name of the NX workstation and the time of export.



6. Click **OK** to close the dialog.

Tools

NX Service and Configuration Tool

To open the NX Service and Configuration Tool:

Click **NX Service and Configuration Tool** in the **Functionality Overview** pane of the **Main Menu** window.

This is a link to the dedicated tool for setting up and modifying NX applications. Refer to the Key user manual for more information.

The date and time of the latest activation is displayed next to the link.

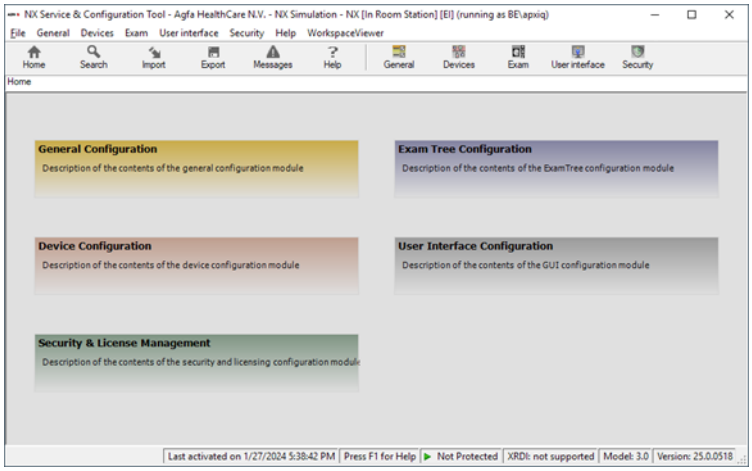


Figure 253: Main screen of the NX Service and Configuration Tool

About NX

To consult the About box:

1. Click **About NX** in the Functionality Overview pane of the Main Menu window.

   This will open the About box showing the current release and version details of NX in the lower right corner.

Figure 254: Example of the NX About box

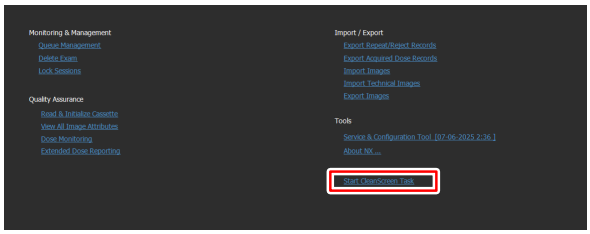
Note Always quote these details when you discuss any issues with Agfa service personnel.

2. Click on the dialog to close it.

Cleaning the touch screen of the PC

Prevent unintended interaction with the software while cleaning the touch screen of the PC.

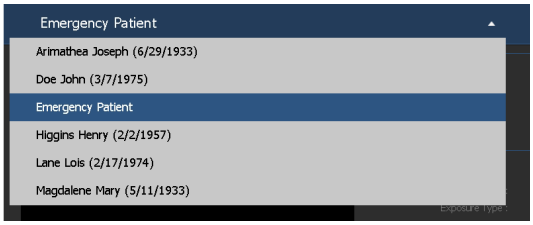
Click **Start CleanScreen Task** in the **Main Menu**.



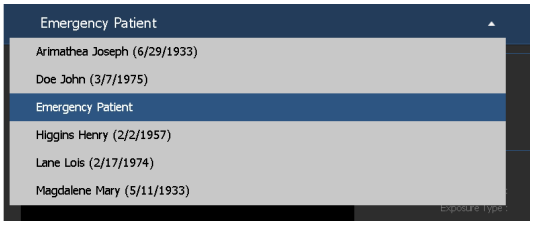
The touch screen is deactivated for 15 seconds. A countdown timer is displayed.

Problem Solving in NX

DR image is not displayed

Details	An image is acquired using a DR detector, but not displayed in the examination.
Cause	The DR Detector could not send the image directly after the exposure to the NX workstation. The image recovery process is able to recover such an image in most cases. Demographic data might be lost however and default data are used.
Brief Solution for DR 10s, DR 14s detectors	**Warning:** Do not power off the DR detector or the X-ray system. The image will be lost! 1. Perform activities described in error message. 2. Check DR detector connection status in soft console. 3. Put DR detector close to access point or to the mobile X-ray unit. 4. Select another empty thumbnail for the same DR detector. Create one if none is available. This allows the system to receive the missing image from the detector. The recovered image is available on the NX workstation in a new examination. It is processed using a default exposure type.  **Figure 255: Check the drop-down list in the title bar of the window for a new examination containing the recovered image.** The recovered image can be transferred to the right patient using the **Transfer Session** button in the **Examination** window. 5. If image does not show up on NX after 3 minutes, restart NX. To restart NX, go to the **MUSICA Acquisition Workstation Control Center** > **NX** and click **Restart NX Completely**. 6. If the image still does not show up on NX, restart the detector. The image cannot be recovered. Contact your local support organization to investigate the problem.

Brief Solution for DR 10e, DR 14e, DR 17e detectors	**Warning:** Do not power off the DR detector or the X-ray system. The image will be lost! **Warning:** Do NOT select a thumbnail for another DR detector! The image will be lost! **Warning:** Do NOT restart NX! The image will be lost! **1.** Perform activities described in error message. **2.** Check DR detector connection status in soft console. **3.** Put DR detector close to access point or to the mobile X-ray unit. This initiates an image recovery process from the detector. The recovered image is available on the NX workstation. **4.** If image does not show up on NX after 10 minutes, restart NX and restart the detector. To restart NX, go to the **MUSICA Acquisition Workstation Control Center** > **NX** and click **Restart NX Completely**. The image cannot be recovered. Contact your local support organization to investigate the problem.

Brief Solution for other detector models	**Warning:** Do not power off the DR detector or the X-ray system. The image will be lost! 1. Perform activities described in error message. 2. Check DR detector connection status in soft console. 3. Put DR detector close to access point or to the mobile X-ray unit. 4. Select another empty thumbnail. Create one if none is available. This initiates an image recovery process from the detector. The recovered image is available on the NX workstation in a new examination. It is processed using a default exposure type.  **Figure 256: Check the drop-down list in the title bar of the window for a new examination containing the recovered image.** The recovered image can be transferred to the right patient using the **Transfer Session** button in the **Examination** window. 5. If image does not show up on NX after 3 minutes, restart NX. To restart NX, go to the **MUSICA Acquisition Workstation Control Center** > **NX** and click **Restart NX Completely**. The image cannot be recovered. Contact your local support organization to investigate the problem. In case the image cannot be processed, it is copied to a directory on the D: drive of the PC. This is done to prevent, that the software continues crashing during the automatic image recovery in case the image is the reason for the fault.

Related information

MUSICA Acquisition Workstation Control Center on page 25
Transferring all images from one exam to another on page 189

CR image is not displayed

Details	An image is acquired using a CR digitizer, but not displayed in the examination.
Cause	The digitizer could not send the image to the NX workstation where the image was identified and the image is rerouted to another NX workstation.
Brief Solution	If the image is stored on the digitizer, it can be rerouted to another NX workstation. For more information about rerouting images on the digitizer, refer to the digitizer User Manual. After rerouting, the recovered image is available on the other NX workstation in a new examination. It is processed using a default exposure type.

Real-time dynamic image halts

Details	Real-time fluoroscopy or rapid sequence image halts during exposure
Cause	A problem occurred while displaying the real-time image.
Brief Solution	**1.** Stop the exposure. **2.** Press the key combination CTRL + ALT + K A dialog is displayed:  **3.** Select "Stop the Acquisition Viewer" The Dynamic Image pane is displayed, showing the acquired dynamic image.

Only part of the image is displayed

Details	DR images and CR 10-X images are cropped to the collimation area that is automatically detected by NX. The cropping is intended to remove non relevant areas of the image. Nevertheless it can occur that the cropping makes useful diagnostic information invisible. In this case you must be able to turn black border and cropping off or re-collimate the image manually.
Cause	Failing auto collimation.
Brief Solution	This problem is solved by: • Turning off the black border and cropping. • Applying manual collimation. To prevent this problem, use the ROI detection exposure techniques as described in “Working with collimation”.

Solution Steps	To turn the black borders and cropping on or off: **1.** Select an image in the **Image Overview** pane. **2.** From the first drop-down list in the **Image Processing** tool section, select the following icon.  To draw a rectangular collimation area: **1.** Select an image in the **Image Overview** pane. **2.** In the **Editing** window, from the first drop-down list in the **Image Processing** tool section, select the icon below.  **3.** Click once to define one corner of the rectangle. **4.** Move the pointer. **5.** Click again to define the opposite corner. **6.** To display the collimation area, select the icon below.  To draw a polygonal collimation area: **1.** Select an image in the **Image Overview** pane. **2.** In the **Editing** window, from the first drop-down list in the **Image Processing** tool section, select the icon below.  **3.** Click to define the starting point. **4.** Move the pointer and click to define each corner. **5.** Click the starting point to close the polygon. **6.** To display the collimation area, select the icon below. 

Related information

Working with collimation on page 283
Black borders and cropping on page 285
Applying collimation and cropping manually on page 285

Part of the image is masked by the black border

Details	During the automatic collimation process, NX normally applies black borders to the image. These black borders are intended to mask non relevant areas of the images. Nevertheless it can occur that the black borders do mask useful diagnostic information. In this case you must be able to either hide the black border or re-collimate the image manually.
Cause	Failing auto collimation.
Brief Solution	This problem is solved by: • Hiding the black border. • Applying manual collimation. To prevent this problem, use the ROI detection exposure techniques as described in “Working with collimation”.

Solution Steps	To show/hide black borders: **1.** The **Image Detail** pane in the **Examination** window has a set of buttons to perform basic operations on an image. With this button you can remove the black border in case of failed collimation. Click the button to show/hide black borders.  To draw a rectangular collimation area: **1.** Select an image in the **Image Overview** pane. **2.** In the **Editing** window, from the first drop-down list in the **Image Processing** tool section, select the icon below.  **3.** Click once to define one corner of the rectangle. **4.** Move the pointer. **5.** Click again to define the opposite corner. **6.** To display the collimation area, select the icon below.  To draw a polygonal collimation area: **1.** Select an image in the **Image Overview** pane. **2.** In the **Editing** window, from the first drop-down list in the **Image Processing** tool section, select the icon below.  **3.** Click to define the starting point. **4.** Move the pointer and click to define each corner. **5.** Click the starting point to close the polygon. **6.** To display the collimation area, select the icon below. 

Related information

Working with collimation on page 283
Performing quality control on the image on page 176
Applying collimation and cropping manually on page 285

NX is not running

Details	NX is not active, no activity takes place.
Solution Steps	If you see NX in the taskbar, click NX in the taskbar. The NX application appears. Alternative solution: Go to the **MUSICA Acquisition Workstation Control Center** > **NX** and click **Restart NX Completely**

Related information

Stopping NX on page 64
Starting NX on page 55
MUSICA Acquisition Workstation Control Center on page 25

Window/Level setting is completely out of range

Details	During the auto processing of an image, NX calculates auto collimation parameters and applies these parameters (such as window/level settings) to the image. In specific situations, these auto collimation parameters may be wrong.
Causes	• automatic collimation failed to detect region of interest • region of interest is extremely small
Brief Solution	• If MUSICA image processing is used: apply manual collimation • If MUSICA2/MUSICA3 image processing is used: adjust the global contrast and intensity (window/level)
Solution Steps for MUSICA Image Processing	To manually draw a rectangular collimation area (for MUSICA image processing): **1.** Select an image in the **Image Overview** pane. **2.** In the **Editing** window, from the first drop-down list in the **Image Processing** tool section, select the icon below.  **3.** Click once to define one corner of the rectangle. **4.** Move the pointer. **5.** Click again to define the opposite corner. **6.** To display the collimation area, select the icon below.  To manually draw a polygonal collimation area (for MUSICA image processing): **1.** Select an image in the **Image Overview** pane. **2.** In the **Editing** window, from the first drop-down list in the **Image Processing** tool section, select the icon below.  **3.** Click to define the starting point. **4.** Move the pointer and click to define each corner. **5.** Click the starting point to close the polygon. **6.** To display the collimation area, select the icon below. 

Solution Steps for MUSICA2/MUSICA3 Image Processing	To adjust the global contrast and intensity (for MUSICA2/MUSICA3 image processing): **1.** Select an image in the **Image Overview** pane. **2.** Select the following icon.  **3.** Use the mouse to adjust the global contrast and intensity. **4.** When the desired contrast and intensity have been reached, click in the image pane.

Related information

Applying collimation and cropping manually on page 285
Changing the global contrast and intensity of an image (window/level) on page 288

Archive button is disabled

Details	After you have performed the quality control tasks and have inspected the images of a study on the NX station, the image must normally be sent to an archive (or a printer, depending on your workflow). You must know that you can only archive an image once. So when an image is archived, it can still be consulted at the NX station but cannot be archived again (the Archive button is disabled). If you still want to archive the image a second time, you have to save it as a new image. The archive button can also be disabled because the image has been rejected. In this case you need to unreject the image if you want to archive it.
Cause	Image has already been archived before. The image has been rejected.
Brief Solution	Saving the image as a new image.
Solution Steps	To save a processed image as a new image: **1.** Go to the **Editing** window. **2.** Select an image in the **Image Overview** pane. **3.** Process the image. **4.** In the **Editing** window, click **Save as New**. The processed image is added to the exam and appears in the **Image Overview** pane. To unreject an image: **1.** Select the image in the **Image Overview** pane. The image is displayed in the **Image Detail** pane. **2.** Click **Unreject Image**.

Related information

Saving a processed image as new image on page 235
Rejecting an image on page 178

Archive cannot be selected in drop down list

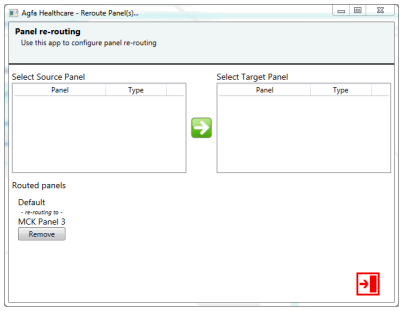
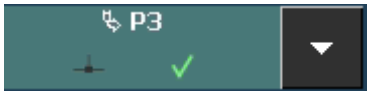
Details	After you have performed the quality control tasks and have inspected the images of a study on the NX station, the image must normally be sent to an archive (or a printer, depending on your workflow). You must know that you can only archive an image once. So when an image is archived, it can still be consulted at the NX station but cannot be archived again (the archive cannot be selected anymore from the list of archives). If you still want to archive the image a second time, you have to save it as a new image.
Cause	Image has already been archived to that archive.
Brief Solution	Saving an image as a new image.
Solution Steps	To save a processed image as a new image: **1.** Go to the **Editing** window. **2.** Select an image in the **Image Overview** pane. **3.** Process the image. **4.** In the **Editing** window, click **Save as New**. The processed image is added to the exam and appears in the **Image Overview** pane.

Related information

Saving a processed image as new image on page 235

DR Detector is out of order

Details	The DR detector status is red.
Cause	The communication between the NX workstation and the DR detector is lost.
Brief Solution	**1.** Stop NX completely. To stop NX completely, go to the **MUSICA Acquisition Workstation Control Center** and click **Stop NX** and confirm the procedure by pushing enter in the command window. **2.** Restart the X-Ray system. This will restart the fixed DR detector that is part of the X-Ray system. Refer to the X-Ray system user manual for more information. **3.** Start NX. To start NX, go to the **Musica Acquisition Workstation Control Center** > **NX** and click **Restart NX Completely**. **4.** Restart the portable DR detector. Refer to the DR detector user manual for more information.
Cause	The DR detector is malfunctioning.

Brief Solution	If another DR detector is available and configured on the NX workstation, it can be temporarily configured as a replacement for the DR detector that is out of order. **1.** Open the rerouting dialog by going to the **MUSICA Acquisition Workstation Control Center** > **NX**and click **DR-Panel Rerouting**.  **2.** Select the malfunctioning DR Detector from the list on the left side and the replacement DR Detector from the list on the right side. **3.** Click the green arrow button. **4.** Close the dialog. Each time an examination is started that is configured to use the malfunctioning DR detector, the replacement DR detector will be used instead. This is indicated in the **DR Detector Switch** by an arrow preceding the name of the DR detector.  **5.** When the DR detector is functioning again, click the **Remove** button in the rerouting dialog.

Related information

MUSICA Acquisition Workstation Control Center on page 25

Cassette is identified with the wrong exposure - detected prior to scanning

Details	Normally you select an exposure at the NX station, insert the cassette with the exposure in the ID Tablet and then identify the exposure by pressing the ID button. It may be possible that you have initially selected the wrong exposure at NX and identify this cassette with the wrong exposure. You must be able to solve this mistake by making a new identification.
Cause	User mistake.
Brief Solution	Re-identifying with the right exposure.
Solution Steps	To re-identify a cassette with the right exposure: **1.** Re-insert a cassette in the ID Tablet. **2.** Select the correct thumbnail in the **Exam Overview** pane. **3.** In the **Examination** window, click **ID**.

Related information

Identifying the cassettes on page 109

Cassette is identified with wrong exposure and the image has been received

Details	Normally you select an exposure at the NX station, insert the cassette with the exposure in the ID Tablet and then actually identify exposure by pressing the ID button. It may be possible that you have initially selected the wrong exposure at NX and identify this exposure with the wrong cassette. If you discover this mistake when the image is already digitized and displayed on NX, you must be able to solve this mistake by editing the data of the exposure (without re-identifying or re-digitizing the cassette).
Cause	User mistake.
Brief Solution	Edit exposure data.
Solution Steps	To edit the exposure data: **1.** Go to the **Examination** window. **2.** Make sure the image you want to edit is selected. **3.** Click **Edit** in the **Image Detail** pane. The **Edit Image Detail** pane opens on top. **4.** To change the **Exposure Type**, click the button displaying the exam/exposure name. This brings up the Add Image dialog where you can select the new exam/exposure type. After you have selected an exposure type, this dialog closes automatically. **5.** Click **OK** to apply the changes and close the Edit dialog.

Related information

Selecting the correct examination after the image has been received on page 182

Cassette is identified with the wrong patient data due to a user mistake

Details	It is possible that an image displayed on NX in conjunction with wrong patient data. This can be caused by identifying cassettes with wrong patient data. In this case, the most efficient solution is to transfer the image from one examination to an other (from the wrong to the correct patient).
Cause	User mistake.
Brief Solution	Transfer an image to the right patient.
Solution Steps	To transfer images to the right patient: **1.** In the **Worklist** window, select the exam from which you want to transfer the images. The images are displayed in the **Image Overview** pane. **2.** Click **Transfer Images**. The **Transfer Images** wizard opens. **3.** In the **Image Overview** pane, select the image(s) that you want to transfer. The image is displayed in the wizard. **4.** Click **Continue**. **5.** In the **Worklist** window, select the exam to which the image should be transferred. The patient data is displayed in the wizard. **6.** Click **Continue**. A transfer overview is displayed to check if all information is correct. **7.** Click **Finish**. The image is transferred.

Related information

Transferring images from one exam to another on page 140

Error "no valid image plate gain calibration file found" when identifying cassette for DX-M digitizer

Details	When identifying a cassette, this error is displayed: “Error, no valid image plate gain calibration file found”. The cassette cannot be used.
Cause	The IP gain calibration file is not available on the NX workstation.
Solution 1: if the IP Gain Calibration CD is available	Fetch the CD labeled “IP Gain Calibration” that is delivered with the cassette and load the IP gain calibration file on the NX workstation.
Solution Steps	To install the gain calibration file: **1.** Insert the CD in the NX Workstation. **2.** Browse to the CD. **3.** Run the application ‘install.exe’. **4.** Follow the instructions on the screen.
Solution 2: if the IP Gain Calibration CD is not available	Contact the Service organization.

Digital tomosynthesis reconstruction fails

Details	The acquisition sequence is visible, but there is no reconstruction sequence made. An error message is displayed.
Cause	The error message indicates the cause of the problem.
Brief Solution	If the error message says that there is a hardware problem with the GPU, try adjusting the reconstruction settings and repeat the reconstruction. If the problem persists, contact your local service organization. If the error message says that the reconstruction failed because of missing data, try adjusting the reconstruction settings to a smaller region of interest or reduced sharpness and repeat the reconstruction. If the reconstruction keeps failing, review the patient position and the X-ray modality settings to control the X-ray system movement, the X-ray exposure parameters.

Suggested Radiographic References and User Guides

Exposure index of digital X-ray imaging systems

A guide to “Exposure index of digital X-ray imaging systems” - IEC 62494-1 Standard.

The IEC 62494-1 Exposure Index standard provides a standard way to measure the exposure to a digital detector. Exposure Index should be used to provide a reference guide for each exam view within department and to monitor variations in exposure within an exam type. The standard consists of three values, Exposure index (EI), target exposure index (TEI), and deviation index (DI).

The EI is related to the amount of radiation reaching the detector. The EI is directly proportional to exposure, doubling the mAs will double the EI value. Reducing the mAs in half will reduce the EI will in half. The EI is also a function of the region of interest (ROI) selected by the NX workstation for the examination type, image processing, and exposure used. If the ROI selection is done incorrectly, either by the system or operator intervention, then the EI will be incorrect.

The target exposure index or TEI is the reference exposure index obtained when an image is exposed correctly. It is dependent on the body part, view, procedure, imaging receptor and image quality required. It should be determined by the user based on the image quality and dose desired.

The deviation index or DI quantifies how much the actual EI varies from the Target Exposure index. In an ideal situation, where EI and TEI are the same, DI will be zero. DI values of 1.0 and 3.0 correspond to 26% and 100% overexposure, respectively. Conversely, DI values of –1.0 and –3.0 correspond to 20% and 50% underexposure, respectively. The DI value gives immediate feedback to the user about the adequacy of the exposure1.

Table 13: Relationship between EI, TEI and DI for a TEI of 400

Agfa NX EI Value*	Target Exposure Index (TEI)	DI	Exposure Factor	% Change
1640	400	6.1	4.1	310%
1000	400	4	2.5	150%
900	400	3.5	2.25	125%
800	400	3	2	100%
640	400	2	1.6	60%
504	400	1	1.26	26%
400	400	0	1	0%
320	400	-1	0.8	-20%
240	400	-2.2	0.6	-40%
200	400	-3	0.5	-50%
180	400	-3.5	0.45	-55%
160	400	-4	0.4	-60%
98	400	-6.1	0.25	-76%

(* Agfa NX workstations use the IEC 62494-1 Exposure Index standard)

Determining Target Exposure Index Values

Agfa provides a useable range of target exposure index values which will achieve acceptable image quality based on the detector type used. The final target exposure index (TEI) selected by the user for each examination should be within this range. CsI - detectors operate typically around a speed class of 400 system with a TEI between 250 and 750 for general radiography and a TEI between 500 to 1000 for extremities. As the TEI is increased the dose is increased and the noise in the images is decreased.

For example: for a chest radiograph one facility might select 275 as the target exposure index. A second site with the same equipment might select 500. Both facilities should have diagnostically acceptable images, but the images created at the site using 275 as their target exposure index will use less dose and will have higher noise.

If the TEI is properly selected the majority of actual exposure index values will fall within +3 to - 3 DI (deviation units) or ± 2 x from the target exposure index for manual exposures. For example: If the target exposure index selected is 400 the majority exposures should fall between 200 and 800 in EI. This is due to normal patient and exposure variation.

[Don Steven, B.R. Whiting, L.J. Rutz, B.K. Apgar. December 2012. New Exposure Indicators for Digital Radiography Simplified for Radiologists and Technologists. American Journal of Roentgenology, 199, 1337-1341]

Patient Categories

The NX Workstation can use patient categories based on patient age and patient weight to apply unique image processing and display settings. When used with Agfa DR systems the NX workstation can also be configured to provide default (average) exposure settings (kVp, mAs, etc.) by age. These default exposure settings appear when the system or operator selects a given exposure view and patient age, based on information provided automatically from the RIS or from patient records.

The default exposure settings should be determined by the user using good radiographic practice and the ALARA principle. They should be based on the target exposure index and image quality desired. This ensures that the appropriate image quality and patient dose is achieved.

The default exposure settings for age groups should be guidelines that work for the average size patient within a given age group at the specific facility. The user should always use appropriate techniques and set the final exposure settings as needed based on the proper measurement of the patient regardless of age.

The following reference provides the most current data for anteroposterior and transverse body diameter for pediatric patients ranging in age from 0.5 to 20 years.

Table 14: Mean Thickness in CM Per Body Part

Kleinman, P. L., K. J. Strauss, D. Zurakowski, K. S. Buckley, and G. A. Taylor. 2010. Patient size measured as a function of age at a tertiary care children's hospital. American Journal of Roentgenology, 194, 1611-1619

Age Group	Skull		Thorax		Abdomen		Pelvis	
	AP	Lat	AP	Lat	AP	Lat	AP	Lat
0-1.5	16.0	13.3	12.2	16.9	11.1	15.7	10.4	15.4
1.6-5	17.9	14.8	13.7	19.2	12.6	18.1	11.9	18.3
6-12	19.3	15.8	17.1	24.5	15.8	23.4	15.4	24.9
13-16	20.0	16.3	20.4	29.5	19.0	28.5	18.7	31.2
17+	20.5	16.7	23.7	34.6	22.1	33.6	22.1	37.5

Reference Guides

The following is a list of textbooks and references which can be used as guides for appropriate radiographic practice, exposures and procedures.

Publications

- Textbook of Radiographic Positioning and Related Anatomy, 7th Edition By Kenneth L. Bontrager, MA, RT(R) and John Lampignano, MEd, RT(R) (CT)
- Merrill's Atlas of Radiographic Positioning and Procedures, 12th Edition By Eugene D. Frank, MA, RT(R), FASRT, FAEIRS, Bruce W. Long, MS, RT(R)(CV), FASRT and Barbara J. Smith, MS, RT(R)(QM), FASRT, FAEIRS
- Principles of Radiographic Imaging: An art and a science, 5th Edition Carlton/Adler
- Willis, C. E. Optimizing Digital Radiography of Children. European Journal of Radiology 72. e-Pub 3/2009.
- Cohen, M.D., R.Markowitz, J. Hill, W. Huda, P. Babyn, and B. Apgar. 2012, Quality assurance: a comparison study of radiographic exposure for neonatal chest radiographs at 4 academic hospitals. Pediatric Radiology 42(6):668-73
- http://www.ncbi.nlm.nih.gov/pubmed/22057362

Web Based Information (subject to change)

- Image Gently - Back to Basics Digital Radiography resources http://www.pedrad.org/associations/5364/ig/
- European guidelines on quality criteria for diagnostic radiographic images in paediatrics ftp://ftp.cordis.europa.eu/pub/fp5-euratom/docs/eur16261.pdf
- FDA Pediatric X-ray Imaging webpage http://www.fda.gov/Radiation-EmittingProducts/RadiationEmittingProductsandProcedures/MedicalImaging/ucm298899.htm
- ACR-SPR PRACTICE GUIDELINE FOR GENERAL RADIOGRAPHY http://www.acr.org/~/media/ACR/Documents/PGTS/guidelines/General_Radiography.pdf
- ACR-AAPM-SIIM PRACTICE GUIDELINE FOR DIGITAL RADIOGRAPHY http://www.acr.org/~/media/ACR/Documents/PGTS/guidelines/Digital_Radiography.pdf
- NCRP Report No. 172 - Reference Levels and Achievable Doses in Medical and Dental Imaging: Recommendations for the United States (2012) http://www.ncrppublications.org/Reports/

For further information contact Agfa.

Automatic exposure control device response & patient dose

Image quality loss due to uncalibrated AEC device

Details	Noticeable decrease in image quality (noise)
Cause	The specific X-Ray scattering of the photostimulable phosphors can influence the response of the automatic exposure device, which is above the cassette. The exposure will be stopped earlier and the patient dose will be reduced accordingly. Lower dose goes together with lower image quality (signal-to-noise ratio).
Solution	The user has two options: keep the lower patient dose with a noticeable decrease in image quality or compensate for this loss of image quality. This compensation can be done by providing an additional exposure step (20%) or by setting the automatic exposure device less sensitively. Such interventions are not to be interpreted as increasing the patient dose, but as bringing the dose to its normal level. The AEC must be recalibrated and optimized for the new system in order to give the correct cut-off dose and the according image quality. Cut-off doses are subject to local legislation. The calibration of the AEC has to be done with the CR cassette or DR detector present in the bucky.

Bone mineral density analysis (DensityScan™)

The MUSICA Acquisition Workstation can be configured to process images automatically to obtain extra clinical data.

On systems equipped with a bone mineral density analysis option (DensityScan™), acquired images configured with “Hand” or “Wrist” as anatomic region or “Hand” as body part, will be processed by the IBEX BH software. The result is a secondary capture image that contains extra clinical data:

- Bone mineral density (g/cm2).
- T-scores for the analyzed regions of interest.
- Advisory statement "Osteoporosis detected at wrist", when the T-score in either region of interest falls below the standard threshold of -2.5 for osteoporosis.

The secondary capture image is archived together with the original image. The secondary capture image cannot be viewed in the NX application.

If automatic processing fails, the error can be reported in two ways, depending on the configuration:

- Displayed as a message on the PC
- Included as a message in the secondary capture image and sent to the archive
- Generating a summary report on page 360

Generating a summary report

The MUSICA Acquisition Workstation can be configured to generate summary reports on a fixed interval time. The reports are stored in this folder on the PC:

```
D:\Agfa\Healthcare\NX\DataFiles\Summary Reports
```

To generate a summary report on request:

1. Go to the **MUSICA Acquisition Workstation Control Center** > **Agfa** > **NX** > **Service**
2. Click **Generate AI Summary Report**

   The report is displayed on the screen. The report can also be found in the folder on the PC where periodic summary reports are stored.

Product Information

Lunit INSIGHT CXR

Lunit INSIGHT CXR is used to perform AI pathology detection.

Product name	Lunit INSIGHT CXR
Manufacturer	Lunit Inc, 15 Floor, 27 Teheran-ro 2gil, Gangnam-gu, Seoul, 06241, Republic of Korea, +82 2 2138 0827, insight@lunit.io, http://lunit.io,
ECREP	Advena Ltd., Tower Business Centre 2nd Floor, Tower Street, Swatar, BKR 4013, Malta
Compliance	Regulation 2017/745 (for European Union)
Importer	Agfa NV Septestraat 27, 2640 Mortsel, Belgium www.agfa.com

IBEX BH

IBEX BH (Bone Health) is used to perform bone mineral density analysis.

Product name	IBEX BH (Bone Health)
Manufacturer	IBEX Innovations Limited, NETPark Plexus, Thomas Wright Way, Sedgefield, TS21 3FD, UK
ECREP	Advena Ltd., Tower Business Centre, 2nd Flr., Tower Street, Swatar, BKR 4013 Malta
Compliance	The IBEX Quality Management System is aligned to MDR 2017/745 and MDR (UK) 2002
Importer	Agfa NV Septestraat 27, 2640 Mortsel, Belgium www.agfa.com

Glossary

Term	Explanation
AEC	Automatic Exposure Control
ATNA	Audit Trail and Node Authentication
CR	Computed Radiography, using a phosphor plate to capture the X-Ray image and a digitizer to read it and send it to the workstation.
Collimation	Collimation is performed during exposure using the tube collimator, to expose only part of the full exposure field. The collimation area is used by the software to apply black borders. DR images and CR 10-X images are automatically cropped at the collimation borders.
Cropping	Selecting a rectangular area on an image and displaying only the contents of this area.
Destination	A destination is a device to which the studies are routed after they have been digitized.
DI	Deviation Index : a number quantifying the deviation of the actual exposure index from a target exposure index
DICOM	Digital Imaging and Communication in Medicine.
DICOM gateway	The DICOM gateway is the DICOM input port on the workstation which enables it to ‘load’ the images.
Digitizer	The Digitizer scans the exposed image plate, converts the information into digital data and automatically transfers the image to the image processing station for further processing and visualization.
DR	Direct Radiography, using a digital image sensor to capture the X-Ray image and send it directly to the workstation.
EI	Exposure Index: measure of the detector response (on a linear scale) in a relevant image region of an image.
Exposure type	An Exposure type is a set of parameters (concerning image processing, exposure options such as view position and cassette orientation, and collimation) which are by default used for a defined type of exposure. A number of Exposure types make up an Exam group.
Graphical Help	Graphical help is based on a simulation of the application. You browse through the simulation until you get to the part (field, button, etc.) you have a question with. Clicking on this object will open the related part of the help system.

Term	**Explanation**
GSPS	A license which allows annotations to be removed on the PACS archive. Only annotations can be removed, markers are burnt on the image.
HIPAA	Acronym for the Health Insurance Portability and Accountability Act of 1996. It is a set of rules to be followed by health plans, doctors, hospitals and other health care providers. It took effect on April 14, 2003.
ID Tablet	Hardware device for performing identifications of cassettes.
LGM	Logarithmic median Value. The median value of the measured pixel values. This is used as a relative measure for the detector-dose.
License	A digital permit containing descriptions of rights that can be applied to one or more pieces of content.
Local database	Database stored on the hard disk of a workstation.
Marker	A marker behaves differently as compared to an annotation. It is always burnt onto the image when it is sent out by DICOM, even when GSPS is used.
Medical printer	Printer used to produce diagnostic hardcopies of radiographic images.
MUSICA	Multi-Scale Image Contrast Amplification.
P mode	Print mode.
PACS	Picture Archiving and Communication System.
Protocol code	A code that completely defines and identifies a specific exposure type. Protocol codes are imported from the RIS, and can be linked to exposure groups, exposures and exams that are displayed in the user interface. This way, an incoming protocol code can be “resolved” and the operator receives immediate feedback on the examination he needs to perform.
PVI	Pixel Value Index: average of the digital value of all pixels in a region of interest of an image, expressed as a logarithmic value.
Remote database	Database stored on a remote volume.
RIS	Radiology Information System.
SAL	Average of the digital value of all pixels in an image or a region of interest of an image. Expressed in terms of SQRT (exposure).

Term	**Explanation**
SALlog	Scan Average Level Logarithmic : average of the digital value of all pixels in a region of interest of an image, expressed as a logarithmic value.
Speed class	Sensitivity of the plate emulsion. Parameter necessary in defining exposure types.
TEI	Target Exposure Index: expected value of the Exposure Index when exposing the X-ray image receptor properly.
Web 1000	Web1000 is a system to provide web-based distribution over hospital networks of (archived) examinations.