ON THE DOT.

A look behind the scenes of Agfa Graphics’ printing plate manufacturing.
With our range of prepress, pre-media and digital printing solutions, we are active where you might not even expect it at first. With our extended range of solutions we can print nearly everything (or nearly everything), ranging from newspapers to magazines, books and packaging, art reproductions, and even cabinet doors, table tops or floors. In addition we also have the software in-house to create tablet publications, or to design security patterns for e.g. packaging or vouchers.

A MARKET LEADER WITH A LOT OF EXPERIENCE
Agfa Graphics has 130 years of experience in the prepress and printing industry – experience that we use to serve graphic arts companies all across the globe. We are the market leader in most of the segments we cater to. Close to one third of all digital printing plates in the world is made by us. We set the standard in workflow innovation; over 10,000 printers use our prepress workflow software. One in two newspapers in the world is produced with Agfa Graphics technology. We have been the leader in chemistry-free printing plate technologies for the past decade. In digital printing, we rank among the top three providers of UV inkjet printing technology. One out of six UV wide-format prints is printed with our inks. With an installed base of over 1,000 sign and display systems, we serve every segment of the UV wide-format market, worldwide.

Our extensive patent portfolio is evidence of our dedication to developing solid innovations that continually take our customers to the next level of quality and productivity.

WE HAVE MET BEFORE – WHATEVER YOU DID THIS MORNING, WHEREVER YOU ARE GOING TONIGHT, YOU DEFINITELY HAVE MET OR WILL MEET AGFA GRAPHICS ON YOUR WAY.
COMMERCIAL PRINTING
This diverse segment consists of over 100,000 printing companies worldwide and ranges from small family-owned concerns to multinational publication systems. Magazines, books, catalogs, brochures, flyers are just some of the applications. Underlying there are geographic differences as well as different product dynamics.

NEWSPAPER PRINTING
Every day, more than 500 million newspaper copies are sold, varying hugely in circulation between a couple of thousand and several million. Together, they reach 3 billion people. One in two newspapers is produced with Agfa Graphics technology.

PACKAGING & LABEL PRINTING
In a world of population growth and industrialization, packaging and labels are a key marketing tool to enable brand owners to expand their businesses. In print value, they represent nearly one third of the total printed output.

Agfa Graphics is one of the largest providers of printing plates worldwide. The world market for digital printing plates amounts to approximately 550 million square meters. Agfa Graphics supplies about one third of that volume. The printing plates that Agfa Graphics manufactures are used in different market segments:
compared to other printing methods, offset printing is best suited for economically producing large volumes of high-quality prints in a manner that requires little maintenance.

PROCESS
Offset lithography works on a very simple principle: ink and water don’t mix. A computer sends a page in layout to a platesetter, which uses a thermal or violet laser to put the text and images onto a printing plate by exposing and/or removing areas of coating. Each of the primary colors – black, cyan (blue), magenta (red), and yellow – requires a separate plate.

On the press, the printing plates are dampened first by a fountain solution loaded with oil. The ink adheres to the image areas, the water to the non-image area. Then the inked image is transferred (or ‘offset’) to a rubber blanket, and from the rubber blanket to the printing surface. In web offset lithography, the paper is fed through the press as one continuous stream pulled from rolls of paper. The paper is cut to size after printing. Offset lithography can also be done with pre-cut paper in sheetfed presses (picture below).

Agfa Graphics’ printing plates are mostly used for offset printing. Offset lithography is one of the most common ways of creating printed materials. A few of its common applications include: newspapers, magazines, brochures, stationery, and books.
Based on sensitivity

Printing plates that are sensitive to visible light are based on a photopolymer emulsion. They are mainly used for the production of newspapers. They are imaged using violet laser light.

Printing plates that are sensitive to heat are also called thermal plates. These plates are optimally suited for commercial printing and packaging because they have a high resolution and can be used for very high image quality work. They are imaged using a thermal laser.

Based on development

In conventional computer-to-plate (CTP) systems, the heat or light from the laser hits the sensitized layers of the plate to form a latent image. Next, the plate is developed in a chemical process. This makes the latent image stable and durable.

With Agfa Graphics’ chemistry-free Thermofuse technology, laser power is used to melt ultrafine thermoplastic particles and fuse them together to create a durable image on the aluminum plate substrate. This image does not need chemical development; it is ready immediately after imaging. The only thing left to do is to remove unused latex in the non-image areas in a clean-out step, using gum – or on the press in the case of direct-on-press plates.

Types of printing plates

Printing plates can be divided in categories based on different criteria:
Based on their lithographic qualities

Printing plates are also classified either positive or negative working. With positive-working plates, the unexposed areas of the plate become the image areas of the plate after the plate is digitally imaged with lasers. When a positive-working plate is exposed, the CIP imaging system creates non-image areas on the plate. During the exposure process, the laser loosens the emulsion in these areas, which is then washed from the plate, revealing the metal base beneath. The metal base of the plate attracts fountain solution during the printing process and the unexposed areas of emulsion, which are the image areas, attract the ink.

With negative-working plates, the exposed areas of the plate become the non-image areas after the plate is digitally imaged with lasers. When a negative-working plate is exposed, the areas of the emulsion exposed by the laser are the areas that attract the ink during the printing process and the unexposed areas become the non-image areas, which attract fountain solution and prevent the non-image area from attracting ink.

Whichever type of printing plates a printer considers, they are high-tech products these days. During their production process, efficiency, quality and sustainability are of the utmost importance and go hand in hand. This is necessary to offer our customers a high-quality and competitive product.

Based on imaging method

Printing plates can be imaged directly from a computer (digital printing plates) or via the intermediate step of film (analog printing plates). These days, most companies in the western world already use digitally imaged printing plates, whereas the emerging markets are rapidly transgressing from analog to digital printing plate imaging technology.
How a printing plate is made

Print quality begins at the printing plate. If the right dot gain curves have been applied in prepress and the plate has been processed correctly, the modern litho press is capable of printing 240 lpi (lines per inch) as standard; more if required. Matched to the right paper and images, the result can be print of award-winning quality.

Achieving the quality of the printed dot on the page starts well before ink reaches the paper. A multi-stage process, where quality and consistency is built in at every point, delivers the plate that takes the ink from the press to the page.

Ever wondered how a high-quality printing plate is made though? Read about the journey from the raw bauxite ore to the high-quality, consistent product that arrives at the printing company. At every step, quality is monitored using the latest devices to ensure that prints will be flawless and printers’ customers delighted.

Printing plates are at the core of the printing process. Only a meticulous production process that leaves nothing to chance will result in flawless prints and happy print buyers.
Every printing plate is born as a lump of bauxite, an aluminum ore type found in a belt around the equator. The bauxite is mined from a few meters below the ground, and then transported to plants where the clay is washed off and the bauxite passes through a grinder.

During the refining process aluminum oxide as main component of bauxite is separated from other impurities by using a hot solution of caustic soda. The separated soluble sodium aluminate is further transferred to aluminum hydroxide and heated, filtered and dried to a pure white powder which is called alumina. About two tons of bauxite are needed to provide one ton of alumina. In metal plants, the refined alumina is converted at about 965°C in electrolysis cells to pure liquid aluminum.

The pure liquid aluminum is cast into large blocks called aluminum slabs of up to nine meter length, weighing up to 32 tons. These slabs will be scalped to provide a smooth surface for rolling, especially required by the graphics arts industry.

After the aluminum slabs are pre-heated to about 500°C to make them shapeable, their thickness gets reduced from 600 mm down to 4 mm in a massive hot rolling mill. The hot rolled strip of 4 mm thickness is then rolled to a coil for further processing. In the following cold rolling steps the strip thickness is further reduced to the final thickness of usually 0.15 to 0.40 mm step by step, from 4 to 2 to 1 to 0.5 and finally to 0.30 mm. Through this rolling process, the surface is enlarged by a factor of 2000! Generating this surface without nearly any imperfections is the distinctive competency of the rolling mills.

Finally the rolled strip has to be stretch levelled, cleaned and conditioned to the final dimensions. A perfect surface and excellent flatness of the aluminum strip is the precondition for an efficient further processing in the graphic arts industry.
The production process for Agfa Graphics’ printing plates occurs entirely in line. It starts with a coil of aluminum, and ends with a finished printing plate at the other end of the machine, after having travelled without interruption for up to 300 m.

At the start of the production line, the aluminum coils are unwound. Before putting the aluminum into production, a thorough quality check is performed on thickness, strength and waviness. The aluminum then undergoes a number of treatments:

- **Etching**: Aluminum always oxidizes when in contact with air, and the undefined oxide layer must be removed. Etching dissolves small metal particles from the aluminum surface. The smoother the micro-porous surface is, the better for the final printing properties of the plate.

- **Anodizing**: On top of the grained surface, a layer of aluminum oxide is built up by applying direct current. This layer is hydrophilic; in other words: it attracts water. Anodization improves the durability of the plate, making it resistant to corrosion and wear, which is required for a firm and consistent printing result.

- **Sealing of the surface**: After the application of the oxide layer, a hydrophilic post-treatment closes the pores in the aluminum oxide, guaranteeing a perfect ink/water balance for a trouble-free printing process.

- **Electrochemical graining**: The aluminum is electrochemically roughened using alternating current. The result is micro-channels that will allow water to run through at a later stage. The roughness of the surface determines the lithographic behavior of the plate, such as the ink/water balance, dot gain and resolution of the printing plates. Computers control the graining currents, the water temperatures and pressures. After roughening, the aluminum is cleaned once again and dried.

- **Cleaning**

- **Etching**

- **Graining**

- **Drying**

- **Anodizing**

- **Coating**

- **Drying**

- **Buffer**

- **Surface inspection**

**Aluminum rolls to high-tech plates**
Using Agfa-patented technology, the aluminum is covered with a (light- or thermal-)sensitive coating in constant thickness. It is this layer that will form the final to-be-printed image or text. After coating, the web is dried.

Surface inspection: before cutting to size, inspection systems monitor every single square millimeter of the surface to guarantee that any substandard material is identified and removed.

Trimming & cutting: the web is levelled to ensure flatness, and an interleaf sheet is added as protection against damage to the surface of the plates. Then, the aluminum is trimmed and then cross-cut to the required dimensions.

Packing and stacking: after yet another quality control the plates are finally wrapped in a type of impermeable paper and packed into cardboard boxes for shipment to the customers. They arrive in pristine condition, each exactly the same as the last one, ready for imaging.

Aluminum: a solid foundation:

- Atomic number: 13
- Atomic weight: 26.981539
- Melting point: 660.37°C
- Boiling point: 2,467°C
- Specific gravity of 2.6989 (20°C)
- Valence: 3

In principle, all of Agfa Graphics’ printing plates are made in the same way. The substrate consists of aluminum. Aluminum has several advantages over other materials:

- Absolute dimensional stability on a printing press. This is very important, particularly for offset color printing, where the various colors are printed one after the other. Printing plates that are dimensionally unstable cause registration errors in the printed result. This means, for example, that you might see a yellow line next to a blue one instead of one green one.
- Aluminum is light yet strong.
- It can be treated to provide the hydrophilic qualities needed for high-quality litho printing.
- It is durable, which makes it possible to print runs of over a million copies.
- It can be recycled to a high degree.

These advantages are what have made aluminum the standard material for printing plates, but that any type of aluminum is suited though. Light graphics uses aluminum of particularly high quality.

Coating: Using Agfa-patinated technology, the aluminum is covered with a light- or thermal- sensitive coating in constant thickness. It is this layer that will form the final to-be-printed image or text. After coating, the web is dried.

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Agfa Graphics has produced a short video to explain how printing plates are produced, from the raw bauxite ore to the high quality, consistent product that arrives at the user in light safe packaging. Find the video on www.agfagraphics.com/plateproduction.

Sleeves: individual pack (wrap) of plates, meant for small and standard plate sizes. The plates are wrapped in brown paper and put into a cardboard sleeve. Multiple sleeves are put on a wooden pallet for transport.

Multiple wrap: bulk packaging with one or more stacks consisting of individual packs of plates (wraps) held together by a large cardboard wrap onto a wooden pallet.

Single wrap separated: bulk packaging with a single stack of plates separated by cardboard (or tabs). Wrapped in black foil and cardboard onto a wooden pallet.

Single wrap: bulk packaging with a single stack of plates. No separations between the plates. Wrapped in black foil and cardboard onto a wooden pallet.

Which packaging is chosen depends on the plate sizes and gauges, and on the amount of plates that needs to be transported. In cooperation with our customers, we always try to pursue the optimum relation between plate packaging style and customer demand volume, as well as to optimize the delivery frequency with a view on distribution costs.

Quality check!

Quality cannot be allowed to vary. Every plate must have the potential to print the highest quality job. That is why standardized process and quality parameters are monitored throughout the whole production process. With contact free measuring technology, developed in-house, any deviations from standard will be recognized and automatically corrected. We can truthfully state that today’s printing plates can be trusted thanks to the care and quality control built in at every stage of its production. All of our printing plate manufacturing plants hold the ISO 9001 quality certificate.

Agfa Production System

In 2007, the printing plate factory in Wiesbaden, Germany, initiated the ‘Agfa Production System’ APS hinges on the implementation of lean management and lean principles, and is designed to improve and standardize all processes to produce the highest quality as efficiently as possible. Over the years, APS has been rolled out to the other Agfa Graphics manufacturing sites, mobilizing the entire workforce, independent of level or education.

The activities of the various APS teams deliver substantial, recurrent improvements every year by reducing waste, enhancing efficiency, and saving significant amounts of raw materials and energy. APS takes care of SHE (Safety, Health & Environmental) aspects as well, e.g. by collecting and implementing ideas to create a better and more ergonomical working environment for our staff.

Wrapping up. Kinds of packaging.
HIGH-PRECISION TECHNOLOGY

Printing plates have gauges ranging between 0.15 mm (for the smaller presses) and 0.40 mm (for the big size jumbo presses). The photographic coating layer which lies on top of the aluminum has a thickness of only 1 µm. The fact that these polymeric coating layers have an enormous resistance is proven by the fact that some of the printing plates are used to print millions of copies. The finest elements that form the image on the printing plates are as small as 10 x 10 µm. Millions of those small dots form the entire image.

SIZE MATTERS

Printing plates are available in a wide variety of sizes. There are small printing plates (e.g. 51 x 40 cm) for the smaller offset presses. On the other side of the range are the very big size plates, which go up to widths of almost 3 meters. The latter plates are typically used on heatset web offset presses, capable of printing up to 96 A4 pages in one revolution. After folding, this means that one single sheet in fact contains an entire 96-page magazine.

Agfa Graphics’ printing plates are produced conform the ISO 12635 standard, being very strict and precise concerning the tolerances for gauge, size, squareness...

RECYCLING

Given the journey from raw material to printing plate, a voyage that can take six months or more, given the heavy investment at all stages from smelter to coil processing to plate coating plant, it is remarkable how little a printing plate actually costs. And a printer can even recover some of its cost price...

Aluminum is valuable to a printer, not just because of its critical role in the printing process, but also quite literally. More than half of the price of a printing plate is bound up in the cost of the metal, yet this can be recouped through recycling the aluminum. And even if not all will be litho aluminum again, it will find a new life in thousands of other applications, where there will be new stories to tell.

AZURA: OVER A DECADE OF INNOVATION

Agfa Graphics has held the industry’s attention for over a decade. The company’s chemistry-free printing plates over the last decade started with the introduction of the first Azura printing plate in 1999.

Azura took the world by storm and became the best-selling chemistry-free printing plate. It is used by thousands of printers worldwide, resulting in enormous cost reductions by many companies. Since its early days, it has been constantly improved upon.

In 2000, Azura Graphics introduced Azura TI, a direct-on-press plate characterized by its high image contrast, stop quality, and fast make-ready. As it requires no processor, no chemistry, no gum and no water, it is extremely environment-friendly and cost-efficient.

For in-depth product information and an overview of the history of Azura, as well as its popularity around the world, visit www.agfagraphics.com/azura.
Agfa Graphics’ printing plate assortment

**Thermal printing plates**

**Positive-working**

- Energy Elite Pro thermal printing plates
  - Uses Agfa Graphics’ dual-layer technology
  - Sheetfed and heatset web applications
  - Runlengths of up to 400,000 impressions
  - Sheetfed, heatset web applications
  - Uses Agfa Graphics’ dual-layer technology
  - Energy Elite Pro thermal printing plates

**Negative-working**

- Visible-light printing plates
  - n94-V traditional violet printing plates
    - Coldset newspaper plate
    - Sustainable plate for sustainable prepress operations
    - Runlengths of up to 150,000 impressions
      - (up to 100,000 for UV inks)
  - n94-VCF chemistry-free violet printing plates
    - Runlengths of up to 350,000 impressions
  - n95-VCF chemistry-free violet printing plates
    - Runlengths of up to 200,000 impressions
      - The standard in sustainable plate making
  - Amigo TS thermofuse chemistry-free plate
    - Image off-press, clean out on-press
    - Sheetfed commercial applications
    - Runs up to 100,000 without baking –
      - Exceptional press durability and extremely
      - Effective for chemical resistance.
  - Thermostar P970
    - Run-lengths of up to 400,000 impressions
  - Energy Elite (Pro)
    - Sheetfed and UV packaging applications
    - Run-lengths of up to 300,000 impressions
      - (150,000 UV)
    - Compatible with all thermal CtP systems

**Visible-light printing plates**

**Negative-working**

- Visible-light printing plates
  - n94-V traditional violet printing plates
  - n95-VCF chemistry-free violet printing plates
  - Runlengths of up to 350,000 impressions
  - Azura T
    - Sheetfed commercial up to 16-up format
    - Runs up to 100,000 without baking –
      - Exceptional press durability and extremely
      - Effective for chemical resistance.
  - Azura TS
    - Sheetfed, coldset and heatset web applications
    - Run-lengths of up to 150,000 impressions
      - Sheetfed commercial up to 16-up format
      - Run-lengths of up to 100,000 impressions

**Positive-working**

- Visible-light printing plates
  - Energy Elite (Pro)
    - Sheetfed and heatset web applications
    - Run-lengths of up to 400,000 impressions
      - Sheetfed, heatset web applications
    - Uses Agfa Graphics’ dual-layer technology
  - Energy Elite Pro thermal printing plates
    - Sheetfed and heatset web applications
    - Run-lengths of up to 400,000 impressions
      - Sheetfed and heatset web applications
  - Energy Elite Pro thermal printing plates
    - Sheetfed and heatset web applications
    - Run-lengths of up to 400,000 impressions
      - Sheetfed and heatset web applications
  - Energy Elite Pro thermal printing plates
    - Sheetfed and heatset web applications
    - Run-lengths of up to 400,000 impressions
      - Sheetfed and heatset web applications

**FOR NEWSPAPER PRINTING**

**FOR COMMERCIAL APPLICATIONS**

**FOR PACKAGE & Label PRINTING**

**TERMOGRAPHIC PRINTING PLATES**

**FOTOGRAPHIC PRINTING**
Better business for a better environment

From the time a product is conceived, our engineers consider ways to benefit the environment. We do this on two levels: in how we manufacture the product itself, and in the way the product is used at our customers’ locations.

Environmental management

At every manufacturing facility in every part of the world we closely monitor the elements that can impact our environment: emissions to air, water and soil, depletion of resources and consumption of energy. In line with our environmental targets, we continuously strive to significantly reduce the usage of natural resources and the consumption of energy and to considerably diminish emissions to air and water.

We also invest in waste reduction and recycling programs, and in sustainable packaging and logistics. We monitor the safety aspects of each operation to ensure the well-being of our employees and the efforts to avoid environmental incidents and complaints.

As one of the largest plate manufacturers in the world, we believe it is our responsibility to go beyond the laws of compliance to sustain a better environment for future generations.
Overview of the quality, environmental and safety management certificates that are obtained by the different Agfa Graphics sites:

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<th>Country</th>
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<th>ISO 14001 Environment</th>
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Overview of the quality, environmental and safety management certificates that are obtained by the different Agfa Graphics sites

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Suzano Brazil certified certified certified certified
Vallese di Opeano Italy certified certified planned certified
Wiesbaden Germany certified certified certified certified
Wuxi China certified certified certified certified

As long as plates remain a critical part of the print process, Agfa Graphics is committed to reducing their impact on the environment. Breakthrough technology, such as ThermoFuse, eliminates or dramatically reduces the amount of chemistry needed for processing, as well as energy consumption. Breakthrough printing plates incorporating this technology do not require traditional developing. The end result is lower costs and lower waste volumes. And because printing plates incorporating this technology do not require traditional developing, they also deliver higher print and visual quality. The most recent plate development based on ThermoFuse technology was Azura: as the plate is cleaned out on press, it is ready for use immediately. The system requires no chemistry and no water whatsoever. For additional plate making efficiency, quality control systems monitor the plate making process to identify any potential defect before they occur. The end result is more reliable production and virtual elimination of waste.

To learn how ThermoFuse works, visit www.agfagraphics.com/azura.

Product Stewardship

In the field of environmental sustainability, Agfa Graphics is a forerunner in the graphics industry. Our products are designed, developed and manufactured in such a way that the environmental impact of production, storage, transport, the use of the products and the waste treatment at the end of life is limited, while quality and reliability are guaranteed. Our solutions eliminate toxic chemicals, use less water, lower ink and water consumption and save energy. Our chemistry-free printing plates are the perfect example of eco-friendly products that really make a difference.

Agfa Graphics will continue to leave no stone unturned in its effort to develop energy-efficient, quality-stabilizing technology that has a gentler impact on the environment and generation on the bottom line. In doing so, we also want to support our customers in their effort to attract print buyers who prefer to do business with printers that demonstrate environmental concern.

Accountability

Last but not least, we provide our customers, our employees, our public and the authorities with an evaluation of our products and manufacturing processes, in all matters pertaining to health, safety and the environment. We also hold our suppliers to the same health, safety and environmental standards we set for ourselves.
Manufacturing around the world

Germany, Wiesbaden
Wiesbaden is Agfa Graphics’ largest plant for the production of pre-sensitized printing plates.

Brazil, Suzano
The Suzano plant produces the complete Agfa Graphics digital plate portfolio, in addition to negative and positive analog printing plates for printing companies in Brazil and the other Latin American countries.

China, Wuxi
Agfa Graphics’ state-of-the-art printing plate facility in Wuxi was inaugurated in 2003. It produces Agfa Graphics’ portfolio of printing plates to meet Asia’s increasing demands for quality printing technology, including (mainly) digital plates, both thermal and violet.

Agfa Graphics manufactures plates in four continents (Europe, North America, South America, Asia). Each manufacturing site is aligned to our global quality control system.

France, Pont-à-Marcq
Agfa Graphics’ factory in the North of France is converting graphic arts film from master rolls coated in Mortsel, and is further specialized in the production of water-based digital offset plates.

Italy, Vallese
Agfa Graphics has concentrated its analog printing plate manufacturing in the Italian production site. In addition, a specific thermal bake plate is produced in Italy.

United Kingdom, Leeds
The Leeds facility manufactures all aluminum substrates for water-based digital plates that are currently coated in Pont-à-Marcq.

United States, Branchburg, NJ
This facility manufactures Agfa Graphics’ assortment of negative analog printing plates and of thermal and photopolymer digital printing plates. It also features a state-of-the-art technology demo center.
All prepress work for this brochure was done using Agfa Graphics' Apogee workflow software, including the Inksave module. Azura Ti Azura thermal plates were imaged on an Azura platesetter using Azura Screening Software. They were cleaned out in an Azura CX clean-out unit and printed on a Komori Lithrone Gs540 h-UV press. The brochure was printed on a high-quality paper from Condat.

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