

Brighter Ideas for Graphics, Textiles and Industrial Printing



Overview

With all the hype around digital printing, it can be sometimes easy to forget that the printing world remains predominantly an analogue one, with only a few areas in which a digital printing process has usurped an analogue one.

When it comes to printing on paper (newspapers, books, magazines, etc.), for example, according to research company Smithers Pira, offset lithography will still account for over 70% of the global print volume by 2022, while digital will only constitute 4.3% of that volume.*

Similarly, packaging printing is dominated by flexography and textile printing by analogue screen processes, and this situation is unlikely to change for a number of years.

At the same time, however, Smithers Pira forecasts that digital processes (inkjet and electrophotography) will see the fastest growth in the printing industry up to 2022 and that, by that time, digital print will constitute almost 20% of the value of global print* (although only 4.3% of the volume, as stated above).

The increase in digital printing is being driven by its customisation/short-run/quick-turnaround/low-waste benefits and more specifically by the benefits offered by inkjet—quality, reliability, economic viability and flexibility (as a noncontact process)—which has become the fastest-growing print process overall.

While early adopters of inkjet used it in narrow format for high-speed transaction and document production and in wide format to produce short-run sign & display and other graphics output, by incorporating it into flatbed and superwide devices, the introduction of UV, latex and dye sublimation systems has enabled print service providers to print on a much broader array of materials, including plastic, metal and wood.

*The Future of Digital vs Offset Printing to 2022, Smithers Pira, 2017

working for you.

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As a result and because of both the demands of manufacturers (to differentiate their products and get them to market quicker) and the benefits it offers, inkjet is starting to gain a foothold in other sectors.

One such sector has become known as “industrial” or “functional” print, where printing is a stage in a manufacturing process or a functional part of the end product, rather than being the focus of the business, i.e., the business is a manufacturer, not a print service provider.

In its report, *The Future of Functional and Industrial Print to 2022*, Smithers Pira identifies the following as markets in which print is included as part of a manufacturing process: décor & laminates, ceramics, electronics, glass, automotive & aerospace, biomedical, promotional & miscellaneous items, textiles and 3D printing. (Although 3D printing is arguably entirely a manufacturing process, involving neither ink nor substrate.)

Setting aside 3D printing, with the exception of the ceramics market, all the other markets above employing industrial/functional printing are dominated by analogue processes (either screen or gravure) and, according to Smithers Pira, this situation will continue to at least 2022.

In the ceramics market, the greater flexibility in design, the shorter runs and the noncontact printing benefits of inkjet meant that it displaced screen as the principal printing process in 2016 and will continue to extend its lead to 2022.

Nevertheless, as more and more manufacturing operations use printing to decorate products or provide additional functionality, all processes, analogue and digital, will continue to grow, although inkjet will show the highest growth rate up to 2022.

For the purposes of this guide, we will look at three core applications areas:

- Graphics
- Textiles
- Industrial/Functional

Graphics

In the graphics market (which includes signage, POP display, decals, floor graphics, and vehicle graphics and wraps), signage and display remain the dominant applications and have reached such a level of maturity that two-thirds of the output (by value) is now digitally printed.

This market segment is one of the few in which a digital printing process has displaced the previously dominant analogue process, here screen printing. At the same time, developments in digital print have enabled new applications, such as building wraps and very-large-format signage, in this market.

With banners, posters, signs and billboards still the top four products produced within the segment, indoor signage accounts for almost two-thirds of the volume output, with outdoor signage making up the balance.

While growth in the overall graphics market is predicted to be in low single figures, there continue to be greater opportunities for growth in specific segments, such as vehicle wrapping, which for the time being remains a haven for solvent-based machines.

Similarly, demand for soft signage is forecast for double-digit growth, as its aesthetic (print quality) and physical (lightweight and easy to assemble and install) benefits are recognised by more and more companies in the retail and exhibition spaces.

One development that is undoubtedly going to have an impact on the printed graphics market is the increased use among retailers of electronic media and signage, which allows content to be updated in real time, potentially increasing customer engagement, as well as offering improved interactive capabilities.

While the capital investment costs of the current available technology may be proving to be a barrier, the advent of lower-cost electronic signage is at some point going to be attractive enough to co-exist with traditional print signage.



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Textiles

According to a report from Smithers Pira, *The Future of Functional and Industrial Print to 2022*, the global printed textile market is estimated at over 32 billion square metres of output annually. Although the majority of textiles are still rotary screen printed, annual growth in that segment is in low single figures.

Meanwhile, the benefits of digital printing—design and colour flexibility, enabling more customisation and personalisation combined with economic short runs, plus shorter delivery times with no need to hold large stocks—are driving the strong growth forecasts in the digital textile market over the coming years.

One key trend pioneered by fashion retailers has been the emergence of “fast fashion” and the launch of multiple collections within a traditional quarterly season to increase the number of mini-seasons in a given length of time with a steady stream of unique new stock entering stores and websites.

As a result, there is strong growth in the digitally printed textile sector. Worth \$321 million in 2012, the market’s value rose by 351% to over \$1.1 billion in 2017. This is set to accelerate to 2022, expanding at an annual growth rate of 14.3% to a value of \$2.1 billion, although the segment only represents around 5% of the total printed textile market.

The printed textile market is hugely diverse, with different segments growing at very different rates. While the flag and banner advertising market is growing at around 8%, home furnishings are up to 20% and direct-to-garment, such as t-shirts, is growing at up to 40%.

Looking at the ink technology used in the digitally printed textiles market by percentage, the breakdown is:

Dye sublimation	50%
Reactive dye	25%
Acid dye	20%
Pigment inks	5%

From a geographical perspective, historically the printed textile market has been dominated by Asia (India and Pakistan), South America (Brazil) and Turkey. While around 96% of volume remains in Asia, thanks to the short-run and quick-turnaround capabilities of digital print, some business is gradually migrating back to Europe.

Industrial/Functional

In its report, *The Future of Functional and Industrial Print to 2022*, Smithers Pira puts the global value of industrial and functional printing at \$76.9 billion in 2017, up from \$37.2 billion in 2012, with further growth to \$114.8 billion forecast by 2022. The market figures cover the added value of the printing, not the printed item, and exclude publications, graphics and packaging.

The markets do not use paper or paperboard substrates, but instead print on plastic, film, glass, wood, metal, ceramics, textiles, laminates and composite materials. These markets are also very fragmented and include large and small manufacturers, including a growing sector of start-up companies that identified an application, many involving new digital print methods.



According to Smithers Pira: “The greatest acceleration across the study period will be in clothing, which has the key sub-segments of fashion, haute couture and sportswear. Household textiles are predicted to grow at the next fastest rate.”

Inkjet printing allows the supply chain to be shortened and made more flexible. For a fashion collection, stock-outs may be avoided by printing and making popular sizes and styles locally in small quantities. This makes higher manufacturing cost less of a problem, and internet retailers can extend this by only commissioning the product after a sale has been completed online.



There are small to medium businesses and very large businesses investing, for example, upwards of \$20 billion in improved OLED display production involving printing. There are specialist contract decorator companies providing components and, increasingly, printing companies.

The report also acknowledges that, while analogue printing methods, such as gravure, flexo, litho, screen, pad printing and foiling, are widely used and continue to grow, the strongest growth is in a digital method, with the new inkjet inks opening up many new opportunities.

However, as screen printing has declined in the traditional signage and graphics sectors, it continues to dominate most of the industrial/functional printing sectors—in both electronics and automotive/aerospace, the capability of screen printing to lay down thick ink films has been key to its success.

There has been a trend for speciality screen printers to move into industrial decoration.

The largest region for industrial print is Asia, reflecting the concentration of manufacturing there, with large printing companies supplying electronics and environment materials, films and interior décor materials.

There is also solid growth in North America and Western Europe for high-value items and improvements to many manufacturing processes. Routes to market, however, vary widely, with large manufacturers employing printing functions as part of their processes, and specialist print businesses supplying components.

In *The Future of Functional and Industrial Print to 2022*, Smithers Pira identifies the main growth applications, which include:

DÉCOR AND LAMINATES

The value of the décor and laminate print market in 2017 was over \$15.8 billion, and this will increase by an annual average growth rate of around 4% to 2022, when it will be worth \$19.6 billion.

For printed interior design applications, the traditional method has been for white or tinted papers to be printed and subsequently laminated onto chipboard or medium-density fibreboard (MDF), for use mainly in flooring and furniture.

Screen printing is used to print the base paper and materials for décor, as well as for decals and transfers where base white is often required. Carpets can be printed with specialist screen systems, while bespoke machines are used to directly print finished shapes, such as doors, furniture and covings.



Laminate flooring, furniture and interior décor are some of the key applications in the growing décor and laminate print market.

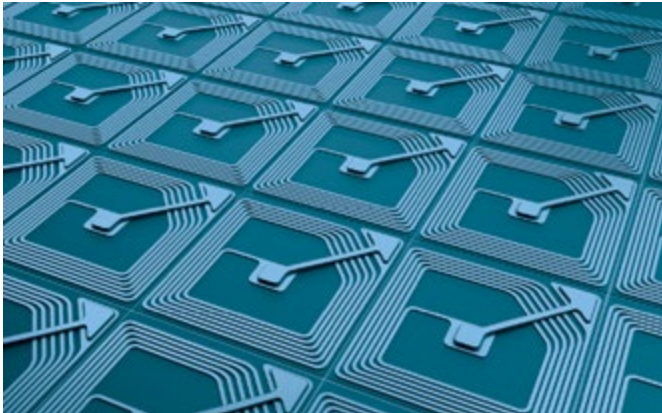
While gravure printing continues to dominate the market, with flexo and offset taking a small share, the development of more pigments designed for digital has led to a gradual move towards more digital output for interior décor.

Inkjet now represents the fastest growing sector and is often the technology of choice for printing individual panels, doors and furniture. Wide-format inkjet machines, including flatbed devices, are used to print directly onto materials and onto transfer paper for small runs such as bespoke table tops.

This print process has grown at a considerable rate in the past few years, and the market is set to mature into a multi-billion-dollar proposition in the foreseeable future. However, Smithers Pira forecasts that, by 2022, décor will be just 17% of the market, while electronic printing will count for over 41.5%.

ELECTRONICS

Using print to produce electronic items—membrane switches, RFID, circuitry, displays and photovoltaics—is already big business for many suppliers, and emerging applications in device and component design will continue to create new opportunities. In 2017 this market segment was valued at \$28.8 billion and will rise to a \$47.8 billion valuation by 2022.



Using print to produce electronic items, such as RFID tags, is big business for many suppliers.

The printing of electronics is still an evolving technology, according to Smithers Pira. It opens up a host of design opportunities and will enable the creation of a range of futuristic electronic devices.

Printed electronics allows electronic functionality to be delivered on a far wider range of substrates than conventional methods. It will enable products with a cost and functionality that conventional electronic structures cannot deliver.

While traditional electronics are used in print and packaging, integrating large-area printable electronics can provide thin, conformable and lightweight circuitry using large-scale, high-volume manufacturing processes at low cost. Printed circuits, RFID, displays, batteries and photovoltaics are all making steady progress.

Asia is the biggest region for printed electronics, led by many leading electronics companies in Japan, South Korea, Taiwan and China. It is a low-cost manufacturing centre for many items, including circuit boards, membrane switches and displays, while large printing companies use print as part of the large-scale production of many items.

Many large, innovative electronics companies making smartphones, TVs and displays, lighting and solar panels are using printing as part of the production process.

CERAMICS

According to Smithers Pira, in 2017 ceramic printing is valued at \$4.6 billion, up from \$3.6 billion in 2012, and this will grow to \$4.9 billion by 2022.

Asia is the largest region, but the growth rate in Western Europe between 2017 and 2022 is much higher, reflecting the adoption of inkjet printing systems producing short runs and high-value customised products.

Between 2012 and 2017, inkjet ceramic printing has grown at an average CAGR of 19.5%, reflecting high rates of adoption of inkjet machines, while the level of screen and pad printing declines. The growth rate of inkjet will fall back, but still reach 6.5% annually in volume terms to 2022.

AEROSPACE AND AUTOMOTIVE PRINTING

Sales of cars, buses, trucks and vans continue to increase, as do those of aircraft. All these new vehicles contain many printed items, such as upholstery, carpets, interiors, switches, windows, dashboards and instrument panels.

This print may be either decorative (e.g., a bike transfer, a wood-effect interior or a branded interior) or functional (e.g., a windscreen de-mister or radio aerial). In some cases, it may be both, so the instrument panels will be designed to be easy to understand, with opaque panels interspersed with translucent colours showing alarms.

This amounts to a print market of \$2.3 billion in 2017 that will grow to \$2.9 billion by 2022. About half of the current market is in Asia, which is growing faster than Europe and North America.

The print value of this segment is growing faster than the overall automotive market, as there are more low-cost models that contain printed interiors rather than fabrics and natural materials.



Vehicles contain many printed items such as upholstery, carpets, interiors, switches, windows, instrument panels and dashboards like the one shown here.

GLASS

In 2017, according to Smithers Pira, the overall value of glass printing was \$908 million, with Asia accounting for some 40.6% of the total. The forecast is for that value to grow to \$1.28 billion by 2022.

For the purposes of these statistics, Smithers Pira took into account flat-sheet glass for architectural use (indoor and exterior); for screens in TV, monitors and mobiles; and hollow-container glass that is usually a tube sealed at one end to form a drinking vessel, lightbulb/tube, laboratory glass, lenses or an ornamental object such as a vase. Not all decorated glass was included, however, for the purposes of these statistics.

Screen printing, the dominant process in glass, is widely used to print onto flat and hollow glass and can lay down heavy coverages of coloured inks and specialist coatings that provide dramatic decorative effects or simpler designs for privacy or solar control.

The printing value of the screen glass market is forecast to grow from \$626 million in 2017 to \$852 million in 2022. However, thanks to its flexibility, the use of inkjet will also continue to grow—from \$208 million in 2017 to \$331 million in 2022.

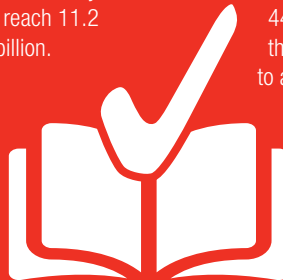
THE FACTS

- In 2016 alone, the global market for printed point-of-sale (POS) and signage generated 10.8 billion square metres of printed material and was worth over \$42.8 billion. — *Future Markets for Printed Signage, Smithers PIRA*
- The overall value of POS/signage is expected to grow annually by 2.7%. The volume of indoor signage is predicted to grow on average at 10% per annum, surpassing outdoor, which will see only marginal increases. Total world output is expected to reach 11.2 billion square metres by 2022 and a value of \$48.9 billion. — *Future Markets for Printed Signage, Smithers Pira*
- Soft signage (banners, flags and similar visual communications) is expected to grow at a rate of 13.7% between 2016 and 2021, pushing the market value to \$658 million. — *FESPA/Smithers Pira White Paper "Inkjet Textile Printing," 2017*
- The value of digitally printed textile will nearly quadruple between 2012 and 2021, reaching \$2.46 billion by the end of the nine-year period. This contrasts positively with the conventional (nontextile) print market that as a whole is advancing at 1.2% year-on-year between 2015 and 2020. — *FESPA/Smithers Pira White Paper "Inkjet Textile Printing," 2017*
- The technical textiles market (digitally printed fabrics used in functional or industrial contexts and where decoration is not the primary motivator) was worth \$57 million in 2016 and is forecast to climb to \$100 million in 2021, at a year-on-year growth rate of

12%. While smaller and slower growing than the other key areas, technical textiles still has clear opportunities for both generalist and specialist PSPs, with automotive fabrics and protective clothing both expanding beyond the mean rate. — *FESPA/Smithers Pira White Paper "Inkjet Textile Printing," 2017*

- Clothing is the largest segment for digitally printed textile, with a global market worth \$770 million and representing 440 million square metres of fabric in 2016. Sportswear is the most lucrative sub-segment of the market—equating to a 27.6% share in 2016 (\$213 million)—which can be accounted for by the popularity of polyester-based materials. Fashion (especially "fast fashion") and haute couture—\$112 million and €98 million in 2016—are also significant sub-segments with lucrative customer bases and together represent another 27.2% market share. — *FESPA/Smithers Pira White Paper "Inkjet Textile Printing," 2017*

- In 2015, the décor market's value was almost \$16 billion and is predicted to grow by an average CAGR of 4.5% to 2020, when it will be worth \$20 billion. The household or home décor market for digitally printed fabrics alone—encompassing products including upholstery, carpets and floorcoverings, bed linen and curtains—was worth \$91.1 million globally in 2016 and represented 70 million square metres of fabric. — *FESPA/Smithers Pira White Paper "New Frontiers in Interior Print," 2017*



Sun Chemical's brighter ideas for graphics, textiles and industrial printing

Sun Chemical offers customers a vast portfolio of inks (for all printing processes) and compatible technologies for multiple applications across the graphics, textile and industrial markets:

GRAPHICS

- A broad range of solvent and UV-curing inks that enable screen printers to produce eye-catching display graphics applications while improving productivity.
- A comprehensive range of high-quality, solvent-based, alternative inkjet inks for use in all popular wide-format and superwide-format printers. Greenguard Gold certified (for wide format) and emitting less odour than many original inks, Sun Chemical's inkjet inks are so carefully formulated to match the performance, quality and colour of the original manufacturer's inks that they can be mixed with the original inks to reduce waste and ensure an easy changeover process, without the requirement to reprofile the printer. Together with an ink supply unit, the inks can be supplied in refill packs that increase capacity and productivity and ensure continuous production when needed.
- An economical, solvent-based, "value" ink series for wide-format and superwide-format customers in regions in EMEA where the economics of the graphics market place additional pressure on reducing print costs. Suitable for printed graphics that do not need the standard three-year lightfastness rating, such as frequently replaced posters at cinemas or promotional displays in supermarkets, the range is ideal for print service providers who tend to use alternative inks almost immediately after ordering their printer and also automatically install a bulk ink feed system.
- Sun Chemical remains fully committed to superwide/grand-format solvent inkjet printers, not only to supply high-quality inks, but also to continue R&D to improve the ink quality and print performance, using less ink to clean the print system, reducing the overall ink cost and lost production time. The inks are jetted more cleanly so there is less "mist" ink deposited onto the printer unit in very high-speed production. As a result, the printer remains in a cleaner condition, so doesn't need to be stopped for the operator to clean it before the next print run, in turn improving printer uptime for production.
- Most wide-format printers come with 440-ml ink cartridges, but with larger print orders these are quickly exhausted and can start to add a lot of cost to the print spend needed to fulfil orders. Sun Chemical can increase productivity, maintain print quality and reduce customer overall ink spend by installing a bulk ink feed system and supplying customers with more cost-effective, 1-litre refill ink bottles.
- Sun Chemical also offers a "closed" bulk ink feed systems for some new printer models. These use 800-ml or 1.85-litre foil ink pouches in place of a tank being filled with ink from 1-litre bottles.
- Ensuring that customers' printers remain in tip-top operating condition, Sun Chemical provides expert support through its field engineers, whose services include on-site support for ink conversions, printer servicing, supply and installation of replacement parts, as well as RIP/colour management profiling support. Many superwide-format printers can be complex in terms of their overall assembly (including ink feed systems, electronics, valves and filters), and many are now 10 to 15 years old. They remain the most profitable tool for printing in many graphics markets, but do benefit from servicing and maintenance.



Sun Chemical offers a wide range of solutions for the graphics market, including high-quality inks for superwide-format printing used for building wraps.

- To meet the regional differences in wide-format solvent ink buying behaviour—in the UK and Germany, for example, there is a strong emphasis on matching for colour yet exceeding quality and performance of original inks—Sun Chemical offers tailored ink value propositions for each market territory, so that customers can feel confident that they can install its ink and continue production without disruption.

TEXTILES

- Multiple ranges of inkjet inks, including dye sublimation inks for direct or transfer print and pigment-based inks, have been developed to deliver high performance in the textile market. The inks deliver exceptional quality and performance, combined with improved ink consumption when compared to leading competitors.

Formulated to enable long print orders on high-speed printers, the inks also meet the Oeko-Tex EcoPass certification, enabling printers to achieve the Oeko-Tex 100 printed garment certification.

Manufactured at the Sun Chemical inkjet centre in the UK, the inks are available in CMYK plus an extended range of special and fluorescent colours and offer high rub resistance, toughness and outdoor durability. With excellent jetting at high print speeds, the inks also have first-class transfer properties with low-cost papers for transfer print.



Sun Chemical inks for textiles have been formulated to enable long print orders on high-speed printers. The inks meet the Oeko-Tex EcoPass certification.

INDUSTRIAL

- A range of heat- and humidity-resistant ink solutions for high-tech, appliance panel and automotive applications, where a combination of high visual impact and long-term durability is required. The range includes an aqueous, formable and VOC-free hardcoat varnish for dashboard fascia that dries to a matte finish, minimising glare, and that has the ability to “self-heal” scratches created during the production process.
- A range of high-peel-strength, colour-consistent screen and offset inks, adhesives and varnishes for laminated plastic cards.



Sun Chemical offers colour-consistent inks, adhesives, varnishes, magnetic tapes, electronic materials, pre-laid overlays and pre-patched holograms for plastic and security ID cards.

- A broad portfolio of magnetic tapes, screen and security inks and electronic materials for plastic and security ID cards. Through its acquisition of C.T.LAY, a global leader in pre-laid overlays and pre-patched holograms, Sun Chemical can also offer experience in sophisticated lamination plates with security elements and plasma coatings.
- A range of screen inks formulated for high-speed screen printing on a variety of plastic container substrates.
- A portfolio of organic UV-curing and conventional solvent-based inks for direct printing onto flat or hollow glass surfaces that provides an alternative to traditional ceramic enamel printing. Enabling printers to deliver the highest-quality printed output with bold accurate colour reproduction for greater colour consistency and brand integrity, the range is available in a choice of bright standard mixing colours and a selection of special effects, such as frosting or etch effects and thermochromic inks, as well as covert and overt brand protection features.

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- A range of advanced materials for printed electronic applications, such as printed antennae, display buss bar and transparent conductors. Offering enhanced conductivities and ultra-fine line printing, these state-of-the-art technologies combine with digital inkjet printing to deliver material solutions for applications that add functionality to packaging, labels or point-of-sale collateral.
- A smart packaging solution in the form of a series of printed conductors embedded in cards, labels and packaging that interacts with touchscreen-enabled devices, smartphones and tablets. More cost-effective than NFC or RFID and invisible unlike barcodes or QR codes, the technology effectively ensures brand authenticity as well as brand awareness and stronger promotions.
- A range of nanosilver inks, designed for use with industry-leading inkjet and aerosol jet systems in printed electronics, which deliver the industry's best-performing low-temperature sintering properties. Their unique chemistry also offers long open life, superior jetting performance and compatibility with most commercial and industrial printheads. Sun Chemical's nanosilver inks enable customers to work with one nanosilver from prototype to production.
- A disruptive, low-cost, visual display system that simulates motion and offers a powerful customer communication value. It is created by printing multiple layers of images on clear media and sequentially illuminating the layer edges to alternate between images. A key feature of the printed layers is that they have excellent transparency so that when the illumination is turned off, the image "disappears," allowing a clear view through the printed panel. It is possible to stack up to three images or stack two images followed by an illuminated view of a physical product. This means that printed panels can be used on items such as refrigerator fronts in stores to advertise features/special offers, etc. and yet still allow customers to look through the panel and see the items in the refrigerator, etc. As the images are printed onto plastic media with illuminating LEDs on the edge, unusual sizes and shapes of image can be created (i.e., it is not limited to commercial LCD aspect ratio), and even 3D thermoformed displays are possible.



Sun Chemical can offer a smart packaging solution in the form of a series of printed conductors embedded in cards, labels and packaging that interacts with touchscreen-enabled devices, smartphones and tablets.

See how our brighter ideas for graphics, textiles and industrial printing can help you

As one of the world's largest and most innovative producers of inks and compatible technologies for multiple applications across the graphics, textile and industrial printing markets, Sun Chemical offers customers an unsurpassed portfolio of products and support services to enable them to increase productivity, reduce costs and diversify their own offerings.

Whatever solution you're looking for, talk to us to find out how our Brighter Ideas for Graphics, Textiles and Industrial Printing can help you and your customers. Visit: www.sunchemical.com/brighterideasforprinting.

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