

# Marketplace

**Xaar's digital inkjet technologies are transforming print processes in a wide range of markets.**

## Industrial markets

### Ceramic Tile Decoration

The majority of the tile decoration market uses digital inkjet technology because, compared to traditional analogue techniques, it is superior in terms of image quality and is lower in cost. In addition, it offers the advantages of flexibility, inventory reduction and larger tile size capability. This is a mature market for Xaar with strong competition. However, with an average useful life of five to six years, several hundred new ceramics printers are required each year for the foreseeable future. Xaar's unrivalled 720 dpi print resolution is starting to attract the attention of tile manufacturers looking to print large slabs for kitchenware (such as table tops).

### Decorative Laminates

Realistic wood finishes or creative design are the key features which sell the board/ plank/ finished item. The digital quality that can be produced with Xaar printheads matches the quality produced by the analogue process, thereby offering the opportunity for more economic short run work to be undertaken whilst reducing inventories and improving time-to-market.

### Functional Fluid Deposition

Xaar's focus on functional fluid is to promote our inkjet technology, which offers an unrivalled method of non-contact, fluid deposition with incredible precision, control and speed. Typically applications are challenging, pushing our technology to and beyond known limits in markets such as Flat Panel Display, Semiconductors, Printed Electronics and Optics.

### 3D Printing

3D Printing is a manufacturing methodology that encompasses a range of processes and applications, with a common theme of building parts up, usually layer-upon-layer. This additive approach ultimately enables manufacturers to eliminate the need for tooling. There are significant advantages, including superior geometric freedom, giving designers much more capability, and a substantial reduction in lead time for products. In addition 3D Printing provides the facility to tailor unique products to consumers, enable de-centralised manufacturing and shrink spare part storage.

### Glass Printing

Architectural glass is increasingly used to complement ceramic tiles in modern commercial design, and is starting to be used in residential projects also. Functional glass, such as car windscreens or glass tops used in induction hob cookers, is predominantly printed using analogue screen techniques, but is increasingly moving to digital to provide production flexibility and inventory reduction. This is an emerging sector for digital inkjet and the Xaar 2002 is the leading printhead for this market due to technology advantages.

## Packaging markets

### Coding & Marking

Coding & Marking is an application which relates to printing product identification codes such as batch numbers, use by dates and barcodes. Xaar's technology is used to print barcodes and logos on outer case/secondary packaging of consumer goods. This is an established and stable business, and competes with alternative technologies including print and apply, and thermal inkjet.

### Labels

Labels are used for many different applications, including product identification, name tags, warning and hazard identification, promotions and as decals for product decoration. There is a large range of substrates and inks in this application which adds complexity to the conversion process. Xaar excels in two areas of label printing: colours (including white) and varnish based finishing effects using Xaar's High Laydown Technology.

### Direct-to-Shape

Direct-to-Shape is the application where bottles and containers have the image printed directly onto their surface without the need for a label. The solution is aimed at reducing unit costs versus the application of a label. This approach can also be used as part of the identity of a brand, and provides differentiation versus other products that use paper or plastic labels. Xaar printheads are the best at printing in a vertical mode (a frequent requirement for these applications), thanks to TF Technology.

### Packaging

The Packaging market is a broad sector covering flexible packaging, bottles, pouches, sachets, food packaging and more. Most packaging is printed using conventional analogue methods, but digital inkjet has the potential to revolutionise this part of the manufacturing process. Xaar printheads for the packaging industry facilitate cost-effective print runs and rapid production turnaround in what is a fast-moving industry. In addition, Xaar's unique Ultra High Viscosity Technology helps customers to print bright bold colours, ultra-thin layers for more flexibility, and a wider range of fluids and textures.

## Other markets

### Product Printing

Product Printing covers printing onto all kinds of industrial objects, including consumer and promotional items, packaging, medical, automotive, apparel, appliances, sports equipment and toys. Xaar's printheads are particularly suitable to these applications because the printhead design enables the use of a wide range of fluids as well as configurations options. In addition, Xaar company Engineered Printing Solutions (EPS) is a leader in this sector, providing best-fit custom printing solutions for many different applications, including promotional, packaging, medical, automotive, apparel, appliances, sports equipment and toys.

### Grand- and Wide-Format Graphics

Grand- and Wide-Format Graphics includes both indoor and outdoor signage and advertising, including billboards, posters and point of sale advertising. It is the most mature industrial inkjet market, active for over 15 years. Xaar's early product range was instrumental in the growth of the digital graphics industry around the world.

### Textiles

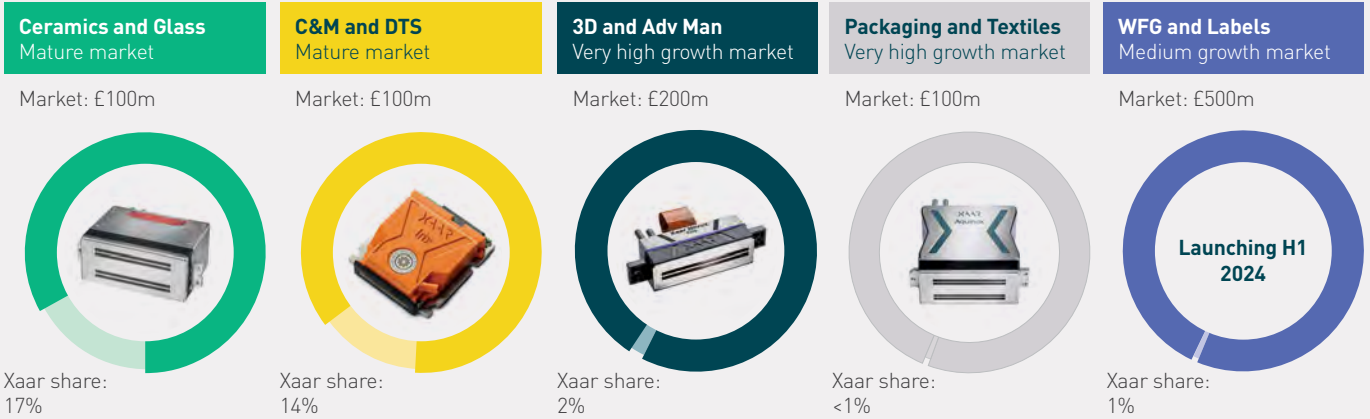
The Textiles sector is a growing market which covers a broad range of applications from fashion, sports, signage and display textiles, to home furnishings and technical textiles, for example for automotive or medical use. Sustainability is becoming a significant consideration, with industry challenges which include supply chain and raw materials pressures and a shift away from Asia ('near shoring'). Other drivers for a move to digital include desire for economic short print runs for faster and more frequent design changes as well as an increased demand for customisation. Whilst Xaar is later to the market than some competitors, the Aquinox has been developed to fix the need for a more reliable inkjet solution. In addition, Xaar technology offers the capability to lay down more pigment and reduce the carrier fluid, meaning richer, more vibrant colours can be printed reliably and more sustainably, and less energy is used in the drying process.

### New inkjet applications

Xaar's Ultra High Viscosity Technology enables jetting of fluids around 100 centipoises (cP) at jetting temperature, equating to approximately 1000cP at ambient temperature – going well beyond average jetting capabilities of 10-12cP. This opens up inkjet to a wider range of applications including printing adhesives and solder masks.

## Product roadmap delivers a significant total addressable market

We focus on a number of core market sectors where our technology offers a competitive advantage. We group these sectors together as shown here because they require the same functionality from the printhead. This is largely driven by requirements for ink type, speed, resolution and robustness.

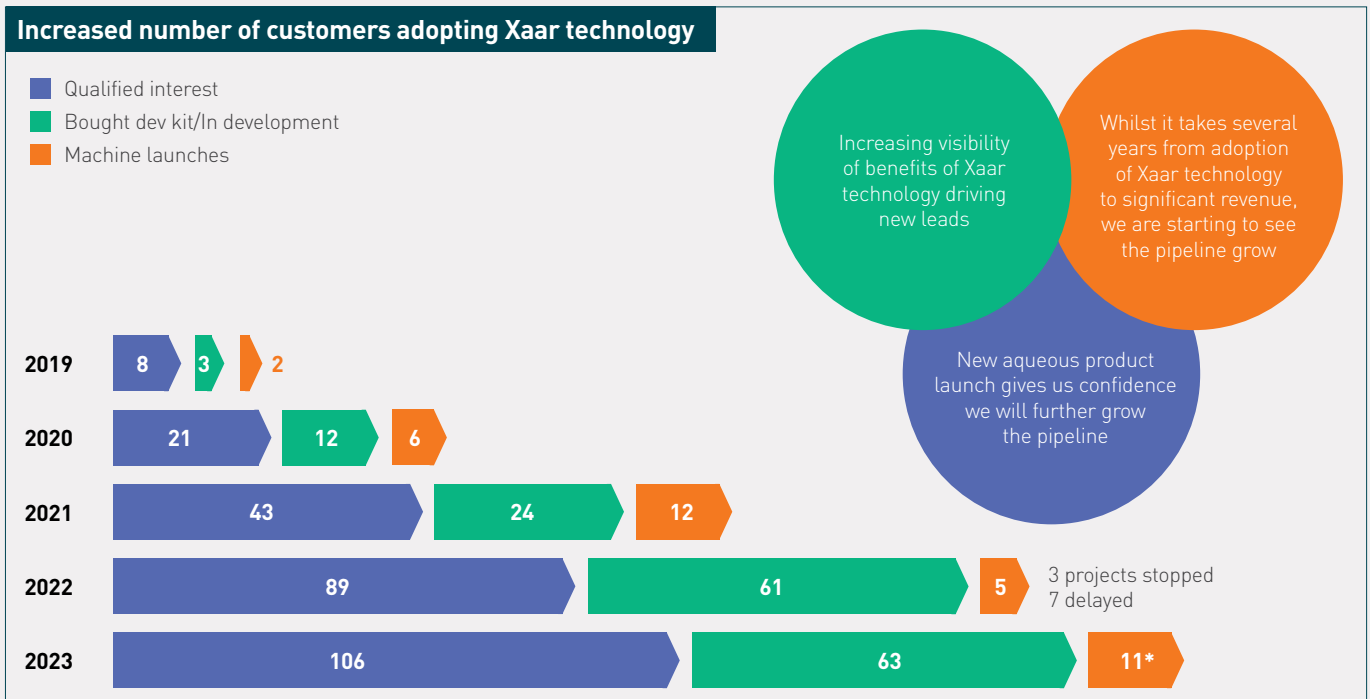


Source: Xaar's internal market sizing model built using data from range of market reports looking at markets up to 2027 including from PIRA: The Future of Inkjet Printing to 202, Smithers: Global Industrial Inkjet Printhead Market Insights, Forecast to 2028, Information Center: The Future of Digital Textile Printing to 2026, Smithers.

## Increased number of customers adopting Xaar technology

Our new business model, product roadmap and value proposition have already had a very positive impact on our customer engagement.

It can take several years from adoption of Xaar technology to significant revenue as you can see in the table below. Since 2019 the pipeline has grown substantially, and future pipeline growth will be driven by us having the right products in our core markets (which you can see in the diagram above). With the recent launch of our aqueous printhead and the next launch to help us re-enter the Graphics market, we expect to see an acceleration in the pipeline with revenue growth following 1-3 years behind.



Source: Data taken from Xaar's CRM software reports

\*Projected machine launches in 2023.

**3D printing is an important focus for Xaar's printhead business with the needs of the sector supported by our extensive product portfolio and strong partnership approach to working with customers.**

Xaar works with OEMs in three different types of 3D printing: Material Jetting, Binder Jet and Powder Bed Fusion.

### Material Jetting

Material jetting creates objects in a similar method to a two dimensional inkjet printer. Liquid-based 3D material is jetted onto a build platform using inkjet printheads.

Example: Xaar customer dp Polar manufactures 3D printing systems which use Xaar 1003 printheads to produce parts on a continuously rotating print platform with a build area of just under 1 square metre. This system was designed to deliver scalability and productivity and has been developed for the automotive, aerospace and consumer markets.

▶ [www.dp-polar.de](http://www.dp-polar.de)

### Binder jetting

The binder jetting process uses two materials; a ceramic or metal powder-based material and a binder. The binder is usually in liquid form and the build material in powder form. A printhead moves horizontally along the x and y axes of the machine and deposits alternating layers of the build material and the binding material.

Example: Linc Solution is in the process of developing a system for metal binding for manufacturing of automotive parts.

▶ [www.lincsolution.com](http://www.lincsolution.com)

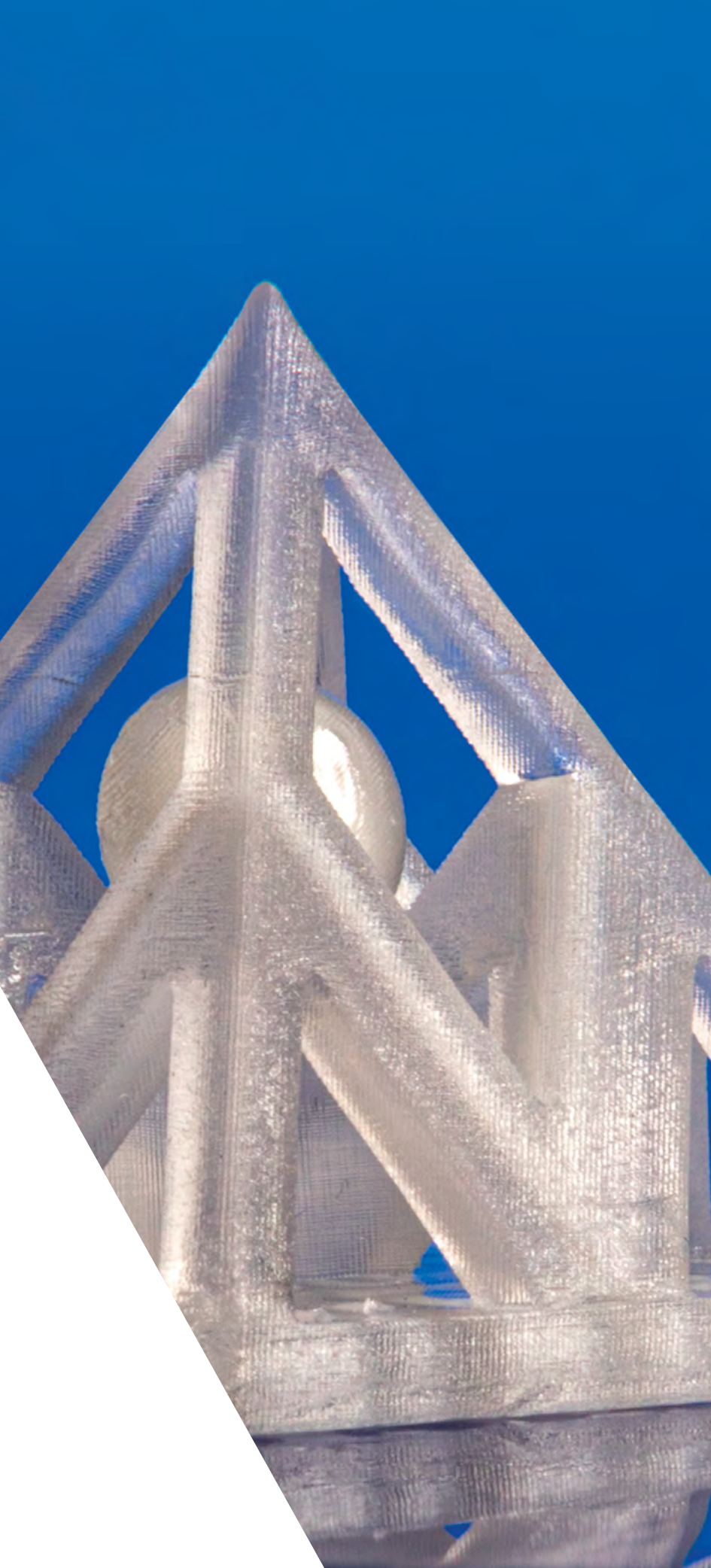
### The Powder Bed Fusion

Of the different types of Powder Bed Fusion, Xaar's involvement is with High Speed Sintering which uses polymer powder-based 3D materials, with Xaar printheads jetting the infra-red absorption fluid into the powder bed, which is exposed to infra-red energy. The printhead causes the powder to melt and fuse together.

Example: The H350 from Stratasys uses Xaar 1003 printheads within its SAF technology to reliably produce end-use production parts with a wide spectrum of part properties.

▶ To learn more visit: [stratasys.com/en/3d-printers/printer-catalog/saf/h350/](https://stratasys.com/en/3d-printers/printer-catalog/saf/h350/)

# Dive deep into 3D printing



## Why is inkjet so relevant for 3D printing?

Inkjet technology offers some significant technical and commercial advantages for 3D compared to the standard manufacturing methods.

- Inkjet can be used to make parts with a range of materials – polymers, metals and ceramics. This means that once a manufacturer has learned how to jet, there are a wider range of applications they can address
- There are sustainability advantages too – you only print the fluid you need to use. Also as it is a contactless technology standard digital advantages apply – less breakages and less waste. And, it is possible to design a whole solution since consolidating many parts into one 3D part is possible. This saves time to market, reduces the materials needed and saves on tooling costs for multiple parts
- Additive manufacturing with inkjet provides the opportunity to use a single process but has multiple material types: materials of different properties can be used in different areas of a product, for example tough and flexible, (mimicking bone and cartilage). Mixing material families (metal and plastic) is not impossible but not usual
- Distributed manufacture: parts can be made customised to the local market in the local market using local market economies of scale. Key know how/components are shipped. Everything else is logistically optimised
- Spares can be created for obsolete equipment from legacy drawing
- Mass customisation: similar to Ceramic tiles or graphics, if you want one part or one million parts, it is the same unit price and each part can be different.

## Why does Xaar have unique advantages in this market?

- Materials: Xaar's Ultra High Viscosity Technology widens the range of material properties that can be introduced because Xaar's printheads can reliably jet fluids with high viscosities and high particle loading. For the end user this means that material properties can improve, such as toughness, flexibility and elasticity, so that, for example optically clear parts (such as lenses) can be printed, or part breakages can be reduced. This is a significant advantage
- Xaar's TF Technology ensures our printheads are extremely reliable; they self prime and their open architecture means that blockages are minimised
- Xaar printheads have the highest nozzle open time which means less purging at startup and therefore less wastage of expensive 3D material.

## High Laydown

High laydown enables the same technology that can produce very detailed, high resolution models to address low resolution, large scale models, such as investment casting models (motor housings or large scale framework). This increase in productivity results in reduced build time. Where resolution is not required, we offer the same benefits (particle and viscosity) but with up to five times the productivity.