

# XAAR TECHNOLOGY

22 June 2022

## XAAR.L

195p

Market Cap: £153m

### SHARE PRICE (p)



12m high/low

273p/145p

Source: LSE Data (priced as at prior close)

### KEY DATA

Net (Debt)/Cash £15.3m (at 31/12/21)

Enterprise value £137.6m

Index/market LSE

Next news Trading Update July 22

Shares in Issue (m) 78.4

Chairman Andrew Herbert

Chief Executive John Mills

Finance Director Ian Tichias

### COMPANY DESCRIPTION

Xaar manufactures specialist industrial and commercial digital printheads, used in a variety of applications.

<https://www.xaar.com>

XAAR IS A RESEARCH CLIENT OF PROGRESSIVE

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## Roadmap to significant profit growth

With a clear roadmap of new digital inkjet products and an ambitious management team focused on gaining (or retaining) significant market shares across the segments that make up its \$1bn addressable market, Xaar is positioned to grow strongly. Management has already demonstrated its abilities in turning the business around, and we believe it is far from clear that the share price fully reflects the opportunities ahead.

- \$1bn market awaits.** The market for industrial digital inkjet printheads is estimated by management to be approaching \$1bn per annum. Xaar's product roadmap suggests that it will be able to address the vast majority of this within a few years. If the management team delivers on the product roadmap, Xaar will be well-positioned to take a strong share of these markets.
- Clear signs of progress.** Management has a strategy in place to drive revenue back up by launching new products and adopting a revised approach to customers and the channel. Improving revenues and a growing number of customer products both in development and in the market show that management is already delivering on this strategy.
- Profit and cashflow upside.** The high gross margin and relatively fixed cost base mean that as product and revenue traction build, the impact on the bottom line will be geared upwards. On top of this, the significant historical capital investment means that material increases in output can be achieved for limited capital outlay: a possible positive profit and cashflow double whammy.
- ESG potential.** Management believes that Xaar can reduce overall ink and energy consumption, most notably with the launch of its aqueous ink capable printheads, which use significantly less water than standard printheads and save on the heat energy used to dry the inks.

Starting from £40m revenue in printheads in FY21, a near \$1bn addressable market opportunity and a management team that has shown itself able to execute, even though the shares are on premium multiples, the market valuation appears that it may not fully reflect the scale of Xaar's potential revenue and profit growth. Xaar offers investors a clear, understandable technology growth story, building on an established set of technologies providing solutions across a range of demanding printing applications.

FYE DEC (£M)	2019	2020	2021	2022E	2023E
Revenue	49.4	48.0	59.3	73.3	81.6
Adj EBITDA	-4.9	0.1	3.2	5.6	8.8
Fully Adj PBT	-8.0	-3.9	-0.6	1.4	4.4
Fully Adj Dil EPS (p)	-15.1	-5.2	-0.1	1.7	5.6
EV/Sales (x)	2.8x	2.9x	2.3x	1.9x	1.7x
EV/EBITDA (x)	-28.3x	2220.1x	43.2x	24.5x	15.7x
PER (x)	N/A	N/A	N/A	112.5x	34.5x

Source: Company Information and Progressive Equity Research estimates.

This publication should not be seen as an inducement under MiFID II regulations.

Please refer to important disclosures at the end of the document.

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## Executive Summary

### Solving printing challenges across multiple industries

Xaar's principal business is the manufacture of specialist industrial and commercial digital printheads. These printheads are used in a variety of applications, from printing ceramic tiles to posters on the sides of buildings to 'best by' dates on bottles of beer. Xaar typically sells the printhead to the printing equipment manufacturer but will also sell printheads along with inks and other subsystems and services to systems integrators, where there are opportunities for long-term recurring sales.

### Near \$1bn addressable market opportunity

The market for industrial digital inkjet printheads is estimated by management to be approaching \$1bn per annum. While Xaar does not currently address all of this opportunity, its product roadmap indicates that it will be able to do so within a few years. If the management team delivers on the product roadmap, Xaar will be well-positioned to take a strong share of these markets.

### New management delivering on new products and growth

The new management team, who joined in late 2019 and early 2020, has steadied the ship. Management has a strategy to drive revenue back up by launching new products and adopting a revised approach to customers and the channel. Improving revenues and a growing number of customer products in development and in the market show that management are delivering on this strategy. We expect that over the short to medium term, as the new product launches translate into volume printhead sales, Xaar will be able to raise its exposure to an increasingly significant portion of the near \$1bn market opportunity. Furthermore, we expect it to do so with modest capital outlays and to see the benefit of operational gearing.

### Enabling positive environmental changes

Within an exciting investment story, Xaar also has an interesting ESG case. Management has been alert to the importance of environmental culture and behaviours at Xaar and has made a commitment to 'net zero by 2030'.

Management believes that digital printing can reduce overall ink and energy consumption. They expect that with the launch of Xaar's aqueous ink capable printheads, those end users already using aqueous inks will be able to use significantly less water, thereby also saving on the heat energy used to dry the inks after printing. Management also sees longer-term potential, with these new printheads potentially enabling the use of aqueous inks in place of environmentally unfriendly oil, solvent or UV cured inks.

### Has the valuation captured the full growth potential?

Compared with other UK-listed technology hardware and high-precision engineering businesses, Xaar trades on premium multiples. The market clearly recognises the potential for Xaar's profits to outgrow those of these comparators. However, starting from a standpoint of £40m revenues in printheads in FY21, a near \$1bn addressable market opportunity and a management that has already shown itself able to execute, it is far from certain that the market valuation fully reflects the scale of this potential outperformance.

## Introduction

### Solving printing challenges across multiple industries

Xaar's principal business is the manufacture of specialist industrial and commercial digital printheads. These printheads are used in a variety of applications, from printing ceramic tiles to posters on the sides of buildings to 'best by' dates on bottles of beer. Xaar typically sells the printhead to the printing equipment manufacturer but will also sell printheads along with inks and other subsystems and services to systems integrators, where there are opportunities for long-term recurring sales. Xaar has over 30 years of experience working with its underlying technology, but because of technological advances and its digital nature, the number and scale of applications continues to grow.

### Not just printheads

In addition to its core inkjet business, Xaar also has a US-based operation, Engineered Printing Solutions (EPS), which accounted for 23% of group sales in FY21. EPS provides equipment to the product print market, typically being used to print text and graphics on non-flat objects such as golf balls, drinks bottles and pens. EPS's financial performance is disclosed under the heading of Product Print Solutions (PPS). Given its exposure to the promotional products market, EPS was hit hard by the pandemic. However, it is now on a revenue growth path, having seen the market return and having had a change of local management, a limited restructuring and profitability restored.

### New strategy, new products, new and old opportunities

This note examines how Xaar is positioned to grow revenues and profits over the coming years as a result of new product launches, a revised channel strategy and a focus on areas where it has an acknowledged expertise and competitive advantages.

The market for industrial digital inkjet printheads is estimated to be approaching \$1bn per annum. While Xaar does not currently address all of this opportunity, its product roadmap means that it should be able to address the majority of it within a few years. Xaar is looking to rebuild share in sectors where it historically held stronger positions, notably ceramics (£100m segment) and wide-format graphics (£500m segment), as well as building positions in sectors where it has had a small presence or none at all.

The new management team, who joined in late 2019 and early 2020, has steadied the ship. Management has a strategy in place to drive revenue back up, and the benefits of new products and a revised approach to customers are already being seen in increased revenues and margins, and significantly improved customer engagement and numbers of customer products in development.

## History and background

### Established technology continuing to develop

Xaar was founded in 1990 to exploit the drop on demand piezo crystal driven inkjet technology created by Cambridge Consultants. The business was established on a technology licensing model, with Toshiba, Seiko, Sharp, Konica Minolta, Brother and Sharp among the licensees. However, the business shifted to a manufacturing plus licence model following its flotation in 1997 and the acquisition of MIT, a licensee based in Sweden, in 1999.

Over the following years, both Xaar and its licensees released a series of printheads based on its technologies, and in 2006 Xaar made the move to start manufacturing in the UK, in Huntingdon. Further product releases followed, and the company grew substantially on the back of its leading position in the rapidly expanding wide-format graphics market for printing on posters, banners and hoardings.

In 2010, invigorated by the strong demand prospects for its next-generation products in the ceramics market, Xaar invested heavily in manufacturing with a £22m spend on new capacity at Huntingdon, with the goal of providing capacity to support £100m of revenue. Over the following years, demand from the ceramics market took off, and in 2013 revenue peaked at £137m, with Adjusted PBT of £41m and year-end net cash of £53.5m.

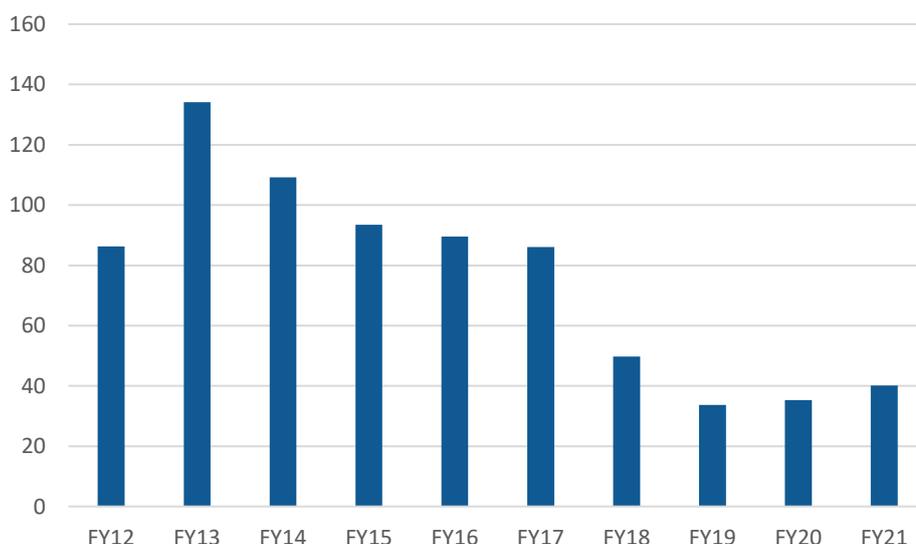
### Success in ceramics short-lived

The initial success in ceramics waned as the market moved from first-time technology transition buy to replacement purchases of a relatively mature technology. And while the other markets, such as coding and marking (C&M), remained relatively robust, some anticipated new markets did not develop as hoped.

*Xaar has been a leader in digital inkjet markets before...*

*...and could be again with the new management, new strategy and new products*

**Printhead revenues, including royalties (£m)**



Source: Xaar

In 2015, in the face of weakening revenues, Doug Edwards took over the reins as CEO from Ian Dinwoodie, CEO since 2003, and put in place a new strategy, Vision 2020, with a goal of taking revenue to over £220m by 2020.

Further investment was made in an attempt to address new markets both organically and via M&A, most notably in 'thin film technology' (see Appendix) and 3D printing, and a new channel strategy was adopted. In 2019, Xaar's revenue was £49m.

### **New management has put business back on a growth path**

John Mills joined the company as CEO in October 2019 and Ian Tichias came in as CFO in March 2020. After some dramatic actions, including closing and disposing of operations and a fundamental change in the approach to markets and customers, the business is now on an even keel. We believe that product developments, rather than revolutions, and a focus on the customers and helping them get their products to market should help to drive sales and profits up significantly.

It should be noted that, for all the company's difficulties in the middle and latter part of the last decade, Xaar did have the comfort of a substantial net cash position. Even at the end of 2020, when the turnaround was far from certain, the company had net cash of £18m.

### **Printheads and Digital Imaging (77% rev FY21)**

The printhead business is the primary driver to Xaar. As we discuss below, the EPS product printing business is unlikely to be a key driver to value creation or destruction for this £153m market cap business over the next few years. For the printhead business, in contrast, the opportunities are considerable. Looking forward just a few years, the total addressable markets for Xaar's printheads is estimated to be nearly £1bn.

Digital Imaging is the FFEI business purchased in March 2021 (see below) generated £5.25m revenues, or 9% of total revenues, for Xaar in FY21. We have included it with Printheads here, and within our forecasting, for the sake of clarity.

Xaar has held considerable market shares across several of the key market segments in the past, primarily ceramics and wide-format graphics, and is executing on a strategy designed to win back these shares while extending its reach into new segments.

Having launched three new printheads in the last two years focused on ceramics, coding and marking, and 3D printing, Xaar is already showing clear evidence that it is winning share across these markets.

Printhead products and market opportunities					
Markets	Ceramics and Glass	C&M and DTS	3D and Adv Man	Packaging and Textiles	WFG and Labels
Market size for printheads	£100m	£100m	£50m	£100m	£500m
Estimated Xaar share	Ceramics 10% Glass <1%	20%	1%	0%	0%
Product Features	Tuned Actuator and AcuChp	Long Throw Distance	High Viscosity High Laydown High Frequency (48kHz)	Robust nozzle plate High speed High resolution	Aqueous compatibility High speed High resolution
	 Xaar 2002	 Xaar Irix	 Xaar Nitrox	 Aqueous coming end 2022	 TBA H1 2024
Xaar market share opportunity	★★	★★	★★★★	★★	★★★★

Source: Xaar

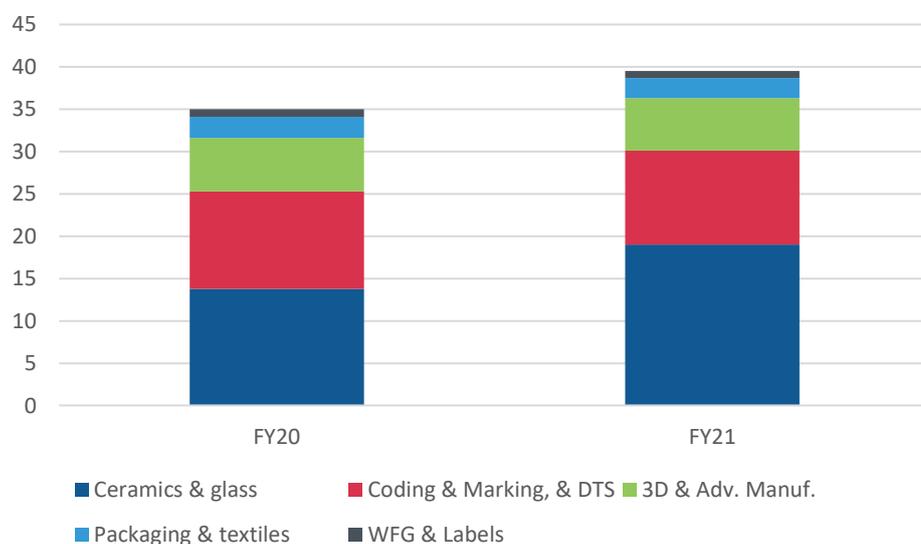
While the largest segment, wide-format graphics, is not one for which Xaar currently has a truly relevant product, we look forward just a few years to 2024 when Xaar plans the last in a series of product launches under its newly introduced ImagineX banner, with a product that is focused on reclaiming the major share of this market, which it once controlled.

Management categorises its end markets as Ceramics & Glass, Coding & Marking and Direct to Surface, 3D & Advance Manufacturing, Packaging & Textiles, and Wide Format Graphics & Labels. It is important to note that, with the exception of 3D and Advanced Manufacturing, this categorisation is based on the key facets of the printhead required, principally the type of ink being jetted, not necessarily because of any particular link between the end markets.

The inks used in ceramics, ie printing on tiles, are oil based; in coding and marking, they are solvent based; in wide-format graphics, they are ultra-violet cured; and in packaging and textiles, they are water based. In the 3D and Advanced Manufacturing segments, the inks can have a variety of ingredients but are almost all regarded as ‘difficult to jet’.

Multiple opportunities across a range of end markets

**Printhead application revenues split (£m) – Ceramics driving growth**



Source: Xaar

### Ceramics and Glass

Ceramics and glass is principally the printing of images/patterns on ceramic tiles. Xaar was the leader in this market as it moved from traditional to inkjet technology and much of its early success was built upon its willingness and ability to work with printer manufacturers to create a product that worked in the technically and physically demanding application. Under the previous management and its focus on thin film technology, Xaar lost almost all of its market share as a result of the entry of competitors, its move to the use of distributors and, to an extent, a reluctance to invest in its product range.

Printers only last 5-6 years in the ceramics environment, so management believes there should be a relatively stable replacement and upgrade market for some years to come.

The use of distributors by Xaar had meant that the printer manufacturers that had based their business models around the ability to sell replacement printheads to users were cut out. Their reaction was, quite understandably, to cut Xaar out by moving to other printhead suppliers that would allow them to make money from replacement printhead sales.

The first new product to be released after the arrival of the new management was the 2002 printhead in August 2020. With greater accuracy, reliability and speed, this product has already made significant progress. The 2002 has 720dpi resolution while competing products can provide only around 360-400 dpi.

*Rebuilding ceramics – a top priority looks likely to be achieved*

### Xaar 2002 printhead



*Source: Xaar*

Management's success in re-establishing Xaar in this market gives us comfort that it will be able to reclaim market share in other markets – most notably the wide-format graphics (WFG) market.

Given Xaar's previous leading position, the current offering's technical specification and the 10% current estimated market share, we do not regard it as unreasonable to expect that Xaar could gain 20%-30% of the ceramics market over the next 3-5 years.

The ceramics industry currently uses oil-based ink, but there is naturally a growing demand, within and outside the industry, for it to move towards a more environmentally friendly solution. Management believes that if Xaar can provide a printhead that can deliver an aqueous ink that works for specific applications within the ceramics industry, then the industry will move rapidly to adopt it – with Xaar to the fore.

### **Glass**

Xaar's ceramics customers have identified the opportunity in printing on glass. The overall market is only a fraction (approximately a tenth) of the size of the ceramics market, but we believe it makes a useful contribution to Xaar's revenues and that Xaar has a leading position in the market. An application that we see all around us is the printing of borders around vehicle windscreens, and management believes that the glass market has potential for both growth in volumes and applications.

## **Coding & Marking, and Direct to Shape (DTS)**

### **Coding and marking**

In the coding and marking market, Xaar's products are used to print such information as product IDs and 'sell by' or 'best by' dates. Alternative technologies include print and apply, thermal inkjets and continuous inkjets (see Appendix). This market is well established, relatively stable and profitable.

*Coding and marking – a robust business for Xaar*

The second new product to launch following the new management team’s arrival was the Irix, an update of the company’s longstanding workhorse 128 product. In its ‘Core’ variant the Irix provides longer inkjet throw – adding to Xaar’s competitive advantage in the product marking market.

**Irix printhead (left) and coding and marking on plastic pipe (right)**



Source: Xaar

Xaar did not lose market share in coding and marking in the same way that its share in ceramics collapsed, so the story for the new management has been one of improvement in service levels and products. We do not anticipate that Xaar’s market share will change radically over the next few years, but we do expect it to increase markedly.

**Direct to shape**

Direct to shape is a relatively new market where ink is applied directly to the product/container to produce a high-quality image rather than using a label or pad printing. Management believes that this has potential cost savings, but it is a challenging application and is some years from volume application. Engineered Printing Solutions (EPS, see below) has direct to shape printers in its roster of products.

**3D and Advanced Manufacturing**

Within 3D printing, Xaar has made some progress with its printheads for additive approaches to 3D printing, ie where the object is built up layer by layer. This approach has been overshadowed by the take-off in fused filament fabrication (ie extruding molten material from a single nozzle and moving that nozzle to build the shape). However, fused filament fabrication cannot provide products with the fine level of detail or the material strength that additive approaches can provide, so there remains significant potential for Xaar’s technologies in more-demanding applications – most notably with high viscosity fluids and new materials.

The control and precision of inkjet printing has also found uses in other niche manufacturing applications. While these have added to the reputation and technology base of Xaar, they have had limited direct impact on the top or bottom lines to date, despite flurries of management and investor interest.

Management states that Xaar’s third new printhead, the Nitrox, with its improved capabilities in ink laydown, ink viscosity and higher operating speeds, has helped improve Xaar’s position in the 3D market and should help build the company’s market share. We do not, however, anticipate that 3D is going to be a major driver of Xaar’s profits in the short term.

## Packaging and Textiles

### Packaging

Although the vast majority of the packaging market is firmly the domain of traditional printing techniques, there is a significant market for digital printheads. It is not, however, an area where Xaar has historically been able to take much market share.

Management believes that Xaar will gain significant traction in this market with the release of its aqueous printhead in late 2022. They believe that the new printhead’s ability to print high-viscosity water-based inks, ie those that do not flow easily, could be transformational in packaging and a number of other markets.

Water-based inks are cheap, and in that regard well-suited for general packaging. However, they require a significant amount of energy to dry. Xaar believes that, with higher-viscosity aqueous inks and its printheads, there could be a saving of around 50% on drying costs along with significant gains to the overall speed of the process.

With no significant history in the market, it is difficult to judge what share Xaar will be able to win. However, we would not expect Xaar to enter a market unless management believed that it had the ability to gain 20%-30% market share on a 3-5 year view. Also, management believes that the company will be addressing the market with a superior product to the incumbents in terms of speed, resolution, and product robustness. We are confident that Xaar will generate credible revenues – measured in the millions if not tens of millions. That said, those revenues will only show through in late 2024, by which time the focus could well be on the prospects of Xaar’s return to the wide-format graphics (WFG) market.

### Textiles

For textiles printing, as with labels, drop on demand technologies cannot compete on cost terms with established traditional volume printing methods. Xaar’s exposure to textile printing will remain limited to relatively low print-run applications, such as garment personalisation. That said, it is distinctly possible that profitable niches of thousands of printheads per year could develop.

## Wide-Format Graphics and Labels

### Wide-format graphics

Wide-format graphics is the printing of text and graphics on large surfaces such as posters, banners and hoardings. It was a key driver of Xaar’s growth until the late 2000s, but the market matured and Xaar lost almost all its share.

Xaar’s growth story here is based around restoring market share. The strategy is based principally around the launch of a new printhead in H1 2024, which will be the culmination of years of development work and combine the improvements seen in the other product launches alongside other significant developments. The new product will feature higher speed, resolution and, importantly, robustness.

*WFG opportunity to reclaim market share*

**Wide-format graphics applications**



Source: Xaar

Management believes that Xaar should be able to reclaim a significant proportion of the market share it once had in wide-format graphics, but until the launch of the new products its progress will be constrained. With a launch date of H1 2024, it will not be until 2026-27 that an impact will be seen on revenues. That said, there is the potential for Xaar to gain tens of millions and perhaps even over £100m of revenues if it were to replicate its historical success in this market.

**Labels**

Although a major part of the wider printing market, label printing is a relatively small market for Xaar and for digital printing. Those companies involved in thin film technologies may one day prove otherwise but drop on demand technologies are simply not economically viable compared to traditional printing techniques in most label printing applications currently.

That said, Xaar’s high-laydown and high-viscosity technologies should provide opportunities as brand owners demand more embellishments and textured labelling.

**Route to market, customer relationships and support**

Just developing and making the next generation of printheads, no matter how good their performance, is not going to be enough to ensure success. As Xaar’s history tells us, losing touch with your customer base or misunderstanding the end users’ needs or business model is a recipe for declining sales and collapsing profits.

The new management team has been very clear in its strategy: taking a revised approach to Xaar’s routes to market, setting out a very clear set of product roadmaps and creating an offering that helps customers get their products to market.

‘Build for partnerships’ is the name given by management to the revised route to market approach.

- The first step of the strategy is that Xaar will only sell printheads that it has designed, developed and manufactured itself.
- The second is that Xaar only sells products to two customer types: OEMs (original equipment manufacturers), ie the firms making the printers, and UDIs (user developer

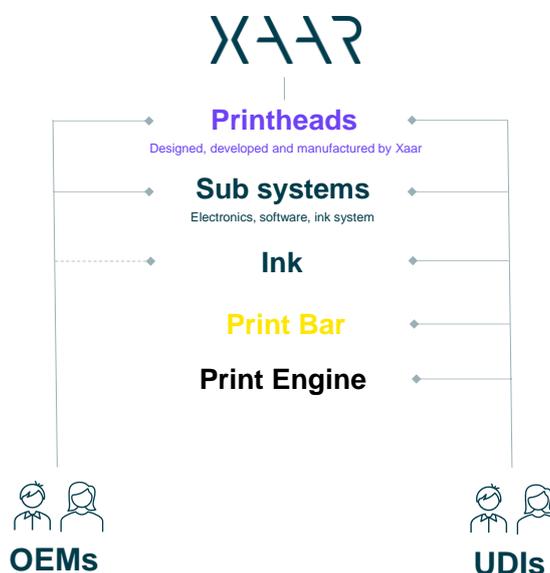
*Management addressed the route to market problems*

integrators), ie firms/consultants that are creating a device/engineering/manufacturing solution within which there is a requirement for inkjet printing.

- In addition to this, Xaar’s goal is to act as a one-stop shop for partners in the form of electronics, ink systems, printbars, integration and application support. Ink systems are the containers, pipes, electronics etc required to get the ink to the printhead. Printbars are assemblies of multiple printheads.

The first step required some work and expense with closing out legacy contracts and relationships, but has now been achieved. The second and third steps are now well established and have been built upon with acquisitions.

**Twin channel strategy to Xaar’s two customer bases**

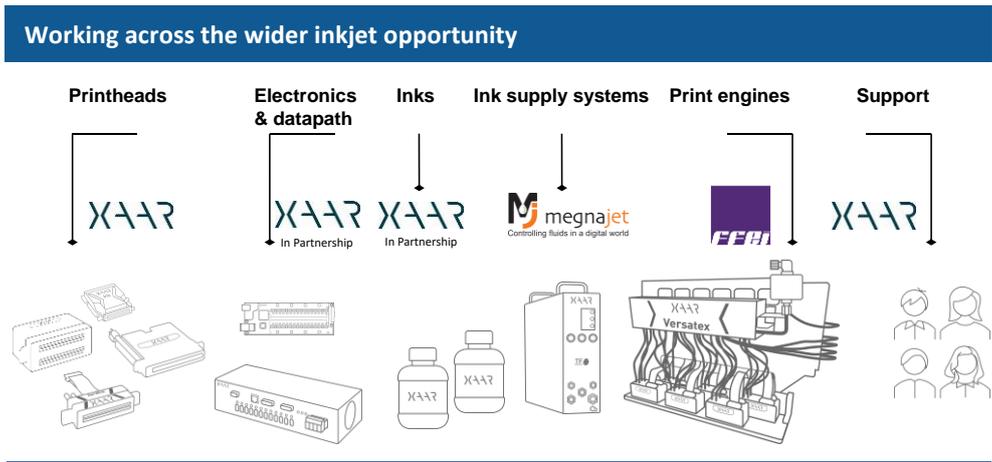


Source: Xaar

In March 2021, Xaar acquired FFEI Ltd, an integrator and manufacturer of industrial inkjet systems and life science technology based in the UK. The goal of the transaction was to help Xaar provide a better solution set for both OEMs and UDIs in their development of systems, its core skills being in ink systems and printbars. In terms of the deal, Xaar paid £3.7m upon completion with £5.4m of deferred consideration due over three years. In the year to March 2021, FFEI generated just under £10m of revenue with an operating margin of 9%.

In March 2022, Xaar increased its investment in integration and printer manufacturing through the acquisition of Megnajet Ltd and Technomation Ltd, paying £1.8m upfront and potentially £0.2m of deferred consideration for each. In their previous financial years, Megnajet and Technomation had generated profits before tax of £0.3m and £0.4m, respectively.

Making it easier for customers to use its products



Source: Xaar

It is noteworthy that these acquisitions have not been made on high earnings multiples. While we do not regard these transactions as immediately transformative for Xaar, they all add to the story of a business realigning itself with the demands of its customers and actively pushing the business towards applications where its products and skillsets have a greater competitive advantage.

Bringing these skills and services in-house and extending the way in which Xaar works with its customers also helps to speed up the customers’ times to market – thereby reducing Xaar’s own time to market and improving its own revenue visibility.

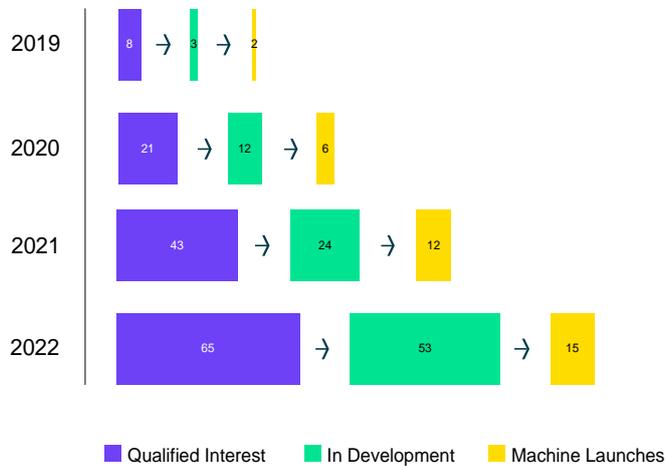
### Evidence of progress

Management’s efforts in reinvigorating the sales line have already borne fruit. In FY21, overall printhead revenues grew from £35.3m (FY20) to £40.2m (FY21). Within this, the increase in Ceramics & Glass revenues from £13.8m (FY20) to £19.2m (FY21) was particularly impressive – driven principally by rebuilding the relationships with the Chinese printer manufacturers that in large part dominate this market. The exact market backdrop is difficult to ascertain, not least because of the pandemic, but we take this as strong affirmation that Xaar is regaining some of its former market positions.

More importantly for the medium and long term is the progress made in (re)engaging with customers and in their development of new printers based incorporating Xaar printheads. Management has been quite open in its discussions of customer pipelines, and actively targets the progress in this area. It is clear from the pipeline diagram below that Xaar is making significant progress with its new approach and ImagineX products. With each new product and each year, it is evident that Xaar is talking to and working with more customers, which are in turn launching new products with Xaar’s printheads.

New products are key to building growth in new and existing markets

**Xaar customer design wins as at 31 December 2021**



Source: Xaar

That said, what we see in the customer pipeline thus far only relates to the three segments where Xaar has recently launched a new product. Given the ImagineX product pipeline, this customer development and launch pipeline could continue to grow for some years yet (see table below).

**Product roadmap**

Feature/Product	Status	Benefits
Tuned Actuator and AcuChp	Launched 2020 Available across all heads	Better uniformity, Plug and play
High Viscosity	Launched 2020 Available across all heads	Jetting new materials for new applications
High Laydown	Launched 2020 Available across all heads	5X increase in productivity
Long Throw Distance	Launched 2021 Xaar Irix	Image quality on curved media and reduced risk of printhead strike
High Frequency (48kHz)	Launched 2021 Xaar Nitrox	40% increase in speed and productivity
Aqueous Compatibility	Alpha test Beta Development	Water based conductive inks and fluids
Robust Nozzle	In development In test	Image quality maintained
High Frequency (57kHz)	In development	3 cycle firing scheme with Gen 2 ASIC
Ultra High Frequency (150+kHz)	In development	Three fold increase in speed
High Resolution	In development	Higher native resolution up to 1440dpi

Source: Xaar

No single printer manufacturer dominates any end-market segment, and no manufacturer holds significant market shares across multiple end-market segments. Our discussions with management confirm that Xaar has a good spread of interest across both manufacturers and end markets. Given Xaar’s strategy to seek to work with those printer manufacturers that have a significant position in a market, this suggests to us that Xaar should (re)gain a significant proportion of the relevant addressable markets.

*Digital printing and Xaar's technologies - helping to cut energy and materials waste*

We expect to see the new customer product in development pipeline continue to build but look forward particularly to see the progress following the aqueous product launch in late FY22. And to see whether, as we suspect, there will be interest in the aqueous product from beyond its initial target markets in packaging and textiles, driven by environmental issues.

## An ESG story

In common with most listed companies, Xaar has a defined set of ESG policies and objectives, most notably the 'net zero by 2030' target. However, the ESG story at Xaar extends beyond its own behaviour and culture to its end customers. Management believes that Xaar's products help its end users to reduce their carbon footprint and potential polluting activities in a number of ways, and that their positive impact could build significantly with the advent of new printheads.

At present, most of the inks used in Xaar's printheads fall somewhat short of the environmentalists' ideals – mainly oil or solvent based or UV cured. Xaar's management believes that using digital printing technology can reduce the amount of wasted or excess ink. Furthermore, Xaar's printheads' abilities to jet thicker ink means that they can use less solvent or carrier. Such factors can not only help end users from an environmental perspective but also from a simple financial cost standpoint.

Looking ahead, management also believes that the aqueous ink capable products should help Xaar's end users dramatically reduce the amount of energy required to dry the inks after printing. Furthermore, they anticipate that the aqueous capabilities of the company's future printheads could well enable users of oil, solvent or UV curing inks to move across to more environmentally friendly water-based inks.

## Competition

Xaar competes with a relatively small number of companies within the inkjet printhead market. While the products may do broadly the same thing, they all have differing pros and cons and are far from being direct drop-in alternatives.

Companies participating in the wider piezo inkjet printhead market include Kyocera, Seiko, Konica, Epson, Toshiba, Ricoh and Fujifilm Dimatix. Xaar's principal competitors are Fujifilm Dimatix, Seiko and Toshiba in ceramics and FujiFilm Dimatix, Seiko, Ricoh and Kyocera in wide format.

Most of Xaar's competitors are parts of far larger entities. While this does bring the risk that the larger companies might adopt aggressive strategies to win volumes or throw considerable sums at product development, over the decades that has generally not been the case. On the other hand, it has led some of them, on occasion, to have limited focus and confused strategies with regard to their inkjet printhead businesses.

The relatively established nature of the end markets gives us some faith that no new entrants will enter the market and disrupt it. The greatest threat of disruption comes perhaps from alternative technologies. Thin film technologies head the list of such technologies. However, this technology's progress has disappointed those that have invested many millions in its development, and Xaar's drive towards more demanding applications in terms of ink, viscosity and product life moves the company away from this threat.

## Engineered Printing Solutions (EPS) (23% rev FY21)

In July 2016, Xaar, under the previous management team, acquired Engineered Printing Solutions (EPS). The stated rationale for acquiring this 'leading provider of product printing equipment in North America' was that it provided access to the US markets for Xaar's printhead business, access and insight to the product printing market, and additional skills and understanding of printer OEMs.

EPS generates approximately 60% of its revenues from the sale of printers using digital inkjet printheads, mostly, but not exclusively, using Xaar supplied printheads.

### Product printed items



Source: Xaar

EPS now back on track after a bad pandemic

Xaar's management teams have attempted a variety of tactics to grow EPS's revenues and profits, including new channel relationships and trying to use it as a channel for another manufacturer's products, but the business's adjusted profit before tax has fallen consistently from the point of acquisition. Given EPS's exposure to the promotional products market, the pandemic caused significant disruption to the business, mainly through a marked reduction in demand.

However, the business has seen a change of local management and some restructuring of operations, and from H2 FY21's performance it would appear to again be moving forward, with our expectation being that it should show a return to profit in FY22.

It is difficult to see what strategic role EPS has within Xaar going forward, but it is also difficult to regard it as a major encumbrance. We see a disposal as possible in the short to medium term and to be a distinct possibility in the long term, but it is not, in our view, a material factor in a decision to invest in Xaar. That said, EPS possesses skills in printhead application and printer development that are parallel to some of those targeted in the acquisitions of FFEI, Megnajet and Technomation, so perhaps its future involves further restructuring to align with the printhead strategy.

## Risks

### Delays to regaining market share in wide format

To grow revenues in this area, Xaar needs to continue to win design-ins in new printers. While the company appears to be regaining credibility and winning design-ins, the printer manufacturers still must make the end-product sales.

### New product execution risk

As with all companies developing new products, there is a risk that these products may not come to market on time or there may be problems or delays in producing them.

### China risks

Xaar has a significant exposure to customers in China and, looking to the future, Chinese customers make up significant proportions of both the ceramics and wide-format graphics markets. As a result, Xaar is exposed to possible disruptions in China, particularly with respect to Covid and China's lockdown policies.

### Raw materials

Xaar sources its Piezo crystal materials from one source. The company holds several months of material stock to account for this. Other sources are available but transitioning to their products would require time. We believe that most of Xaar's competitors are dependent on the same Japanese supplier. It is worth noting that in 30 years of activity, Xaar has not had significant issues with supply of PZT.

### Relatively small company

Most of Xaar's competitors are parts of far larger entities. While this does bring the risk that the larger companies might adopt aggressive strategies to win volumes, it also could lead to some of them, as small cogs in vast machines, to have limited focus.

### Thin film technology

Thin film technology has not been the success within digital print that many had hoped, although it has become established in some market segments, notably those with low viscosity liquids. It does remain possible that product breakthroughs could be made in other areas. Such a set of events could cause problems for the industry, but management's strategy to focus more on higher viscosity and difficult to jet inks means it is relatively well positioned to survive this scenario.

### Acquisitions

Xaar has recently acquired three new, albeit not that large, businesses. With all such transactions there is a risk with integrating the new businesses and of overpaying. However, given that progress to date with FFEI would appear to be satisfactory and that Xaar has long-established relationships with and understanding of these businesses, we do not regard this as a significant risk factor. Furthermore, we note that there is no strategic imperative for Xaar to make acquisitions, large or small, in the short, medium or long term, and that these three transactions were undertaken on relatively low multiples.

## Forecasts and financials

### Income statement - Printheads

We are forecasting compound average revenue growth over our forecast period FY21 to FY23E of 20%. Evidently much is dependent upon Xaar's ability to maintain the building momentum of recent years with improved customer engagement and recognition, along with further relevant product launches.

Printheads are sophisticated high precision pieces of equipment that demand high gross margins. The business has what management diplomatically describe as 'significant latent capacity', with the potential to support revenues 3x higher than current figures with less than £2m of new investment. Management anticipates that they will be able to provide further details on these investments/opportunities later in the year.

We anticipate that although the company will continue to invest strongly in development the overall rise in operating costs should lag the increase in revenues significantly.

### Income statement – Product printing

We do not forecast a dramatic change of fortunes for EPS, with revenue growth of 9% in FY22 and FY23. As discussed, we do not expect EPS to be a significant driver to change in the market value of Xaar. Although we would not be surprised to see Xaar dispose of EPS or significantly restructure it at some point in the future, it is not something that we have included in our forecasts – nor, given the strength of the wider Xaar balance sheet, is it something that we see any pressing need for, either for financial or strategic reasons.

### Balance sheet and cashflow

With £25.1m net cash as at 31 Dec '21, Xaar has a strong balance sheet. It remains well invested and, as noted above, has the potential to increase its output levels significantly for a relatively small outlay. It should, however, be noted that the nature of Xaar's products, components and manufacturing process means that Xaar does hold higher inventories that might be expected from a 'traditional' IT hardware/electronics business.

The short-term working capital demands of rebuilding the sales line, and of course the acquisition spend, act as a drain on cash such that in FY22 our forecasts show year-end cash balances decline, before a rebuild in FY23.

### Acquisitions

Although Xaar has made three acquisitions in relatively quick succession, we do not see further acquisitions as necessary for the company to achieve its strategic objectives. We would expect any further acquisitions to be, like FFEI, at a relatively small scale and to have the purpose of adding skills and expertise (rather than fundamental technology) and/or market access.

### Forex

Xaar undertakes most of its trading activities in GBP, USD and EUR, with GBP being the company's main trading currency. In FY21 approximately 44% of revenues were in USD and 7% in EUR. At times, Xaar may cover forward on its foreign currency exposures and management believes that it has some natural hedging because of the spread of its revenues and operations across the world.

*Strong balance sheet and cashflow to support growth*

*Premium rating, but does it capture all the upside?*

## Valuation

From the table below it is evident that compared to some UK-listed technology hardware and high-precision engineering businesses, Xaar trades on premium multiples. This suggests to us that the market valuation recognises the potential for Xaar's revenue and profit growth to significantly outpace those of these comparators. However, as this note has hopefully made clear, it will be several years before the traction that Xaar's revised strategy is now gaining is fully reflected in the actual scale of the revenues and profit numbers.

### Xaar valuation metrics vs UK listed comparators

	Market cap £m	EV/EBITDA (x)		EV/Sales (x)		PER (x)	
		CY1E	CY2E	CY1E	CY2E	CY1E	CY2E
<b>Xaar PLC</b>	<b>153</b>	<b>31.2</b>	<b>19.2</b>	<b>2.0</b>	<b>1.8</b>	<b>160.4</b>	<b>39.5</b>
CML Microsystems Plc	71	10.2	6.9	3.0	1.8	35.0	19.7
TT electronics PLC	329	7.5	6.4	0.8	0.8	11.3	9.4
Gooch & Housego PLC	219	11.3	9.6	1.8	1.7	22.4	18.1
Renishaw PLC	2760	12.4	11.5	3.8	3.6	21.4	20.3
discoverIE Group plc	631	12.2	11.7	1.7	1.7	24.0	22.5

*Priced as at close 20 June 2022. Source: Eikon, Progressive Equity Research*

Starting from a standpoint of £40m (\$50.1m) revenues in printheads in FY21, a near \$1bn addressable market opportunity and a management team that has already shown itself able to execute, it appears that the market valuation may not have fully captured the scale of this potential outperformance.

## Management

*Strong management team*

The current management team has shown skill and resolve in dealing with Xaar's problems. Key personnel are John Mills, CEO, and Ian Tichias, CFO. John has considerable experience in board level positions, including CEO, within inkjet and early-stage technology companies. Ian has a background as a cost/pricing and operations focused finance professional within a number of major corporates. Many investors are also familiar with the non-execs, most notably Andrew Herbert, part of the highly successful management team at Domino Printing that led the company's growth for nearly two decades.

### Andrew Herbert – Chairman

Andrew has over 30 years' experience in the global digital printing industry. He is a Fellow of the Institute of Chartered Management Accountants and was Group Finance Director/Chief Financial Officer of Domino Printing Sciences plc from 1998 to 2015. He has also held a number of director roles in Operations, Planning and Business Development. He has a proven track record of leading sustained international growth across a wide range of market sectors through acquisition of technology-based businesses and creation of sales channels. He is Non Executive Chairman of Midwich Group plc.

**John Mills – Chief Executive Officer**

John joined Xaar in October 2019 following five years as CEO at Inca Digital. John started his career at Domino Printing Sciences plc as Development Scientist following a Ph.D in Physics, progressing through a number of technical roles to Director of Development, a role he held for over four years. Other roles since leaving Domino Printing include CEO at DataLase Ltd and COO at Plastic Logic Ltd.

**Ian Tichias – CFO**

Ian joined Xaar in March 2020 with over 15 years' experience in senior financial roles and a proven track record of delivering business-focused finance operations that drive efficiency and commercial performance beyond finance. Previously, Ian was Group Finance Director and Deputy CFO at Istock plc, responsible for the group's clay business. Other past roles include Senior Director, Finance & Global Pricing Lead – Europe, Africa and Middle East for Zoetis and before that, Head of Finance for Pfizer Diversified Businesses (PDB) UK.

**Chris Morgan – Non Executive Director**

Chris joined Xaar in January 2016, bringing a wealth of expertise in managing complex international technology businesses, having spent 25 years at HP, Inc. He has a strong background in global marketing, sales and general management senior executive roles including global accountability for HP's multibillion-dollar graphics/industrial portfolio of digital 2D and 3D printing businesses from 2009 to 2012. Chris has led strategic investments in key growth markets and has been involved in a number of mergers and acquisitions at both the strategic and operational levels. Chris was Chief Marketing Officer for Stratasys in 2014-2015, where he led rebranding of the company, and he served as Senior Vice President of Americas and Asia for 3D Systems, Inc. from 2016 until January 2018. Chris is currently a Non-Executive Director for San Diego based additive manufacturing company Intrepid Automation.

**Alison Littley – Senior Independent Director**

Alison joined as a Non-Executive Director in 2020. Alison has over 25 years' experience within international blue-chip organisations, including multinational manufacturing, supply chain and marketing services roles. Alison has a strong international leadership background of building effective management teams and third-party relationships gained through a variety of senior management positions in Diageo plc, Mars Inc and an Agency to HM Treasury, where she was Chief Executive Officer.

For the past nine years Alison has been a NED of both international PLCs and privately owned businesses. She is currently a NED at Norcros plc and musicMagpie plc.

## Appendix: Inkjet technologies

The term inkjet covers several distinct technologies with limited overlap between their applications. Xaar is focused upon the drop on demand technologies, but thermal inkjet and continuous inkjet approaches have also established significant shares of the industrial and commercial digital print markets.

### Drop on demand

Drop on demand inkjets work by running a continuous flow of ink through channels in a printhead and compressing this channel to squirt a droplet(s) of ink from a small hole or nozzle on the side or end of the channel. There are two main approaches to constructing the channels and changing its shape.

Historically the main solution in this market has been to make the channels out of piezo electric materials that change shape when a potential difference is applied; so-called bulk printheads.

In recent years, after many years (in tech terms) of investment, a number of companies have begun providing printheads where the channels are engineered from silicon and a tiny slither of piezo material is attached to a wall of the channel to provide the distorting or squeezing force. It is this thin film of piezo that gives these thin film products their name. However, industry progress has not been as significant as its proponents had hoped and bulk silicon remains the dominant technology.

### Bulk vs thin film technologies

Thin film technology has significant potential advantages over traditional bulk technology, but there are also a number of considerable commercial and technological challenges.

Making the core device from silicon should make it significantly cheaper. However, there are high upfront costs in terms of capital equipment and development that mean significant volumes are required for it to make sense. Some of the costs can be avoided by using outsource providers of the MEMS (microelectromechanical) technologies, but this strategy is itself not without risks.

Even though the basic material costs of thin film may be reduced compared to bulk piezo, the remainder of the componentry, packaging and testing mean that the cost saving is not as great as the basic material price differential.

Silicon devices could be faster and provide finer drop control than piezo. While the core MEMS technologies are well established, challenges remain with attaching the piezo and creating a product with an acceptable product life. In a bulk device, the piezo is moving itself to change the shape of the channel but with thin film it must distort the relatively rigid silicon structure to which it is attached. In a 'general' application the lifecycle of a thin film device is expected to be only 6-9 months, compared to several, if not many, years for a contemporary bulk device.

As noted above, thin film technology has become established in some segments of the market where the inks have low viscosity and are relatively easy to jet

Among the bulk piezo printhead suppliers, Ricoh, Dimatix, Epson, Konica and Toshiba have entered the thin film fray, where they compete with HP, Canon, Memjet and Panasonic. Despite the great promise, thus far thin film technologies have made limited commercial progress.

### **Thermal or bubble jet**

Thermal or bubble inkjet is the technology that most people will come across in their daily lives as it is the basis of most consumer inkjet printers. With this technology, the printhead heats the ink up, creating a bubble that then forces the ink out of the nozzle. Best suited to water based (aqueous) inks, it is not well suited to very high-volume applications or situations where permanent inks are required, and it has found limited traction in industrial markets due to the limited product lifetime.

### **Continuous inkjet**

Continuous inkjet technology (CIJ) works by having a continuous stream of electrically charged ink droplets pumped out of a nozzle. An electric field is used to guide the droplets either towards the object to be printed on or into a 'gutter' where the ink is reclaimed and reused. CIJ is commonly used in such applications as printing 'use by' dates and product identification data. It is very much an industrial application.

**Financial Summary: Xaar**

Year end: December (£m unless shown)

	2019	2020	2021	2022E	2023E
<b>PROFIT &amp; LOSS</b>					
Revenue	49.4	48.0	59.3	73.3	81.6
Adj EBITDA	(4.9)	0.1	3.2	5.6	8.8
Adj EBIT	(7.9)	(3.7)	0.6	1.6	4.7
Reported PBT	(10.9)	(4.3)	1.0	0.9	3.9
Fully Adj PBT	(8.0)	(3.9)	(0.6)	1.4	4.4
NOPAT	(2.9)	(3.1)	0.0	1.1	3.6
Reported EPS (p)	(18.7)	(5.7)	0.9	1.1	5.0
Fully Adj Dil EPS (p)	(15.1)	(5.2)	(0.1)	1.7	5.6
Dividend per share (p)	0.0	0.0	0.0	0.0	0.0
<b>CASH FLOW &amp; BALANCE SHEET</b>					
Operating cash flow	(13.2)	(4.3)	(2.2)	(3.4)	6.5
Free Cash flow	(9.8)	(2.8)	(2.1)	(3.4)	6.5
FCF per share (p)	(12.5)	(3.6)	(2.6)	(4.4)	8.3
Acquisitions	(0.6)	(0.6)	(1.4)	(9.6)	(6.3)
Disposals	0.0	0.0	9.2	0.0	0.0
Shares issued	0.0	0.0	0.2	0.0	0.0
Net cash flow	0.3	(4.7)	5.1	(13.0)	0.2
Overdrafts / borrowings	(4.0)	(2.6)	(9.7)	(8.7)	(7.3)
Cash & equivalents	24.8	18.0	25.1	12.0	12.2
Net (Debt)/Cash	20.8	15.4	15.3	3.3	4.9
<b>NAV AND RETURNS</b>					
Net asset value	70.3	56.2	68.8	70.2	74.6
NAV/share (p)	89.8	71.7	87.8	89.6	95.2
Net Tangible Asset Value	41.0	29.6	44.4	43.3	44.7
NTAV/share (p)	52.3	37.8	56.7	55.3	57.1
Average equity	101.1	63.2	62.5	69.5	72.4
Post-tax ROE (%)	(112.8%)	(28.0%)	17.8%	1.2%	5.3%
<b>METRICS</b>					
Revenue growth		(2.8%)	23.5%	23.7%	11.4%
Adj EBITDA growth		(101.3%)	5033.9%	76.9%	56.2%
Adj EBIT growth		(52.7%)	(115.3%)	180.6%	191.6%
Adj PBT growth		(50.8%)	(85.4%)	(337.7%)	225.7%
Adj EPS growth		(65.3%)	(98.5%)	(2267.0%)	225.7%
Dividend growth		N/A	N/A	N/A	N/A
Adj EBIT margins		(7.8%)	1.0%	2.2%	5.7%
<b>VALUATION</b>					
EV/Sales (x)	2.8	2.9	2.3	1.9	1.7
EV/EBITDA (x)	-28.3	2220.1	43.2	24.5	15.7
EV/NOPAT (x)	-47.2	-44.4	-4576.1	125.2	38.4
PER (x)	N/A	N/A	N/A	112.5	34.5
Dividend yield	N/A	N/A	N/A	N/A	N/A
FCF yield	(6.4%)	(1.8%)	(1.3%)	(2.3%)	4.2%

Source: Company information and Progressive Equity Research estimates

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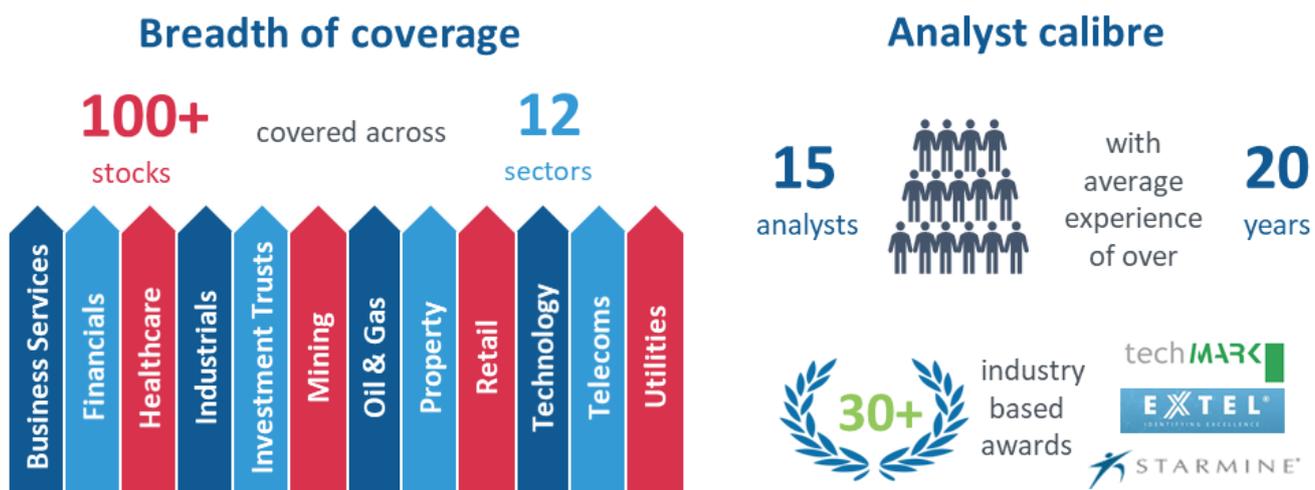
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