SURVIVAL OF THE FITTEST

Despite the effects that the Covid-19 pandemic is having on the inkjet market, Jérôme Mouly predicts a bright future for this ever-evolving technology

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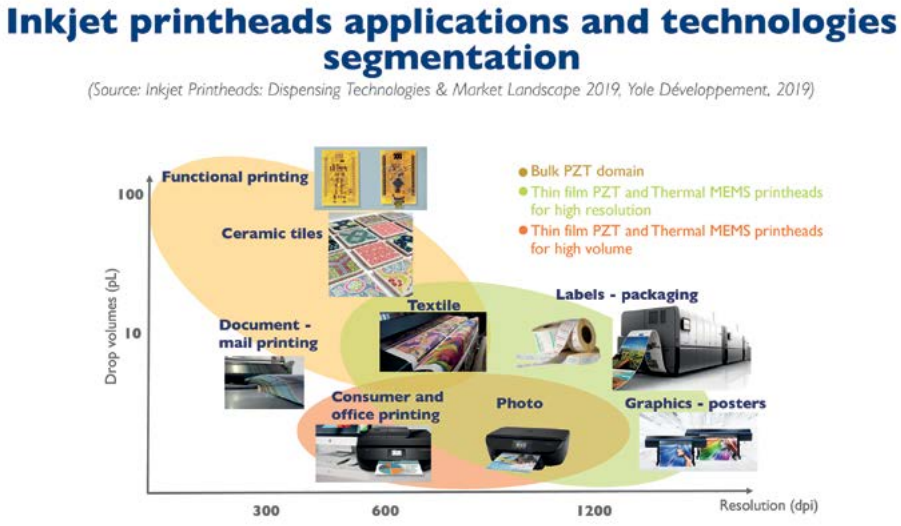

The printhead market for functional printing applications is estimated to grow more than 26% from 2018 to 2024

When the first inkjet printer was marketed in 1998 by Hewlett Packard (HP), it was surely difficult to imagine at the time that inkjet technology could print large format posters or decorate ceramic tiles, and would even be used to make electronic circuits or create three-dimensional objects.

Although now broadly mature, the inkjet printhead market continues to highlight market opportunities, meeting emerging needs in the digitalisation of the industry (Industry 4.0) and providing innovative technology solutions.

MARKET TRENDS

With a global market of US $2.7 (UK £2.1) billion revenue expected in 2024, industrial printing is fuelling printhead market growth with 10% CAGR [compound annual growth rate] over the same period. Changes in end-user needs, customisation and point-of-need requirements are motivating the industrial market, fostering digital printing with a huge interest in inkjet technology. Piezoelectric ejection printheads are dominant in industrial printing applications, with more than 85% of printhead shipments based on conventional technologies (non-MEMS [micro-electro-mechanical systems] -based printheads). On the other hand, the consumer market is expected to continue decreasing (despite a small rebound from HP in 2018, due partially to its ink loyalty program). A year on year decrease of 1.1% for consumer and office printing is forecast until 2024.[1]

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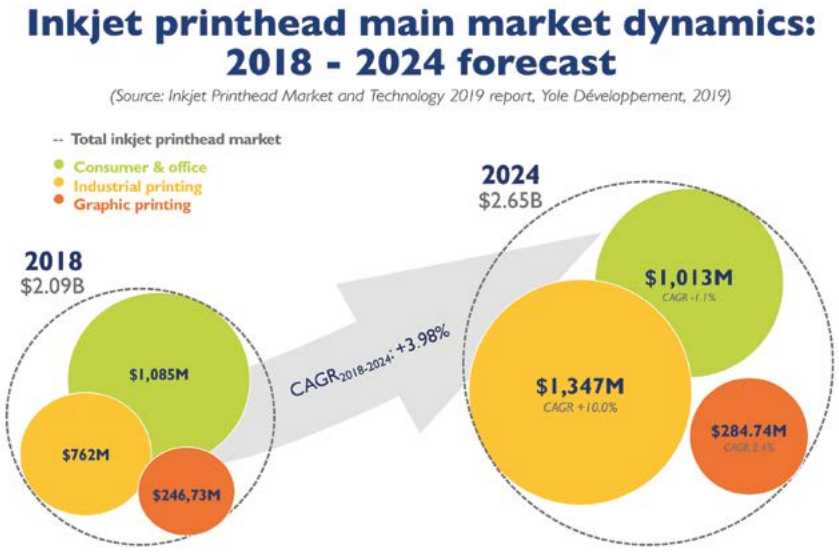

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PANDEMIC IMPACT

But today, it is impossible to talk about the market without mentioning the Covid-19 pandemic impact. Like many markets, the printing sector has been impacted by the sanitary crisis measures implemented by different governments, imposing temporary factory closures, production slowdown, delays or stoppages of international trade as well as a restriction of labour to maintain distance between people.

The effects vary depending on the application and the manufacturers of inkjet printheads. HP recorded the largest decrease in Q2 2020 with -19% YoY compared to the same quarter in 2019 for its printing activity. Moreover, revenue from commercial printers fell by a significant 31%. Japanese firms, like Canon and Epson, are also experiencing some slowdown in revenue for commercial and industrial printing with flat to mid-single digit losses in revenue for Q1 2020 and are

expecting even greater losses in Q2 2020.

The complexity of the supply chain seems to have a big impact on companies, such as HP, which have partners all over the world compared to companies integrating most activities internally and suffering less from supply slowdowns. At mid-year, we estimate that sales volumes for industrial and commercial printers are expected to have fallen by 20%. Since the resolution of the Covid-19 pandemic is still very uncertain, these figures will require an update, and Yole is following the situation closely[2].

DIGITAL BENEFITS

As seen above, the impact of the pandemic creates exceptional and even unexpected situations. Beyond the negative effects, this health crisis could greatly accelerate certain applications of inkjet technology. Indeed, as consumer printers have seen increased demand due to the growth of 'working from home', some printing applications would benefit from the digital move. For example, the mass-produced textile sector is considered to be a major polluter, given the volumes produced and shipped all over the world. The use of inkjet technology for textiles could offer an alternative to traditional textile printing, allowing production according to demand and as close as possible to the end customer. The same occurred for the emerging electronics, dispensing and 3D printing markets. In addition to the aspect of proximity to the end customer, inkjet technology allows, for example, for contactless deposits of biological liquids highly recommended for biomedical applications, as well as the application of conductive materials for circuits in 3D form which are becoming increasingly important for flexible and conformable PCB applications. In addition, additive techniques are requested more and more by customers to avoid the cost linked to waste.

Printhead market for functional printing applications is currently estimated to grow more than 26% from 2018 to 2024[3], with strong interest from industrial companies like Fujifilm Dimatix and Konica Minolta. But the inkjet functional printing industry is still in a consolidation phase with strong competition in the OLED printing display market between Kateeva, JOLED and TEL. Also, the inkjet printing industry is attracting strong interest from semiconductor equipment manufacturers with the acquisition by Süss Microtec of the Pixdro assets from Meyer Burger. PCB manufacturing, sensors on flexible substrates, and micro-optics are emerging applications for inkjet technology.

TECHNOLOGICAL ADVANCES

From a technological perspective, inkjet technology is gaining in maturity and quality, with printheads enabling the ejection of specialty inks. Functional printing applications are examples of strong demand to eject conductive or dielectric inks. This requires printheads ejecting higher viscosities and bigger size particles. The growth opportunities in industrial markets for printed electronics, display, and biodispensing are contributing substantially to technology improvement.

Two major trends have been noted for inkjet printhead design: high-resolution printing and ink recirculation. High resolution is mainly targeting improved deposition quality for applications like graphics and poster printing. It has caused most piezoelectric printhead players that serve industrial markets to think about MEMS technology, allowing silicon-based and batch manufacturing approaches.

Manufacturers are using thin-film PZT deposition to create the ejection chamber instead of a piece of bulk piezo ceramic. Fujifilm Dimatix, Ricoh, and Konica Minolta (through the acquisition of Panasonic printhead assets) are already paving the way for MEMS thin-film piezo printheads. Thin-film PZT deposition is a real challenge, one that requires considerable experience. Xaar recently experienced the challenges of thin film PZT-based printheads and preferred to discontinue development to focus on bulk PZT technology. MEMS foundries are supporting certain OEM printhead makers to subcontract this particular manufacturing step, while other players are internalising MEMS production.

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Conventional printhead makers are still innovating in this area, e.g. Kyocera improving its bulk PZT technology. It is also worth noting that new inkjet players are entering this mature market, players such as Suzhou RealFast Printing, the first Chinese inkjet printhead company with MEMS thermal inkjet printheads commercially available and currently in development for piezo printheads.

In the functional printing applications, recirculating ink printheads are a must in order to avoid clogging from inks containing large particles, as well as for single-pass printhead modules to increase productivity and lower maintenance issues. Among others, Seiko Instruments (SII) or Toshiba Tec have developed such ink recirculating printheads to address additive and functional printing applications.

It is clear that inkjet technology is not only a digital printing technology of choice, but is also now foreseen to 'manufacture' high-end products. New players in the field, the transition from printing to printheads, and new technology solutions for high quality ejection printheads allow us to say that there is no doubt about it: inkjet printheads have a very bright future, Yole's analyst will follow this evolution. ■

[1, 2, 3] Source: Inkjet printheads: dispensing technologies and market landscape report 2019, Yole Développement

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