Hybrid Software Group PLC
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Ticker (Exchange)	HYSG-EBR
Recent Price (05/11/2023)	€4.68
52-week Range	€3.50-5.54
Shares Outstanding	32.9 mm
Market Capitalization	€154 mm
Average volume	600,000
EPS (Yr. ended 12/31/2022)	€0.04
Employees	297

HYBRID SOFTWARE GROUP'S SUBSIDIARIES

HYBRID SOFTWARE	Enterprise workflow and editing solutions
GLOBAL GRAPHICS software	Software components for graphics and industrial inkjets
meteor	Industrial inkjet electronics, software, tools, and services
COLOR Logic	High end color management software
XITRON	Software and drivers for print providers and inkjet OEMs
iC3D	3D packaging design and visualization software

COMPANY DESCRIPTION

Hybrid Software Group PLC ("the Group" or "the Company") develops enterprise software and hardware solutions for industrial digital **inkjet printing†** through the operation of its subsidiaries: (1) Global Graphics Software: a developer of software components for high-speed digital printing; (2) HYBRID Software: an enterprise software developer for the label and packaging market; (3) Meteor Inkjet: a developer of industrial inkjet **printhead** driving solutions, electronics, and software; (4) Xitron: a developer of **prepress** workflow solutions; (5) ColorLogic: a developer of **color management** software technology; and (6) iC3D: a developer of 3D packaging design and visualization software. The Group's combined product portfolio has created a company unique in the industry: a single provider of all core technologies required to drive digital printing equipment. Because of this, the Group does not see itself as a holding company, but as an integrated group of six interrelated companies that allows it to leverage its offerings to the market. The Company is focused on four strategic digital printing growth markets: labels and packaging, ceramics, textiles, and **additive manufacturing** (3D printing). The Group's strategic focus is to offer **original equipment manufacturers (OEMs)**, print manufacturers, and print service providers an end-to-end integrated solution covering all the stages of a digital printing operation. The Company believes that its ability to act as a full-stack supplier offering its clients a fully integrated system that can handle the end-to-end process of a digital printing operation, including automation, **variable data printing**, and color management, translates into a competitive advantage.

KEY POINTS

- The global digital printing market was valued at $27.6 billion in 2022 and is projected to reach $42.7 billion by 2028 (Source: Prodture's Digital Printing Market, 2022).
- The Company's customers include leading press manufacturers such as Hewlett-Packard, Canon, Kodak, Epson, Ricoh, Durst, Roland, and Hymmen, among others, as well as hundreds of packaging printers and trade shops around the globe.
- The Company plans to continue to grow revenue both organically and through acquisitions, as it focuses on leveraging its subsidiaries' combined offerings to maintain its technological leadership in the digital printing market and achieve further growth.
- One key element of the Company's competitive strategy is the ability of the Group's portfolio companies to collaborate and integrate each other's products and technologies into complete solutions to meet the demand of their respective customers.
- A key project that demonstrates the potential of this collaboration effort is the development of SmartDFE™, the first product to be co-developed by all Group companies. SmartDFE is a one-provider complete software solution designed to drive a fully automated high-speed digital inkjet printing process that can be integrated into manufacturing lines.
- In 2021, despite the lingering effects of the COVID-19 pandemic, the Company was able to successfully conclude two major acquisitions, rebrand the Group to reflect its focus on digital printing software, and more than double its revenue from 2020. In Q1 2022 the Company made a further strategic acquisition.
- As of December 31, 2022, the Company's cash position was €6.3 million.

Table of Contents

Executive Overview

Hybrid Software Group PLC ("the Group" or "the Company") is a leading developer of integrated software and hardware solutions for industrial inkjet printing. The Company believes that the combined offering of its subsidiaries has created a company unique in the industry: a single provider of all core-critical technologies required to drive digital printing equipment for industrial print manufacturing.

Because of this, the Group does not see itself as a holding company, but as an integrated group of six interrelated companies that allows it to leverage its offering to the market. The Company's subsidiaries are listed below and highlighted in Figure 1:

- ColorLogic: An award-winning developer of color management software technology;
- Global Graphics Software: A leading developer of software platforms for high-speed digital printing;
- HYBRID Software: An enterprise software developer for the labels and packaging prepress value chain;
- iC3D: the industry's largest library of modelling templates for 3D packaging design, visualization, and prototyping;
- Meteor Inkjet: A provider of industrial inkjet printhead driving solutions, electronics, and software; and
- Xitron: A developer of prepress workflow solutions that drive the industry's most popular output devices.

Figure 1
SUBSIDIARIES

Source: Hybrid Software Group PLC.

The Group provides critical technology used for printing and manufacturing in an increasingly diverse range of markets, from labels and packaging, to textiles, floor tiles, laminates, wall coverings, and additive manufacturing and 3-D printing applications. This not only positions the Group as a technology leader in the industrial printing market, but also as a leading full stack supplier offering its clients a fully compatible and integrated system that can handle all the needs of a digital printing operation, including automation, variable data printing, and color matching.

The Company believes that its ability to act as single provider offering an end-to-end integrated solution encompassing the software and related products and services that meet its client's digital printing operations needs translates into a competitive advantage. Current customers include world leading press manufacturers, such as Hewlett-Packard, Canon, Kodak, Epson, Ricoh, Durst, Roland, Hymmen, and Mark Andy, among others, as well as hundreds of packaging printers, trade shops, and converters in global markets such as Europe, North and South America, and Asia.

Digital Printing

Digital printing is a method of printing a digital-based image directly to a variety of media using laser or inkjet printers. The global digital printing market size was valued at $27.6 billion in 2022, and is projected to reach $42.7 billion by 2028, behind rapid adoption of digital printing systems in the packaging and textile industries, penetration of smart factories and digital image technologies, and a surge in demand for sustainable printing techniques due to environmental concerns (Source: Prodture's *Digital Printing Market: Global Market Size, Forecast, Insights, and Competitive Landscape*, 2022).

Within digital printing, digital inkjet printing is a versatile, non-contact printing process in which different sizes and colors of ink droplets are formed and sprayed at high speeds in precise, computer-controlled patterns from tiny nozzles on a moving or stationary printhead. Because inkjet printers use real ink, they can generally create vivid and professional-quality color photos.

Software and Critical Core Technologies in Digital Printing

Unlike a traditional analog printing workflow, where graphic designs are transferred to a printing plate, in a digital workflow a **PDF** file is created by the designer, which is then submitted to the digital printing press via a **digital front end (DFE)**—the control center of the digital printing operation and a key component of the ability to achieve an integrated and automated smart printing operation.

Once a PDF file is created for printing, specialized software is used to prepare it for printing. This step might include layout, proofing, and color management tools, as well as workflow and automation software solutions that send print-ready layouts to a DFE. During the printing process, additional software in the DFE ensures high-quality output, centered around the use of **RIP (Raster Image Processing)** software, which translates (**rasterizes**) computer vector files (such as PDF, JPG, etc.) to a raster image that is composed out of a matrix of dots that the printer can understand.

The final step in the process is the actual printing. Using automation software, the printing process can benefit from digital inkjet printing advantages, allowing for on-demand printing and customization of printing jobs, in which modifications of the image (variable data) are used for each impression (which is useful in packaging for bar codes or promotional material), as well as smaller printing jobs with a quick turnaround.

Variable Data and Mass Customization

A key area for growth and increased adoption of digital printing is its unique ability to deliver variable data printing (mass customization), where elements such as text, graphics, and images may be changed from one printed piece to the next, without stopping or slowing down the printing process, using information from a database or external files. As variable data printing's capabilities continue to improve, its usage is expected to expand beyond its traditional areas like greetings cards and photobooks, into other markets where the opportunity to mass customize products represents a competitive advantage, such as flooring, 3D objects, tiles, clothing, and many more.

However, as variable printing's complexity grows to meet the demand of its new applications, so does the complexity of the software needed to achieve an efficient and automated process. Customers are looking for software solutions that provide a complete solution that can deliver mass customization, including access to the database containing the variable data information, graphic composition, and color management for the different jobs, among others. The ability of printing software components to handle variable printing could lead to expansion of digital printing in additional markets.

Hybrid Software Group's Value Proposition

The Group's strategic focus—based on the technology leadership position of each of its companies in its respective market—is to offer original equipment manufacturers (OEMs), print manufacturers, and print service providers end-to-end integrated solutions consisting of the different offerings of the Company's portfolio companies.

The Company's value proposition to OEM and printer manufacturers is to offer turnkey solutions and individual components in the areas of printhead electronics, output quality and speed, and image processing and control device, to enable them to migrate analog processes to digital. The Group's value proposition to print service providers is a complete set of software applications to maximize efficiency in production workflows in areas such as file preparation and editing, workflow automation, and rasterization and output.

The Need for Seamless Integration

Through internal development and its acquisition strategy (described on pages 37-39), the Group's combined product portfolio has created a company unique in the industry, a one-stop provider of all the critical technologies required to drive digital inkjet printing.

As digital printing operation workflows become more complex, the importance of connectivity between the different software and hardware components needed for smart printing operation and automation—the DFE, the workflow automation engine server, the color management software, and printhead technology, among others—becomes more critical. As the demand for end-to-end automation, variable data printing, and color matching capabilities continues to increase, printing operators and OEMs need to ensure that the software components and other tools and hardware used during the printing process are compatible with each other and easily integrated.

The need for full integration of all components tend to favor those companies that can offer a fully compatible system that can handle all or most of the needs of a digital printing operation. The Company believes that its ability to act as a full-stack supplier offering its clients a fully compatible system that can handle all the needs of a digital printing operation, including automation, variable data printing, and color matching, translates into a competitive advantage.

Collaboration Between the Group's Portfolio Companies—SmartDFE™

One key element of the Company's value and competitive strategy is the ability of the Group's portfolio companies to collaborate and integrate each other's products and technologies into complete solutions to meet the demand of their respective customers. Not only can different products from different portfolio companies be banded together to create a complete solution, but Global Graphics Software's Harlequin® is the foundation for other Group companies' products and offerings: HYBRID Software's CLOUDFLOW®, a workflow automation solution for the packaging industry, incorporates the Harlequin RIP processor; and Xitron's Navigator Harlequin RIP is a best-in-class implementation of the Harlequin RIP.

Collaborations between the portfolio companies have yielded many dual company product offerings, including: iC3D 3D packaging modeling technology, which is fully integrated into HYBRID Software's STEPZ® and PACKZ® offerings. In addition, compatibility with both ColorLogic's color management software technologies and Meteor Inkjet's printhead driver solutions are incorporated in integrated solutions by some of its other portfolio companies.

A key project that demonstrates the growth potential of the collaboration between the portfolio companies and underlines the Group's position as the only full stack supplier of all critical core technologies for inkjet, is the development of SmartDFE™, the first product to be co-developed by all Group companies and marketed through the Global Graphics Software subsidiary. SmartDFE is a full software and hardware stack designed to be the heart of a fully automated manufacturing system, incorporating print functionality to the fully automated smart factory.

SmartDFE offers a one-provider complete software solution to drive high-speed digital inkjet printing process, with everything from a powerful prepress workflow through to an ultra-high-speed RIP and halftone **screening** solution. It is built around Global Graphics' award-winning Harlequin Direct™ RIP technology that has been designed to drive the fastest, widest, and highest quality inkjet presses, and incorporates components from other Hybrid Software Group at each step of the process. This product is the next step in DFE design, incorporating functionalities beyond the RIP software to achieve greater automation levels through the development of digital printing software.

Hybrid Software Group's Business Segments

Through its subsidiaries, the Company offers solutions in three key unique business areas needed to achieve an efficient and automated digital printing workflow:

- Printing Software – graphic processing engines for fast and high-quality digital output.
- Enterprise Software – file preparation and workflow automation for print manufacturing.
- Printhead Solutions – electronics and software for industrial inkjet devices.

Printing Software

The Company develops software components and workflow solutions for high-speed digital printing for a wide variety of applications. Before a digital file can advance to actual printing, the image needs to be converted into data that the printer can translate into an effective print. The Company's Global Graphics Software subsidiary is one of the world's foremost developers of the graphic processing engines that are used for these tasks.

Color management is also required for high-quality output, a task which is especially difficult for digital printing where the inks supported by the printer may not be capable of exactly matching brand-specific spot colors. The Group's ColorLogic brand provides a full set of products for these demanding applications.

Enterprise Software

Under the HYBRID Software brand, the Company offers specialized production software designed for the labels and packaging industry. The Group's enterprise software products are used by more than 1,000 customers worldwide in both conventional and digital printing processes in all areas of prepress and printing, including labels and packaging, folding cartons, corrugated, and wide format. Most of these customers are end-users, companies who print labels and packaging to support brands and consumer product companies that requires specially trained employees to provide sales, support, and integration services, which is an important barrier to entry for smaller and growing companies trying to compete in this space.

Printhead Solutions

Under the brand of Meteor Inkjet, the Company develops and supplies printhead drive electronics, software, tools, and services for industrial inkjet systems and printing devices. Printheads are a critical component of an inkjet press and generally contain multiple nozzles for jetting ink or other fluids onto substrates. The Company's software and proprietary drive electronics send data to printheads inside inkjet devices to control the output produced. The Company works closely with most leading printhead vendors, including Xaar, FUJIFILM Dimatix, Kyocera, Konica Minolta, Toshiba TEC, SII, Ricoh, Epson, and Xerox, which allows the Group to identify inkjet development projects and trends.

Hybrid Software Group's Markets

The Group is active in four strategic digital printing growth markets: labels and packaging, ceramics, textiles, and 3D printing (additive manufacturing).

Labels and Packaging

The label and packaging sectors, early adopters of digital printing, accounted for more than two-thirds of the global digital printing packaging market in 2021, behind a demand for shorter runs, more customized packaging, and greater sustainability. This market requires very specialized knowledge and advanced software solutions, especially for variable data printing and serialization.

The Group companies enjoy strategic partnerships with the major players in this market and are experts in several key areas: variable data preparation and processing, color management for matching brand colors accurately, and the speed and precision required for high-volume production environments. HYBRID Software offers specialized production software designed specifically for the labels and packaging industry. Thus, the Company believes that it is well positioned to take advantage of the strong growth expected from the digital label and packaging printing market.

Ceramics

Driven by the demand for more customization, smaller lot sizes, and faster cycle times, digital printing technology is now very well established in the ceramics printing industry, with over 90% of the addressable market in most countries already converted (Source: Industrial Prints' *Unique Ceramics*, 2017). Special features needed for ceramic tile printers include recirculating printheads and ink systems to prevent the sedimentation and nozzle blocking, a common problem with the heavily pigmented ceramic inks used. Led by Meteor Inkjet, the Group's products fully implement the control functions required for such systems. Furthermore, the Group's software and electronics solutions are compatible with all the leading printheads used for ceramic tile decoration and are designed to easily support ceramics printers of any size and printing speed. The Group's business model for the ceramics market is to sell directly to the end users, the printing operations, on a usage model. One example of this is to charge a set dollar amount per printed square meter, knowing that some companies printing volume can be millions of square meters every year.

Textiles

Digital textile printing technology, which refers to the inkjet-based method that allows manufacturers to print different designs in any kind of fabric, has emerged as a new printing trend and has already started to make an impact on the textile world**.** To obtain a competitive edge and increase their market share, providers of digital technology are making significant investments in their R&D for new digital textile printing technologies. Technological advance are anticipated to create new opportunities along with the many new digital textile printers coming to market. The Group's reputation for high-speed software, color management technology, and expertise in inkjet electronics address the manufacturers' demands for turnkey solutions to drive these machines.

Additive manufacturing (3D Printing)

Inkjet 3D printing is a low-temperature, low-pressure additive manufacturing technology that involves the deposition of liquid printing materials through a small nozzle within a print head. As the printhead scans over a surface, multiple layers are built up in a layer-by-layer process. Recently, machine vision systems and artificial intelligence (AI) are broadening the applications for inkjet 3D printing, overcoming technical limitations that prevented the process from being used in production of end-use parts. Through its subsidiary Meteor Inkjet, the Group helps manufacturers harness the power of inkjet for additive manufacturing applications without the distraction of having to design electronics and software solutions in-house.

Acquisition Strategy

The Company's acquisition activities are the foundation of its goal to become the technology leader in the industrial printing market as well as the only vertically integrated supplier to the market. The Group's strategy is to acquire companies that fill a gap in its technology portfolio in order to offer its customers a full stack solution of software and critical technology needed for their industrial digital print manufacturing and production.

The Group believes that its 2021 acquisition of HYBRID Software was a critical step in shaping the Company's objective, as it broadened its focus from its traditional OEM sales channel to high-margin enterprise software for both OEMs and end users—companies who print and convert labels and packaging. And it did so while bringing a greater focus on the high-growth labels and packaging market, along with innovative products for enterprise workflow and packaging production. A list of the Company's acquisition activities is provided on pages 38-39.

Environmental Matters

The Group allocates significant importance to its environmental responsibilities and believes that driving sustainability goals throughout the business is not only the right thing to do but also makes for good business practice. In fact, the sustainability and environmental benefits of digital printing is a key driver contributing to the adoption of digital printing technologies in some of the Companies key target markets. In labels and packaging, digital printing minimizes waste and the costs of storing inventory in warehouses. In textiles, one of the world's biggest sources of water waste and pollution, digital inkjet production reduces water, energy usage, pollution, and waste compared to traditional textile printing methods, which use numerous chemicals and create a great deal of wastewater.

In terms of the Company and its subsidiary's operations, policies aimed at minimizing the Group's environmental footprint to the lowest levels possible have been implemented for several years. To enhance these efforts, in 2021 the Group partnered with Ecologi, a platform that facilitates the funding of carbon offset projects and tree planting around the world, to offset its carbon footprint. Through this partnership, the Group has been working towards compensating for the environmental footprint of every employee both at work and in their personal life.

Company Background

Hybrid Software Group PLC (formerly Global Graphics PLC) is a public limited-liability company registered in England and Wales with its shares traded on Euronext Brussels under stock code HYSG. The company was formerly known as Global Graphics PLC and changed its name to Hybrid Software Group PLC in October 2021. Hybrid Software Group PLC was founded in 1986 and is headquartered in Cambridge, the United Kingdom. The Company and its subsidiaries have 297 employees worldwide.

Milestones

Over the last 24 months, Hybrid Software Group has achieved significant milestones as it continues to solidify its position as the only full-stack supplier of all the critical core technologies needed to drive digital inkjet printing, while expanding its foothold as an industry leader. In 2021, despite the lingering effects of the COVID-19 pandemic, the Company was able to successfully complete two major acquisitions, rebrand the Group to reflect its focus on software for inkjet manufacturing, and more than double its revenue from 2020. These strong results continued in 2022, with additional acquisition activities and business growth.

Acquisitions

- ***January 2021***—Completed the acquisition of HYBRID Software Group S.à r.l., a software developer focused on enterprise software for the graphic arts industry, with a strong focus on labels and packaging.

- ***October 2021***—Completed the acquisition of ColorLogic GmbH, a leading developer of high-end color management technologies.

- ***March 2022***—Completed the acquisition of iC3D, a developer of technology for digital packaging design that allows users to design and generate asymmetric 3D models quickly.

- ***December 2022***—Completed the acquisition of the technology and intellectual property of Quadraxis, a French company that developed pioneering technology in 3D scanning and image processing.

Corporate

- ***October 2021***—Following shareholder approval, the Company changed its name from Global Graphics PLC to Hybrid Software Group PLC to better reflect the Group's position as a software company providing innovative technology for industrial print manufacturing.

- ***December 2021***—Partnered with Ecologi, the platform that facilitates the funding of carbon offset projects and tree planting around the world to offset its carbon footprint, continuing its commitment towards environmental responsibilities and sustainability.

Product News

- Developed and launched SmartDFE™, a full software and hardware stack designed to be the heart of a fully automated manufacturing system, incorporating print functionality to the fully automated smart factory. SmartDFE™, the first product to be co-developed by all Group companies, demonstrates the growth potential of future technical and commercial collaboration between the portfolio companies.

- Awarded two 2021 Pinnacle Product Awards from the U.S. industry body PRINTING United Alliance — ColorLogic for ZePrA 9 Smart Color Server, and Global Graphics Software for Direct™. The Group has been honored with six such awards in the last five years.

FUTURE MILESTONES

The Company plans to continue to execute its strategic plans to grow revenue both organically and through acquisitions, as it focuses on integrating the subsidiaries' combined offerings and leveraging the different technologies to develop better products, maintain its technological leadership in the digital printing market, and achieve further growth.

Company Leadership

MANAGEMENT

Figure 2
MANAGEMENT

Guido Van der Schueren	Executive Chairman
Mike Rottenborn	Chief Executive Officer
Joachim Van Hemelen	Chief Financial Officer
Jill Taylor	Corporate Communications Director
Neil Wylie	Operations Director
Matt Gosnell	Chief Information Officer
Christopher Graf	Chief Marketing Officer
Nick De Roeck	Chief Technology Officer
Clive Ayling	Managing Director at Meteor Inkjet
Justin Bailey	Managing Director at Global Graphics Software
Karen Crews	President of Xitron
Barbara Braun-Metz	CEO of ColorLogic

Source: Hybrid Software Group PLC.

Guido Van der Schueren, Executive Chairman

Guido Van der Schueren has been Chairman of the Board since 2014 and has close to 50 years of experience in the graphic arts industry. In 1992, he co-founded Artwork Systems and from 1996 to 2007 served as Managing Director and Chairman of the Board of Artwork Systems Group. He served as Vice Chairman of the EskoArtwork Group from June 2007 until April 2011. He runs Powergraph, an investment company mainly active in graphic arts software and technology. He is also the Chairman of Congra Software, the holding company which owns a majority stake in Hybrid Software Group PLC.

Mike Rottenborn, Chief Executive Officer

Mike Rottenborn took up the position of Chief Executive Officer in January 2020. He was formerly the President and CEO of HYBRID Software Inc., which he founded in 2007. He has spent 30 years working in the graphic arts industry and began his career as an electrical engineer with DuPont Printing & Publishing. After DuPont, Mr. Rottenborn joined PCC Artwork Systems to focus on prepress workflow software for packaging and commercial printing customers. Mr. Rottenborn received his Bachelor of Science degree in Electrical Engineering from Virginia Tech and his Master of Science degree in Computer Science from Villanova University.

Joachim Van Hemelen, Chief Financial Officer

Joachim Van Hemelen was appointed Chief Financial Officer, Company Director, and a member of the Group's executive team in September 2022. Mr. Van Hemelen has management responsibility over the firm's global finance, treasury, and corporate development functions. Prior to being appointed, he was CFO of HYBRID Software which he joined in 2015. Before this, he worked as a corporate finance advisor in an Antwerp-based family office, Portolani, and as a merger and acquisitions advisor in a Flanders-based mid-market M&A boutique. He started his professional career in 2010 as a financial auditor at BDO. Joachim earned his Master of Science in Business Administration at the Lessius Hogeschool Antwerp.

Jill Taylor, Corporate Communications Director

Jill Taylor has been with the Company since 2001. She leads the marketing communications team and works with the CFO on the Company's financial and investor relations programs. With a background in PR and marketing communications, she is responsible for external communication with journalists, industry analysts and shareholders, working with a wide range of colleagues on the company's websites, product launches, and thought leadership programs. Jill is a member of the Chartered Institute of Public Relations and has a Masters in English.

Neil Wylie, Operations Director

Neil Wylie joined Global Graphics (formerly Harlequin) in 1994. Neil currently manages all aspects of operations, including commercial, contractual, patent, and legal matters as well as HR matters and building infrastructure. Prior to joining Global Graphics, Neil was a Senior Commercial Manager working for British Telecom specializing in providing complex trading systems to stockbrokers/investment bankers in the City of London. Before joining British Telecom, Neil held various senior positions within the Philips NV Group of companies working on major worldwide mobile radio projects in both a purchasing and commercial management role. Neil has a BA (Hons) Degree in Business Studies.

Matt Gosnell, Chief Information Officer

Matt Gosnell joined the Company in 2009 and has worked in both Engineering and IT management positions until being promoted to Group Chief Information Officer in November 2021. With a background firmly in IT infrastructure and support, Matt leads and manages an agile team responsible for the continuous availability, security, and integration of technology for the operating companies within the group. Previously Matt was an onsite engineer working for a managed service provider, delivering business continuity and support to organizations in the Cambridgeshire area. Matt holds a BA degree in Photographic and Digital media from Anglia Ruskin University in Cambridge.

Christopher Graf, Chief Marketing Officer

In 1994, Christopher Graf founded PIC GmbH (Production Integration Company), which was acquired by Artwork Systems in 1998. Between 1998 and 2008, he was managing director for the German speaking territories for Artwork Systems and later EskoArtwork. Before starting HYBRID Software GmbH in September 2011, Christopher was managing director of DALIM SOFTWARE. As a partner and member of the board of HYBRID Software, he is in charge of the DACH region and Eastern Europe, with special responsibility for global business development and marketing.

Nick De Roeck, Chief Technology Officer

After graduating in computer science at the University of Ghent, Nick De Roeck started at Artwork Systems NV in 1998. In 2000, he became development manager for Artwork Systems' web-oriented products. In 2007, he founded NiXPS NV, an engineering company focused on developing software technology for the graphic arts. At NiXPS NV, he spearheaded the development of PDF technology, web-based tools and automation software for the graphic arts. NiXPS merged operations with HYBRID Software in 2013. Nick is Chief Technology Officer for HYBRID Software and for the Hybrid Software Group.

Clive Ayling, Managing Director at Meteor Inkjet

Clive Ayling was appointed Managing Director of Meteor Inkjet in Cambridge, UK in December 2016 upon Meteor's acquisition by Global Graphics. He has been a specialist in digital print and inkjet technologies for over twenty years. Together with Meteor's Director of Engineering, he co-founded Meteor in 2006 and has led its growth to being a leading company in the field of industrial inkjet electronics. Clive holds a degree in Physics from Cambridge University.

Justin Bailey, Managing Director at Global Graphics Software

Justin joined Global Graphics in 2013. He has over 25 years of experience in the document imaging and print markets. He worked for 17 years for Canon in the UK and then founded eCopy's EMEA business, which grew to represent approximately 30% of the company revenue. During this time, Justin was involved in broadening the reach of eCopy's technology platforms so that most leading brands of MFP had eCopy solutions to sell via their channel. He also was instrumental in growing the eCopy partner ecosystem. In 2009, eCopy was acquired by Nuance and Justin's responsibilities were extended to include the Equitrac, Safecom, and Copitrak imaging systems for MFPs, as well as desktop applications for OCR and PDF, and the Omnipage Development SDK.

Karen Crews, President of Xitron

Karen Crews joined Xitron as an accountant in 1986. She helped guide the company's growth as VP, Finance and Operations from 2002 through 2007 when VGI Holdings acquired Xitron from Afga. She continued in that role until 2013 when she was named President of Xitron, while also serving as VGI's Chief Financial Officer. Karen has been instrumental in driving Xitron's engineering efforts towards Digital Front End development while maintaining the company's industry-leading role as a top Harlequin RIP and workflow supplier to the commercial printing market. She joined the Global Graphics executive team when Xitron was acquired by Global Graphics in 2019.

Barbara Braun-Metz, Chief Executive Officer, ColorLogic

Barbara Braun-Metz founded ColorLogic in 2002. Barbara has many years of experience in the areas of software development, color management, printing and prepress paired with a strong background in graphic arts and print production. This enables her to develop many ideas on how to optimize color reproduction. Prior to founding ColorLogic, Barbara worked for six years for various graphic art agencies and an additional seven years as an Applications Specialist, Product Manager, Marketing Manager, and OEM Manager for Dalim GmbH, Quark Inc. and GretagMacbeth AG.

Board of Directors

The Board of Directors combines decades of industry experience with building successful technology companies. Together with the senior management teams, they work together to deliver the Group's business strategy to the highest standard.

Figure 3
BOARD OF DIRECTORS

Guido Van der Schueren	Executive Chairman
Mike Rottenborn	Chief Executive Officer
Joachim Van Hemelen	Chief Financial Officer
Clare Findlay	Non-executive Director
Luc De Vos	Non-executive Director

Source: Hybrid Software Group PLC.

Guido Van der Schueren, Executive Chairman

Biography in page 10.

Mike Rottenborn, CEO

Biography in page 10.

Joachim Van Hemelen, Chief Financial Officer

Biography in page 10.

Clare Findlay, Non-Executive Director

Clare Findlay was appointed an independent non-executive director of the Company in March 2019. Ms. Findlay was previously a non-executive director of the Company from June 2011 until 2014 and has more than 20 years of experience at senior level positions in the computer software industry, including as managing director of the UK operations of Concentrix Corporation, the global business process outsourcing division of SYNNEX. In 2013, Ms. Findlay co-founded Purple Demand, a Demand Creation Agency.

Luc De Vos, Non-Executive Director

Luc De Vos was appointed an independent non-executive director in February 2021. An engineer by training, Mr. De Vos is credited with championing the early implementations of the internet in Europe and was the founding father of the first sizeable pan-European Internet Service Provider. A notable business angel during the nineties' new media and internet boom, he was a key player in KPNQwest, Stepstone, and Starlab, to, more recently, CarsOnTheWeb (now ADESA Europe). He has also been a non-executive chairman to the first mediatech venture capital fund (Arkafund) in Belgium as well as a director to the global leasing and fleet management company Sofico, and advisor to unified threat management security provider AXS|GUARD. In all, he has worked with more than 60 companies with a strong focus on growth and corporate governance.

Intellectual Property

The Group's success is heavily dependent upon its proprietary technology. To protect its proprietary rights, the Group relies on a combination of patent, copyright, trade secrets, and trademark laws, as well as the early implementation and enforcement of non-disclosure and other contractual restrictions. As part of its confidentiality procedures, the Group enters into written non-disclosure agreements with its employees, prospective customers, OEMs, and strategic partners and takes steps to limit access to, and distribution of, its software, intellectual property, and other proprietary information. The Group's subsidiaries currently have 2322 patents granted. However, according to the Company, some of these patents can be considered legacy patents that are no longer relevant to the current business operation due to the rapid advancement of digital printing technology.

The Company believes that the technical leadership position of its subsidiaries on their respective market is a significant competitive advantage, a position that the Group seeks to maintain through continuous research and development of novel technologies, leading to new technologies and patents. These efforts continue to yield results, as seen in these recent patent activities:

(a) Global Graphics Software was granted a U.S. patent for "Methods and systems for organizing variable data documents including those with long repeat lengths" (Patent No. 11,334,303) by the U.S. Patent and Trademark Office. The patent covers how the control system of a digital printer decides which pages to send to which RIP in a RIP farm—where multiple RIPs are running simultaneously—to optimize their delivery.

The patent describes a solution to the challenge of scheduling the submission of pages from a variable data job to each RIP in a RIP farm, given the conflicting demands of wanting pages to be delivered in the order required for printing, to minimize memory requirements and the potential for stalling RIPs to wait for late-arriving pages; wanting each RIP to receive as many pages with the same re-used elements on them as possible to maximize the efficiency of variable data optimization.

(b) Global Graphics Software was granted a U.S. patent for methods to add late breaking data into PDF design files prior to print. The U.S. patent, "Methods and systems for indicating and replacing missing element(s) in print job files prior to printing" (Patent No. 11334302B1) describes how a PDF file may be delivered containing placeholders for data that is not available at the time at which that PDF was created, or not available to the person creating the PDF file. The placeholders may be specified using patterns, spot colors, or specific color values.

The method may therefore be used in a variety of use cases, including: placeholders for variable data, especially in cases where the jobs should be streamed and the full set of data is not available when the print run starts, or where the variable data is generated dynamically on the fly during printing, e.g. serial and batch numbers, expiry dates, etc.; placeholders for secure data that is only made accessible during the printing process, e.g. for security documents, ID cards, lottery, or entry tickets etc.; and placeholders for data that could be damaged if processed through a regular PDF creation and prepress workflows, such as digital watermarking.

(c) Global Graphics Software was granted a U.S. patent for "Systems and methods for printer density compensation and stability" (Patent 11,167,549) by the U.S. Patent and Trademark Office. The patent relates to the technology which underlies PrintFlat™, Global Graphics' groundbreaking software that improves uniformity and removes unwanted banding from inkjet output, enabling digital production of a wide range of products, including wide format graphics, flooring and décor, laminates, and packaging.

(d) Meteor Inkjet Ltd was granted a U.S. patent for “Inkjet nozzle status detection” (Patent 11,504,966) by the United States Patent and Trademark Office. The patent covers a system and method for determining, in real-time, the operational status of a nozzle in a piezoelectric industrial inkjet printhead. Conventional solutions to jetting issues are often sufficient for scanning printers in applications where multiple passes can mitigate the impact of nozzle failure. However, for single-pass systems running at high speed, existing inline imaging solutions are often complex and typically cost more than the print system itself. Meteor Inkjet’s invention uses real-time monitoring of electrical feedback from the nozzle to detect clogged or clogging print nozzles. This disruptive innovation has the potential to remove a significant barrier to implementation of inkjet in applications where the impact of nozzle failure makes inkjet unsuitable.

In addition, in December 2022 HYBRID Software completed the acquisition of the technology and intellectual property of Quadraxis, a French company which developed pioneering technology in 3D scanning and image processing. After Quadraxis went into receivership, HYBRID Software was the successful bidder to acquire its intellectual property from the liquidators, including software source code.

Core Story

Hybrid Software Group PLC ("the Group" or "the Company") develops enterprise software and critical technology for industrial print manufacturing. The Company is a leading developer of integrated software and hardware solutions for graphics and industrial inkjet printing.

The Group, through its operating subsidiaries, provides critical technology used for printing and manufacturing an increasingly diverse range of goods, from labels and packaging, to textiles, floor tiles, laminates, wall coverings, and even additive manufacturing and 3-D printing applications.

The Company believes that the combined offering of its subsidiaries has created a company unique in the industry: a single provider of all core technologies, both hardware and software, required to drive digital printing equipment. This not only positions the Group as a technology leader in the industrial printing market, but also as the only full stack supplier offering its clients a fully compatible and integrated system that can handle all the needs of a digital printing operation, including automation, variable data printing, and color matching. The Group's subsidiaries, shown in Figure 4, include:

Figure 4

BUSINESS SEGMENTS

Source: Hybrid Software Group PLC.

- ColorLogic: An award-winning developer of color management software technology;
- Global Graphics Software: A leading developer of software platforms for high-speed digital printing;
- HYBRID Software: An enterprise software developer for the labels and packaging prepress value chain;
- iC3D: the industry's largest library of modelling templates for 3D packaging design, visualization, and prototyping;
- Meteor Inkjet: A provider of industrial inkjet printhead driving solutions, electronics, and software; and
- Xitron: A developer of prepress workflow solutions that drive the industry's most popular output devices.

The Group does not see itself merely as a holding company, but as an integrated group of six interrelated companies that allows it to leverage its offering to the market to achieve its goal of becoming the leading supplier of all products and technology needed to power inkjet manufacturing.

The Group's strategic focus is to offer OEMs integrated solutions for their production digital presses and to provide efficient and innovative enterprise software tools for packaging production. The Company believes that its ability to offer an end-to-end integrated solution encompassing the software and related products and services needed for its clients' digital printing operations translates into a competitive advantage. Current customers include world leading press manufacturers such as HP, Canon, Kodak, Epson, Ricoh, Durst, Roland, Hymmen, and Mark Andy, among others, as well as hundreds of packaging printers, trade shops, and converters in global markets such as Europe, North and South America, and Asia.

DIGITAL PRINTING OVERVIEW

Digital printing is a method of printing a digital-based image directly to a variety of media. It usually refers to professional printing where images from digital sources are printed using **large-format** and/or high-volume laser or inkjet printers. The two most common digital printing methods include inkjet and laser printers, which deposit pigment and toner, respectively, onto substrates, such as paper, canvas, glass, metal, and marble.

Digital Inkjet Printing

Inkjet printing is a versatile, non-contact printing process in which different sizes and colors of ink droplets are formed and sprayed at high speeds in precise, computer-controlled patterns from tiny nozzles on a moving or stationary printhead. An inkjet printer works by placing tiny ink droplets onto the paper or substrate. Because inkjet printers use real ink, they can generally create vivid and professional-quality color photos. A laser printer, on the other hand, uses a laser mechanism combined with electromagnetism to create the printed end product. Basically, a laser traces the image onto an electromagnetic canvas, upon which electrically charged particles of toner attach.

One of the biggest advantages of digital inkjet printing is the ability to produce full-color, photo-quality graphics on a huge variety of materials and items. While inkjet printers do not print as quickly as laser printers, they can produce high-quality color images better than laser printers. Digital inkjet printing can be used to print a large array of products, including promotional products (including three-dimensional items like thumb drives, pens, phone and tablet covers, laptops, golf balls, etc.), fine art reproductions, product packaging and labels, fabric and textile décor, and flooring, among others. Some printers are also capable of creating unique textured 3D effects and raised printing (e.g., for creating Braille and raised lettering on ADA signage).

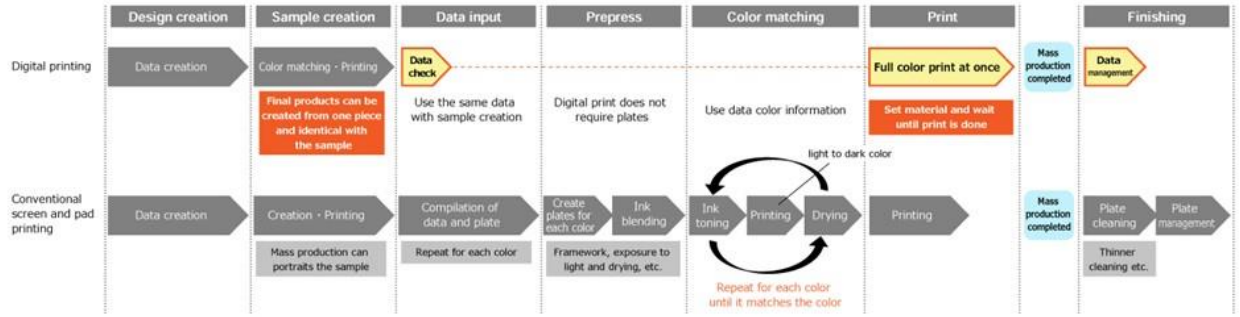
The applications of digital inkjet printing are so extensive, that many industries use inkjet printing for applications that go beyond what most people would consider conventional printing. These applications include the manufacture of products such as laminate and vinyl flooring, wall coverings and textiles, as well as electronics such as OLED displays, 3D components using additive manufacturing, and 3D objects printed "direct to shape" (commonly referred as 3D printing).

Digital vs. Analog Printing

Conventional analog printing methods, such as **lithography**, **flexography**, and **gravure**, reproduce images by creating a copy of a master or primary image. Lithography, for example, uses images on plates to transfer ink to different print substrates, effectively copying the original image (Source: Engravers Journal's *Digital Inkjet Printing: What is all the Fuzz?*). Digital printing, on the other hand, uses a digital image, eliminating the need for printing plates or screens every time the image or printing job changes. Figure 5 (page 18) provides a comparison of the workflow differences between digital and conventional printing.

Figure 5

DIGITAL VS. CONVENTIONAL PRINTING



Source: Mimaki Global.

Although digital printing normally has a higher cost per page than more traditional printing methods, this price is usually offset by avoiding the cost of all the technical steps required to make printing plates. This results in quicker turnaround time and lower cost. It also allows for on-demand printing and customization of printing jobs, in which modifications of the image used for each impression is performed. When using conventional printing methods, the smallest changes might require new printing plates and a significant pre-printing preparatory work to be redone. With digital printing, printing options (such as orientation, text, or color, among others) can be adjusted with the click of a button (Source: HP's *How does digital printing work*, 2019).

The savings in labor and the ever-increasing capability of digital presses means that digital printing is reaching the point where it can match or supersede offset printing technology's ability to produce larger print runs of several thousand sheets at a low price.

Color Matching in Digital Printing

Despite digital printing customization, turnaround, and saving advantages, a key limiter for many companies moving towards digital printing, especially when it involves packaging, labels, and art, is the fact that most digital printing processes typically involve difficulty in matching the required colors exactly.

Color matching is the process of transferring a particular color across different technologies or platforms, assuring that a color on one medium remains the same when converted to another medium. Getting the color right is an important factor in a company's branding and packaging efforts. However, getting an exact color match is challenging, especially as digital and conventional printing use different color modeling tools.

Figure 6

PANTONE

Source: Pantone.com

Most conventional printing methods use a four-color process: cyan, magenta, yellow, and black (CMYK). In theory, you can reproduce virtually any color using a combination of the four CMYK process colors. A tool that relies on these four colors that many printing operations use is the Pantone Matching System (Figure 6), pre-printed books with color swatches that relate to a specific color. Pantone colors are associated with unique CYMK values, like PANTONE P 112-13 C which has its own mix of CYMK (70.81, 19.39, 4.32, 0, respectively).

However, CMYK tends to fall short when the image or print job consists of human flesh tones or specific brand-related color shades (e.g., Coke Red, Pepsi Blue, Home Depot Orange), especially when digital printing is involved. In these cases, color matching is performed by adding more colors and printheads. Although this can achieve the objective, adding color to the mix makes the color matching process significantly more difficult. As each color is added, the complexities increase exponentially.

Color matching is perhaps the most complex element of the prepress workflow. Label and packaging web converters are losing valuable production hours and scrapping material in attempting to meet tight color targets expected by brands for their packaging material. Color matching is considered the main element in loss of productivity for printing operators, costing an average of two-and-a-half press hours per day trying to reach color targets (Source: Flexographic Technical Association's *Digital Color Matching: A Recipe for Repeatable Quality & Optimized Efficiency*).

For digital printing to result in the same level of quality as traditional printing, companies need to standardize the workflow with digital color references, measurements, and databases. This led to the creation of intelligent cloud-based software solutions that include a database of color and mixing recipes for different printing methods, ink types, and printing media.

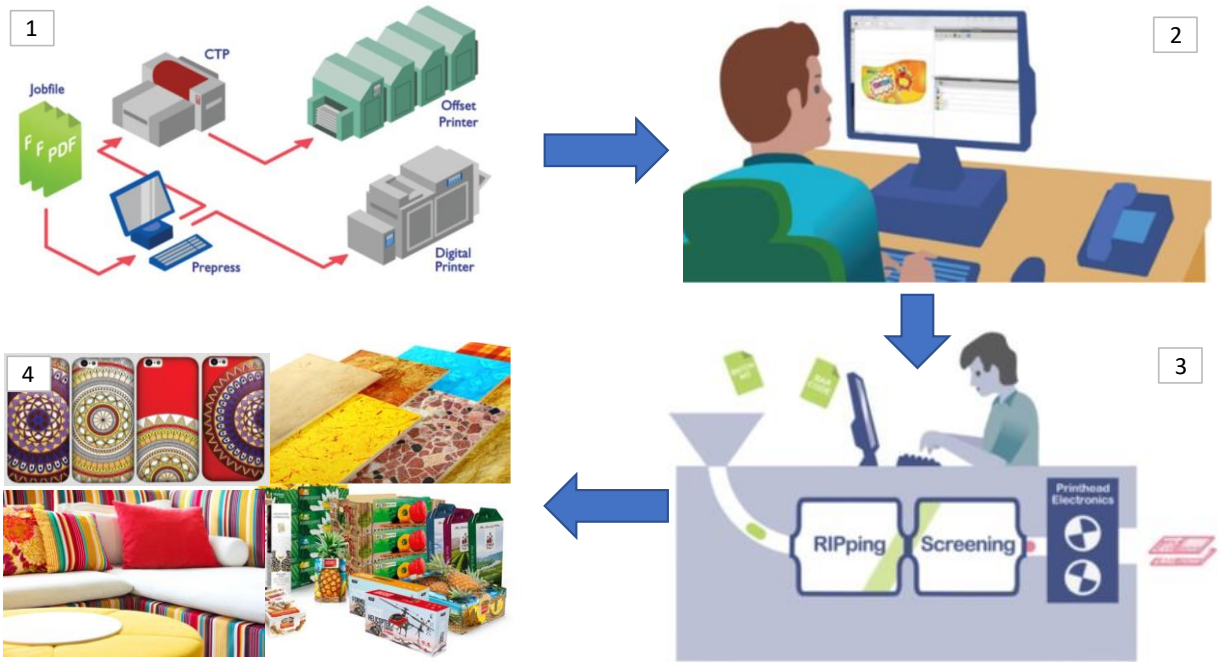
One such example are the products of ColorLogic GmbH, an award-winning German developer of color management software technology acquired by the Group in October 2021. According to the Company, ColorLogic's software solutions excel at moving brand colors into a digital platform using seven colors. This provides the Group with a strategic advantage and a key component of its strategic goal of becoming the leading single provider of all core technologies required to conduct digital printing operations.

Digital Inkjet Printing Workflow

Unlike a traditional analog printing workflow where graphic designs are transferred to a printing plate, in a digital workflow a PDF file is created by the designer which encapsulates all the data required for printing. The PDF file is submitted to the digital printing press via a digital front end (DFE), an application that manages, feeds, and monitors a digital press. An overview of a digital printing process workflow is provided in Figure 7.

Figure 7

DIGITAL PRINTING PROCESS



Source: Hybrid Software Group PLC.

PDF Preparation and Editing (Figure 7 [page 19]—2)

Specialized software is used to prepare the PDF file for printing. This may include color management to achieve specific brand colors; layout tools to ensure the most economical use of raw materials; tools to proof the artwork on screen; and enterprise software for workflow automation. The automation engine and prepress software normally sends print-ready layouts to a DFE, including layouts with variable data.

Output quality and speed (Figure 7 [page 19]—3)

Software embedded in the DFE ensures high-quality output using RIP (Raster Image Processing) software and/or screening, depending on the specifications of the printing device. RIP Software translates (rasterizes) computer vector files (InDesign, Illustrator, Photoshop, PDF, JPG, etc.) to a raster image that is composed out of a matrix of dots that the printer can understand and print. The raster image is similar to the pixels on the computer screen. The RIP software processes multiple content types for a specific print environment and communicates that processed data to the printer for final output.

The RIP is an important component in the printing process as it determines the color, screen pattern, and resolution of the printed product. The quality of the RIP software directly determines the quality of the output. RIP software ensures reliable color reproduction, saves time, and reduces waste, eliminating the need for reprints.

Printing (Figure 7 (page 19)—4)

The final step in the process is the actual printing. A digital inkjet press can print on a large variety of surfaces, such as textiles, laminates, ceramics, and packaging. In addition, using automation software, the printing process can take full advantage of digital inkjet printing advantages, allowing for on-demand printing and customization of printing jobs, in which modifications of the image are used for each impression (useful in packaging for bar codes or promotional material), as well as smaller printing jobs with quick turnaround. A key consideration for an optimal printing operation is to ensure that the automation engine server, the color management software, and the DFE server are compatible with each other, including the use of the same color database (by default, they are each installed with their own color database). This also applies to the compatibility of these software components to other tools and hardware used during the printing process.

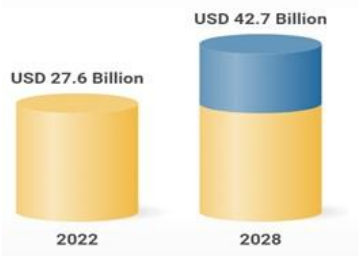
The Company believes that its ability to offer an integrated solution encompassing the software and related products and services needed for digital printing operations translates into a competitive advantage. The ability of the Group, through the offerings of its subsidiaries, to become a single provider of all core technology required to drive digital printing equipment creates a unique positioning in the market that adds value to its customers by simplifying and optimizing the digital printing process, especially if the client is transferring its operations from conventional to digital printing.

Digital Printing Market Adoption

The global digital printing market size was estimated at $27.6 billion in 2022, and is projected to reach $42.7 billion by 2028, registering a CAGR of 7.6% during that period, as seen in Figure 8 (page 21) (Source: Prodture's *Digital Printing Market: Global Market Size, Forecast, Insights, and Competitive Landscape*, 2022). Rapid adoption of digital printing systems in the packaging and textile industries, penetration of smart factories and digital image technologies, and a surge in demand for sustainable printing techniques due to environmental concerns are expected to drive the projected market growth (Source: Allied Market Research' *Digital Printing Market by Type, Ink Type and Application: Opportunity Analysis and Industry Forecast*, 2021-2028, 2021).

Over the past 20 years, the inkjet printing process has been adapted to replicate and expand the capabilities of offset, flexographic, gravure, and other conventional printing processes. The ability of digital printing to eliminate various prepress stages between files and final goods (such as the need to create printing plates), and the cost-savings and flexibility that this brings, is further fueling the growth of this technology. However, one of the key elements resulting in the adoption of these technologies over conventional printing is digital printing's ability to allow for job customization and variable data (where each print job can be altered), a capability exclusive of digital printing (Source: IMARC Group's *Digital Printing Market: Global Industry Trends, Share, Size, Growth, Opportunity and Forecast 2022-2027*, 2022)

Figure 8
DIGITAL PRINTING MARKET



Source: ResearchandMarkets.

Data and Mass Customization

The print manufacturing market is transitioning from the mass production of products (many thousands of identical products) to the mass customization of products (thousands of products and each one unique), or variable data printing. Variable data printing is a form of digital printing, including on-demand printing, in which elements such as text, graphics, and images may be changed from one printed piece to the next, without stopping or slowing down the printing process using information from a database or external files.

Digital inkjet printing is uniquely positioned to take advantage of this change as it can go beyond simply reproducing the same design repeatedly, and is capable of changing what is printed in real time on every object, making every item different even in a short run. Digital printing allows for variable data printing to be used at different points in the production process, for instance during product decoration, packaging, and/or labelling. Variable data printing can be considered a direct outgrowth of digital printing, which harnesses computer databases and digital print devices with highly effective software to expand the applications of printing technology.

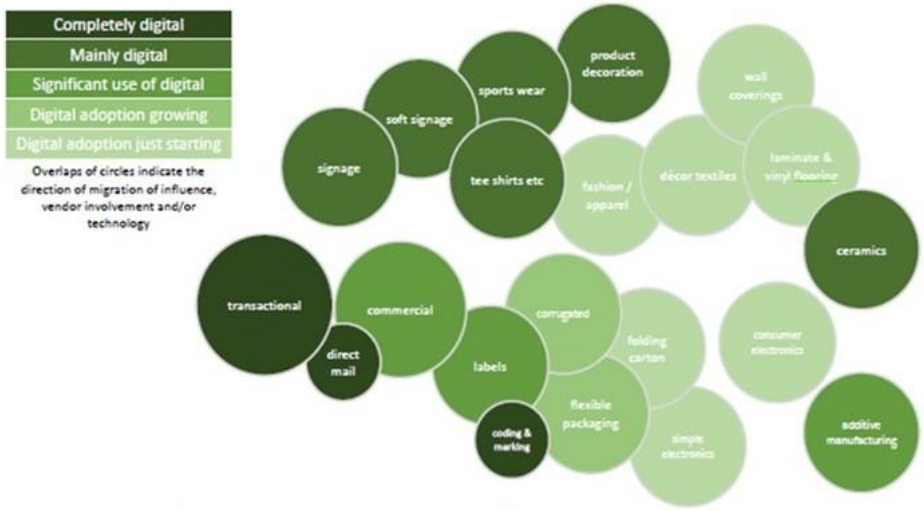
There are several levels of variable printing. At the most basic level, variable printing allows for name customization, whether it is for a coupon, mailer, or label. The next level is adding custom copy and imagery, tailoring the message to each customer based on the collected data. The most advanced form is able to produce fully customized pieces, where anything can be changed, from the design of the print (colors, layout) to the images and text. All variable data printing begins with a basic design that defines static elements and variable fields for the pieces to be printed. While the static elements appear exactly the same on each piece, the variable fields are filled in with text or image as dictated by a set of application and style rules and the information contained in the database.

Applications of variable data printing started with billing, direct mailing, and promotional printing applications, allowing companies to create customized marketing campaigns using print products to engage with customers more precisely. However, it is now used far more widely, across multiple industries. For example, in packaging for pharmaceuticals and for premium goods, such as spirits, wine, and beauty products, the use of unique marks on every item in support of track and trace and anti-counterfeit has become a normal part of the workflow. Similar track and trace efforts are appearing in a variety of markets that are perhaps surprising, from books to wallcoverings, where they can be useful in identifying and preventing abuses of distribution systems, and in supporting safety recalls.

Inkjet Digital Printing Adoption by Segment

The use and reach of inkjet digital printing has increased massively over the last few years. While it is still an emerging technology in some industries, it is maturing and evolving further in others. Digital printing initially expanded from billing and transactional print into direct mail, then into books, and labels, and even into folding cartons and flexible packaging. At the same time, the wide format market has grown primarily on digital, from signage to soft signage and into sportswear and product decoration. Digital printing and deposition, almost exclusively inkjet of various forms, has also found applications into some industrial markets, most obviously ceramics, but also into fashion and décor textiles, wall coverings, laminate, and vinyl flooring, and some parts of the electronics market (Source: Global Graphic Software's *Software Considerations for Inkjet in The Smart Factory*). Figure 9 illustrates the adoption of inkjet digital printing by market/industry.

Figure 9
DIGITAL PRINTING ADOPTION BY INDUSTRY



Source: Hybrid Software Group PLC.

As the use of inkjet digital printing spreads across multiple industries, its adoption into other markets also accelerates, with each market learning from the experience of those where it is already established. Ideas, technologies, and even vendors have learned and expanded from those applications that were first to market. Through the expanded applications of digital printing, vendors who would have traditionally been regarded as office printer suppliers, such as Hewlett-Packard, Ricoh, and EFI, have become major players in multiple industries, from commercial print to labels and packaging, and into some industrial sectors. such as wallcoverings and textiles. This sharing of ideas and technology from industry to industry means that manufacturers, converters, and printers should be watching what is happening in other industries using inkjet because often an innovation in one space may prove effective and profitable in another space.

In some segments, especially labels and packaging, the migration of analog printing to digital has been slowed by the challenge of matching critical brand colors, a process normally achieved in traditional printing processes by using specially mixed inks, something that is not possible with digital inkjet printers. However, advances in color management software technology can be considered a solution to this problem. Once the color matching issues are resolved, adoption of digital printing solutions across the textile and packaging sectors is expected to expand significantly due to this industry's requirement for ultraviolet (UV) radiations cured ink, high-quality graphics, detail, and clarity printing machines with reduced operational costs (Source: IMARC Group's *Digital Printing Market: Global Industry Trends, Share, Size, Growth, Opportunity and Forecast 2022-2027*, 2022).

The Company's acquisition of ColorLogic in October 2021 is a clear example of how the Group plans to take advantage of the digital printing market dynamics through its acquisition strategy. The integration of ColorLogic into the Company's operations not only strengthens its strategic goal of becoming the leading single provider of all digital printing core technologies, but also enables it to increase its market share within the digital inkjet market.

One of the first markets to fully embrace digital printing following its expansion outside the initial billing and advertising use was the ceramics industry. Once inkjet devices achieved a number of threshold requirements, adoption in the ceramic market was extremely rapid. Since digital printing is a non-contact technology, it puts less physical pressure on the tiles being printed. As a result, tiles may be made thinner, reducing costs for materials, manufacturing, and shipping. The use of digital printing in the ceramics market has introduced a number of additional opportunities, including:

• The ability to randomize the imagery on each tile so that they all look different when applied to a wall or floor;

• The ability to produce larger single tiles without excessive weight; and

• The removal of limitations on repeat lengths.

The setup cost for rotary screen print, widely used for ceramics before digital, can also be extremely high, which means that it would normally only be used for very long runs. Storage of screens between production runs also carries risks and costs.

The adoption of digital inkjet technologies into different markets fuels its growth into other industries. The same advantages that drove the adoption of digital technology into the ceramic markets are expected to be seen in several parts of the textile printing market, mainly around reductions in water and power usage. As digital printing software and hardware technology improves, solving specific issues within each industry, these solutions can be integrated into other markets. For example, the consumer electronic industry could take advantage of certain benefits of digital inkjet technology, including reduced wastage of materials and reduced risk of contamination by dust or stray particles, for the printing of OLED displays. These factors can also be applied to the automotive industry. As such, the use of digital printing technology in automotive and consumer electronic industries is expected to provide lucrative opportunities for the global digital printing industry (Source: Allied Market Research' *Digital Printing Market by Type, Ink Type and Application: Opportunity Analysis and Industry Forecast*, 2021-2028, 2021).

SOFTWARE AND CRITICAL CORE TECHNOLOGIES IN DIGITAL PRINTING

The advent of new digital printing technologies brings new challenges in the way print operators handle workflow, as previous prepress methods lack the automations levels needed for modern digital printing. Many environments in which inkjet is used have benefited from the adoption of computers and automation. Going forward, to maximize the potential uses and applications of digital inkjet printing systems, there is a push for greater automation levels that allow to maximize productivity, minimize errors, and respond as quickly as possible to changing circumstances.

This fully automated vision for production is based on the advent of **Industry 4.0** (also known as the fourth industrial revolution), a term for fully automated production, where equipment performing different processes are interconnected and share information. For digital inkjet printing, this includes the use of interconnected smart machines, cloud computing, artificial intelligence (AI), and robotics, aimed at delivering "Smart Factories" designed to autonomously run the entire production process, including the print subsystems. The smart factories self-optimize, self-adapt, and learn from new conditions in real time, allowing them to optimize the printing production process.

However, adding smart factories to a print operation requires new strategies involving the software and hardware components. From a software standpoint, the creation of smart and automated printing operations requires digital printing software, containing graphic processing engines for fast and high-quality digital output, as well as enterprise software solutions, to manage file preparation and workflow automation. From a hardware standpoint, a smart printing operation requires electronics and software for industrial inkjet devices (such as printheads), as well as the ability to integrate printhead technology and other printing equipment to the required software for a completely hands-free automated workflow.

In all of these cases, the inkjet unit must be connected to the factory management systems so that the appropriate requests can be submitted to the unit and so that any problems can be automatically adjusted. As an example, a problem in ink-jetting on ceramic tiles might require kiln temperatures or speed to be altered, or defective tiles to be diverted out of the manufacturing process. This means that different software and hardware solutions need to be seamlessly integrated into factory-wide systems to achieve a connected fully automated ecosystem.

Digital Front End (DFE)

A key component in the ability to achieve an integrated and automated smart printing operation is the digital front end (DFE)—the control center containing the software required for digital printer operations. The DFE is the main workflow touchpoint that accepts a print file, commonly a PDF, and turns that file into a format that the print engine needs to print. The DFE used to consist mainly of the Raster Image Processor (RIP), but with the increased demands stemming from automated and smart printing operations, many DFEs have expanded their role to become the heart of an efficient, automated workflow.

A RIP software translates (rasterizes) computer vector files (e.g., Photoshop, PDF, JPG, etc.) to a raster image that is composed out of a matrix of dots that the printer can understand and print. While the RIP is a key element of the DFE, modern DFEs that support complex devices often have expanded functionality, with some DFEs functioning as prepress devices where adjustments can be made to color, ink load, and other image handling activities. Modern DFEs normally include advanced color management tools and the ability to handle variable data.

In any print operation more complex than a simple coding and marking system, the DFE performs multiple processes, including:

- provides a user interface to allow the machine operator to configure the system correctly and to track status and progress of jobs and of the machine itself;.
- reception of submitted jobs and analysis and transforming the job into a raster format at the correct resolution for delivery through the inkjet heads;
- color management and calibration to convert the job into the correct color space for the inks being used in such a way that process colors are reproduced accurately;
- optimization of output quality by applying the correct screening and bit depth for the ink, inkjet heads, and substrate in use, and by compensating for uneven tonality across one or more inkjet heads; and
- connectivity and communication with other workflow components, both other processors and management systems.

Almost all these steps are usually performed using software, partly because some of them (such as rendering PDF files to raster) are far too complex for other approaches. The software is also much more adaptable and can be updated relatively easily to respond to new requirements. The DFE is therefore a critical component of the inkjet unit when it comes to delivering increases in speed, efficiency, and quality. It is also key for at least some examples of doing things differently, especially in enabling the system to process shorter run lengths, variable data, and mass customization.

The Use of Printing Software for Variable Data Printing

A key area for growth and increased adoption of digital printing is its unique ability to deliver variable data printing (mass customization), where elements such as text, graphics, and images may be changed from one printed piece to the next, without stopping or slowing down the printing process, using information from a database or external files. As variable data printing's capabilities continue to improve, its usage is expected to expand beyond its traditional areas like greetings cards and photobooks, into other markets where the opportunity to mass customize products represent a competitive advantage, such as flooring, 3D objects, tiles, clothing, and many more.

However, as variable printing's complexity grows to meet its new applications so does the complexity of the software needed to achieve an efficient and automated process. Customers are looking for DFEs that provide a complete solution that can deliver mass customization, including access to the database containing the variable data information, graphic composition, and color management for the different jobs, among others. The ability of a printing software component to handle variable printing could lead to expansion of digital printing in additional markets, where these new applications may include:

- the use of unique marks on every unit for pharmaceutical and premium goods, such as spirits, wine, and beauty products, has become a normal part of the workflow as it provides track and trace and anti-counterfeit applications (Figure 10).

Figure 10
VARIABLE DATA PRINTING

Source: Hybrid Software Group PLC.

- for natural-looking designs, which are used for ceramic tiles, vinyl tiles, and laminate flooring, it is better if there is no obviously repeated pattern when they are applied to a wall or floor, as that breaks the illusion of naturalness. In this case, a very large design is created, much larger than an individual tile. A window the size of one tile can then be randomly selected from that design and imaged onto one tile.

The Need for Seamless Integration

As printing operation workflows become more complex, the importance of connectivity between the different software and hardware components needed for smart printing operation and automation—the DFE, graphic and color processing engines, the automation engine server, the color management software, and printhead technology, among others—becomes more critical. In addition, the printing components need to be connected to the factory management systems to achieve full automation.

Printing operations shifting from conventional to digital printing need to ensure that the software components and other tools and hardware being used during the printing process are compatible with each other and easily integrated. Achieving this provides all the benefits of digital printing, including flexibility, efficiency, versatility, minimal set-up, end-to-end automation, fast turnaround, short and long runs, print-to-kit, and elite color matching capabilities.

The need for full integration of all components tends to favor those companies that can offer a fully compatible system that can handle all or most of the needs of a digital printing operation. As a single provider of all core technologies needed to achieve smart printing capabilities, the Company believes that is uniquely positioned to take advantage of the digital printing market growth.

HYBRID SOFTWARE GROUP VALUE PROPOSITION

Through internal development and its acquisition strategy (described on pages 37-39), the Group's combined product portfolio (highlighted in Figure 11), has created a company unique in the industry, a one-stop provider of all the critical technologies required for digital inkjet printing. Because of this, the Group does not see itself as a holding company, but as an integrated group of six interrelated companies that allows it to leverage its offering to the market.

Figure 11
KEY PRODUCTS

Company	Product	Description
Global Graphics Software	Harlequin	Raster Image Processor (RIP)
	Screnpro	Screening engine converts continuous tone data into ready-to-print halftone data
	SmartDFE	Complete solution for automated and smart printing
HYBRID Software	Stepz	PDF editor for digital printing applications
	Packz	PDF editor for digital and analog printing applications
	Cloudflow	Modular workflow suite
Meteor Inkjet	Electronics	For all major industrial printheads
	Software	Application-specific DFEs
	Tools	DropWatcher analysis and tunes ink drops in flight
Xitron	Navigator	Harlequin-based Rip and workflow
	Variagator	Variable data printing manager
	Sierra Adobe	Adobe-based workflow solution
ColorLogic	ColorAnt	measurement data optimization
	CoPrA	color profiling
	ZePrA	smart color server
iC3D	Real-time all-in-one package design software to generate live 3D virtual mockups on-the-fly.	

Source: Hybrid Software Group PLC.

The Company believes that its ability to offer all the software and related products and services needed for its clients' digital printing operation needs translates into a competitive advantage, as it facilitates a seamless transition from conventional to digital printing. As the demand for end-to-end automation, variable data printing, and color matching capabilities continues to increase, printing operators shifting from conventional to digital printing, or even those already performing digital printing but wanting to expand its capabilities or efficiency, need to ensure that the software components and other tools used during the printing process are compatible with each other and easily integrated.

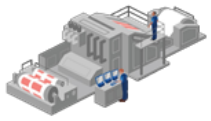
The Company is uniquely positioned to take advantage of the increasing need for full integration of all components, as it can offer all the critical core technologies needed to achieve smart printing capabilities, providing its customers a fully compatible system that can handle all the needs of a digital printing operation.

Offers to OEM and Print Service Providers

The Group's strategic focus—based on the technology leadership position of each of its companies in its respective market—is to offer OEMs and print service providers integrated solutions consisting of the different offerings of the Company's portfolio companies.

The Company's value proposition to OEM and printer manufacturers is to offer turnkey solutions and individual components in the areas of printhead electronics, output quality and speed, and image processing and control device, to enable them to migrate analog processes to digital. Figure 12 illustrates the Group's value proposition to OEMs, with a sample of the portfolio companies and specific products involved in each area of interest.

Figure 12
OEM VALUE PROPOSITION

PRINTHEAD ELECTRONICS	OUTPUT QUALITY AND SPEED		IMAGE PROCESSING AND DEVICE CONTROL	
meteor 	GLOBAL GRAPHICS software	COLOR Logic	GLOBAL GRAPHICS software	COLOR Logic
	PrintFlat ScreenPro	ColorAnt CoPA	DIRECT SmartDFE HARLEQUIN Fundamentals	ZePrA

Source: Hybrid Software Group PLC.

The Group's value proposition to print service providers is a complete set of software applications to maximize efficiency in production workflows, in areas such as file preparation and editing, workflow automation, and rasterization and output. Figure 13 illustrates the Group's value proposition to print service providers with a sample of the portfolio companies and specific products involved in each area of interest.

Figure 13
PRINT SERVICE PROVIDERS VALUE PROPOSITION

FILE PREPARATION AND EDITING		WORKFLOW AUTOMATION		RASTERIZATION AND OUTPUT
HYBRID SOFTWARE	COLOR Logic	HYBRID SOFTWARE	COLOR Logic	XITRON 
PACKZ STEPZ	ColorAnt CoPA	CLOUDFLOW	ZePrA	

Source: Hybrid Software Group PLC.

SMART DFE—Collaboration Between the Group's Portfolio Companies

One key element of the Company's value offerings and competitive strategy is the ability of the Group's portfolio companies to collaborate and integrate each other's products and technologies into complete solutions to meet the demand of their respective customers. Not only can different products from different portfolio companies be incorporated to create a complete solution, but Global Graphics Software's products like Mako™ and Harlequin® also form the foundation for other Group companies' products and offerings.

Collaborations between the portfolio companies have yielded many dual company product offerings, including: HYBRID Software's CLOUDFLOW®, a modular production workflow suite for workflow automation in the packaging industry, which incorporates Global Graphics Software's Harlequin® RIP processor; Xitron's Navigator Harlequin RIP, which is a best-in-class implementation of the same Harlequin RIP technology; and iC3D 3D packaging modeling technology, which is fully integrated into HYBRID Software's PACKZ® offerings. In addition, compatibility with both ColorLogic's color management software technologies and Meteor Inkjet's printhead driver solutions are incorporated into integrated solutions by some of its other portfolio companies.

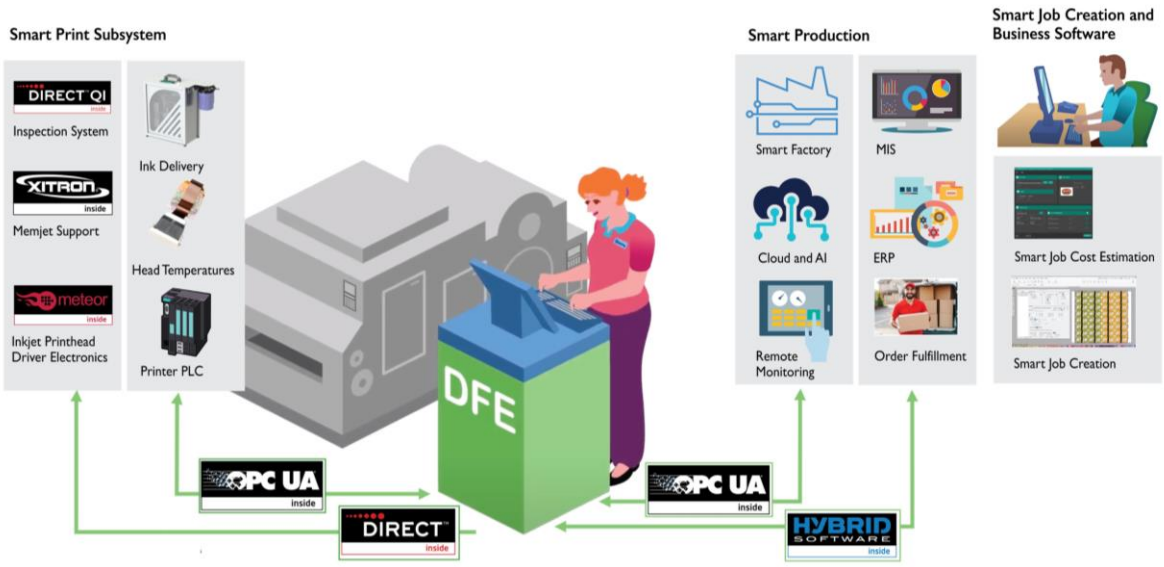
A key project that demonstrates the growth potential of future technical and commercial collaborations between the portfolio companies and underlines the Group's position as the only full stack supplier of all critical core technologies for inkjet, is the development of SmartDFE™. The first product to be co-developed by all Group companies, SmartDFE is a full software stack designed to be the heart of a fully automated manufacturing system, incorporating print functionality to the fully automated smart factory.

SmartDFE provides everything needed to add print to an industrial production environment and is designed to be part of a fully automated manufacturing solution, supporting Industry 4.0 telematics and MIS integration, and includes connectivity with automated manufacturing lines. SmartDFE brings together the creation of optimized print-ready PDF files, workflow and job automation to connect with enterprise IT systems, RIPping, screening, and optimized image quality. It meets the need for fully variable data, gives complete control of the print workflow, and provides valuable information for quality assurance and inspection, press maintenance, and stock control. Its Smart Media Manager™ tunes the press for optimum print quality through the generation of smart media definitions, including color profiles for specific ink types and media using technology from ColorLogic.

During the development of SmartDFE, the Group of companies targeted three key components and requirements so that its final product could be easily integrated into the overall workflow of its customers, relying on tight, high-speed integration, communication, and control between components from the job creation all the way to the printheads: (1) Smart business and job creation software; (2) Smart integration with the production systems and components; and (3) Smart direct print subsystems with real time streaming of data to heads and inspection systems. The different portfolio companies pooled their resources and technical expertise to collectively solve each requirement. Figure 14 illustrates some of the different components that were integrated to perform the required functions in each area of interest.

Figure 14

SMART DFE COLLABORATION



Source: Global Graphics Software.

SMARTDFE Offerings

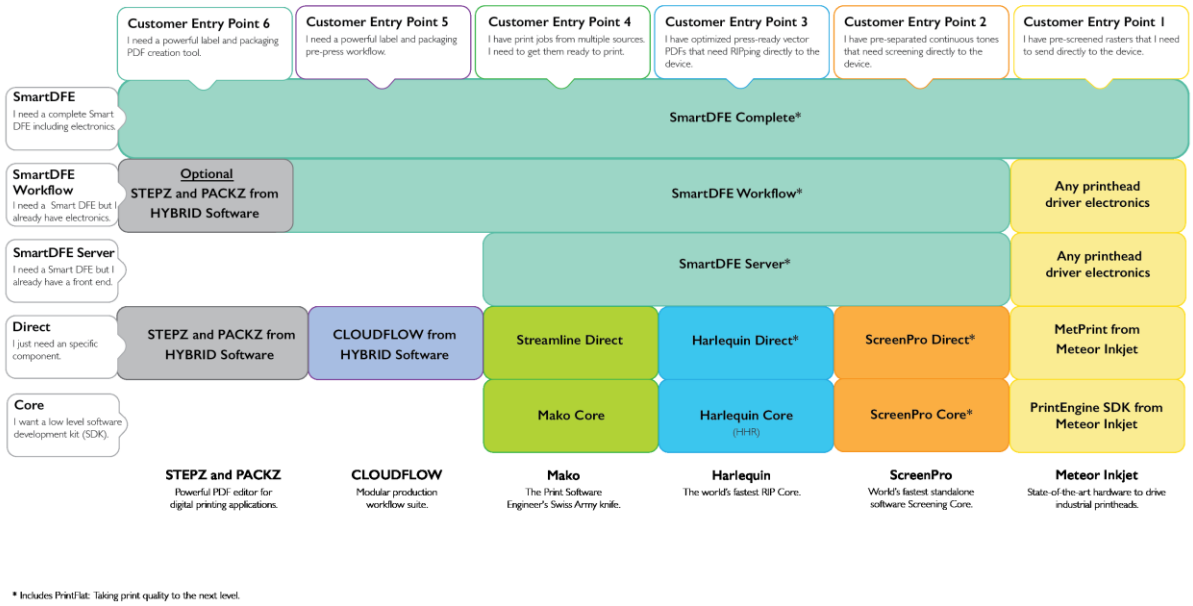
SmartDFE offers a one-provider complete software solution to drive high-speed digital inkjet printing process, with everything from a powerful prepress workflow to an ultra-high-speed RIP and halftone screening solution. It is built around Global Graphics' award-winning Harlequin Direct™ RIP technology that has been designed to drive the fastest, widest, and highest quality inkjet presses, and incorporates components from other Hybrid Software Group companies at each step of the process.

Global Graphics offers a complete solution—SmartDFE Complete—which incorporates HYBRID Software's prepress and workflow automation solutions, Global Graphics' Harlequin-centric offerings, Xitron's Navigator DFE platform, as well as support for Meteor Inkjet's industry-leading printhead electronics and software. The complete solution brings together the creation of optimized print-ready PDF files; workflow and job automation to connect with enterprise IT systems; RIPping; screening; optimized image quality; and, via Harlequin Direct™, it drives the print

data directly to the printheads at high speeds through Meteor software and electronics, or through Xitron's Navigator DFE platform.

To facilitate integration with existing printing operations, which might use non-Meteor printhead drive electronics or other prepress solutions, Global Graphics also offers SmartDFE Workflow, with the same capabilities of SmartDFE Complete but which integrates with third party printhead drive electronics; as well as SmartDFE Server, eliminating the prepress and workflow components. Figure 15 provides a description of SmartDFE offering packages, as well as an illustration at the bottom of the products included in each option.

Figure 15
SMART DFE



Source: Global Graphics Software.

HYBRID SOFTWARE GROUP BUSINESS SEGMENTS

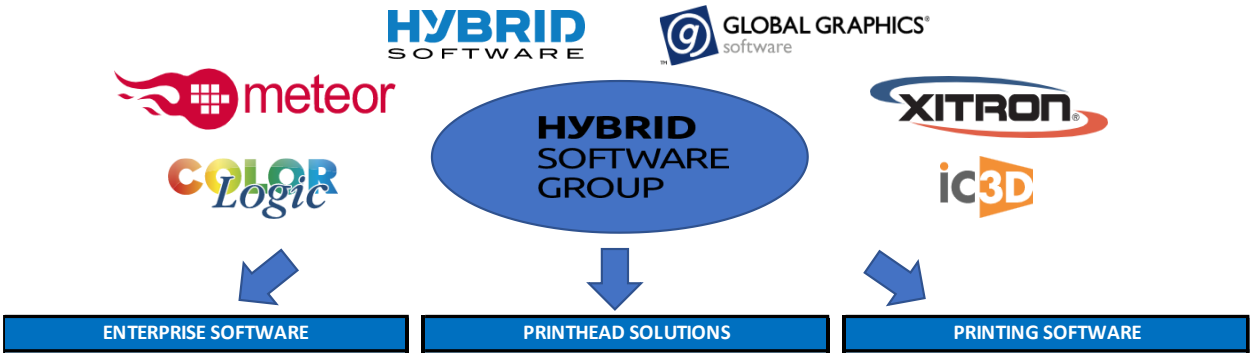
Through the offering of its subsidiaries, the Company provides solutions within three key different business areas needed to achieve an efficient and automated digital printing workflow (Figure 16 [page 30]):

- Printing Software – graphic processing engines for fast and high-quality digital output.
- Enterprise Software – file preparation and workflow automation for print manufacturing.
- Printhead Solutions – electronics and software for industrial inkjet devices.

Printing Software

Before graphic designs can be printed or displayed on a monitor, they must be broken down into vector data (mathematical drawing algorithms), raster data (image pixels), and/or screened data (calibrated areas of ink or pigment representing image data). The Company's Global Graphics Software brand is one of the world's foremost developers of the graphic processing engines that are used for these tasks.

Figure 16
BUSINESS SEGMENTS



Source: Hybrid Software Group PLC.

Color management is also required for high-quality output, a task which is especially difficult for digital printing where the inks supported by the printer may not be capable of exactly matching brand-specific spot colors used for packaging and corporate branding. The Group's recently acquired ColorLogic brand provides a full set of products for these demanding applications, as well as a Software Development Kit (SDK), which allows OEMs to produce their own customized color management tools.

The Company develops software components and workflow solutions for high-speed digital printing of a wide variety of applications, such as photo books, labels, packaging, interior décor, textiles, and ceramics. The Company's combination of software and first-rate engineering skills enables it to help press manufacturers respond to technical challenges with innovation, meeting their speed and quality requirements, adding value to their products, and getting them to market quickly.

Customers

Customers include group companies HYBRID Software, Meteor Inkjet, and Xitron, plus OEMs such as Hewlett Packard, Mimaki, Mutoh, Canon, Durst, Roland, Agfa, Kodak, Kirk-Rudy, Postmark, Ryobi, Mitsubishi, Memjet, Presstek, Printware and Neopost, as well as many others who embed the Company's printing software solutions into their own branded Digital Front Ends (DFEs).

Key Products

Global Graphics Software

- ***Harlequin Core***: Harlequin Core is a Raster Image Processor (RIP) that results in a high-quality process without sacrificing speed, driving the next generation of digital presses. According to the Company, Harlequin RIP is the fastest RIP on the market, which means that printing devices which incorporate Harlequin can be kept running at full rated speed, even on the most complex jobs, without incurring high costs for computing hardware.

- ***ScreenPro™***: ScreenPro™ is a software solution that converts continuous tone image data into ready-to-print halftones (dots of varying size and spacing) in real-time with no compromise on quality.

- ***Mako™:*** Mako™ is a software that creates, rasterizes, converts, analyses, and optimizes many different page description languages, allowing print software developers full control over color, fonts, text, images, vector content and metadata with precision and performance.

ColorLogic

- ***Color management software***: Color management software is a color accurate matching of brand colors for digital production where more capable 7 color printing devices require extended gamut color management. Products include CoPrA, ColorAnt, ZePrA, as well as a full SDK for OEM licensing.

Xitron

- ***Navigator Harlequin RIP and Workflow***: Navigator Harlequin RIP and Workflow Software provides prepress environments with fast, predictable, and reliable interpretation of PostScript, PDF, and EPS format files.

Collaboration

- ***SmartDFE***: SmartDFE is a turnkey DFE based on Harlequin Direct, CLOUDFLOW, and Meteor printhead solutions.

Printhead Solutions

Under the brand of Meteor Inkjet, the Company develops and supplies printhead drive electronics, software, tools, and services for industrial inkjet systems and printing devices. The industrial inkjet market is very broad and fast growing, and includes ceramic tiles, flooring and décor, wallpaper, labels and packaging, functional and 3D printing, product decoration, and textiles. The Company's software and proprietary drive electronics send data to printheads inside inkjet devices to control the output produced. Printheads are a critical component of an inkjet press and generally contain multiple nozzles for jetting ink or other fluids onto substrates.

The Company works closely with most leading printhead vendors, including Xaar, FUJIFILM Dimatix, Kyocera, Konica Minolta, Memjet, Toshiba TEC, SII, Ricoh, Epson, and Xerox, which allows the Group to identify inkjet development projects and trends. The Company uses this information to continually develop hardware and software drivers for new printhead models and partner with printhead manufacturers and OEMs to accelerate their route to production.

Key Products

The Company supports the leading printheads demanded by OEMs and print system integrators with solutions that provide high speed output and rapid time to market. The Company's printhead solutions-related products include:

- ***Electronics***: flexible and scalable drive electronics for all major industrial inkjet printheads.

- ***Software***: Meteor Inkjet offers application-specific DFE for single-pass inkjet and multiple-pass inkjet devices as well as a SDKs to facilitate bespoke solutions. Optional integrated Harlequin RIP and ScreenPro Advanced Inkjet Screens are available, along with NozzleFix™ and NozzleMask™, to compensate for missing nozzles that cause artifacts in printed output as well as the award-winning patented PrintFlat™ software for output uniformity.

- ***Tools and services***: DropWatcher™ for analyzing and tuning ink drops in flight, as well as waveform development services for optimized output quality of any ink and substrate combination.

Enterprise Software

Under the HYBRID Software brand, the Company offers specialized production software designed for the label and packaging industry, based on the Group's extensive experience in this market. HYBRID Software's products only use industry standard formats like PDF and TIFF™, with no use of proprietary or legacy file formats. This follows the Company's commitment to industry standards, which facilitates direct integration with leading third-party systems and output devices.

The Group's enterprise software products are used by more than 1,000 customers worldwide in both conventional and digital printing processes in all areas of prepress and printing, including labels and packaging, folding cartons, corrugated, and wide format. Most of these customers are end-users, companies who print and convert labels and packaging to support brands and consumer product companies, which requires specially trained employees in all major markets worldwide to provide sales, support, training, and integration services, an important barrier to entry for smaller and growing companies trying to compete in this space.

Key Products

- ***CLOUDFLOW***: CLOUDFLOW is a modular production workflow suite for file processing, asset management, soft proofing, and workflow automation. It is a flexible application platform specifically tailored for packaging graphics with support for, among other things, PDF color separation, trapping, layout, and variable data as well as rasterization and screening using the Harlequin Host Renderer from HYBRID Software's sister company Global Graphics Software. CLOUDFLOW can run on physical hardware as well as in public or private cloud computing environments.

- ***PACKZ***: PACKZ is a professional PDF editor for packaging and label production that operates native PDF files and can be used for conventional printing methods (flexography, offset lithography, gravure, etc.) as well as digital printing. PACKZ provides a "Swiss Army Knife", which contains a full set of tools for packaging prepress.

- ***STEPZ***: STEPZ is a specialized production tool derived from PACKZ but with a feature set aimed specifically at digital printing of labels and packaging. STEPZ contains the same powerful tools for layout and variable data as PACKZ but drops functionality not required for digital printing.

- ***iC3D*****:** iC3D is a full software suite that generates photorealistic 3D virtual mock-ups and offers a large library of modelling templates for digital packaging design and prototyping.

HYBRID SOFTWARE GROUP DIGITAL PRINTING MARKETS

The Company derives its revenues from commercial and wide format digital printing operations. The Company believes that two specific market trends in particular play to the Group's strengths: the fact that digital press manufacturers are asking for turnkey Digital Front Ends (DFEs) to drive their presses rather than the components to build their own DFEs, and that the Group is uniquely positioned to deliver these DFEs. Secondly, the new generation printing devices are faster than ever before and require more print-ready jobs to be delivered to the DFE. The Group specializes in the automation and enterprise integration required to achieve this.

In particular, the Group is active in four strategic digital printing growth markets: labels and packaging, ceramics, textiles, and 3D printing (additive manufacturing), as shown in Figure 17.

Figure 17
DIGITAL PRINTING MARKETS

Ceramics	Packaging	Textiles	3D Printing
			

Source: Hybrid Software Group PLC.

Labels and Packaging

The global packaging market was estimated at $876 billion in 2020 and is expected to reach $1.1 trillion by 2030, expected to account for almost two thirds of the global print market, making this a key strategic market for the Group's products (Source: Smithers's *The Future of Packaging: Long-term Strategic Forecasts to 2030*, 2020). Within the larger packaging printing market, digital printing adoption for packaging applications is relatively low, with only 3% to 15% of the market (depending on the market segment) converted to digital printing as of 2021. Despite this, the demand for digital printing technologies for the packaging industry is strong and growing, as adoption continues to advance behind enhanced production flexibility and packaging design creativity. The size of the global digital printing market for packaging is expected to grow from $20.6 billion in 2021 to $49.9 billion by 2031, as shown in Figure 18 (Source: Packaging Digest's *What's Happening in Digital Printing for Packaging?* 2022).

The label sector, an early adopter of digital printing, accounted for more than two-thirds of the global digital printing packaging market in 2021, behind a market demand for shorter runs, more customized packaging, and greater sustainability. However, the industry expects the packaging sector to experience strong growth as the development of sophisticated software printing applications allows more of the design, approval, and marketing process to be completed using the digital product. The ability of digital printing to facilitate variable data printing, leading to maximum flexibility and to an optimum economical value, is expected to allow digital printing to gain a strong foothold in all packaging printing sectors (Source: Packaging Strategies' Digital Printing: A Packaging Revolution, 2019).

Figure 18

DIGITAL PRINTING IN THE PACKAGING INDUSTRY

Source: Packaging Digest.

The top two categories withing the digitally printed packaging are food and beverages, as the range of examples in this space shows what a good fit digital printing can be, particularly for craft and artisanal consumables due to the possibility of printing small runs, as well as the potential for personalization, fast turnaround, and on-the-fly changes to pack designs. In the pharmaceuticals and cannabis industries, companies are increasingly turning to digital printing to accommodate requirements for security and counterfeit initiatives and legally required variable data. Furthermore, equipment advances have made it possible to digitally print a greater variety of packaging materials and formats, including aluminum beverage cans, food wrappers, and metallized-film pouches, which is expected to help the continued adoption of digital printing technologies in this market (Source: Packaging Digest's *What's Happening in Digital Printing for Packaging?* 2022).

In terms of digital printing technology, digital Inkjet printing dominated with more than half of the total market share, and is expected to exhibit the highest growth in the future (Source: Allied Market Research's *Digital Printing Packaging Market*, 2022).

Company's Offerings

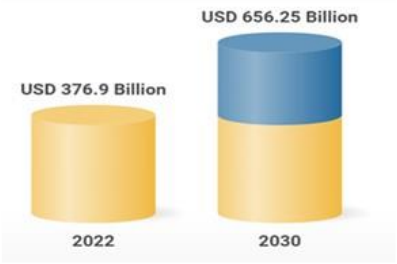
This market requires very specialized knowledge and advanced software solutions, especially for variable data printing and serialization. The Group companies enjoy strategic partnerships with the major players in this market and are experts in several key areas: variable data preparation and processing, color management for matching brand colors accurately, and the speed and precision required for high-volume production environments. HYBRID Software, in particular, offers specialized production software designed specifically for the labels and packaging industry. The Company believes that is well positioned to take advantage of the strong growth expected from the digital label and packaging printing market.

Sustainability

Another factor contributing to the adoption of digital printing technologies in this market is the sustainability factor. As companies continue to achieve their sustainability goals and underline their green credentials, expansion of digital printing in folding cartons and especially corrugated board is expected to grow. Digital printing minimizes waste and the costs of storing inventory in warehouses. It also enables the incorporation of new features on product packaging or labelling that would not be possible with analog printing. These might include personalization or anti-counterfeit measures requiring the high-speed processing of variable data so that each item is unique and identifiable.

Ceramics

Figure 19
GLOBAL CERAMIC TILE MARKET



Source: ResearchandMarkets.

The global ceramic tiles market was estimated at $376.9 billion in 2022 and is expected to reach $656.25 billion by 2030, expanding at a CAGR of 7.1% during the forecast period (Figure 19). The growth is expected to be fueled by a parallel increase in construction projects coupled with new technologies that expand the functionalities and applications of the tiles as well as result in enhanced aesthetics. Technological advancements in the manufacturing process have introduced customization options in color, size, texture, and dimensions, thus likely gaining high traction in residential and commercial building renovation projects (Source: Grand View Research's *Ceramic Tiles Market Size, Share & Trends Analysis Report*, 2022).

Just over a decade ago, conventional screen printing was the most common printing methodology for ceramic tile. But since then, driven by the demand for more customization, smaller lot sizes, and faster cycle times, the ceramic tiles production industry is witnessing a rising trend of digital inkjet printing technology for the decoration of tiles (Source: Printing News's *Ceramics Printing Goes Digital,* 2020).

Digital technology is now very well established in the ceramics printing industry, with over 90% of the addressable market in most countries already converted (Source: Industrial Prints' *Unique Ceramics*, 2017). This includes European countries such as Spain and Italy, where production is almost exclusively digital. In addition, significant advances in print head design and ink formulation are expected to further increase the uptake of inkjet in the industry, as inkjet functionality goes beyond printing designs and expands into simulating textures and highlights on ceramic tiles.

Industrial inkjet systems are now considered to be the industry standard, with the ceramics market becoming one of the largest users of industrial inkjet equipment and components. Digital ceramic printing offers high-quality output and a noncontact solution for decorating ceramics while reducing tile breakage. Faster setup, improved color management, and minimization of repeat patterns drives ceramic manufacturers toward digital technology. Improvements in design software also reduces the possibility of repeat patterns and eliminates the need to sort tiles for repeat prevention while allowing the product to be packed sooner.

Cost and design benefits

Digital printing of ceramic tiles offers significant cost advantages over analog screen printing. Short production runs become economically feasible due to lower set-up requirements and reduced stock of finished goods. Other manufacturing benefits include less breakage/waste due to non-contact printing and ease of color matching for repeat orders. Inkjet-printed ceramic tiles offer attractive design benefits, including the ability to produce realistic images of marble and other natural materials and to print large quantities of tiles without repeating patterns. Digital printing also reduces the overall environmental footprint of the manufacturing process, including reduction in waste and production costs and elimination of toxic chemicals associated with the screen-printing process.

Hybrid Software Group Offerings and Business Model

The Group provides scalable, customizable solutions for systems of any size, speed, or complexity. Special features for ceramic tile printers include recirculating printheads and ink systems to prevent the sedimentation and nozzle blocking to which heavily pigmented ceramic inks are prone. Led by Meteor Inkjet, the Group's products fully implement the control functions required of such systems. Furthermore, the Group's software and electronics solutions are compatible with all the leading printheads used for ceramic tile decoration and are designed to easily support ceramics printers of any size and printing speed.

The Company believes that its technological competitive advantage in the digital printing market, derived from its advanced software offerings, positions it to continue to expand within this industry. The continued acceptance of the industry to print digitally needs to overcome the high initial investment; for some printers, the cost exceeds $10 million. In order to do so, the final product not only needs to deliver cost savings on an ongoing basis, but needs to result in high quality images able to provide a competitive advantage against conventional printing methods. Although penetration of digital technology in the ceramics industry is extensive, the quality of the final products sometimes represents an obstacle for continued growth. The Group believes that through its offerings, it can deliver on the promise of ceramics digital printing while eliminating quality issues.

One such example is the Group's PrintFlat technology (offered through its portfolio company Global Graphics Software), a software that improves uniformity and removes unwanted banding from inkjet output, enabling digital production of a wide range of products, including wide-format graphics, flooring and decor, laminates, and packaging. PrintFlat software masks the banding or unwanted patterning in inkjet printing that is caused by variations in inkjet printheads. Figure 20 shows the results of PrintFlat technology (left side) on different types of flooring and ceramic tiles, with the right-side displaying bands and imperfections in the print quality.

Figure 20
PRINTFLAT TECHNOLOGY

Source: Hybrid Software Group PLC.

The Group's business model for the ceramics market is to sell directly to the end users, the printing operations, on a usage model. One example of this is to charge a set dollar amount per printed square meter, knowing that some companies printing volume can be millions of square meters every year. In addition, the Group believes that its ceramic-centered products can be used for other products in addition to the ceramic tile, including wallpaper, countertops, and other different aspects of decor.

Textiles

Digital textile printing technology, which refers to the inkjet-based method that allows manufacturers to print different designs in any kind of fabric, has emerged as a new printing trend and has already started to make an impact on the textile world. In this process, the fabric is fed into the printing device using rollers, and then ink is deposited in the textile substrate in the form of small droplets. The inks used vary according to the fabric, such as cotton, silk, or polyester. The global digital textile printing market size was valued at $2.0 billion in 2020, and expected to reach $7.9 billion by 2030, at a CAGR of 14.8%. The largest inkjet printing textile market segment, thought to be around three quarters of the total digital market, is fashion and sportswear, followed by displays and signage, and then household and technical textiles (Source: Allied Market Research's *A Digital Textile Printing Market Outlook— 2021-2030*, 2021).

Due to the rise in demand for printed textiles, the industry is predicted to grow significantly. Presently, digital technology holds less than 10% of the share in the textile printing industry. However, the COVID-19 pandemic heavily impacted global supply chains and spurred the growth of digital production from around 6% to 10% in the first year alone (2020). The industry believes this to be a continuous trend to the textile supply chain, with the adoption of digitization growing significantly, and digital textile printing expected to hold at least a fourth of the textile printing industry in the next 10 years (Source: Grand View Research's *Digital Textile Printing Market Size, Share & Trends Analysis Report, 2022—2030*).

The growth is being driven by multiple factors. Digital inkjet enables brands to respond to changing consumer behavior and rapidly changing fashion trends as fashion cycles shorten, enabling manufacturers to quickly adopt to those trends to stay relevant. Digital textile printing can also meet the on-demand printing requirements that the increase of on-line personalized purchases should bring. Furthermore, digital production provides more control over inventory through new technology that simplify long supply chains and inflexible production methods focused on long runs that were standard with conventional printing methods. Brands are recognizing that it is the cost per item sold that is important and acknowledging the efficiencies that digital business and manufacturing processes can bring.

Reducing Waste and Sustainability

Sustainability is a key driver for digital inkjet production because it reduces water, energy usage, pollution, and waste. Compared to traditional textile printing methods, which use numerous chemicals and create a great deal of wastewater, digital textile printing technologies can help achieve huge reduction in water and power consumption during textile production, therefore is gaining popularity as the industry keeps seeking ways to reduce negative environmental impact. Textile production is currently one of the world's biggest sources of water waste and pollution, mostly because of dyeing and printing processes. The industry believes that the increasing awareness regarding the environment and sustainability around the world will further facilitate the growth of digital textile printing technologies (Source: Business Wire's *Digital Textile Printing Market Poised for Big Growth*, 2017).

Investments in Technical Advances

To obtain a competitive edge and increase their market share, providers of digital technology are making significant investments in their R&D for new digital textile printing technologies. The Group's reputation for high-speed software, color management technology, and expertise in inkjet electronics responds to manufacturers' demands for turnkey solutions to drive these machines.

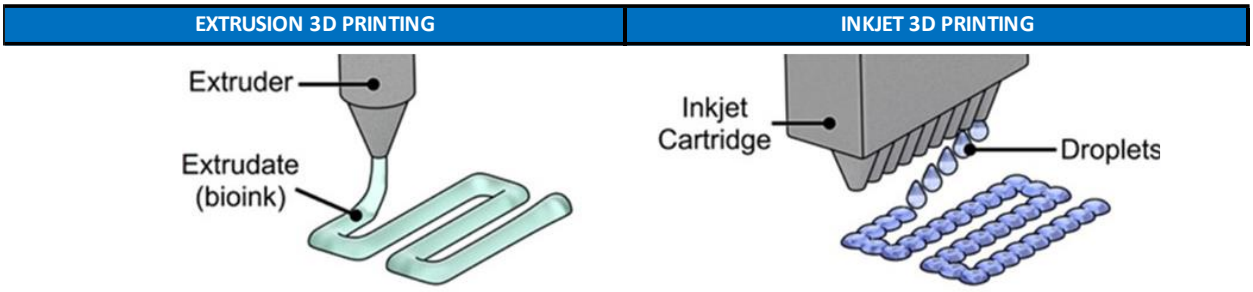
Additive Manufacturing (3D Printing)

Inkjet 3D printing is a low-temperature, low-pressure additive manufacturing technology that involves the deposition of liquid materials or solid suspensions for a variety of applications. In this process, the printing material is extruded through a small nozzle within a print head. As the print head raster scans over a surface, multiple layers are built up in a layer-by-layer process.

The 3D inkjet printing process is similar to other 3D printing processes in that it proceeds through layer-by-layer deposition. Printing instructions in each layer are generated from a 3D mechanical model. However, the inkjet-based additive manufacturing process is unique in that it is adaptable to a wide range of liquid materials or solid suspensions. These functional materials can have dielectric, conductive, adhesive, mechanical, optical, or chemical properties, and are printed with very small-sized droplets from a digital file (Figure 21, page 37).

Figure 21

INKJET 3D PRINTING



Source: Stockholm International Peace Research Institute.

The global additive manufacturing/3D printing market size was estimated at $13.8 billion in 2020 and is expected to reach $64 billion by 2028 (Source: Grand View Research 3D printing market size, trends and share analysis report, 2021). Within this market, inkjet 3D printing is one of the technologies that is expected to grow fastest because it enables the most flexible and innovative forms of additive manufacturing technology. Its precise drop placement, accurate drop volumes, and ability to incorporate different materials make functional inkjet printing suited to printed electronics, displays, OLED, sensors, PCBs, semiconductor assembly, chemical machining, photovoltaics, life science, and optics. Inkjet additive manufacture has all the benefits of digital printing. It is Industry 4.0 compliant, makes hardware development agile, enables just-in-time manufacturing for minimal inventory cost, and is inherently low-waste with more opportunity for sustainability.

However, in the initial stages of the technology, inkjet 3D printing was being used for prototype creation as technical and logistic complications during implementation of the new technology prevented the process from being used in production of end-use parts. But machine vision systems and AI are broadening the materials and applications for inkjet 3D printing and facilitating the transition.

This barrier to entry makes the Company's integrated solutions more valuable. Through its subsidiary, Meteor Inkjet, the Group helps manufacturers harness the power of inkjet for additive manufacturing applications without the distraction of having to design electronics and software solutions in-house. Meteor can simplify the path through development to production for 3D inkjet printer manufacturers and integrators.

Robustness and Flexibility

There are two types of inkjet additive manufacturing. Binder jetting can make robust ceramic and metal parts and even produce more complex molds for sand-casting. The powder bed means that there is less need for adding supports to overhanging structures. Materials jetting using UV cured polymers has excellent detail and accuracy and a unique capability for combining multiple materials and colors in a single print job. Materials jetting is also the only additive manufacturing technology capable of functional printing, such as PCBs, embedded electronics, batteries, etc.

HYBRID SOFTWARE GROUP ACQUISITION STRATEGY

The Company's goal to become the technology leader in the industrial printing market, as well as the only vertically integrated supplier to this market, is driven by its acquisition activities. The Group's strategy is to acquire companies that fill a gap in its technology portfolio in order to offer its customers a full stack solution of software and critical technology needed for their industrial digital print manufacturing and production. With each acquisition, the Group strives to continue to add value for its potential customers by offering more of what they need to differentiate the product lines and tap into new revenue streams.

The Group's acquisition history began with the objective of strengthening its technology leadership position in the xOEM component market as well as expanding its software portfolio. However, the Group believes that its 2021 acquisition of HYBRID Software was a critical step in shaping the Company's objective, as it broadened its focus from its traditional OEM sales channel to high-margin enterprise software for both OEMs and end users—companies who print and convert labels and packaging. And it did so while bringing a greater focus on the high-growth labels and packaging market, along with innovative products for enterprise workflow and packaging production.

In October 2021, it also added a strategic technology to its portfolio with the acquisition of ColorLogic GmbH, experts in color management for digital printing, adding its extended gamut color management technology to the product mix, providing accurate brand color matching for digital labels and packaging production. Highlights of the Company's acquisition activities are provided in Figure 22, followed by a brief description of each acquisition. The Group believes that synergies between the portfolio companies following these strategic acquisitions will accelerate innovation and revenue growth.

Figure 22
ACQUISITION HISTORY

March 2015	Acquisition of RTI Global, Inc. and RIPMall Technologies, Inc.
September 2015	Acquisition of URW++ Design and Development GmbH. Sold to Monotype GmbH in May 2020
December 2016	Acquisition of TTP Meteor Limited (now Meteor Inkjet Limited)
November 2019	Acquisition of Xitron LLC
January 2021	Acquisition of HYBRID Software Group S.à r.l.
October 2021	Acquisition of ColorLogic GmbH
March 2022	Acquisition of iC3D. Fully integrated into STEPZ and PACKZ from HYBRID Software

Source: Hybrid Software Group PLC.

- ***March 2015***—Acquisition of RTI Global, Inc. and RIPMall Technologies, Inc., providers of custom-branded versions of the Harlequin RIP direct to print service providers and printing equipment manufacturers. Now part of the Xitron portfolio.

- ***September 2015***—Acquisition of URW++ Design and Development GmbH. Sold to Monotype GmbH in May 2020.

- ***December 2016***—Acquisition of TTP Meteor Limited (now Meteor Inkjet Limited), developers of production-ready electronics and software to drive industrial inkjet print heads. The acquisition enables the Group to offer a broader solution to inkjet press manufacturers by combining the Company's software solutions with Meteor's industrial print head driver solutions.

- ***November 2019***—Acquisition of Xitron LLC, a prepress solutions company based in Ann Arbor, Michigan, USA. Xitron develops workflow systems and interfaces to drive the prepress industry's most popular output devices and has been building solutions around the Harlequin RIP® since 1991.

- ***January 2021***—Acquisition of HYBRID Software Group S.à r.l. from Congra Software S.à r.l. HYBRID Software is a group of software development and marketing companies focused on enterprise software for the graphic arts industry, with a strong focus on labels and packaging.

- ***October 2021***—Acquisition of ColorLogic GmbH, leading developers of high-end color management technologies, notably extended gamut color management, providing the speed and quality required for the accurate matching of brand colors in digital label and packaging production.

- ***March 2022***—Acquisition of iC3D, to own technology for digital packaging design that allows users to design and generate asymmetric 3D models quickly, such as perfume bottles, trigger sprays and molded containers. It is fully integrated into STEPZ and PACKZ from HYBRID Software.

Furthermore, on December 1, 2022, HYBRID Software completed the acquisition of the technology and intellectual property of Quadraxis, a French company which developed pioneering technology in 3D scanning and image processing. After Quadraxis went into receivership, HYBRID Software was the successful bidder to acquire its intellectual property from the liquidators, including software source code. The acquisition strengthens Hybrid Software Group's offering in 3D and additive manufacturing solutions. The Group plans to integrate Quadraxis software into its extensive portfolio which includes other 3D applications such as iC3D.

ENVIRONMENTAL MATTERS

The Group allocates significant importance to its environmental responsibilities and believes that driving sustainability goals through the business is not only the right thing to do but also makes for good business practice. In many of the Group's key growth markets, such as packaging and textiles, environmental factors are influencing how those markets develop.

The Company believes that its business operations have no direct activities which are likely to have a significant, detrimental effects on the environment. On the contrary, digital inkjet printing is inherently more sustainable than analog or conventional printing, generating less waste, facilitating just-in-time production, and permitting the use of more sustainable raw materials. This is a key factor behind the expected growth and increased adoption of digital printing technologies, as environmental concerns become more important, and companies continue to achieve their sustainability goals and underline their green credentials.

In fact, the sustainability and environmental benefits of digital printing is a key driver contributing to the adoption of digital printing technologies in some of the Companies key target markets. In labels and packaging, digital printing minimizes waste and the costs of storing inventory in warehouses. In textiles, one of the world's biggest sources of water waste and pollution, digital inkjet production reduces water, energy usage, pollution, and waste compared to traditional textile printing methods, which use numerous chemicals and create a great deal of wastewater.

In terms of the Company and its subsidiaries' operations, policies aimed at minimizing the Group's environmental footprint to the lowest level possible, including recycling waste from paper, ink, toner cartridges, other computer consumables, have been implemented within the Group for several years. To enhance these efforts, in 2021 the Group partnered with Ecologi, the platform that facilitates the funding of carbon offset projects and tree planting around the world, to offset its carbon footprint. Through this partnership, the Group has been working towards compensating for the environmental footprint of every employee in their work and personal life.

As part of this initiative, the Group is implementing policies to reduce Scope 1 and Scope 2 footprint, such as sourcing renewable energy and low carbon travel, and is talking with supply chains to measure and push down on Scope 3 carbon footprint. The Group now offsets the carbon footprint of all Group employees, whether at home or at work. So far, the Group has achieved an offset of over 1,000 metric tons of CO_2 and contributed to environmental projects across the globe, such as solar power generation in Tamil Nadu and Telangana, India, preserving Amazonian rainforest in Brazil, wind power projects in Mexico, Honduras, Thailand, South Africa, Bulgaria, and Vietnam, and using waste biomass to produce electricity in Chile, among others. More information about the projects and the positive environmental impact can be found on the Company's dashboard at https://ecologi.com/hybridsoftwaregroup.

SUBSIDIARIES

GLOBAL GRAPHICS SOFTWARE

Global Graphics Software is a leading developer of innovative software components for high-speed digital printing. Its product line includes SmartDFE™, the first product to be co-developed by all Group companies, the Direct™ product range, and its Core line (composed of software development kits) (Figure 23). The Core SDK product line is used by customers and printer manufacturers looking to create their own printing software; SmartDFE™ is used to integrate print into fully automated smart factories; and the Direct™ range is used by printer manufacturers and clients looking to integrate digital print into industrial processes.

Figure 23
GLOBAL GRAPHICS PRODUCT

Source: Global Graphics Software Ltd.

Global Graphics products provide comprehensive solutions for driving data through digital presses and ensuring high quality print jobs, and are designed to meet the most demanding printing applications, from general commercial printing to labels and packaging and industrial inkjet applications, such as textiles, ceramics and décor. The company's products are built using Global Graphics' own technologies for rendering, screening, and color management, including Harlequin RIP®—the fastest RIP engine available—ScreenPro, Mako, and PrintFlat. The company's products are used in solutions marketed by the world's leading brands, including HP, Canon, Durst, Roland, Kodak, and Agfa.

The company believes that its Core components allow customers to build their own software solutions providing the required elements for an integrated product. However, that would require a large investment, a team of experienced software developers, and a long timeframe (maybe measured in years), to replicate the functionalities of Global Graphics integrated solutions available through its Direct™ offerings. This is a competitive advantage when it comes to printer manufacturers, as the incorporation of a complete solution can allow these companies to avoid the need to set up software development efforts and focus on the hardware element.

Core SDKs

Designed specifically for software developers whose business it is to create powerful print software, Global Graphics' SDKs—Harlequin, Mako, and ScreenPro— are enhanced by the company's supporting technologies, such as PrintFlat™, to mitigate artifacts in inkjet printing, as well as color profiling and calibration tools to provide accurate, consistent, and predictable color reproduction for a wide range of workflows.

Harlequin Core

Harlequin Core is a Raster Image Processor, or RIP, that converts text and image data from many file formats, including PDF, TIFF™, or JPEG, into a format that a printing device can understand. Proven in the field, the first Harlequin-based digital presses were introduced in 2002. Harlequin scalable RIP gives OEM partners access to a complete range of RIP/server configurations allowing them to bring high-quality, highly robust solutions to market quicker, with minimal development effort for initial integration.

Harlequin is the fastest RIP engine available, powering the next generation of digital printers. Independent speed tests by the Rochester Institute of Technology show that Harlequin's processing power beats the industry's highest performing digital presses, delivering pages far in excess of the rated speeds of the industry's highest performing digital presses. Harlequin RIP also requires less hardware, resulting in a reduction of manufacturing costs, operating systems, and other associated software costs.

Harlequin further provides variable data printing capabilities through the use of its Harlequin VariData™, which accelerates the processing time of PDF files containing variable data using a unique method of intelligently recognizing repeated content and responds to changes in variable data usage. In addition, Harlequin ColorPro™ allows clients to achieve accurate brand color emulation, high-quality image reproduction, and offers a variety of methods to maintain pure blacks through the color engine.

Mako Core

Mako provides rapidly developing upstream tools for viewing and manipulating PDF, PCL, PostScript, and other page description languages. Mako is ideal for the creation of powerful prepress workflows, managed print service solutions, and much more. Mako's offers control over color, fonts, text, images, vector content, and metadata, among others, combining precision with performance.

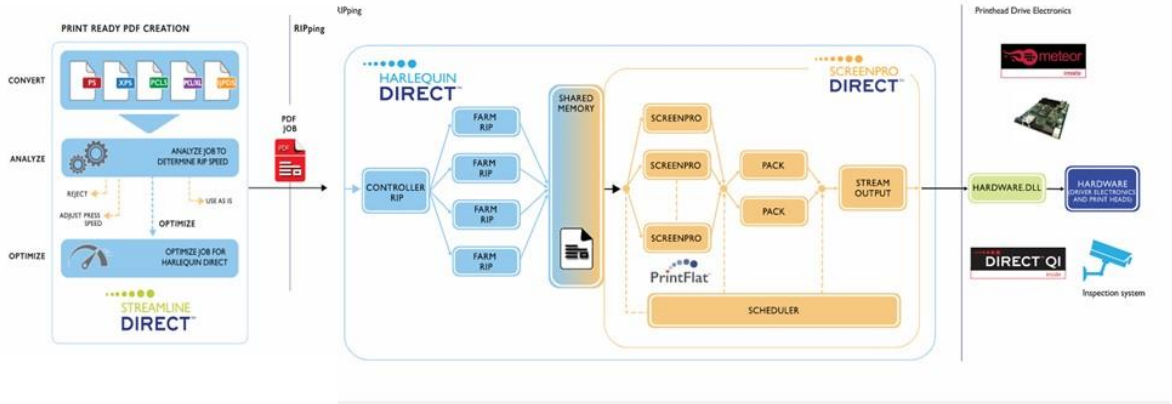
ScreenPro™ Core

A core part of the software required to drive a digital printer is the halftone screening engine, which converts image data into ready-to-print halftone screened data in real-time. Screening engines are complementary to RIP software, as many RIP's screened output is outdated and result in sub-optimal prints. ScreenPro is a halftone screening engine that can be added to any existing workflow and RIP. It uses patterns of discrete ink drops that result in prints with rich colors and tones. ScreenPro is the fastest RIP-independent screening engine, allowing customers to run at full rated print speed whilst enhancing quality. ScreenPro sits between the RIP and the printer and takes the output of the RIP software and screens the image to the drop levels supported by the printer being used.

Direct™ Product Range

The power of a digital printer is in the software that drives it. Direct is a new class of print software that drives print jobs directly to the printer electronics, bypassing a disk, proving speed and security benefits. Direct provides printer OEMs and integrators ready-to-use software for the next generation of faster, wider, higher resolution digital printers. The Direct range of products are built using the fastest core technologies on the market, and include modules—Streamline Direct, Harlequin Direct, and ScreenPro Direct—covering the entire printing process, including pre-print workflow, RIPping, and printing, respectively. An overview of Direct's modules is provided in Figure 24.

Figure 24
DIRECT SUITE OF PRODUCTS



Source: Global Graphics Software Ltd.

Direct™ was awarded a 2021 Pinnacle InterTech Award from PRINTING United Alliance, which honor the development of innovative technologies expected to have a significant impact on graphic communications and related industries. It is the company's third InterTech award in four years.

Streamline Direct

Streamline Direct prepares and streamlines the PDF specifically for Harlequin Direct, reducing the file complexity and enhancing Harlequin Direct's efficiency. Streamline Direct will check each PDF, allowing customers to reject any that are likely to slow the device down. Streamline Direct can also be used to streamline any problem PDF to achieve the same output quality whilst maximizing the device speed.

Harlequin Direct

Harlequin Direct provides the tools to take print-ready PDFs and then RIP, screen, and stream them at maximum physical print speed directly to the head driver electronics. Harlequin Direct is a multiple PC, ultra-high-speed, massively scalable RIP solution, and can be integrated with any workflow and electronics, allowing customers to get to market without huge software development expenses.

Harlequin Direct includes Harlequin VariData™, which accelerates the printing of zoned variable data jobs. The content outside of the variable data zones is static and can be RIPed once whilst the data in the variable data zones is RIPed for every page. This greatly reduces the PC hardware required to RIP the zoned variable data PDF and keep up with the printer. Harlequin Direct also incorporates PrintFlat and custom screen design service. While Harlequin Direct can drive Meteor Inkjet electronics out-of-the-box, it was designed to drive any electronics, with plug-ins available for a number of other industry standard electronics.

ScreenPro Direct

ScreenPro direct is a multi-core and multiple PC, ultra-high-speed, massively parallelized halftone screening solution that accepts continuous tone rasters (images) from any RIP and then screen and stream them at maximum physical print speed directly to the head driver electronics.

SmartDFE™

SmartDFE, the first product to be co-developed by all Group companies and sold through Global Graphics, is a full software and hardware stack designed to be the heart of a fully automated manufacturing system, incorporating print functionality to the fully automated smart factory. SmartDFE expands the applications of print systems, from mass production to mass customization at the same cost as current devices. SmartDFE brings together the creation of optimized print-ready PDF files; workflow and job automation to connect with enterprise IT systems; RIPping; screening; optimized image quality; and, via Harlequin Direct™, it drives the print data directly to the printheads at high speeds through Meteor software and electronics, or through Xitron's Navigator DFE platform. An in-depth description of SmartDFE is provided on pages 27-29.

Additional Technologies–PrintFlat

PrintFlat is an award-winning technology that corrects digital inkjet quality issues, improving uniformity and removing unwanted banding from inkjet output. PrintFlat software masks the banding or unwanted patterning in inkjet printing that is caused by variations in inkjet printheads that jet ink onto a printing surface. It also compensates for manufacturing differences between new printheads. Banding can be particularly acute in large format printing as well as décor applications, such as wallpaper and flooring. The PrintFlat technology is applied at runtime and can enhance the quality of the output without slowing down the printing process. PrintFlat is available with ScreenPro Core™, ScreenPro Direct™, and Harlequin Direct™. PrintFlat was the recipient of the 2019 Printing Industries of America Technology Award for its innovation and potential to significantly impact the industry.

HYBRID SOFTWARE

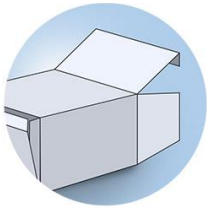
HYBRID Software is an enterprise software development company focused on innovative productivity tools and software solutions for the labels and packaging industry. The company is focused on the development and commercialization of innovative prepress and workflow tools for the graphic arts industry. HYBRID software has offices in Belgium, Germany, Italy, France, Australia, UK, China, and the U.S.

HYBRID Software's products helps its customers reduce costs, streamline processes, and speed up turnaround times. Its products are used by hundreds of customers worldwide with applications in all areas of prepress and print, including labels and packaging, folding cartons, corrugated printing, and flexibles and trade shops, as shown in Figure 25.

Figure 25
LABEL AND PACKAGING APPLICATION

Label printing
Lights-out automation
Increased speed to press
Process more orders in less time
Unified platform for digital and conventional label printing

Corrugated printing
Pave the way for digital printing
Improve customer service
Reduce touchpoints
Work from anywhere with HTML



Folding carton printing
Complete automation of repeat orders
Fully based on industry standards
Accelerate turnaround times
Eliminate costly errors

Flexibles & trade shops
Reduce time-to-market
Increase prepress operator performance
Maximise plate & device usage
Customisable automated service platform

Source: Hybrid Software Inc.

The company's product portfolio includes PACKZ and STEPZ PDF editor and CLOUDFLOW workflow:

PACKZ PDF Editor

PACKZ is a professional PDF editor for packaging and label production that operates native PDF files and can be used for conventional printing methods (flexography, offset lithography, gravure, etc.) as well as digital printing. PACKZ provides a "Swiss Army Knife" containing a full set of tools for packaging prepress.

PACKZ shifts prepress production into a higher gear with the unique blend of automated actions and dedicated prepress tools. With its editing and quality assurance functions, the professional PDF editor makes designs print-ready for any printing process. PACKZ enriches designs with priming and finishing separation, handles ink sets and object-based screening, applies trapping, and generates dynamic marks and panels.

The application also produces unique seasonal packaging and personalized labels with the VDP (Variable Data Printing wizard), produces warp and 3D visualizations, allows for barcode creation and recognition, and provides fonts, text, and character recognition. In addition, the product offers separation and color profile handling, as well as other color management functionalities powered by ColorLogic spectral technology. The company also offers an optional CLOUDFLOW module for automated industrial production. Running on OS-X and Windows, the adaptive multi-display work environment in PACKZ ensures maximum performance and usability.

STEPZ PDF Editor

STEPZ is a specialized production tool derived from PACKZ but with a feature set aimed specifically at digital printing of labels and packaging. STEPZ contains the same powerful tools for layout and variable data as PACKZ but drops functionality not required for digital printing.

The complete and easy-to-integrate prepress software is perfect for digital printers looking to increase production efficiency and improve the quality of their prints. STEPZ offers solutions for variable data printing, step and repeat, print optimizations, quality control, and more. STEPZ transforms the condensed prepress cycle into a time-effective operation.

CLOUDFLOW Workflow Suite

CLOUDFLOW is a modular production workflow suite for file processing, asset management, soft proofing, and workflow automation. It is a flexible web-based application platform specifically tailored for packaging graphics with support for, among other things, PDF color separation, trapping, layout, and variable data as well as rasterization and screening using the Harlequin Host Renderer from HYBRID Software's sister company Global Graphics Software.

CLOUDFLOW was designed following three key concepts: (1) modular architecture; (2) Open standards; and (3) Industry 4.0 ready.

Modular Architecture

Modularity and scalability are fundamental characteristics of CLOUDFLOW. Clients can add and combine a large variety of functional modules, listed in Figure 26, for soft proofing, prepress automation, RIPping, screening, job- and order lifecycle management, and many more functionalities. Multiple Workspaces can be clustered for extra computing power, high availability, and multi-location configurations. With CLOUDFLOW´s Share technology, it becomes even possible to link Workspaces across the internet to exchange and synchronize files, data, and licenses to optimize their utilization.

Figure 26
CLOUDFLOW MODULAR ARCHITECTURE

WORKSPACE	The foundation for any CLOUDFLOW configuration	PROOFSCOPE	Turnkey solution for soft proofing and collaboration
PACKZFLOW	Prepress automation based on native PDF files	RIP	Fastest RIP based on proven Global Graphics Harlequin RIP technology
TECTONICS	High Performance Flexo Plate Layout	JOBS	Job management
DATALINK	Connectivity and data collection	COCKPIT	Order Lifecycle Management
SHARE	Multi-location service for files and licenses	3D	Workflow automation for 3D generation

Source: Hybrid Software Inc.

The Workspace module is the foundation for any CLOUDFLOW configuration. The module provides file and asset management capabilities, automatically indexing file repositories and extracting relevant metadata, and storing all of its information in a database to make it available and searchable to other CLOUDFLOW applications, allowing for centralized configuration and backup.

Workspace features an innovative workflow engine to create business and production flows. Its fully web-based user interface offers easy and customizable user management and access to all processes and content. With the webserver built-in, it can host custom portal solutions that tie directly into workflows and access files with proper user and permission management.

Open Standards

CLOUDFLOW is completely built on open standards: it is web-based from the start (HTML5), uses PDF and XML, and supports all major industry standards, such as CIP3, XMP, and many others. CLOUDFLOW is fully data driven by the power of the document-oriented MongoDB database. Its configuration allows CLOUDFLOW to seamlessly integrate with most external IT environments. The Datalink module offers data access and manipulation functionality to interoperate with SQL and other data structures.

Industry 4.0

With its ability to run completely in the cloud, CLOUDFLOW offers a reliable platform to master the challenges of digital transformation and Industry 4.0 in the labels and packaging world. By adding the Orchestrator module, it can integrate and interoperate with all contributors, IT services, and equipment of the entire value chain from initial order to final delivery by providing flexible interfaces and powerful process engines.

COLORLOGIC GmbH

In some printing specialty markets, especially labels and packaging, the migration of analog printing to digital has been slowed by the challenge of matching critical brand colors, like company logos as digital printing processes typically involve loss of detail and difficulty in matching the require colors exactly. Getting the color right is an important factor in a company's branding and packaging efforts. However, in traditional printing processes, critical colors are achieved by using specially mixed inks, but this is not possible with digital inkjet printers. Because of this, color matching is considered perhaps the most complex element of the digital printing prepress workflow.

ColorLogic color management software technology solves these issues, as it provides advanced color management software solutions to achieve fast, high-quality color matching on inkjet presses. Their suite of products offers an unparalleled range of color management technology with a high level of automation possibilities. In addition to ColorLogic's Software Development kits (SDK) offering color management technology for OEMs, ColorLogic has a complete solution of products – ColorAnt for color measuring and correcting, CoPrA for color profiling, and ZePrA Smart Color Server (Figure 27).

Figure 27
COLORLOGIC PRODUCTS

Optimize	Profile	Automate
ColorAnt MEASUREMENT DATA OPTIMIZATION	CoPrA HIGH-END COLOR PROFILING	ZePrA
Color Measuring and Correcting	Color Profiling	Smart Color Server

Source: ColorLogic GmbH.

ColorAnt

ColorAnt is an award-winning, easy-to-use color measurement and correction tool that corrects and optimizes color data prior to profiling. ColorAnt produces immediate results working standalone, integrated into an existing workflow, or in conjunction with other ColorLogic solutions. Key features include:

- Data Analysis: Use ColorAnt's 2D, 3D, TVI, Spider Web and Curves to fully verify measurement data;
- Detailed Reporting: Use ColorAnt's advanced analysis to create detailed Reports on measurement data;
- Create Custom Charts: Create patch sets for specific print methods, including Flexo printing, re-profiling and Multicolor printing;
- Link Color Charts: Merge test charts by channel name;
- Automatic Data Correction: Correct measurement data with a few simple clicks. Special features for Flexo printing, included to protect highlight areas;
- Measure Test Charts: Integrated measuring for a wide array of measurement instruments;
- Multicolor Options: Edit Primaries allows replacement or removal of Multicolor data without remeasuring; and
- Tone Value Correction: Correct TVI curves to profile, G7 and ISO 20654 specifications.

CoPrA

CoPrA acts as the control center for any profiling task, creating high-quality profiles with a user-friendly interface for any color space and printing process. CoPrA includes a wide range of features allowing time and cost savings during production, producing results whether being used as a standalone, integrated into an existing workflow, or as part of the powerful ColorLogic Suite for a complete color management solution. Some of CoPrA's key features include:

- Printer Profiles: Profile Gray, RGB, CMY, CMYK and Multicolor color spaces;
- Update Profiles: Update ICC printer and DeviceLink profiles to new printing conditions;
- Flexo Printing Features: Utilize First Printed tone options to create the ideal Flexo profiles;
- DeviceLink Profiles: Generate DeviceLink profiles for all combinations of color spaces;
- Visual DeviceLink Editing: Edit charts in popular image editing tools and create a DeviceLink profile; and
- Ink Saving Profiles: Create Ink Saving DeviceLink profiles with a variety of presets including Multicolor.

ZePrA Smart Color Server

ZePrA is a full-featured color server that optimizes and automates PDF printing data and image files such as PSD, TIFF and JPEG via DeviceLink profiles. ZePrA's easy-to-use interface simplifies the process of custom color conversions and seamlessly integrates into existing workflows for immediate results. It allows for the creation of customized configurations and queues to automate day-to-day color management tasks. ZePrA was the recipient of the 2021 Pinnacle Product Award winner. Key features include:

- Wizard Driven: Create workflows with the Auto Setup Wizard to automate color management tasks quickly;
- PantoneLIVE® Integration: Access all PantoneLIVE libraries within the Spot Color Module;
- Transparency Flattening: Flatten PDF files on-the-fly for color conversion;
- Cloud Functionality: Easily share spot color libraries and profiles utilizing cloud services;
- Ink Saving and TAC Reduction: Create SaveInk and TAC reduction workflows with a few short clicks;
- Spot Color Iteration: Iterate spot colors for more accurate conversions;
- Enfocus Switch Integration: Integrate ZePrA's features into Enfocus Switch workflows; and
- Spot Color Reporting: Verify spot color conversions with workflows before processing.

ColorLogic's Software Approach

ColorLogic's software is flexible and customizable to adapt to ever changing profiling needs, working standalone, integrated into an existing workflow, or as part of the powerful ColorLogic Suite for a complete color management solution. The company sells its offering through different packages that can include limited functionality, or a full suite of products for a complete solution. Figure 28 (page 48) shows the different product levels for ColorLogic's three main product offerings: ColorAnt, CoPrA, and ZePrA. In addition, the company offers a Software Maintenance Agreement (SMA), a paid annual plan which provides an upgrade to the latest version, and major upgrades of the application at no additional charge to the end user.

Figure 28

COLORLOGIC PRODUCT PACKAGES

Source: ColorLogic GmbH

METEOR INKJET

Meteor Inkjet is a leading supplier of industrial inkjet printhead driving solutions, electronics, software, tools, and services. Working closely with major printhead manufacturers, Meteor supplies production-ready electronics and software to printer OEMs and print system builders. Together with comprehensive software, Meteor electronics are readily scalable to systems of any size and offer straightforward integration of different printhead types within a single printer.

Meteor's global customer base serves a wide variety of markets including ceramic tiles, pharmaceutical, direct-to-shape, textiles, packaging, 3D/additive manufacturing, functional, security and electronics, labelling, signs and displays, decor, commercial print, book printing, and glass printing.

Meteor headquarters are situated in Cambridge, UK with sales and support facilities in seven international locations, including the U.S., China, Japan, and Korea. The company is well-placed to serve its global customer base, with customers in more than 44 countries around the world. In recognition of its outstanding success, Meteor was honored with the prestigious Queen's Award for Enterprise in 2019. Similar to conservation efforts by its parent company—Hybrid Software Group—Meteor has established a comprehensive sustainability development plan and is committed to a carbon negative future. Meteor's UK headquarters uses 100% renewable power, and the company contributes to a scheme which offsets the remaining carbon footprint as well as the estimated domestic carbon footprint of all UK-based employees.

Printhead Controllers/Drive Electronics

Working closely with printhead manufacturers, the team develops, delivers, and supports the electronics and software required to drive printheads, allowing customers to realize the benefits of digital inkjet printing technologies. The company offers production-ready, scalable drive electronics for all leading industrial inkjet printhead companies, including Fujifilm Dimatix, Epson, Konica Minolta, Kyocera, Ricoh, Seiko Instruments, Toshiba, Xaar, Xerox, and others (Figure 29).

Figure 29

METEOR PRINTHEAD ELECTRONICS COMPATIBILITY

Source: Meteor Inkjet.

Known for technical expertise and innovation, Meteor is trusted by printhead manufacturers and print system builders alike. Over decades, the company has gained a deep understanding of the fundamental science and engineering that underpins digital printing. Combining this expertise with market insight, Meteor offers products which are robust, cost-effective, and future proof. This technical expertise can be seen in the following efforts that highlight the company's leadership position and ability to respond to market dynamics:

- In July 2022, the company announced the development of a new electronics platform to avoid reliance on key computer chips that are in worldwide short supply in 2022 due to the COVID pandemic. Meteor's Print Controller Card (PCC) is used by hundreds of OEM customers around the world to synchronize image data sent by a PC to arrays of printheads, including those by Epson, FUJIFILM Dimatix, Konica Minolta, Kyocera, Seiko Instruments, Toshiba TEC, Xaar and Xerox. The PCC was reliant upon an electronic component that is in critically short supply, potentially delaying more than £4 million (UK pounds) of printhead drive electronics.

Anticipating these long-term supply issues, Meteor embarked upon a fast-track project to re-architect the PCC. In quick response to the diminishing availability of alternative components, Meteor identified a suitable replacement chip that was freely available in high volume, taking the unusual step to acquire more than a year's supply of the new chip before even starting development. The risk of this decision paid off, and Meteor's new PCC2 print controller is now shipping in production quantities.

- The company was the first supplier to offer printhead drive electronics and software products in support of the Ricoh TH5241 industrial inkjet printhead, aimed primarily at entry level scanning applications including sign graphics, textiles, and labels. The head features 1280 nozzles in four separate channels so that a single head can jet up to four colors.

- The company announced the development of printhead drive electronics and software for the new T3200, T1600, and D3000 printheads recently announced by Epson. These solutions join Meteor's existing products to drive Epson S3200, S800, I3200, and I1600 printheads, ensuring that Meteor continues to provide the most complete range of Epson industrial printhead driving solutions on the market.

Meteor is also capitalizing on its technological expertise and market knowledge to partner with Xaar, a leading inkjet printing technology group, and Dyndrite, providers of the core accelerated computation engine used to create next generation digital manufacturing hardware and software, on the development of an integrated industrial inkjet solutions for Binder jet additive manufacturing applications. The combined solution delivers integrated, optimized 3D CAD-to-inkjet printhead development environment empowering OEMs to quickly invent new, more innovative raster inkjet machines. The project aims at simplifying the machine development process by providing easy-to-implement system elements that are optimized for additive manufacturing processes, enabling OEMs to focus on materials and applications development and end-product differentiation.

Developed by MIT in 1995, binder jetting is widely regarded as the fastest additive manufacturing method for production-volume output of highly dense and functional precision parts. The process involves industrial printhead selectively depositing a liquid binding agent onto a thin layer of powder particles—foundry sand, ceramics, metal, or composites—to build high-value and one-of-a-kind parts and tooling. Similar to printing on sheets of paper, the process is repeated layer by layer, using a map from a digital design file, until the object is complete. In recent years, new market entries are proving the technology's adaptability to industrial applications.

The binder jetting market is projected to grow from $300 million in 2018 to $1.3 billion in 2024 (Source: Knowledge Sourcing Intelligence's *Binder Jetting 3D Printing Technology Market Size, Share, Opportunities, COVID-19 Impact, and Trends*, 2021). For this project, Meteor is providing scalable printhead drive electronics, the world's fastest RIP, and a flexible software Digital Front End (DFE) tailored to the specific requirements of additive manufacturing.

Software

Meteor offers an extensive suite of software for building industrial inkjet printers from the ground up while significantly reducing time-to-market and development risk: DFE, workflow solutions, image quality enhancements, and software development kits. At the heart of the Meteor software stack is the PrintEngine which works together with Meteor's printhead drive electronics to control the print system data path. For bespoke single-pass or scanning systems, the power and flexibility of PrintEngine is accessible through Meteor's SDKs.

For print system developers who prefer not to create their own workflow or control solutions, Meteor offers a range of configurable DFEs for a variety of single-pass or scanning applications. Ready to use DFE MetPrint is a high-speed, single-pass printing applications which removes the complexity of developing a DFE from the ground up.

Meteor also offers eLab Pro, a complete RIP solution for Meteor-based systems. eLab Pro is a scalable industrial inkjet RIP solution in a complete, plug and play package. Implementing Harlequin, eLab Pro works seamlessly with Meteor's printhead drive electronics offering an intuitive, customizable graphical user interface with the ability to command the RIP directly from the print controller or printer DFE. Specifically designed for industrial inkjet, eLab Pro is suitable for development or production environments.

Meteor 3D specific product is Met3D, which facilitates the development of inkjet 3D and additive manufacturing applications. When used in conjunction with Meteor's eLab Pro software and a DFE such as MetPrint or MetScan2, Met3D offers the ability to print 3D CAD files without requiring complex and expensive 3D build tools for processing and slicing.

Meteor software innovations extend beyond core print system operation to include solutions designed to enhance print quality, including screening, swath management, color profiling, print calibration and nozzle-out compensation technologies.

Tools and Services

Meteor offers an extensive range of tools, training and services for ink characterization, print reliability analysis, printhead evaluation, and print process development.

Ink Delivery Systems

Through years of industry experience, Meteor has developed strong relationships with ink delivery system suppliers.

XITRON

Xitron develops innovative workflow systems and interfaces to drive the prepress industry's most popular output devices. The company software, tools, and workflow systems are designed to be used with fully digital, computer to plate, or conventional printing methods, including commercial offset, flexo, narrow web, label, wide format, packaging, and specialty graphics.

Products

Xitron's solutions, built around the Harlequin RIP core technology from Global Graphics and the Adobe PDF Print Engine from Adobe Systems, are recognized as prepress standards. Xitron engineers continue to develop solutions for the graphic arts market, driving hundreds of different models of imagesetters, proofers, plate setters, inkjet printers, and digital presses. With shipments of more than 35,000 RIPs, Xitron is the largest independent Harlequin RIP developer in the market. The company's product portfolio includes Navigator DFE, Navigator Harlequin RIP, Sierra Adobe Workflow, and Variegator Variable Data Creator, among other offerings.

Navigator DFE

Xitron's scalable Navigator DFE, based on the accurate Harlequin software, is a print management system for digital presses that prepares printing jobs, keeps track of them, positions them on paper, controls the color, and reliably prints them at top speed. The Navigator DFE renders the incoming jobs, spreading the data across 16 RIPs housed on four PC platforms. The raster data is routed directly to the printheads without writing any data to disk (a security concern), allowing the press to run at incredible speeds, even with extremely high levels of variable data.

Navigator DFE's scalability allows for the print management system to supply printing data at the full rated speed of the press in real time, regardless of the number of inks, printheads, or size press involved. The Navigator DFE can be integrated with printing operators' hardware, software, or both, providing bi-directional communication and guaranteed full-speed data delivery.

Navigator Harlequin RIP and Workflow

Xitron's Navigator Harlequin RIP, a best-in-class implementation of Global Graphic's Harlequin RIP technology with over 35,000 installations worldwide, provides prepress environments with fast, predictable, and reliable interpretation of PostScript, PDF, and EPS format files. Building on this successful foundation, Navigator Workflow adds cross-platform functionality and user control from any Mac or PC workstation on the network. Protracted scalability enhances performance while maintaining the overall low cost of ownership.

Sierra Adobe Workflow

Sierra is built on Adobe's PDF Print Engine with cross media functionality in mind. The workflow solution is equally productive in commercial, digital, and hybrid applications with a strong feature set that includes Adobe in-RIP trapping, PDF pre-flighting, dynamic imposition, and advanced soft proofing in both 2D and 3D formats.

Sierra's client-server architecture provides a simple user interface for both Mac and PC workstations, allowing operators quick access to jobs and status as they move through each step of job preparation towards final output. Able to output to over 250 different output devices on today's market, Sierra handles complex job requirements with ease, resulting in fewer mistakes and increased productivity. Sierra offers true prepress independence in a scalable, affordable, and complete package, and has proven itself with over 300 installations worldwide and the user base continues to grow.

Variegator Variable Data Creator

Variegator is a simple, stand-alone application that makes variable data printing quick and profitable. Variegator unlocks the power of a digital press to produce high-profit variable data print jobs such as labels, hangtags, and flyers. Sophisticated layouts and multiple variations including images, bar codes, colors, and data are easily assembled within an intuitive GUI. Variegator makes running repeat jobs with new data much quicker and more automated, especially when paired with Xitron's Navigator workflow.

iC3D

iC3D is the first real-time all-in-one visualization design software that lets customers generate photorealistic 3D virtual mockups in real-time, allowing cartons, labels, flexibles, bottles, shrink sleeves, point of sale displays, and in-store visualization to be accurately rendered for design verification and e-commerce applications. Operating and rendering at unparalleled speeds, iC3D offers a unique level of packaging design versatility that delivers faster turnaround and up to 80% reduction in the design life-cycle. Figure 30 provides examples of IC3D-generated product mock-ups.

Figure 30
IC3D 3-D RENDERINGS

Source: IC3D.

In addition, iC3D offers the industry's largest library of modelling templates for digital packaging design and prototyping as well as an online viewing platform that allows designers, brands, and print providers to collaborate on new designs with accurate real-time 3D rendering.

The Company has already integrated IC3D's technology into HYBRID Software's PACKZ software offerings, allowing customers of its sister company to visualize 3D packaging in real time, and is working to integrate the 3D rendering platform into its DFEs and other software products. The Company believes that 3D rendering and visualization was a gap in its technology portfolio, and its acquisition of iC3D strengthens its 3D offering and closes the loop between the design of high-end labels and packaging and industrial print manufacturing.

Product Offerings

iC3D provides four different levels of its 3D rendering technology: iC3D Suite, the original all-in-one visualization software for packaging design on the fly; iC3D Designer, the essential software portfolio for packaging artworkers and designers; iC3D Modeller, the world's first dedicated toolkit for packaging model development; and iC3D Automate, an application that ensures iC3D can be seamlessly connected to any existing mixed workflow environment, like HYBRID CLOUDFLOW.

The original iC3D Suite, together with iC3D Designer and iC3D Modeller, delivers a range of modular solutions providing essential tools that target three key market segments of the packaging design industry: (1) CPG brands and retailers; (2) packaging designers; and (3) packaging engineers and converters. iC3D believes that its product offering can be used as an all-in-one design tool that gets brands to market faster, ensuring a smooth transition from concept to shelf in the shortest possible timeframe and shortening the package design cycle times.

IC3D Suite, the original product, features the full collection of modules and functionalities required to maximize the potential, capabilities, and applications of iC3D's 3-D rendering software. Some of the products key modules and features are:

- Patented Smart Mesh, which allows labels and artwork to be instantly slid over models without needing tedious texture co-ordinate mapping.

- Shape Modeler feature, which allows customers to design and generate asymmetric 3D models such as perfume bottles, trigger sprays, and molded containers, no matter how complex.

- Shrink and Shrink Correction, which enables users to accurately visualize how artwork or labels will distort when applied to shrink- and film-wrap products.

- Ray Tracing, which accurately simulates effects of light on virtual objects for photorealistic, ultra-high-resolution photo studio effects, while Light Map Editor re-creates studio lighting, editable highlights and shadows.

- Dynamic Backgrounds and Perspective Control, which allow real-time merging of 2D photo images with 3D designs to visualize the package design from every angle and in any setting, from store shelves to gondolas, chiller cabinets or freezer displays.

In addition to its full iC3D Suite product, iC3D Designer offers an affordable selection of the most essential and versatile capabilities of the original iC3D Suite product, designed as an easy to use, packaging design tool for Adobe Illustrator® artworkers and designers. iC3D Modeller combines all of the original product's features required for experimenting with packaging shapes, offering an inexpensive, modular solution to taking designs into new territory while learning on the job.

Investment Highlights

- Hybrid Software Group ("the Group" or "the Company") through its operating subsidiaries, develops enterprise software and hardware solutions for industrial digital inkjet printing.

- The Company's subsidiaries include: (1) Global Graphics Software: a developer of software components for high-speed digital printing; (2) HYBRID Software: an enterprise software developer for the label and packaging market; (3) Meteor Inkjet: a provider of industrial inkjet printhead driving solutions, electronics, and software; (4) Xitron: a developer of prepress workflow solutions; (5) ColorLogic: a developer of color management software technology; and (6) iC3D: a provider of 3D packaging and design tools.

- The Group's combined product portfolio has created a company unique in the industry: a single provider of all core technologies required to drive digital printing equipment. Because of this, the Group does not see itself as a holding company, but as an integrated group of six interrelated companies that allows it to leverage its offering to the market.

- The Group's strategic focus is to offer OEMs, print manufacturers, and print service providers integrated solutions covering all stages of a digital printing operation. The Company's customers include leading press manufacturers such as HP, Canon, Kodak, Epson, Ricoh, Durst, Roland, and Hymmen, among others, as well as hundreds of packaging printers and trade shops in Europe, North and South America, and Asia.

- The global digital printing market size was valued at $27.6 billion in 2022 and is projected to reach $42.7 billion by 2028. Inkjet adoption is increasing rapidly across multiple industry sectors as analog markets are converting to digital production. The Company plans to continue to grow revenue both organically and through acquisitions as it focuses on integrating its subsidiaries' combined offerings to strengthen its position as the only vertically integrated supplier to this market.

- The Company is focused on four strategic digital printing growth markets: labels and packaging, ceramics, textiles, and additive manufacturing (3D printing).

- One key element of the Company's competitive strategy is the ability of the Group's portfolio companies to collaborate and integrate each other's products and technologies into complete solutions to meet the demand of their respective customers. The Company believes that its ability to offer an integrated solution encompassing the software and related products and services needed for its clients' digital printing operations translates into a competitive advantage.

- A key project that demonstrates the potential of this collaboration efforts is the development of SmartDFE™, the first product to be co-developed by all Group companies. SmartDFE™ is a one-provider complete software solution designed drive a fully automated high-speed digital inkjet printing process.

- In 2021, despite the lingering effects of the COVID-19 pandemic, the Company was able to successfully conclude two major acquisitions, rebrand the Group to reflect its focus on digital printing software, and more than double its revenue from 2020.

- Group operating companies are award-winning technology leaders. ColorLogic and Global Graphics Software were awarded 2021 Pinnacle InterTech Awards from US industry body PRINTING United Alliance. The Group has been honored with six such awards in the last five years.

- The Company's acquisition strategy is to acquire companies that are technology leaders in their respective field in order to offer its customers a full line of software and critical technology needed for their industrial digital print manufacturing and production. With each acquisition, the Group strives to continue to add value for its potential customers by offering more of what they need to differentiate the product lines and to tap into new revenue streams.

- The Group believes that its 2021 acquisition of HYBRID Software was a critical step in shaping the Company's objective as it broadened its focus from its traditional OEM sales channel to high-margin enterprise software for both OEMs and end users. The Company believes that synergies between Group companies following strategic acquisitions made in 2021 will accelerate innovation and revenue growth.

- As of December 31, 2022, the Company's cash position was €6.3 million.

Competition

As the Company continues the development and expansion of its digital printing technologies, it may encounter competition from individual companies operating in the different market segments each of the Group's subsidiaries target, as well as other companies that offer more complete and integrated solutions affecting different stages of the digital printing process.

The sub-markets the Company targets are normally dominated by a large participants—such as Esko's prepress workflow solutions (competing with HYBRID Software) and Adobe's PDF Print Engine RIP (competing with Global Graphics' Harlequin products). However, the Company believes that in some cases, these products could be considered legacy products, with some companies becoming slower or unwilling to innovate and meet the new demands of the evolving digital printing market.

The group competitive position relies on achieving and maintaining technology leadership position of each of its companies in its respective market through investments in research and development of its software offerings, both in terms of updating current products as well as developing new ones. One key element of the Company's competitive strategy is the ability of the Group's portfolio companies to collaborate and integrate each other's products and technologies into complete solutions to meet the demand of the digital printing market.

The Company believes that its unique position as a single provider of all core technologies, both hardware and software, required to drive digital printing equipment, and its ability to offer an integrated solution covering the whole digital printing process, places the Company in a strong competitive position and allows it to take advantage of the growing digital printing marketplace. The summaries presented below are not intended to be an exhaustive collection of potential competitors to the Hybrid Software Group; however they are believed to be a representative of the type of competition the Company may face as it seeks to continue its growth within the digital printing market.

Adobe Inc. (ADBE-NASDAQ)

Adobe operates as a diversified software company worldwide through three segments: Digital Media, Digital Experience, and Publishing and Advertising. The Digital Media segment offers products, services, and solutions that enable individuals to create, publish, and promote content. The Digital Experience segment provides an integrated platform that enable brands and businesses to create and manage customer experiences, from analytics to commerce. The Publishing and Advertising segment offers products and services such as technical document publishing, and high-end printing. Its printing products include the Adobe PDF Print Engine, the industry's leading RIP. It powers workflows in every industry segment, driving over 200,000 presses and proofers around the globe. Continually optimized algorithms in PDF Print Engine take full advantage of the latest computer processors yielding the fastest platform for rendering complex graphics and variable printing. The Adobe PDF Engine versatility can be seen in the company's End-to-End Packaging Workflow product, which powers every step in the packaging process, from design to review to final production. The company was formerly known as Adobe Systems Incorporated and changed its name to Adobe Inc. in October 2018. Adobe Inc. was founded in 1982 and is headquartered in San Jose, California.

Caldera (Dover Corporation, DOV:NYSE)

Caldera develops high-quality software for empowering the digital print and cut industry serving the graphics and textile markets. The company helps its customers improve the efficiency of their printing production workflow with advanced prepress optimization, image processing, and color management tools. Caldera's product portfolio includes CalderaRIP 16 software, prepress automation PrimeCenter, print production workflow Nexio, and web-to-workflow SportsFactory Solution. The company was founded in 1991 and is headquartered in Strasbourg, France, with offices in China, Italy, and the U.S. In 2017, Caldera joined Dover Digital Printing, a branch of the Dover Group.

Electronics For Imaging, Inc. (EFI)

EFI™ is a global technology company, leading the worldwide transformation from analog to digital imaging by developing breakthrough technologies for the manufacturing of signage, packaging, textiles, ceramic tiles, building materials, and personalized documents. The company's solutions integrate with a wide range of printers, inks, digital front ends, and a comprehensive business and production workflow suite that transforms and streamlines the entire production process. EFI's products include its line of Fiery® DFEs sold through its partners, market-leading companies in the print manufacturing industry, Fiery® workflow suites that streamline and automate printing workflows, as well as Fiery® Color Profiler Suites that are fully integrated into Fiery digital front ends to provide color management capabilities. EFI was founded in 1988 and is headquartered in Freemont, California.

Ergosoft AG

Ergosoft is a leading developer of software solutions for over 25 years in the high-end digital printing community. The company's mission is to provide intuitive, high fidelity digital printing solutions to the demanding imaging professional. Ergosoft RIP brings the highest productivity, quality control, and a broad variety of color, production controlling and automation tools to a printing facility. The Ergosoft 16 RIP Software is a more complete production and workflow suite, with an emphasis on making the job of the RIP operator more efficient. The company also offers Delta Automation, a powerful automation interface for the digital inkjet printing workflow, and Ergostream, a Web-to-print application. The Company is headquartered in Altnau, Switzerland.

Esko-Graphics BV (Danaher Corporation, DHR:NYSE)

Esko, a Danaher company, is a global provider of integrated software and hardware solutions for the packaging and printing industry. The Esko product portfolio supports and manages the packaging print processes for brand owners, designers, premedia and trade shops, packaging manufacturers and converters. Esko's portfolio of integrated software solutions addresses needs in the areas of design, prepress, workflow automation, color management, and supply chain collaboration used for packaging, labels, displays and signs. Esko's product portfolio includes packaging prepress solutions such as ArtPro+ PDF editor, Automation Engine prepress server, and Color Engine color management tool. Esko also offers printing products through its subsidiaries. For example, Blue Software Enterprises' SaaS label and artwork management applications simplify the label and packaging process through automated workflow templates, online proofing tools, and digital asset management. According to Esko, packaging for 9 out of 10 major brands is produced by Esko customers. Headquartered in Gent, Belgium, Esko operates worldwide with a unique focus on packaging and labels.

Global Inkjet Systems (GIS) (Nano Dimension, NNDM-NASDAQ)

GIS, a Nano Dimension division, provides complete solutions for inkjet system developers-high performance RIP software, drive electronics & ink supply components. The company software offering, its Atlas® user interface and control software, is a unique, modular software suite to manage the entire data path from image to print, along with sub-systems and peripherals necessary for maximum print performance. GIS printhead controllers support a wide range of printheads including Epson, Fujifilm Dimatix, Konica Minolta, Kyocera, Ricoh, Seiko Instruments, Toshiba Tec, and Xaar. Global Inkjet Systems is headquartered in Cambridge, UK.

GMG color

GMG is the leading developer of high-end color management solutions. With more than 35 years of experience in managing color, GMG is a pioneer in its field of color management. GMG's focus is on delivering complete solutions to standardize color management workflows across various printing methods and varying substrates. GMG has more than 12,000 color management system installations globally. GMG's clients range from creative agencies, prepress companies, offset-, flexo- packaging and digital- as well as gravure- and large format-printers to name just a few. The company offers a full suite of color management tools, including ColorProof, ColorServer, ColorPlugin (for packaging), and ColorCard (color reference for packaging printing). The company was founded 1984 and is headquartered in Tübingen, Germany.

Onyx Graphics, Inc.

Onyx Graphics develops and markets powerful, reliable, rip and print workflow software solutions for wide format printing that helps customers increase productivity, reduce costs, and gain a competitive edge with superior software solutions for the print industry. The company's products include its RIP offerings—Onyx Go, Onyx PosterShop, and Onyx RIPCenter—as well as integrated solutions ONYX Thrive, which enables end-to-end PDF workflow from file submission through color management, printing, and cutting; and ONYX TruFit artificial intelligence engine for optimal media utilization. The company also offers ONYX Color, a color engine and integrated color management tools. Onyx Graphics' new subscription RIP software ONYX Go was named by the PRINTING United Alliance as the Best RIP Software of 2021. Onyx Graphics software is used in over 100 countries around the world, and the company partners with over 120 OEMs. Onyx Graphics was founded in 1989 and is headquartered in Salt Lake City, UT.

Xaar plc (XAR-LON)

Xaar is a world leader in the development of inkjet technology and manufacturer of piezoelectric drop-on-demand industrial inkjet printheads and print engines. The company's technology is used in a wide range of manufacturing applications, including graphics, labelling, direct-to-shape, packaging, product decoration, ceramic tile and glass decoration, décor, and outer case coding, as well as printing with specialist functional fluids for advanced manufacturing techniques. Xaar is based in Cambridge, UK.

Historical Financial Results

Figures 31, 32, and 33 (pages 61-63) provide a summary of Hybrid Software Group's key financial statements for the year ended December 31, 2022. Please refer to Notes in the Company's annual report, https://www.hybridsoftware.group/application/files/9316/8120/3602/2022_HYSGPLC_annual_report_FINAL.pdf.

Figure 31
HYBRID SOFTWARE GROUP PLC
CONSOLIDATED STATEMENT OF COMPREHENSIVE INCOME

		For the year ended 31 December	
In thousands of euros	**Note**	**2022**	**2021**
Continuing operations			
Revenue	7	46,693	48,562
Cost of sales		(7,388)	(8,475)
Gross profit		39,305	40,087
Selling, general and administrative expenses		(26,841)	(22,457)
Research and development expenses		(13,488)	(12,713)
Other operating expenses	8	(3)	(180)
Other income	9	3,301	33
Operating profit		2,274	4,770
Finance income	14	43	870
Finance expenses	14	(424)	(466)
Net finance (expenses)/income		(381)	404
Foreign currency exchange losses		(58)	(609)
Profit before tax		1,835	4,565
Tax (charge)/credit	19	(535)	349
Profit from continuing operations		1,300	4,914
Other comprehensive (loss)/income			
Items that may be reclassified subsequently to profit or loss:			
Foreign currency translation differences		(282)	2,108
Other comprehensive (loss)/income for the year		(282)	2,108
Total comprehensive income attributable to equity holders		1,018	7,022
Earnings per ordinary share			
Basic earnings per share (euro)	29	0.04	0.15
Diluted earnings per share (euro)	29	0.04	0.15

Source: Hybrid Software Group PLC

Figure 32

HYBRID SOFTWARE GROUP PLC

CONSOLIDATED STATEMENT OF FINANCIAL POSITION

		For the year ended 31 December	
In thousands of euros	Note	2022	2021
ASSETS			
Non-current assets			
Property, plant and equipment	15	1,702	1,662
Right-of-use assets	26	2,912	3,606
Other intangible assets	16	43,959	45,205
Goodwill	17	65,927	64,678
Financial assets	18	955	935
Deferred tax assets	19	2,069	2,236
Trade and other receivables due after more than one year	20	3,718	3,682
Total non-current assets		121,242	122,004
Current assets			
Inventories	21	3,913	2,308
Current tax assets		-	71
Trade and other receivables	22	10,893	10,915
Other current assets	23	425	297
Prepayments		1,611	1,684
Cash and cash equivalents	24	6,317	9,234
Total current assets		23,159	24,509
TOTAL ASSETS		144,401	146,513
EQUITY AND LIABILITIES			
Equity attributable to owners of the Parent			
Share capital	25	13,164	13,164
Share premium	25	1,979	1,979
Merger reserve	25	67,015	67,015
Treasury shares	25	(161)	(202)
Retained earnings		39,847	38,624
Foreign currency translation reserve		(10,911)	(10,629)
Total equity		110,933	109,951
Non-current liabilities			
Deferred tax liabilities	19	8,664	9,646
Lease liabilities	26	2,560	3,060
Accrued liabilities		1,147	1,316
Other liabilities	27	3,931	7,407
Contract liabilities	7,28	44	427
Total non-current liabilities		16,346	21,856
Current liabilities			
Current tax liabilities		1,366	821
Trade and other payables		2,919	1,931
Lease liabilities	26	834	761
Accrued liabilities		2,287	4,261
Other liabilities	27	5,881	3,767
Contract liabilities	7,28	3,835	3,165
Total current liabilities		17,122	14,706
Total liabilities		33,468	36,562
TOTAL LIABILITIES AND SHAREHOLDERS' EQUITY		144,401	146,513

Source: Hybrid Software Group PLC

Figure 33
HYBRID SOFTWARE GROUP PLC
CONSOLIDATED STATEMENT OF CASH FLOWS

		For the year ended 31 December	
In thousands of euros	**Note**	**2022**	2021
Cash flows from operating activities:			
Net profit for the year		**1,300**	4,914
Adjustments to reconcile net profit to net cash:			
- Depreciation of property, plant, equipment and right-of-use assets	15,26	**1,559**	1,394
- Amortisation of other intangible assets	16	**7,111**	5,789
- Share-based remuneration expenses	30	**-**	15
- Gain on disposal of IPv4 addresses	9	**(3,297)**	-
- Net finance expense, net of loan forgiveness	14	**381**	463
- Net foreign currency exchange losses/(gains)		**58**	609
- Tax charge/(benefit)	19	**535**	(349)
- Change in fair value of contingent consideration	9,27	**(4)**	(3)
- Other items		**104**	(439)
Total adjustments to net profit		**6,447**	7,479
Change in operating assets and liabilities:			
- Financial assets	18	**(20)**	(910)
- Inventories	21	**(1,605)**	(1,117)
- Trade and other receivables	20,22	**(295)**	(6,116)
- Other current assets	23	**(128)**	(78)
- Prepayments		**73**	(629)
- Trade and other payables		**988**	1,167
- Accrued liabilities		**(2,143)**	3,293
- Contract liabilities	28	**287**	2,023
Total change in operating assets and liabilities		**(2,843)**	(2,367)
Cash generated from operating activities		**4,904**	10,026
Interest received	14	**43**	3
Interest paid	14	**(424)**	(466)
Taxes paid		**(504)**	(107)
Net cash flow from operating activities		**4,019**	9,456
Cash flows from investing activities:			
Capital expenditures on property, plant & equipment	15	**(805)**	(1,254)
Capital expenditures on other intangible assets	16	**(75)**	(77)
Capitalisation of development expenses	16	**(3,981)**	(3,396)
Proceeds on disposal of discontinued operation, net of cash disposed of		**500**	2,000
Proceeds on disposal of IPv4 addresses	9	**3,297**	-
Acquisition, net of cash acquired	34	**(3,430)**	(780)
Net cash flow used in investing activities		**(4,494)**	(3,507)
Cash flows from financing activities:			
Repayment against loans and borrowings	27	**(307)**	(2,700)
Deferred consideration paid	27	**(310)**	-
Contingent consideration paid	27	**(715)**	(492)
Principal payments on lease liabilities	26	**(935)**	(849)
Net cash flow used in financing activities		**(2,267)**	(4,041)
Net (decrease)/increase in cash		**(2,742)**	1,908
Cash and cash equivalents at 1 January		**9,234**	6,855
Effect of exchange rate fluctuations on cash at 1 January		**(175)**	471
Cash and cash equivalents at 31 December		**6,317**	9,234

Source: Hybrid Software Group PLC

Recent Events

05/04/2023—Hybrid Software Group PLC provided a trading update for the three months ended 31 March 2023. The following information is unaudited. Revenue for the period was €13.96 million (2022: €12.45 million). EBITDA for the period was €3.25 million, or 23% of revenue (2022: €2.74 million, 22% of revenue).

05/03/2023—Meteor Inkjet Ltd, leading supplier of electronics, software, tools and services for industrial inkjet, was granted a U.S. patent for "Methods and Systems for Shell Formation in 3D Printing" (United States Patent No. 11,625,902) by the United States Patent and Trademark Office. Meteor is a wholly-owned subsidiary of Hybrid Software Group PLC.

05/03/2023—ColorLogic GmbH, a subsidiary of Hybrid Software Group, announced the release of ZePrA 11 Smart Color Server. The new software version focuses on optimizing and automating printing data to deliver smoother Multicolor workflows and high-quality spot color conversions for better sustainability.

04/27/2023—HYBRID Software announced MyCLOUDFLOW, enterprise workflow software delivered as a leading edge Software-as-a-Service (SaaS) solution. MyCLOUDFLOW presents customers with rapid, hassle-free access to their award-winning CLOUDFLOW enterprise workflow software. MyCLOUDFLOW is hosted by HYBRID Software on the fastest cloud computing platforms to bring convenience and security to the label & packaging industry, without requiring in-house IT support or heavy capital investment.

04/18/2023—Hybrid Software Group PLC announced details of its Annual General Meeting. Notice is hereby given that the Annual General Meeting ("AGM") of Hybrid Software Group PLC will be held by video conference on Wednesday 24 May 2023 at 15:00 hrs (CEST).

04/12/2023—Hybrid Software Group PLC announced that it has published its annual report and financial statements for the financial year ended 31 December 2022. The full document is available to download from the financial reports section of the Company's web site at: https://www.hybridsoftware.group/investors/financial-reports.

04/05/2023—HYBRID Software has created an internal startup unit within its Ghent office to develop and advance the Company's software solutions for the 3D and additive manufacturing sector. The unit plans to develop new application-specific solutions and will initially utilize the existing products and expertise throughout the Company to create new 3D applications. The unit is headed up by Kris Binon, the former director of Flam3D, the Benelux Additive Manufacturing Association.

04/04/2023—ColorLogic GmbH announced that they have been named the recipient of the Innovation and Research Award as part of the 2023 Barbieri Excellence Awards. The awards recognize three organizations that have demonstrated excellence in color measurement, customer experience, operational business results, digital print integration, and customer advocacy.

03/29/2023—Hybrid Software Group announced that it had amended the date of publication of its annual report and financial statements for the year ending 31 December 2022 ("Annual Report") to 12 April 2023.

03/07/2023—Meteor Inkjet, a leading supplier of electronics, software, tools, and services for industrial inkjet, announced the expansion of its product portfolio with drive electronics and software for Ricoh's TH6310F industrial inkjet printhead. The TH6310F is Ricoh's latest printhead to use highly-integrated technology, enabling precise jetting even with a large gap. Compatible with aqueous, UV and solvent inks, and incorporating a unique ink recirculation system, the TH6310F is ideal for single pass packaging and textile applications, as well as high-end scanning systems requiring many printheads.

02/27/2023—Xitron, a subsidiary of Hybrid Software Group and the developer of Harlequin-based Navigator RIP and workflow solutions, announced a collaboration with Ultimate TechnoGraphics of Montreal, Canada. Ultimate's Impostrip® software will now be the imposition option incorporated into Xitron's popular Navigator Workflow. According to Xitron, Impostrip® offers broad functionality with various levels of automation, making it the optimum imposition choice for pairing with the well-established Navigator name. Ultimate Technographics is a recognized leader in imposition and finishing solutions, having pioneered digital imposition as a desktop application in 1989.

01/19/2023—HYBRID Software, a leading enterprise software company for the label and packaging industry, announced the release of PACKZ and STEPZ 8.5 PDF production editing software. This is a major release for both products containing hundreds of new features and enhancements that meet the challenges of professional packaging prepress and illustrate once again the power of innovation.

12/28/2022—Hybrid Software Group PLC announced that the Prospectus for the January 2021 acquisition of HYBRID Software has been approved for public release and is available at https://www.hybridsoftware.group/investors/hybrid-software-acquisition. The 21,074,030 new shares that were issued as consideration for the purchase of HYBRID Software will be listed for trading on Euronext Brussels on 28 December 2022. This marks the conclusion of the final step in the successful acquisition of HYBRID Software.

12/13/2022—ColorLogic GmbH, a subsidiary of Hybrid Software Group, has released ColorAnt 9, an advanced color measurement and correction tool that creates, analyzes, and optimizes measurement data. ColorAnt 9 enables automatic processing and optimization of measurement data with custom features and options.

12/06/2022—Meteor Inkjet welcomed Namrata Sharma as the company's Sales Associate in India. In recognition of the immense opportunity for industrial inkjet in India, Meteor is gearing up for growth in this important region. Based in Gurugram, Haryana, Namrata Sharma brings a wealth of product, marketing, and sales experience to the role of Meteor Sales Associate, having worked in the digital printing industry in India since 2004.

12/01/2022—Hybrid Software Group completed the acquisition of the technology and intellectual property of Quadraxis, a French company which developed pioneering technology in 3D scanning and image processing. After Quadraxis went into receivership, HYBRID Software was the successful bidder to acquire its intellectual property, including software source codes and trade names. The acquisition strengthens Hybrid Software Group's offering in 3D and additive manufacturing solutions. The Group plans to integrate Quadraxis software into its extensive portfolio which includes other 3D applications, such as iC3D.

11/29/2022—Meteor Inkjet Ltd was granted a U.S. patent for "Inkjet nozzle status detection" (United States Patent No. 11,504,966) by the United States Patent and Trademark Office. The patent covers a system and method for determining, in real-time, the operational status of a nozzle in a piezoelectric industrial inkjet printhead.

11/17/2022—Xitron, a subsidiary of Hybrid Software Group, is celebrating its 45th year of supplying innovative tools to the printing industry. The company started in 1977 with the invention of an interface that tied newspaper editorial systems to high-speed typesetters. Since then, it has evolved into a team of specialists developing software solutions for almost all printing markets, including RIPs, workflows, computer-to-plate interfaces, DFE's, and machine controls for high-speed inkjet presses.

11/11/2022—Hybrid Software Groups plans to showcase its complete range of solutions at IGAS, the international graphic arts exhibition at the Tokyo Big Sight in Japan (November 24-28, 2022). Group companies – ColorLogic GmbH, Global Graphics Software, iC3D, HYBRID Software, Meteor Inkjet and Xitron – are exhibiting together to demonstrate their broad spectrum of packaging, digital and commercial print applications, including the co-developed SmartDFE™ digital front end for digital presses, designed to be part of a fully automated manufacturing system supporting Industry 4.0.

10/18/2022—Xitron, a subsidiary of Hybrid Software Group and the developer of Harlequin-based Navigator RIP and workflow products, was selected as Memjet's sole developer for the Digital Front End (DFE) of two soon-to-be announced digital print engines. Navigator's speed, and its level of integration allowing to fully control all press functionalities were key factors in the partnership.

10/14/2022—Hybrid Software, the innovative software solutions provider for packaging, labels, and print, showcased its products along with Hybrid Software Group's sister companies' technologies (Global Graphics Software, iC3D, ColorLogic, Xitron, and Meteor Inkjet), at Printing United Expo, October 2022, in the Las Vegas Convention Center.

10/05/2022—Hybrid Software Group enjoyed brisk business at Labelexpo Americas, the first major industry event where all of the companies in the Group exhibited together. Group companies demonstrated new products that they had pre-announced before Labelexpo, generating a record level of interest on the booth. The Company booked more than $690,000 in business from label printers in Latin America, and expects additional orders from its OEM partners as their interest for the SmartDFE™ solution for industrial inkjet printing was very high.

09/22/2022—ColorLogic GmbH released its latest profiling solution CoPrA 9, a control center for color profiling. The profiling engine's new version contains many new features and improvements of all modules. Major changes are supported in ink-splitting, 3D-view, and profile updating.

09/01/2022—Global Graphics Software, a subsidiary of Hybrid Software Group, will be launching SmartMedia at Labelexpo Americas 2022 (September 13-15, 2022). SmartMedia, a major upgrade to the SmartDFE digital front end for label and packaging presses, removes complexity from the process of color profiling to ensure the best quality and color output from the press. SmartMedia technology creates a library of predefined media definitions describing all the settings needed to get perfect color and quality.

08/10/2022— Hybrid Software Group appointed Joachim Van Hemelen as its new CFO and company director following Graeme Huttley's decision to take up a new role in private equity. Joachim is currently the CFO of HYBRID Software, a post he has held since 2016. Peter Goodwin is being promoted from group financial controller to group finance director and company secretary, and Floris De Ruyck, currently the Group's legal counsel, will be responsible for market relations and compliance. The team will take up their new roles from September 1st, 2022.

08/03/2022—Hybrid Software Group's Global Graphics was granted a U.S. patent for methods to add late breaking data into PDF design files prior to print. The patent, "Methods and systems for indicating and replacing missing element(s) in print job files prior to printing" (United States Patent No. 11334302B1), describes how a PDF file may be delivered containing placeholders for data that is not available at the time at which that PDF was created, or not available to the person creating the PDF file.

07/26/2022—Hybrid Software Group will showcase its recent acquisition of iC3D by showing 3-D visualization throughout the entire prepress process at Labelexpo Americas 2022, September 13-15 in Rosemont, IL. iC3D will join a number of its Hybrid Software Group sister companies, including HYBRID Software, Global Graphics Software, ColorLogic, Xitron, and Meteor Inkjet. iC3D is an all-in-one visualization software package that lets users generate live 3D virtual mockups on-the-fly. One of the highlights will be the integration of PACKZ and iC3D, allowing HYBRID Software users to visualize 3D packaging in real time, from labels and flexible packaging to shrink wrap products.

07/14/2022—Meteor Inkjet announced the development of a new electronics platform to avoid reliance on key computer chips that are in worldwide short supply in 2022. Meteor's Print Controller Card (PCC) is used by hundreds of OEM customers around the world to synchronize image data sent by a PC to arrays of printheads, including those by Epson, FUJIFILM, Dimatix, Konica, Minolta, Kyocera, Seiko Instruments, Toshiba TEC, Xaar, and Xerox. The PCC was reliant upon an electronic component which is in critically short supply, potentially delaying more than £4 million (UK pounds) of printhead drive electronics. Anticipating these long-term supply issues, Meteor embarked upon a fast-track project to re-architect the PCC. In quick response to the diminishing availability of alternative components, Meteor identified a suitable replacement chip that was freely available in high volume, taking the unusual step to acquire more than a year's supply of the new chip before even starting

development. The risk of this decision paid off, and Meteor's new PCC2 print controller is now shipping in production quantities.

07/04/2022—HYBRID Software released Version 8 of its PACKZ and STEPZ native PDF editors, featuring automated action lists and new prepress tools for the demands of digitally printed flexible packaging. PACKZ and STEPZ support flexo and digital printing of flexible packaging, with more than 4,000 copies used by packaging printers and trade shops worldwide.

06/30/2022—Global Graphics Software has been granted a U.S. patent for "Methods and systems for organizing variable data documents including those with long repeat lengths" (United States Patent No. 11,334,303) by the U.S. Patent and Trademark Office. The patent covers how the control system of a digital printer decides which pages to send to which RIP in a RIP farm—where multiple RIPs are running simultaneously—to optimize their delivery.

05/12/2022—Hybrid Software Group is exhibiting at FESPA in Berlin (May 31 to June 3, 2022) to showcase solutions for the digital production of textiles, packaging, décor, wide format, and specialty graphics. The exhibit will feature a demonstration of the SmartDFE (digital front end), a full software and hardware stack that delivers mass customization at mass production prices by adding the power of inkjet printing into the smart factory. It is the first product co-developed by companies in the Hybrid Software Group: ColorLogic GmbH, iC3D, HYBRID Software, Global Graphics Software, Meteor Inkjet, and Xitron. The Company will also showcase solutions from Global Graphics Software, developers of the Harlequin RIP®, ScreenPro™, and PrintFlat™; and Meteor Inkjet, a leading supplier of industrial inkjet printhead electronics, software, tools and services.

05/05/2022—ColorLogic, a subsidiary of Hybrid Software Group, released ZePrA 10, the smart color server that optimizes and automates printing data. This is the anticipated sequel to the 2021 Pinnacle Product Award winner, ZePrA 9 Smart Color Server. Among the most important innovations are the improved and expanded automation options. The new version allows for almost every function in ZePrA to be controlled remotely without the need to intervene in ZePrA's user interface.

04/27/2022—Global Graphics Software partnered with APS Engineering to create an OPC UA-enabled ink delivery system to communicate with any aspect of an industrial inkjet ecosystem. Its development means that the printer can be monitored remotely from an iPad or from a browser on the desktop, or that data can be stored from the ink delivery system in a historical archive database to enable other functions like predictive maintenance

04/21/2022—Announced that it published its annual report and financial statements for the financial year ended 31 December 2021.The full document is available to download from the financial reports section of the Company's web site at: https://www.hybridsoftware.group/investors/financial-reports.

04/14/2022—Xitron announced the successful installation of the scalable Navigator DFE at IGT's Principal Instant Ticket Printing Facility in Lakeland, Florida. Xitron, Memjet, and Paper Converting Machine Company (PCMC) partnered on this first-of-its-kind application. An innovator in instant ticket games, IGT sought alternatives to current, single-color technology used to print scratch-off (instant) lottery tickets, ultimately deciding on a full-color digital imaging solution.

03/15/2022—Hybrid Software Group announced that on March 14, 2022, it acquired the business and assets related to iC3D from Creative Edge Software LLC. The iC3D software suite generates photorealistic 3D virtual mock-ups on the fly, allowing cartons, labels, flexibles, bottles, shrink sleeves, point of sale displays, and in-store visualization to be accurately rendered for design verification and e-commerce applications. In addition, iC3D offers the industry's largest library of modelling templates for digital packaging design and prototyping as well as an online viewing platform which allows designers, brands, and print providers to collaborate on new designs with accurate real-time 3D rendering.

03/08/2022—Announced that ColorLogic celebrated its 20th anniversary. On March 12, 2002, founder Barbara Braun-Metz started the business in an expanded basement in her home. Many years of product development experience, color management, printing and prepress know-how paired with ideas on optimizing color reproduction were the basis for founding ColorLogic.

02/22/2022—All five companies that make up Hybrid Software Group will be exhibiting together for the first time at Labelexpo Europe (Brussels Expo, April 26-29, 2022) showing their full range of solutions for both analog and digital label production. Hybrid Software Group CEO Mike Rottenborn will be presenting at the Labelexpo Masterclass on Industry 4.0. He will be covering pre-production automation from pre-flight to imposition, automating color management across multiple substrates, and integrating prepress with press and factory management systems.

02/10/2022—Global Graphics Software was granted a U.S. patent for "Systems and methods for printer density compensation and stability" (Patent 11,167,549) by the U.S. Patent and Trademark Office. The patent relates to the technology which underlies PrintFlat™, Global Graphics' groundbreaking software that improves uniformity and removes unwanted banding from inkjet output, enabling digital production of a wide range of products, including wide format graphics, flooring and décor, laminates, and packaging.

02/03/2022—Global Graphics Software will be presenting SmartDFE™, a full software and hardware stack that adds print to the fully automated smart factory, at InPrint Munich. Co-developed by Hybrid Software Group companies—ColorLogic, Global Graphics Software, HYBRID Software, Meteor Inkjet and Xitron—SmartDFE provides everything needed to add print to an industrial production environment. It supports Industry 4.0 telematics and MIS integration and includes connectivity with automated manufacturing lines via OPC UA. SmartDFE brings together the creation of optimized print-ready PDF files; workflow and job automation to connect with enterprise IT systems; RIPping; screening; optimized image quality; and, via Harlequin Direct™, it drives the print data directly to the printheads at blistering speeds through Meteor software and electronics, or through Xitron's Navigator DFE platform. It meets the need for fully variable data, gives complete control of the print workflow, and provides valuable information for QA and inspection, press maintenance, and stock control.

12/21/2021—Hybrid Software Group partnered with Ecologi, the platform that facilitates the funding of carbon offset projects and tree planting around the world, to offset its carbon footprint. Since October 2021, Hybrid Software Group has been working towards compensating for the environmental footprint of every employee in their work and personal life. At work, the Group is implementing policies to reduce Scope 1 and Scope 2 footprint, such as sourcing renewable energy and low-carbon travel, and is talking with supply chains to measure and push down on Scope 3 carbon footprint. Through the partnership with Ecologi, the Group now offsets the carbon footprint of all Group employees, whether at home or at work.

12/09/2021—ColorLogic released ColorAnt 8, an advanced color measurement and correction tool that creates, analyzes and optimizes measurement data. ColorAnt 8 brings overall new capabilities and enhancements to the features used every day.

11/11/2021—ColorLogic announced that Thorsten Braun, Chief Technology Officer of ColorLogic, was the 2021 recipient of the Joe Clarke Innovator Award in the category for Business Innovation and Software Technology. The recipients of this prestigious award have exhibited the Joe Clarke spirit of innovation through inventing or renovating existing products, processes, or methodologies that have improved the print industry.

10/28/2021—Hybrid Software Group announced that on October 27, 2021, it acquired the entire issued share capital of ColorLogic GmbH, a company with its registered office in Rheine, Germany. ColorLogic was founded in 2002 and has developed an extensive portfolio of color profiling and conversion software, recently winning the 2021 Pinnacle Product Award from the PRINTING United. Its products are sold worldwide to both end users with demanding requirements for color quality, as well as to Original Equipment Manufacturers (OEMs) of printing equipment.

10/20/2021—Hybrid Software Group celebrated its change of name and corporate identity by ringing the bell to open trading at the Euronext Stock Exchange in Brussels. Hybrid Software Group changed its name from Global Graphics PLC following shareholder approval on October 13, 2021. The new name underlines the Group's position as a software company providing innovative technology for industrial print manufacturing processes at a time when industry is accelerating towards mass customization, smart factories, and Industry 4.0. The Group's solutions are hybrid because they meet the needs of analog and digital production processes and because they integrate both software and printhead drive electronics.

10/05/2021—ColorLogic announced that the company was awarded the 2021 Pinnacle Product Award for ZePrA 9 Smart Color Server. PRINTING United Alliance has selected 27 recipients to receive the 2021 Pinnacle Product Award. This award honors 58 exemplary technologies and products from leading companies across the printing industry.

09/27/2021—Global Graphics Software, the developer of the Harlequin RIP®, was awarded a 2021 Pinnacle InterTech Award from PRINTING United Alliance, for Direct™, the software that drives data directly to inkjet printhead electronics giving unprecedented speed and image quality. It is the company's third InterTech award in four years. The Pinnacle InterTech Awards from PRINTING United Alliance honors the development of innovative technologies judged to be truly innovative and expected to have a significant impact on graphic communications and related industries.

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Risks and Disclosures

This Executive Informational Overview® (EIO) has been prepared by Hybrid Software Group ("the Group" or "the Company") with the assistance of Crystal Research Associates, LLC ("CRA") based upon information provided by the Company. CRA has not independently verified such information. Some of the information in this EIO relates to future events or future business and financial performance. Such statements constitute forward-looking information within the meaning of the Private Securities Litigation Act of 1995. Such statements can only be predictions and the actual events or results may differ from those discussed due to the risks described in Hybrid Software Group statements on forms filed from time to time.

The content of this report with respect to Hybrid Software Group has been compiled primarily from information available to the public released by the Company through news releases and other filings. Hybrid Software Group is solely responsible for the accuracy of this information. Information as to other companies has been prepared from publicly available information and has not been independently verified by Hybrid Software Group or CRA. Certain summaries of activities and outcomes have been condensed to aid the reader in gaining a general understanding. CRA assumes no responsibility to update the information contained in this report. In addition, for year one of its agreement, CRA has been compensated by the Company in cash of forty thousand dollars for its services in creating this report and for quarterly updates.

Investors should carefully consider the risks and information about Hybrid Software Group business, as described below. Investors should not interpret the order in which considerations are presented in this or other filings as an indication of their relative importance. In addition, the risks and uncertainties overviewed in the accompanying section are not the only risks that the Company faces. Additional risks and uncertainties not presently known to Hybrid Software Group or that it currently believes to be immaterial may also adversely affect the Company's business. If any of such risks and uncertainties develops into an actual event, Hybrid Software Group's business, financial condition, and results of operations could be materially and adversely affected.

This report is published solely for information purposes and is not to be construed as an offer to sell or the solicitation of an offer to buy any security in any state. Past performance does not guarantee future performance. For more complete information about the risks involved in an investment in the Company as well as for copies of this report, please contact Hybrid Software Group by calling +44 (0) 1954 283100.

The following risks are derived from the Company's annual report for the year ended December 31, 2021.

PRINCIPAL RISKS AND UNCERTAINTIES

The Group does not have a dedicated risk management or internal audit function, consequently the risk management review is carried out by the executive management team. The risks and uncertainties described below are not necessarily set out in order of priority or potential impact on the Group's financial statements.

Russia's invasion of Ukraine

The Group does not have any operations in Ukraine and does not generate any significant revenue from either Russia or Ukraine, thus is not directly affected by the current situation. The political uncertainty from this situation is a concern for the board and it continues to monitor it closely. If the situation were to worsen and spread to other countries, there could be a negative impact on the demand for the Group's products and services, which could impact the Group's revenue and profitability.

RISKS RELATED TO THE GROUP'S FINANCIAL SITUATION

The Group's business, results of operations, and financial condition could be materially affected by global economic and political conditions.

The Group sells its products and services throughout the world and economic conditions that affect the global economy or regional economies may significantly impact the demand for printing technology and therefore for the Group's products and services.

The current uncertainty from the COVID-19 pandemic regarding the strength and longevity of economic recovery, international trade and the pace of growth in the countries and industries in which the Group's existing and prospective customers and suppliers operate may negatively affect the level of demand for the Group's products and services. A reduced demand for the Group's products and services will reduce the Group's revenue and profitability.

A significant portion of the Group's revenue comes from a small number of large customers.

The Group is dependent on a relatively small number of large customers for a significant portion of its revenue. For the year ended December 31, 2021, the Group's ten largest customers represented 42.3% (2020: 52.5%) of the Group's revenue, with the single largest customer representing 13.9% (2020: 22.4%) of the Group's revenue. If one or more of these customers choose to source the products or services supplied by the Group from an alternative vendor the effect on revenue, and therefore profitability, could be material.

Source dependency might lead to higher prices to be paid to suppliers or disruption in the production of certain of the Groups' products and therefore impact the Group's business activities and profitability.

On December 5, 2016, the Company announced that it had acquired the entire issued share capital of TTP Meteor Limited ("Meteor"), specialists in printhead driver systems, from TTP Group PLC ("TTP") based near Cambridge, UK. Following the acquisition of Meteor in 2016, the Group supplies electronic controls to device manufacturers.

These products include some key electronic components which are subject to shortage of supply from time to time. There is a risk that some of the Group's products could not be manufactured if there is a disruption to that supply, therefore customer orders could be delayed or cancelled, which could result in a reduction in revenue and profits in the Group. Revenue for these products is reported in the Group's Printhead Solutions segment and for the year ended December 31, 2021, revenue from external customers for that segment was €13.98 million (2020: €9.82 million), which is equal to 28.8% (2020: 43.7%) of the Group's total revenue.

Certain contractual arrangements with customers contain extended payment terms, which lead to an increased credit risk on such customers.

The Group sells its products and services to a range of established customers and generally takes payments in advance for the sale of physical goods in the Printhead Solutions segment, thus minimizing the credit risk. In the Printing Software and Enterprise Software segments, certain licensing arrangements allow, however, for payments to be made over an extended period of time, up to five years in some instances. These extended payment terms increase the credit risk and the chance that the Group may not be paid. During the year ended December 31, 2021, €2.70 million (2020: €2.30 million) of revenue was recognized in respect of a licensing arrangement that includes extended payment terms of up to 5 years. To date, for licensing arrangements where revenue has been recognized in previous years, all contractually due payments have been received in accordance with the contractual terms.

The COVID-19 pandemic increased the likelihood of the materialization of such a risk, as the liquidity position of certain customers could be affected by the consequences of the pandemic and the payment behavior of certain customers could change.

RISKS RELATED TO THE GROUP'S BUSINESS ACTIVITIES AND INDUSTRY

The Group is dependent on the graphic arts and digital printing industries.

The Group derives all of its revenues from products and services provided to the graphic arts and digital printing industries. Accordingly, the Group's future success significantly depends upon the continued demand for its products within such industries. The Board believes that an important factor to consider is the substantial change in the graphic arts and digital printing industries, as evidenced by sustained growth in digital printing and low growth in conventional printing. The shift in inkjet printing technology opens up opportunities to the Group when manufacturers develop new products. If this environment of change were to slow, the Group could experience reduced demand for its products, which could have a material adverse effect on its operational results.

There is no assurance that the Group will identify and complete suitable acquisition opportunities, on which its growth strategy heavily relies, in a timely manner or at all.

The Group operates in an industry where customer acquisition costs, as well as costs for such customers to switch between suppliers, are significant. Therefore, the Group significantly focusses on strategic acquisitions to achieve growth. The success of the Company's business strategy is highly dependent on its ability to identify sufficient suitable acquisition opportunities and once identified, to complete such acquisitions. The Company cannot guarantee that it will be able to identify suitable acquisition opportunities or complete such acquisitions at all within the next 12 months. If the Company fails to complete a proposed acquisition (for example, because it has been outbid by a competitor) it may be left with substantial unrecovered transaction costs, potentially including substantial break fees, legal costs or other expenses. Furthermore, even if an agreement is reached relating to a proposed acquisition, the Company may fail to complete such an acquisition for reasons beyond its control. Any such event will result in a loss to the Company of the related costs incurred, which could materially adversely affect subsequent attempts to identify and acquire another target business.

Security breaches and other disruptions could compromise the Group's confidential and sensitive information and expose the Company to liability, which would cause its business and reputation to suffer.

The Group and certain third parties that it relies on for its operations collect and store confidential and sensitive information, and their operations are highly dependent on information technology systems, including internet-based systems, which may be vulnerable to breakdown, wrongful intrusions, data breaches and malicious attack. This information includes, among other things, intellectual property (IP) and proprietary information, source codes, and commercially sensitive data, both of the Group and of its customers.

Although the Group has appropriate measures in place (including appropriate insurance coverage) to protect its business from any potential interruptions, any attack or breach could compromise the Company's networks or those of related third parties and stored information could be accessed, publicly disclosed, lost, or stolen. For example, if the Group would, as a result of such an attack, be unable to access its source code needed to develop new products, it might lose customers, which will have an impact on its operational results. In addition, if IP were to be stolen from the Group, such stolen IP could be used by competitors to improve their products or produce products, which could reduce the Group's competitive advantage and therefore impact the Group's operational results in the long term.

Following the acquisition of HYBRID Software, the Group directly serves, in addition to its traditional client base of original equipment manufacturers, end user customers and such customer mix needs to be carefully managed to avoid an adverse impact on its business and results of operations.

46.5% of the Group's revenue for the year ending December 31, 2021, was generated by customers that are original equipment manufacturers (OEMs), such as industrial inkjet press manufacturers who embed the Group's software in their own products that they sell to end users.

On January 12, 2021, the Group acquired HYBRID Software. For further information on this acquisition, please refer to note 35 to the consolidated financial statements.

Although HYBRID Software does have a limited amount of OEM customers who manufacture products for package printing, most of its customers are end users (representing 97.4% of its revenue in 2021), i.e., companies that create packaging files and packaging converting companies. Those companies purchase, in addition to the software of HYBRID Software, the systems and equipment from OEMs, including those who are customers of the Group. As a result of the HYBRID Software acquisition, the Group directly serves certain clients of its own clients.

While the Board believes that this customer mix will not have an adverse effect on the newly created group, as is confirmed by the fact that no OEM or end user customers provided negative feedback on the acquisition, its customer mix needs to be carefully managed in the future to avoid an impact on either the OEM sales or end user sales and therefore on the profitability of the Group.

The HYBRID Software acquisition made the environment in which the Group operates more competitive, which could have a material adverse effect on the Group's business and results of operations.

Because of the highly technical nature of the products produced by both the Group and HYBRID Software, there is a high barrier for competitors to enter the market. As a result, the limited number of competitors which do exist tend to be larger companies with sufficient resources to compete in these demanding market segments

The acquisition of HYBRID Software and merging its products and services mix with the products and services of the Group, has increased the number of competitors the Group is facing, as companies that used to be only competitors of HYBRID Software will now also be competing with the Group. In addition, companies that were traditionally only competitors of the Group might now also view the activities of HYBRID Software in a more competitive way.

Although HYBRID Software has been a long-standing partner of the Group and such a relationship was already well known in the industry, it cannot be excluded that such increased competition could result in a business disruption from both customers and suppliers of the Group, which could have a material adverse effect on the Group's results of operations.

Recruitment and retention of key personnel.

An important part of the Group's future success depends on the continued service and availability of the Group's senior management, including its Chief Executive Officer and other members of the executive team. These individuals have acquired specialized knowledge and skills with respect to the Group. The loss of any of these individuals could harm the Group's business.

The Group's business is also dependent on its ability to attract, retain, and motivate talented, highly skilled personnel, notably in software development, electronic engineering, and technical support areas. Such personnel are in high demand and competition for their talents is intense. Should the Group be unable to continue to successfully attract and retain key personnel, its business may be harmed. The Group offers a competitive package of salary and benefits to directors and employees and regularly benchmarks them against similar businesses to ensure that they remain attractive to current and prospective employees.

LEGAL AND REGULATORY RISK

Failure to adequately protect the Group's intellectual property could substantially harm its business and operating results.

The Group's success is heavily dependent upon its proprietary technology. To protect its proprietary rights, the Group relies on a combination of patent, copyright, trade secret and trademark laws, as well as the early implementation and enforcement of non-disclosure and other contractual restrictions. As part of its confidentiality procedures, the Group enters into written non-disclosure agreements with its employees, prospective customers, OEMs and strategic partners and takes steps to limit access to, and distribution of, its software, intellectual property, and other proprietary information.

Despite these efforts, if such agreements are not made on a timely basis, complied with or enforced, the Group may be unable to effectively protect its proprietary rights and the enforcement of its proprietary rights may be cost-prohibitive. Unauthorized parties may attempt to copy or otherwise obtain, distribute, or use the Group's products or technology. Monitoring unauthorized use of the Group's software products is difficult. Management cannot be certain that steps taken to prevent unauthorized use of the Group's proprietary technology, particularly in countries where the laws may not protect proprietary rights as fully as in the EU or the United States, will be effective.

The Group's source code is also protected as a trade secret. However, from time to time, the Group licenses its source code to partners, which subjects it to the risk of unauthorized use or misappropriation despite the contractual terms restricting disclosure, distribution, copying, and use. In addition, it may be possible for unauthorized parties to obtain, distribute, copy, or use the Group's proprietary information or to reverse engineer its trade secrets.

The Group holds patents, and has patent applications pending, in the United States and in the EU. There may be no assurance that patents held by the Group will not be challenged, that patents will be issued from the pending applications, or that any claims allowed from existing or pending patents will be of sufficient scope or strength to provide adequate protection for the Group's intellectual property rights. The failure to adequately protect the Group's proprietary technology may adversely affect the Group's business, financial position, results of operations, and prospects.

Enforcing, acquiring, and defending intellectual property rights is costly and could have a material adverse effect on the Group's financial position and result of operations.

In connection with the enforcement of its own intellectual property rights, the acquisition of third-party intellectual property rights or disputes relating to the validity or alleged infringement of third-party rights, including patent rights, the Group may be in the future subject to claims, negotiations or protracted litigation. Intellectual property disputes and litigation are typically very costly and can be disruptive to the Group's business operations by diverting the attention and energies of management and key technical personnel. Although the Group has successfully defended or resolved past litigation and disputes, it may not prevail in any future litigation and disputes.

Third-party intellectual property rights could subject the Group to significant expenditures, require the Group to enter into royalty and licensing agreements on unfavorable terms, prevent the Group from licensing certain of its products, cause disruption to the markets where the Group operates or require the Group to satisfy indemnification commitments with its customers, including contractual provisions under various license arrangements, any one of which could harm the Group's business and have a material adverse effect on the Group's financial position and results of operations.

As a result of Brexit, both Belgian and UK takeover regulations apply in their entirety to the Company, which may render a potential takeover complex and costlier.

As the Company is a public company limited by shares with its registered office in the United Kingdom, the provisions of the UK City Code on Takeovers and Mergers (the "UK City Code") apply to the Company. Simultaneously, as the Company's shares are listed on the regulated market of Euronext Brussels, a voluntary takeover bid for the Shares of the Company would also be subject to the Belgian takeover legislation. Accordingly, any voluntary takeover bid for the Company would be governed by both the UK and Belgian takeover legislation.

Contrary to what was the case before Brexit where certain aspects were governed by UK law and certain other aspects by Belgian law based on the provisions of the European Directive 2004/25/EC of April 21, 2004 (the EU Takeover Directive), UK and Belgian takeover legislations apply in their entirety to any potential voluntary takeover bid with respect to the Shares and it could not be excluded that these regulations might be conflicting.

The process to make a successful bid could therefore be more complex and costlier. This could potentially discourage potential bidders from launching a takeover attempt and thus deprive shareholders of the opportunity to sell their Shares at a premium (which is typically offered in the framework of a takeover bid).

The Company cannot guarantee that its disaster recovery and business continuity plans will adequately address any potential issue in the future.

The Company cannot guarantee that the Group's disaster recovery and business continuity plans will be adequate in the future for its critical business processes nor that they will adequately address every potential event. Although the Group has insured major risks, the Company can give no assurance that the Group's present insurance coverage is sufficient to meet any claims to which it may be subject, that it will in the future be able to obtain or maintain insurance on acceptable terms or at appropriate levels or that any insurance maintained will provide adequate protection against potential liabilities. Any losses that the Group incurs that are not adequately covered by insurance may decrease the Group's future operating income. In addition, defending the Group against such claims may strain management resources, affect the Group's reputation, and require the Group to expend significant sums on legal costs.

The Group's business is currently operated from various locations across the UK, Europe, North America, China, and Japan. Some business-critical IT infrastructure is concentrated at one site in the UK with a continuous backup of those systems and data to a separate UK site. Business continuity plans are intended to ensure that business-critical processes and data are protected from disruption and will continue even after a disastrous event (such as a major fire or weather, political or war event). Without these plans, or if these plans prove to be inadequate, there is no guarantee that the Company or any of its operating subsidiaries would be able to compete effectively or even to continue in business after a disastrous event or major disruption to one or more of its operating subsidiaries. Accordingly, if critical business processes fail or are materially disrupted as a result of a disastrous event or otherwise and cannot recover quickly, this could have a material adverse effect on the Group's business, financial condition, and results of operations.

Glossary

Additive Manufacturing—Building physical product by digitally 'printing' it, often with technology similar to the inkjet heads used for 2D printing. The term "3D printing" is often used for home and small-scale additive manufacturing.

Binder Jetting—A class of additive manufacturing in which the solid form is created by jetting a binder fluid into a bed of powder. This technique can be used for metals, polymers, and glass.

Color Separation—Color can be specified in many different ways in the digital world, but printing uses only a small set of inks. All colors in the source document must be transformed into a set of separations, one for each of the inks to be used. Most commonly in commercial print, labels and packaging this means Cyan, Magenta, Yellow and Black (see also "Extended Gamut").

Converting—The design for a label or package is converted from a primary copy, such as a PDF file, through printing on a substrate and then one or more processes, such as cutting, folding, and gluing to create a label that can be applied or a carton that can be filled.

CTP (Computer to Plate)—Imaging a printing plate directly from digital data rather than imaging a film and using that to image the plate.

Digital Front End (DFE)—The controller that manages and drives a digital press, consuming source files such as PDF, processing them as necessary, and sending color separations to the printhead.

Enterprise Software—Computer programs that have common business applications. In relation to printing these typically manage customer relationships, estimation, billing, production management, and shipping.

Flexo/Flexograph—A conventional printing technology in which flexible plates with raised areas are used to transfer ink onto the substrate. Widely used in labels and packaging.

Gravure—Conventional print technology in which a cylinder is engraved with cells which carry ink to transfer it to the substrate. Very expensive to prepare cylinders for each job, so it is mostly used for jobs with extremely long run lengths (millions of copies), such as long-run magazines and wall-coverings.

Industrial Inkjet—A term that is used with various different meanings but is best applied to printing where the substance being printed is a part of the final product, as opposed to carrying information (e.g. in commercial print) or to protect a product (e.g. in packaging). Examples of industrial print include applications of color and functional coatings to textiles, ceramics, and other décor.

Industry 4.0—A term for fully automated production, where equipment performing different processes are interconnected and share information.

Inkjet Printing—Application of colored or functional fluids to a substrate by jetting as drops.

Joint Photographic Experts Group (JPEG)—A committee (ISO/ IEC JTC1/SC29) and the format that was defined for storing images in a very compact way using (mainly) compression. There are now variants, such as JPEG 2000 and JPEG-XR, which use rather different and incompatible techniques.

Litho (Offset Lithograph)—Conventional printing press technology using plates treated to make some areas hydrophilic and others hydrophobic (attracting and rejecting water) to control where ink will adhere to them. 'Offset' in this case means that the ink is transferred from the plate to a blanket before being applied to the media being printed on.

Mass Customization—Mass produced products where every item is unique. Examples include personalized labels, tee-shirts, phone cases, etc.

Original Equipment Manufacturer (OEM)—An organization that makes devices from component parts bought from other organizations.

Portable Document Format (PDF)—A universal file format that is maintained by the International Standards Organization. In printing, it can contain all the information required to produce an item that matches exactly what the graphic designer intended in terms of fonts, color specifications, etc.

Prepress—A department or series of software processes that prepare files for printing.

Printhead Driver Solutions—Software and other technology that send data to printheads inside inkjet devices to control the printing process.

Printheads—Component of an inkjet press and generally contain multiple nozzles for jetting ink or other fluids onto substrates.

Rasterization—The process of transforming a page description language (see PostScript), comprising text, vector graphics, images, and other complex constructs, into a rectangular grid of pixels that is suitable for delivering to an inkjet head, plate setter, or other imaging device. Often equated to 'rendering'.

RIP/RIPping—A Raster Image Processor converts graphic designs into raster data (image pixels) for onward processing by the printing device.

Screening—Sometimes called halftone screening, a process that converts graphical designs from raster data (such as that delivered by a RIP) into a slightly different format. The process compensates for the fact that most printing technology cannot represent more than a very small number of different tints of each ink. Screening places very small and carefully structured collections of areas of ink in such a way that the human eye is fooled into seeing additional tints from the intended viewing distance.

Screen Printing—A printing process where ink is applied to a surface through a stencil held on a mesh attached to a frame.

Smart Factory—Smart factories are designed to autonomously run the entire production process, including the print subsystems.

Variable Data Processing (VDP)—Printing items where every instance varies at least slightly from the others, often with some graphics in common as well. Examples range from adding serial numbers to labels, through direct mail and variations designed to ensure that packaging has more shelf appeal.

Wide Format—Printing on devices with a width that is usually more than 50 cm, usually using inkjet and often related in some way to marketing or photo finishing, including banners, stickers, soft signage, and sportswear.

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