

TECHNICAL GUIDE

DECORATIVE INTERIORS

GETTING STARTED WITH PRINTING WALLPAPER DIGITALLY

Second Edition

FESPA
profit for purpose

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Getting started with printing wallpaper digitally

Wallcoverings have been a popular surface decoration for hundreds of years and their production covers a well-established and wide industry producing billions of metres per year. With a proud tradition and long, rich history encompassing mass production and luxury bespoke offerings, William Morris is famously credited with the birth of mass-produced wallcoverings in 1861. Prior to the Arts and Crafts era, wallcoverings were predominately Textile, the creative link between the two as an Interior surface decoration still exists today.

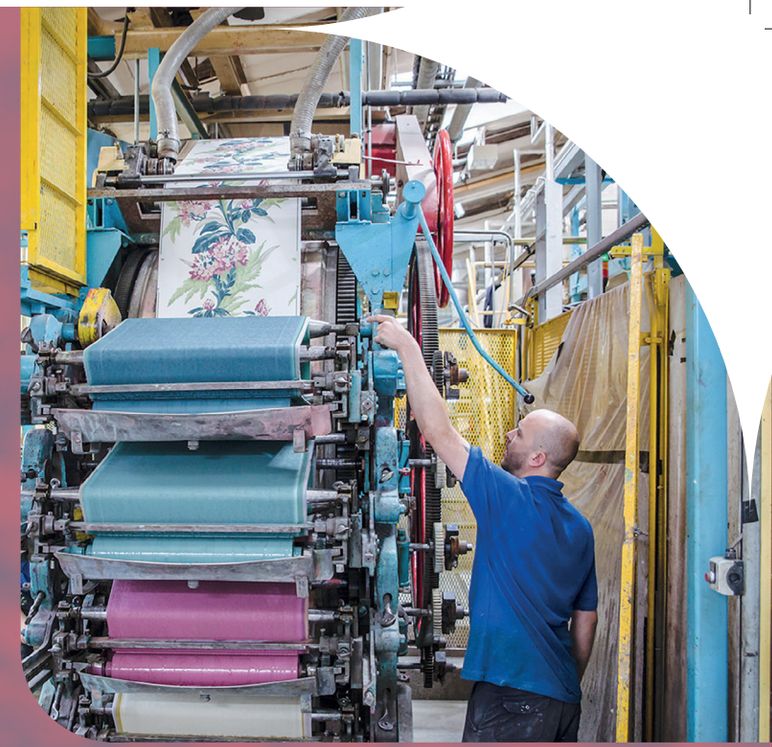
As with so many other industries, the digital revolution has unlocked production options and the sector is witnessing significant reform. Over the last ten years or so digital printing of wallpaper has taken off and is on the rise. Mass production is now possible at speed in this sector, and for

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simple surface effects, the visual digital reproduction matches traditional flexo technologies, with huge advantages for design diversity, reduced inventory, and customisation. But there are some challenges and process limitations for digitally printed wallpapers, and so we'll highlight some of these issues in this guide.

Traditional wallpaper production was an artisan craft, requiring a lot of manual preparation and printing technique. But like most other print applications profitable volume production demanded industrial methods and technologies. Today large volume wallpaper production is mainly produced in dedicated screen and flexo printing machines, and also with gravure printing technology. To print a 30m roll with screen printing technology demands either a very large flatbed screen for luxury production, or using a rotary screen printing press for volume.

To justify the start-up costs in these types of printing presses (as they require cylinders, plates or rotary screens), this is a volume industry, and make-ready times are much longer than with digital print. However, the established conventional processes continue to offer an enormous array of surface opportunities for flock, foam, metallics and spot colours and the ability to print onto a very wide variety of standard papers and specially prepped luxury materials.



Traditional wallpaper flexo press
Image courtesy of Surfaceprint.

Emerson & Renwick Rotogravure and Rotary screen press for high volume wallcoverings.



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Sophie Conran flock paper



PE foamed wallpaper



Screen printed metallic Gingko leaf paper



Spot colour screen printed toile by Timourous Beasties

Enter the digital printer and wallpaper printed on-demand. As with other types of digital printing there are no time consuming or costly printing plates or screens to prepare for a digital press. However, the design process remains the same, and pre-press is simplified for production as all colour separations are digitally created and controlled. The challenges when printing wallpaper digitally are instead in three main areas: limitations in substrates and textures, limitations regarding special inks and finally the economic and efficient finishing of digitally printed wallpapers.

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Substrates & textures

Anyone who has been shopping around for wallpaper knows what a fantastic variety there is to choose from. Mass market, volume wallpapers are quite simple in their execution: a pattern printed on a flat surface, with a design repeat that reduces waste when applied to the wall surface. Paper surface effects and grammage vary in this sector, where the domestic marketplace typically uses 180gsm, and luxury 300gsm and beyond.

Commonly, wallcoverings may also have an embossed surface texture adding both perceived value and in enhancing the design aesthetic which may be an integral part of the design or a simple texture. Such textures add a tactile element and imply luxury.

Remember a wallcovering is applied to a flat surface, as light is reflected the surface can be manipulated to add perceived value and interior ambiance. Complex textured effects such as are found with flocked wallpapers are not normally possible to produce using standard digital printing methods. Many vertical manufacturers now produce hybrid wallcoverings that blend both technologies, digital and analogue, to create innovate surface effects.



Wallpaper on-demand, digitally printed, is definitely on the rise. Here an example from the collection at Hevensent, a start-up company founded by Janet Hodcroft, England.

As the marketplace for digitally printed wallpapers has exploded, so has the wide availability of the core substrates at low volume. Originally wallpaper bases were typically only available as reems of 3000m, its now possible to buy as little as 25m for custom printed projects using speciality papers. Spawning a new requirement for variable substrates that are proven and certified for digital production. There are both independent retailers for such substrates sold via 3rd party suppliers for low volume purchase. It's also possible to buy smaller quantities than previously available direct from the paper mills themselves.

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As the marketplace grows the availability of commercial grade, certified base papers continues to expand for all applications and print processes.

The choice of substrate will also affect how to colour manage the artwork, many paper suppliers now also offer downloadable print profiles for their substrates which helps in achieving improved results.

Other considerations when choosing what type of paper stock to print wallpaper on is how it will the paper be applied to the wall. Here too there are many new developments and offerings. Self-adhesive, pre-pasted, paste the wall etc. There are low tack self-adhesive paper stocks on offer, which can be removed and repositioned. Yet another consideration is the paper's fire resistance, compliance to EN-15102 is essential in most hospitality, retail or public buildings. Checking that your finished product meets the EN-12149 standard for toxicity is another important consideration.

Which application to use?

As with all printing presses, both analogue and digital, a particular press or printer is designed for - and optimised to use, a specific range of ink formulations. Each is chosen specific to end use and the final product specifications, the production volumes to meet market requirements. If you plan to invest in a digital press for wallpaper production you must choose the technology that best suits your needs carefully, because the digital press would normally be restricted to one type of ink. Within digital printing there are several main categories of inks used: aqueous inks, dye based, solvent based, UV-curable ink and latex inks, just to mention some of the most common ones.

Whatever ink you use, you typically want colour accuracy, but also lightfastness and durability in general. Durability will mean different things for different people. Even so your customer will demand a defined list of specific restrictions for end use and accurate product specification, testing is essential and often must be certified. Durability is a condition of sale. A washable wallpaper can be lightly

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cleaned using a sponge or damp cloth. Many mass produced wallcoverings are only wipeable, and even this should be done gently. Again, here technology continues to addresses the need for durability, and the addition of printed lacquers and laminates increases the sectors range of specified use.

If you are tempted to offer metallic inks for the artwork you will probably be disappointed with what is on offer when printing digitally. While there is some progress in this area, using real metallic inks remains a big challenge. You may choose to print onto a metallic effect substrate or a pre-coated wallcovering to achieve an artistic effect. It all depends on if the application, the chosen print process and the products end use and requirements. The good news is that inkjet digital printing technologies can print on more or less any type of substrate.

The inkjet printing technology exists for pretty much every level of production volume required, from entry level multi-purpose wide format printers through to mid-volume systems such as Canon and Fotoba's Wallpaper factory, the Xeikon Wall decoration press and then up to the massive industrial capability of the Palis 2250.



Dimense wallpaper is a great example of the 4-colour process plus approach. The expanding foam embossing offers and interesting surface texture that can raise up to 1mm in height. Innovations continue in this sector pushing the boundaries of design and application.

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There is a wide range of printers to choose between suitable to print wallpapers digitally. Shown here is the Mimaki JV300-160 using solvent based ink



The HP Latex 3600 achieves print output of around 80 m2 per hour for high quality indoor and is a good choice where a wide range of roll substrates are to be processed. It has the capacity to handle peak production of 35,000 m2 per month and tiling colour accuracy of ≤1 ΔE 2000.



The Xeikon 3500 wall decoration press uses dry toner technology and prints at speeds of 19.2 metres per minute at 508mm wide. This full production system includes the X-800 DFE with XML workflow for automation and is presented with in-line finishing to rolls for shipping at up 55 metres in length.



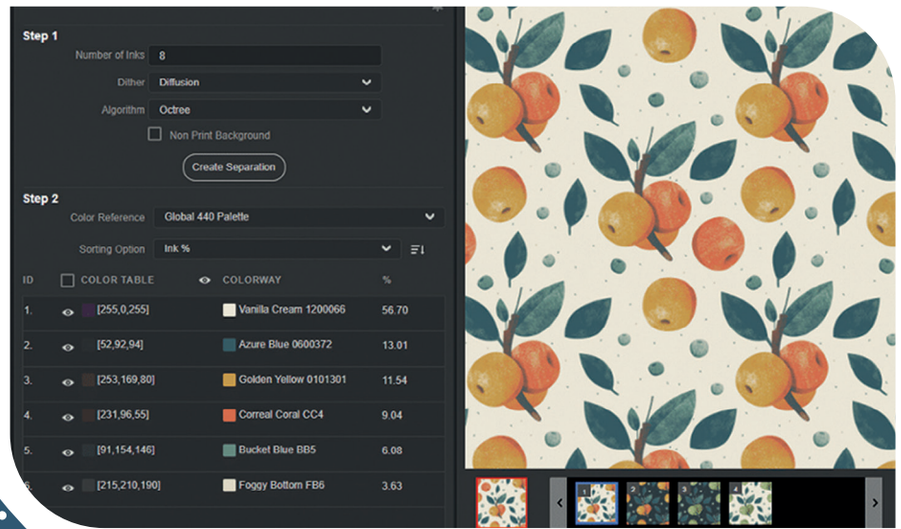
SPG Prints PIKE 700 prints at 70 linear metres per minute with non-stop splicing for constant production. This is a good example of the higher volume presses that print with single pass UV technology. It also offers in-line finishing where print volumes driven by consumer web-to-print justify the capital investment.

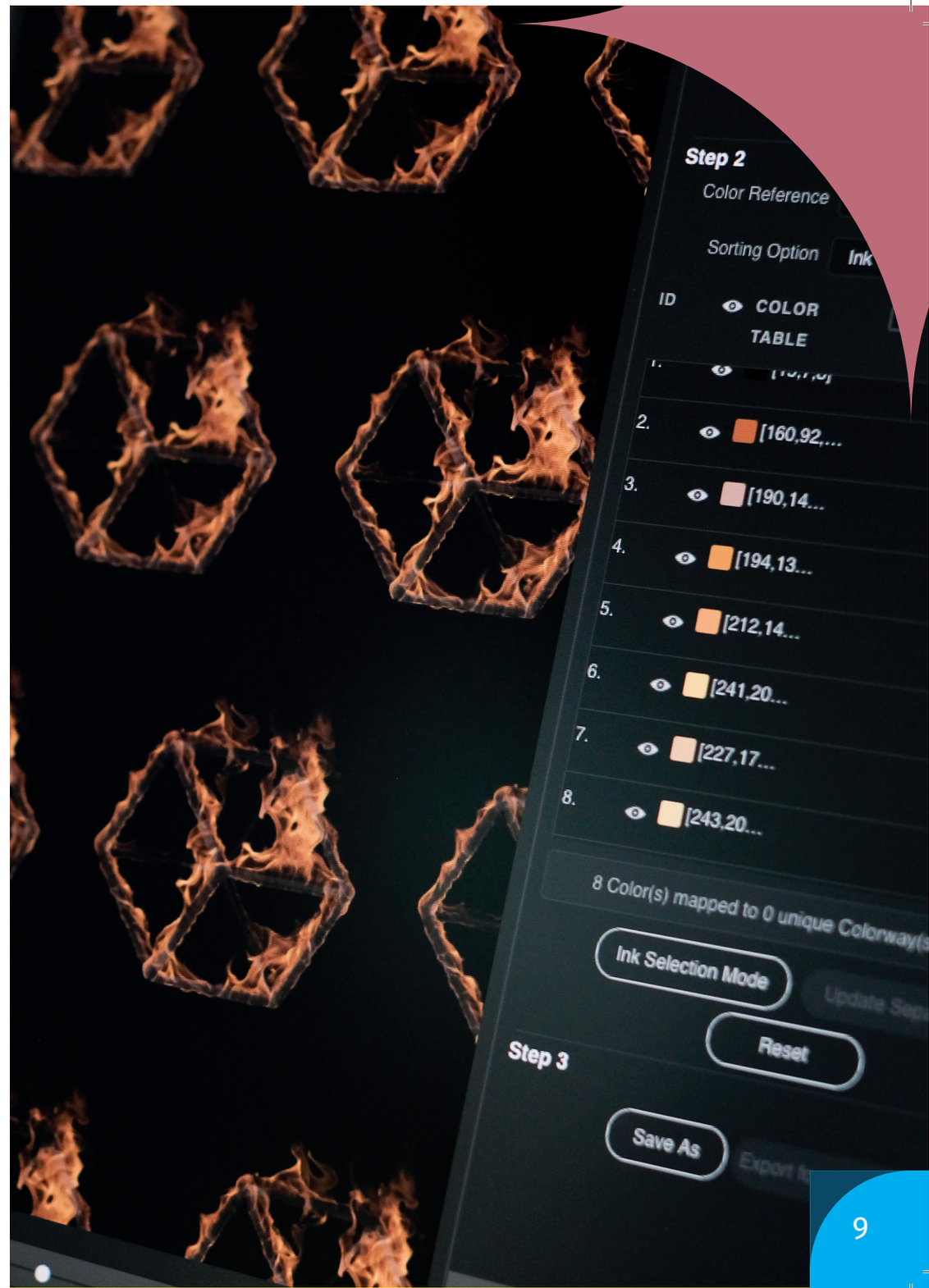
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Preparing the artwork

Printing on wallpaper, just like any other sector, has its own unique specifications for artwork preparation. Similar to textile design, wallpaper patterns can repeated across the surface, or using digital technologies panel printed. There are a variety of software tools which can help with this, from AVA's CAD/CAM suite which supports complex step and repeat, separation, colourway and digital printing through to Ned Graphics, Pointcarres and Adobe's Textile Designer which can be applied to wallpapers.

Adobe Textile Designer plugin





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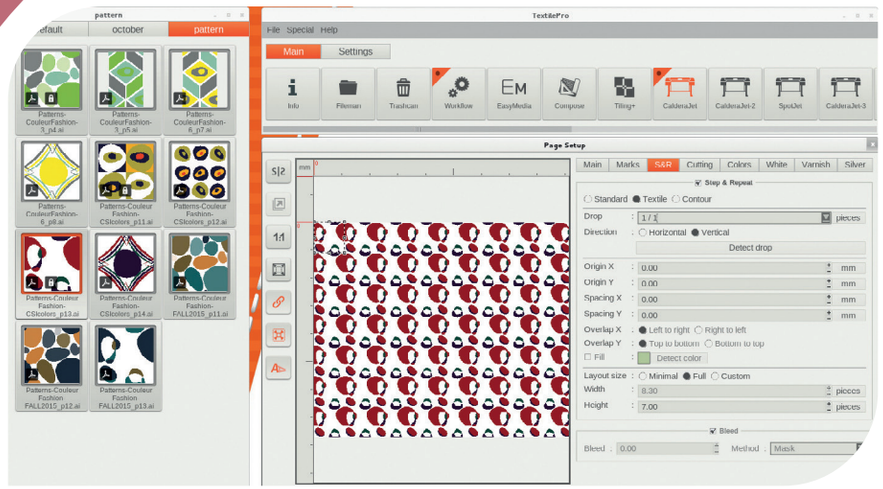
Speed of use is essential in any production software, choosing the correct partner for your chosen application and business model is essential. If you are simply printing a client's artwork then pre-press tools and colour management will be sufficient. For more complex design and separation, you will need a specific software suite.

When using analogue printing techniques, you could technically use as many spot colours as you like, although this would be expensive. But when printing digitally you will have to translate the special spot colours to their closest matches using the CMYK process colours. Some colours simply can't be reproduced with CMYK only, and then you will need a printer with additional inks to achieve a larger colour gamut. Today it's increasingly common to add Orange, Green and Violet to extend the gamut and reach up to 99% of Pantone colours.

Many digital wallcovering manufacturers use RGB as a design space, as the colour gamut is greater than CMYK. Colour management is critical – make sure that colour is controlled throughout your production workflow.



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There are some challenges when preparing artwork for wallpaper printing, and managing pattern repeats in a proper way is one of them. But there are software solutions to help in this, such as the Caldera RIP system, here showing the function for step-and-repeat in their TextilePro RIP.

One important consideration to be taken into account is that of artwork file type and resolution, it would ideal to receive vector files as PDF-X 4 format for every order. It is important to let your customers know which format is best for your workflow but it remains commonplace to have files arrive in inappropriate formats. With wallcoverings there are a number of situations to account for, if you're printing spot colours with conventional printing you'll encourage the use of vector formats which facilitate very low data overhead when compared to pixel based files that can be very large in size.

There is frequent confusion about DPI, PPI and LPI as expressions of resolution. DPI refers to dots per inch which denote the output resolution for printers, in the wallcovering area where prints may be judged at close viewing distance a minimum of 720dpi – 1200dpi would be expected. PPI means pixels per inch, the higher the number the more the detail providing that comes from the source. For example a high resolution photo is only as good as its native resolution and no matter what you do to a small jpeg to scale it up you can't make a bad file good. In wallpaper you would usually be able to create a descend quality of end result from a 150ppi file at 100% scale. If you work at 25% scale for a mural remember to request the file at 600ppi.

LPI is used to qualify the number of halftone dots plotted onto film positives for screen or plate making in this case a range between 85 and 100lpi .

The final point on this topic is that careful use of file compression is worth exploring, saving a maximum quality jpeg over a full sized tiff will lead to more efficient processing speed and reduced storage overhead without sacrificing quality.

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The Application Centre from HP showing Wallart app and social sharing.

The Application Centre allows users of HP printers to connect to this cloud based platform where all printers regardless of location can be monitored and managed whether it's ink usage, production volume, job tracking or in the case of wallpaper enabling the Wallart app. This gives printers the opportunity to set up an online customer facing design environment where they can prepare their own customised wallcovering designs from library sources or by uploading. It provides a helpful interface that secures orders and detailed

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information to progress onto to print whilst allowing sharing ideas on social media services. Where web enabled services aren't the priority the system can be harnessed for internal use to great effect. As part of HP's Print OS workflow system these tools provide an eco-system that simplify the often-complex processes that lead to great improvements in production and customer satisfaction. This approach represents a significant trend across the industry where printer manufacturers have increasingly provided joined up software solutions to power print businesses.





Image courtesy of Surfaceprint



Personalised projects are now widely available this one using Shape Collage

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Finishing the wallpaper

While there are some challenges and limitations in the substrates and inks that can be used in digital printing, perhaps the biggest challenge is how to properly finish the printed wallpaper. By finishing we mean trimming or cutting the printed substrate to size ready for installation. This must be done to tight tolerances, since by its nature wallpaper has to match exactly from roll to roll, or overlap slightly for contract applications, especially with a repeated pattern. Precise registration is of course also crucial when printing a large image in several parts, or a big map. Both applications are very popular for on demand digital wallpaper production.

While there are many digital printer types to choose among from vendors like HP and Mimaki, there are fewer vendors of dedicated post-press (or finishing) equipment for digital print production. If you only aim at custom made digital wallpaper production in small volumes and believe that you can charge a premium, then you might be able to handle the finishing process more or less manually or invest in automated

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cutting, set to your unique workflow. It's nigh impossible to check the side match of roll to roll wallpaper production. Any microscopic variance will over the length of the print run cause the pattern to miss-match and be deemed faulty.

Wallcoverings are affected by humidity and temperature, as such the manufacturing environment must be controlled to avoid print and product variance. Ignoring these disciplines will result in failed production.

For higher volumes and for digital wallpaper production in fiercely competitive markets, you will need to invest in fast and precise finishing equipment that works within tight tolerances. Customers won't come back to you if they are not happy with the end result.

There are fantastic opportunities with digitally printed wallpapers, especially when combining creative design with the use of new materials, be it substrates or inks, or a combination of both. So go explore, and let your imagination go wild!



Fotoba XLD170WP-REW160 high speed cutter. Picture courtesy of Fotoba



Miura Wallpaper slitter. Picture courtesy of Flexa.it

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Published by FESPA Limited
Holmbury
The Dorking Business Park
Station Road
Dorking
RH4 1HJ

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