



UVgel  
TECHNOLOGY  
WHITEPAPER

# SETTING THE NEW STANDARD

VERSION 4.0

**Canon**



Version history

Version	Date	Revision details
1.0	May 2017	-
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2.1	January 2020	Minor updates
3.0	May 2021	Update Colorado series
4.0	June 2023	Update with: Colorado M-series, FLXfinish+ and market data

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# INTRODUCTION

If you're active in today's exciting world of Large Format Graphics (LFG), you know that in this rapidly growing market, it's 'up or out'. Current trends mean that you not only need to handle increasing volumes in less time, but operational flexibility and application versatility are also key. You have to find new ways to combine creativity, efficiency and profitability. The ability to offer durable, sustainable and eye-catching applications is ensuring that UVgel customers can now scale up their business and offer new, unique and high-margin applications quickly and profitably.

Since its introduction in 2017, UVgel technology has been changing the way LFG companies look at their business. In this whitepaper, we explain how this ground-breaking technology is opening the door to new levels of business, with impressive quality at high productivity and a vast range of value-adding applications.

UVgel is perfect for shorter runs and personalisation. This is enabling Print Service Providers – from print-shops to complete print factories – to take on their competition as the market consolidates. Moreover, production managers love the ease with which they can create exciting, stunning applications that meet the needs of designers and customers.

It's little surprise that more and more users of eco-solvent, latex and traditional UV printers are increasingly turning to UVgel to replace or upgrade their printing machine parks. They are experiencing how just one UVgel machine can achieve the same performance as up to three of their existing machines, with up to 40% less ink.

The latest version of our popular UVgel Technology Whitepaper outlines the background to why this award-winning technology has more than proven its value. We introduce FLXfinish+ technology as an important enhancement to the successful FLXfinish, making it now possible to combine velvety matte and high-impact gloss in the same print and last but not least, bring you "White ink without worry" with UVgel white ink! UVgel white ink is like any other ink colour. The unique gel formulation of Canon UVgel ink translates to fast build-up of dense and opaque white images in fewer passes than with conventional printing technologies, and printed output maintains its original whiteness over time. UVgel's particular properties also eliminate many of the production, nozzle-cleaning and maintenance issues commonly associated with white ink, offering smooth, error-free printing, minimizing ink usage and waste, and maximizing productivity.

We have also added some new ideas for applications in growing market segments such as retail, interior décor and packaging applications.

Discover how UVgel is taking the market by storm, and why there are now more than 3000 installations across the globe.





01

**MARKET  
TRENDS,  
REQUIREMENTS &  
OPPORTUNITIES**



# MARKET TRENDS, REQUIREMENTS & OPPORTUNITIES

## Market trends

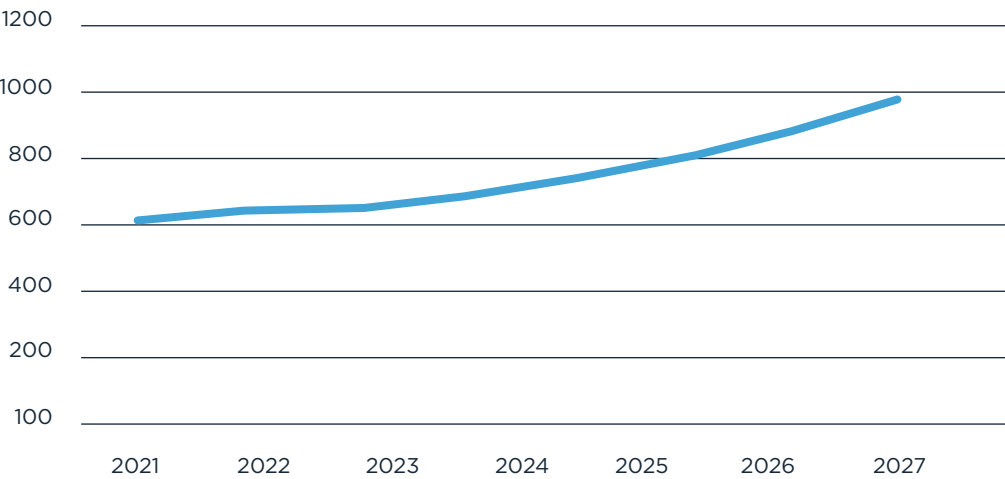
### Growth & consolidation

More and more of the world around us is being printed on, and decorated. New applications are continuously being developed and hot segments like interior décor, the retail experience and packaging are pushing new growth. Although industry growth was interrupted during the COVID pandemic and despite economic uncertainty, research into large format trends conducted in 2022 by IT strategies indicates further growth for large format graphics. Expected worldwide annual growth in eco-solvent, latex and UV roll-to-roll print is forecast to exceed 1 billion m<sup>2</sup> by 2027.

This continued growth is the result of increased adoption of new technologies, as well as the opening up of new market segments with an expanding range of applications. In addition, more efficient workflow solutions are enabling LFG companies to respond to customers' requests more efficiently, with shorter turnaround times and more, smaller print runs.

Furthermore, there is clearly a consolidation underway, and it is becoming a question of 'up or out' for many LFG companies serving this lucrative market. In order to succeed, they need a technology that offers the broadest media range and highest productivity, without compromising quality.

Large Format Graphics is a dynamic and exciting market. It's 'up or out' for companies looking to thrive as the sector accelerates and consolidates. Within the lucrative business of added-value applications, we are seeing two undeniable trends: volumes keep on growing, and pressure on turnaround times is ever increasing.



Source: IT strategies, 2022 Inkjet Wide Format Graphics

FIGURE 1: Forecasted worldwide LX/ES/UV Volumes (in thousands m<sup>2</sup>)

Increased overall productivity is a must for LFG operations. However, this must not come at the expense of quality!

Many current printing devices need highly skilled operators, which significantly impacts the ability to respond quickly and offer customers the flexibility they are looking for.

## Productivity

The current 'on-demand' economy continues to put pressure on LFG printing businesses. A combined need for higher volumes and faster turnaround times means that increased overall productivity is a must for LFG operations. However, this must not come at the expense of quality!

A study carried out by Smithers Pira in 2019 concluded that traditional large format technologies were unable to address needs regarding productivity, flexibility, quality at adequate speeds, and media versatility<sup>[1]</sup>.

In addition to the ink technology, a key driver behind the decision to invest in new printing equipment is the need for more flexible and efficient workflow solutions that safeguard productivity.

## Quality

In the same study, LFG companies also gave overall quality as a critical aspect of their business. They pointed out that latex and eco-solvent technologies are forced to compromise productivity for quality or vice versa.

Advertising and Point Of Purchase (POP) applications, for example, are subject to close scrutiny. And décor products such as wallcoverings require precision image reproduction, a velvety smooth finish with no banding and excellent colour reproduction. At the same time, colour consistency from panel to panel across the printed image, from multiple printers and across multiple locations is also a must.

While the technologies in latex and eco-solvent devices may deliver an acceptable range of quality for many applications, when higher-quality print modes are used, they force a dramatic slowdown in output speed, thereby increasing the productivity frustrations described above.

## Media and application versatility

The opportunity for LFG companies to diversify into new application areas continues to grow. Very often, this is the lifeline for businesses that are seeing their profit margins squeezed with their current offering. However, traditional printing technologies limit the ability to produce multiple applications with a single device, without compromising quality, efficiency or productivity. Across all market segments, designer creativity and technical innovation are leading to new and exciting applications in sectors as diverse as interior design, retail and packaging. In the next chapter we explore these opportunities in more detail.

In order to access this new business, it is important to be aware of the possibilities and limitations of the different technologies available. For example:

Time-consuming manual adjustments may improve quality, but at a considerable cost to productivity. Moreover, many current printing devices need highly skilled operators, which significantly impacts the ability to respond quickly and offer customers the flexibility they are looking for.

Although latex, eco-solvent and traditional UV printers are suitable for a broad range of media types and applications, they have limitations due to the need for the heat drying process, to evaporate the water/solvent. The evaporative process makes latex and eco-solvent technologies fundamentally unsuitable for heat-sensitive media and film, for example. In addition, prints coming from a traditional UV device often have an unpleasant smell. Moreover, the 'finish' of the output is limited to a single look.

Depending on the application, performance qualities such as abrasion resistance, stretch, colour gamut and lightfastness must also be taken into consideration when deciding which technology will achieve the required results.

[1] 2019-03-27-The-Future-of-Printed-Signage-in-an-Electronic-World-to-2024



## Printing on eco-friendly alternatives

As the print industry looks for ways to transition to more sustainable media, and the trend of the paperisation of applications continues, so does the need for reliable printing solutions that are able to print on a wide range of eco-friendly substrates. These include PVC-free media, paper-based alternatives, as well as 100% recycled or recyclable media.



“

Before the Colorado, we had HP Latex printers and the issues we were having with those was the fact that the colour was inconsistent throughout the tiles [...]. Since we got the Colorado those issues have been completely cured.”

**Mike Harris**  
Operations Director  
Iconic Display



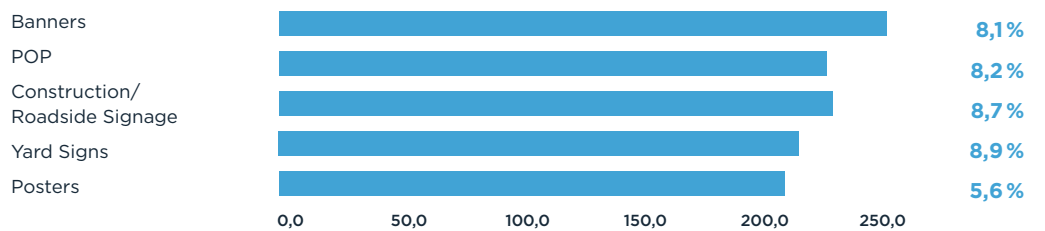
*100 years of wallpaper history reborn with UVgel technology - Arne Bülow-Berntzen, CEO & owner of Cicero Digital og Grafisk AS.*



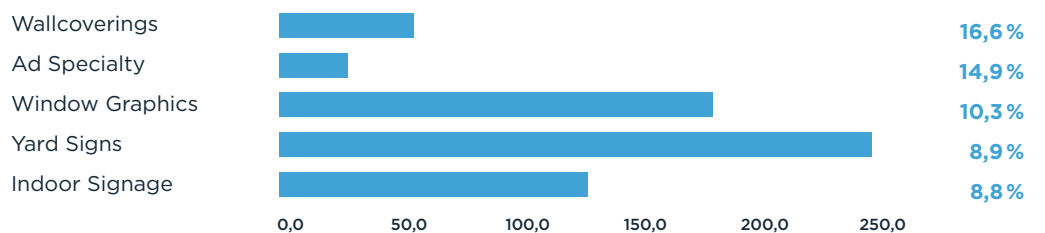
## Market opportunities

The world of Large Format Graphics is both highly creative and dynamic. Traditionally, it served mainly the sign and display industry, but new market segments are opening up and volumes are increasing year on year. The drivers for this growth are the changing nature of marketing itself, as well as the constant search for new applications.

Biggest applications with CAGR 2022 – 2026



Application areas with largest growth CAGR 2022 – 2026



Source: Keypoint, 2021-2026 Wide Format Value of Print Forecast

FIGURE 2: What products are seeing an increase in demand?

THE WORLD OF  
LARGE FORMAT  
GRAPHICS IS BOTH  
HIGHLY CREATIVE  
AND DYNAMIC.

## Immersion-based retail experience

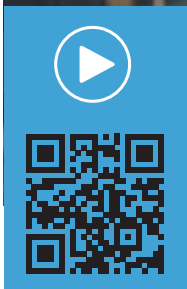
The world of retail has undergone significant change in recent years. Both the design and function of physical shops have experienced a drastic transformation.

The original role of brick-and-mortar stores was for closing transactions, and exchanging and taking delivery of goods. In recent years, we have seen a major shift to online retail. As a result, physical sales environments are more than ever focussed on the complete customer experience, centred around total immersion into the brand, the product and its messaging.

Over the years, print has proven to be highly effective in providing a lasting effect on brand recognition. However, requirements have changed. Superior quality is now the norm. Unequivocal accuracy of brand colours is essential over a wide variety of media and applications, to create the desired atmosphere and immersive world around the brand.

Brands are continuously refreshing their message, and strive to capture their audiences with localised, customised and targeted short-run, high-frequency campaigns that also include floor graphics, posters and stickers. Added-value print applications can now give a unified brand experience throughout the entire store design and décor.

Added-value print applications can now give a unified brand experience throughout the entire store design and décor.



*The importance of print in retail. Calico Club store, Venlo, the Netherlands.*



Professional as well as personal interiors are now being customised thanks to digital print.

## Opening up the stunning world of interior décor

In response to the meta trend of individualising and mass personalisation, LFG printing technology is increasingly being used for producing work outside the traditional advertising and sign & display segment. Professional as well as personal interiors are now being customised thanks to digital print.

However, the interior décor market places additional requirements on the printed output:

- **Strict consistency of quality, colour and dimensions**

The ability to produce large runs of exactly the same quality, colour and dimensions, is the 'licence-to-play' for anyone looking to enter the B2B wall décor market. They are essential when panelling large surfaces, or to provide a reliable and repeatable colour reproduction over time.

- **Odourless prints**

Digitally printed output has not always been odourless. For interior décor purposes, this is an absolute must.

- **Look-and-feel and perception**

Interior décor demands a different level of finish than the one that was previously sufficient for the regular sign and display applications. Interior décor is all about look-and-feel and perception. A velvety matt look, for example, is highly sought after for high-end interior spaces.

“

We are happy to deliver top-quality prints to customers and fill customised orders quickly and efficiently.”

**Marta Naranowicz**

Chief Operating Office  
Caro Group



## Adding the wow factor to packaging, labels & gift wrapping

In line with the shift towards online commercial fulfilment and delivery, demand for product packaging has increased dramatically over recent years. The COVID pandemic has also resulted in a dramatic rise in online consumer shopping and the corresponding need for creative packaging solutions. In fact, packaging is now the fastest growing print sector and one of the most competitive. The function of the packaging is not merely protection and containment; packaging is now an integral part of the product, its branding and the product experience.

Tote bags are a regular staple among today's youth. With a heat-transfer film, this application is now available for anyone running a UVgel printer.

There is now a market emerging in short run, customised packaging. Stores want to complete their branding and image by providing customised boxes, bags or holders. We are also seeing the same thing happening with gift wrapping. What was once a festive protection of the actual present, is now personalised, and has become the first part of the gift. The wow factor now starts before the unwrapping and before the actual gift is revealed.

## Extending the range of industrial applications

In the traditional graphic arts world of industrial applications, the media used includes magnetic and magnetic-receptive media, metal foils, uncoated papers and heat transfer films. Such media places its own demands on the printing technology and inks and the final applications must be tough and hardwearing in demanding conditions.



*Using UVgel white ink next to CMYK adds more value to printed wrapping paper.*

UVgel excels in a wide range of industrial applications, including DuPont™ Tyvek®. Its light weight, smooth surface, high dimensional stability, opacity, toughness and durability make this an increasingly popular printing substrate.

Packaging is now the fastest growing print sector and one of the most competitive.

The wow factor now starts before the unwrapping and before the actual gift is revealed.

## Limitations of 1.6 m latex and eco-solvent systems

To assess the most important parameters for our LFG customers, Canon conducted in-depth discussions with LFG companies – large and small – in Europe, the US and Asia. All of the participants had multiple print engines ranging from 2 to 40 devices under one roof.

The aim of the qualitative research was to understand the day-to-day operational frustrations confronting LFG companies, and how technological innovation could support their business growth and commercial development.

This valuable insight into customer and market requirements has helped form the foundation of Canon's R&D philosophy of outcome-driven innovation.

The feedback demonstrated clearly that, with the output technologies then available in the market, there was a clear gap in the product offering caused by the limitations of the 1.6 m latex and eco-solvent devices.

Customers found these devices to be inadequate for the demands of their high and peak volume production.

Although these printers have the advantage of requiring a relatively low initial investment, according to the customers surveyed, they have three key limitations, which mean that they do not fully address the needs of LFG companies today.

Since this research was carried out, some developers of 1.6 m latex and eco-solvent printers have improved output speed with later iterations of these technologies.

For example, there has been a tendency for some printer manufacturers to shift towards more production-focussed systems in the low- to mid-volume segment, supported by increasing ink tank sizes. However, speed gains have been only incremental, rather than radical, and these technologies continue to struggle to achieve the balance between quality, productivity and cost.

Moreover, overall productivity is still hampered by a lack of automation, media handling and intrinsic frame designs in previous generation devices.

LATEX AND  
ECO-SOLVENT  
TECHNOLOGIES  
CONTINUE TO  
STRUGGLE TO  
ACHIEVE THE  
BALANCE BETWEEN  
QUALITY,  
PRODUCTIVITY  
AND COST.

PRODUCTIVITY  
AND SPEED



QUALITY AT  
ADEQUATE SPEED



MEDIA  
VERSATILITY





### Reasons behind the inherent limitations of latex and eco-solvent technologies

- The high degree of dot gain/coalescence of 1.6 m latex and eco-solvent inks limits the volume of ink that can be laid down without compromising image quality.
- As a result, 1.6 m latex and eco-solvent technologies require a high number of passes to achieve desired image quality over a given area.
- This slows printing down, or forces LFG companies to compromise quality for higher output speeds.
- 1.6 m latex and eco-solvent processes require a drying stage to evaporate the water/solvent, reducing productivity even further.

In practice, LFG companies using traditional technologies reported that they typically find themselves managing production bottlenecks. This means that they cannot actively pursue increased job volumes, and may indeed be reluctant to accept certain jobs — especially for large volume jobs or applications, where they perceive an element of risk associated with delivery to a fixed deadline or working with an unfamiliar substrate.

### LFG companies have tried to address this dilemma in several ways

#### • Multiple printing machines

This approach requires significant space, as well as increasing staffing levels and complicating maintenance requirements.

The use of multiple printers is often cited as a benefit in terms of production flexibility. However, Canon customer research indicates that, in practice, even LFG companies running multiple roll-to-roll printers often have individual devices set up to print on their most popular media types, and are reluctant to incur the time delays associated with switching media and amending profiles. Consequently, they do not really obtain the expected flexibility gains, and still lack the true production capacity to take on larger job volumes and diversify their applications offering.

#### • Extending shifts

Another pragmatic solution may be to extend or increase the number of shifts. This too comes with increased operator costs. In regions where labour costs are high, this may fundamentally limit the growth potential of LFG companies, because business owners are reluctant to increase staffing commitments, moreover current labour shortages are making this option even less viable.

#### • Outsourcing

Outsourcing work with large volumes or perceived 'high-risk' jobs, may offer a solution. However, LFG companies are reluctant to do this, as it involves sacrificing margin, as well as control over quality and delivery.

### Conclusion

Most LFG companies would prefer to enhance their own in-house capabilities to service their customers' print requirements.

**High-end industrial systems**

Customers looking for a more 'industrial' production solution may turn to high-end 3.2-meter UV and latex systems. These technologies offer higher output speed and the scope to work in dual-roll mode. They are, therefore, able to cope with industrial production volumes. However, they represent a significant capital investment (> Euros 120,000), which may be beyond the scope of small- to medium-sized LFG companies.

To be assured of an acceptable ROI, investing in this type of printing device requires a clear prospect of consistently high production volumes. They also occupy a large physical footprint, which may not be an option for some businesses. Moreover, their suitability for short runs is questionable.

**A breakthrough new technology that bridges the gap**

It was clear from our research that there was a substantial gap in the mid-volume/scale-up segment, which pointed to the need for a breakthrough new technology to meet the needs of LFG companies looking for a better balance of productivity, quality and investment.

UVgel has successfully bridged this gap, and now offers LFG companies the technology to scale up their business, without breaking the bank.

This customer-driven innovation has proven itself, and is now well-established as the most productive and flexible solution, while avoiding the need to compromise between quality and productivity.

UVGEL OFFERS LFG  
COMPANIES THE  
TECHNOLOGY  
TO SCALE UP  
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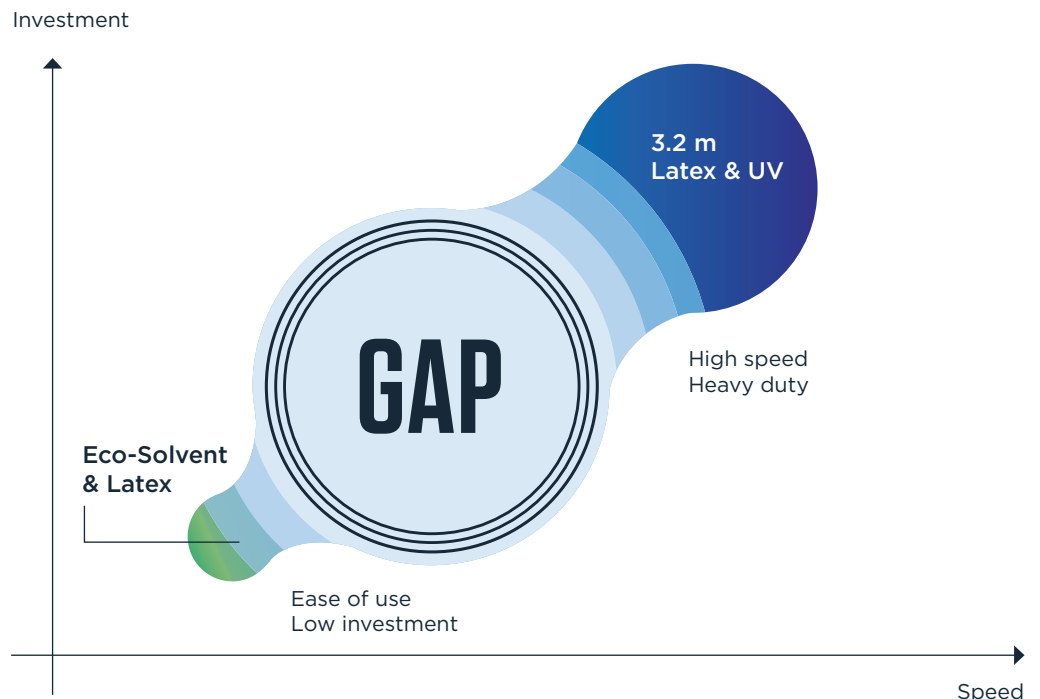


FIGURE 3: Speed versus investment in the printer landscape before UVgel

## Conclusion

There is a clear and growing market demand for a wider range of LFG applications. Both independent and our own research also show that LFG companies are looking for the optimal combination of productivity, quality and media to achieve the application versatility and operational flexibility the different market segments increasingly require.

Radical technological innovation was necessary in the LFG sector, in order to meet customers' productivity, quality and application diversity requirements. In the next chapter, we explain how UVgel has now successfully filled the gap created by the limitations of evaporative latex and eco-solvent technologies.

We outline how the productivity of UVgel is one of the most important technology factors that is now opening up new, profitable growth opportunities for small - to medium-sized LFG companies. We also show how automation in print factories, which already had high volumes, is also ensuring they too no longer need to compromise on productivity to achieve the quality and application versatility they are looking for.







02

**INTRODUCING  
UVGEL  
TECHNOLOGY**

# INTRODUCING UVGEL TECHNOLOGY

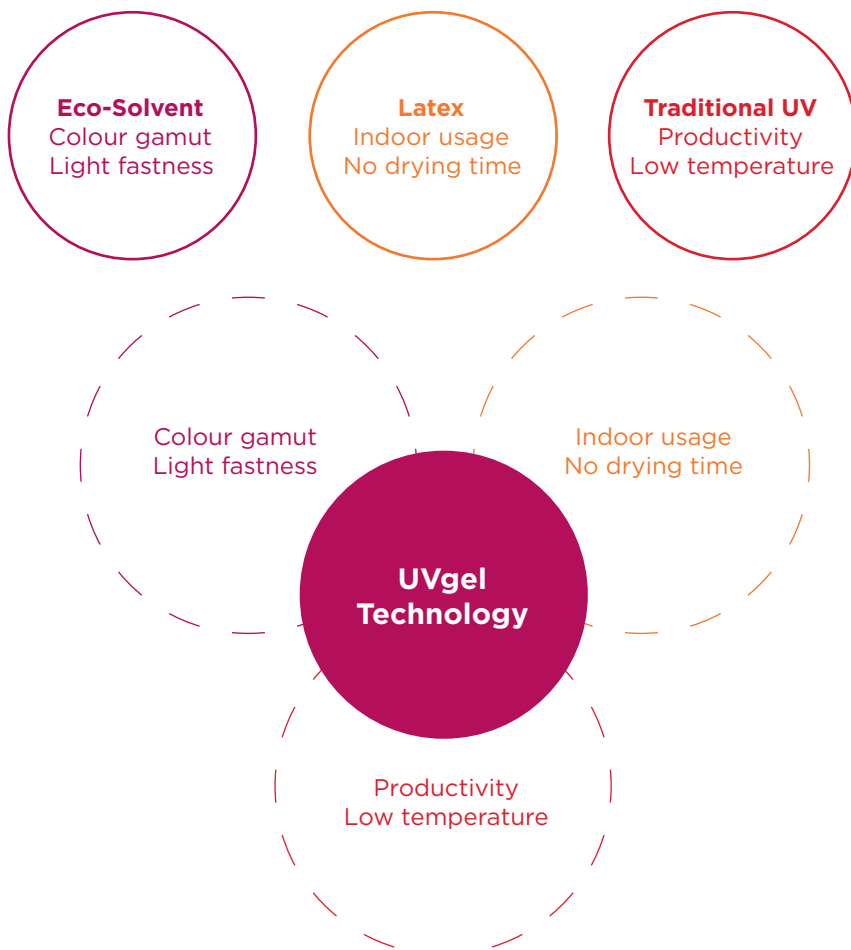
02

## UVgel technology

### What does UVgel technology offer?

Having identified the key trends and opportunities in the market, Canon developed the successful UVgel technology that puts an end to the compromises LFG companies have had to make when choosing between latex, eco-solvent or traditional UV solutions. So, what does our UVgel technology offer?

- Industrial speed and end-to-end productivity, for those urgent or high-volume jobs that have to be delivered within ever shorter turnaround times.
- Constant, stable, high-quality output, suitable for a wide and unique application range, including demanding indoor, outdoor and décor uses, as well as for car graphics, posters, banners, canvas and robust floor graphics.
- Maximum media versatility, to enable LFG companies to produce an ever-increasing variety of current and future applications using a single device.



UVgel technology consists of several specifically developed elements, which combine to achieve a process that retains the advantages of the traditional printing technologies, while eliminating many of the limitations.

USING A GEL  
INSTEAD OF A  
LIQUID INK SOLVES  
MANY OF THE  
PROBLEMS THE  
TRADITIONAL INK  
TECHNOLOGIES  
STRUGGLE WITH.

## What is UV technology?

UVgel ink is essentially a gel that solidifies when exposed to UV light. Using a gel instead of a liquid ink solves many of the problems the traditional ink technologies struggle with. The holistic approach behind this pioneering technology has revolutionised how LFG applications are printed.

UV technology comprises several specifically developed elements which, once combined, manage to capture all the advantages of the traditional printing technologies while, at the same time, tackling their disadvantages or compromises.

### These include:

- **Patented UVgel ink technology**

Canon invented and patented this new ink technology, which solves many of the problems associated with traditional ink technologies in Large Format Graphics.

- **Canon-developed, proprietary printheads**

The specially developed printheads provide industrial reliability and stable quality output, and are equipped with ingenious predictive nozzle failure compensation technology.

- **Ink liquification inside the printhead**

UVgel ink is a gel everywhere except inside the printhead, where it is heated to a very high temperature, so it transforms momentarily into a jettable liquid.

- **Stable, temperature-controlled print surface**

Because the print surface is conditioned and captured in the completely enclosed machine frame, the media substrate is maintained at a constant temperature regardless of any environmental or atmospheric factors.

- **Low-heat LED-UV curing**

The crux of the sustainable UVgel technology is that the ink is essentially a gel, that cures upon exposure to a certain spectrum of light. The LED technology used means that this is a low-temperature process.

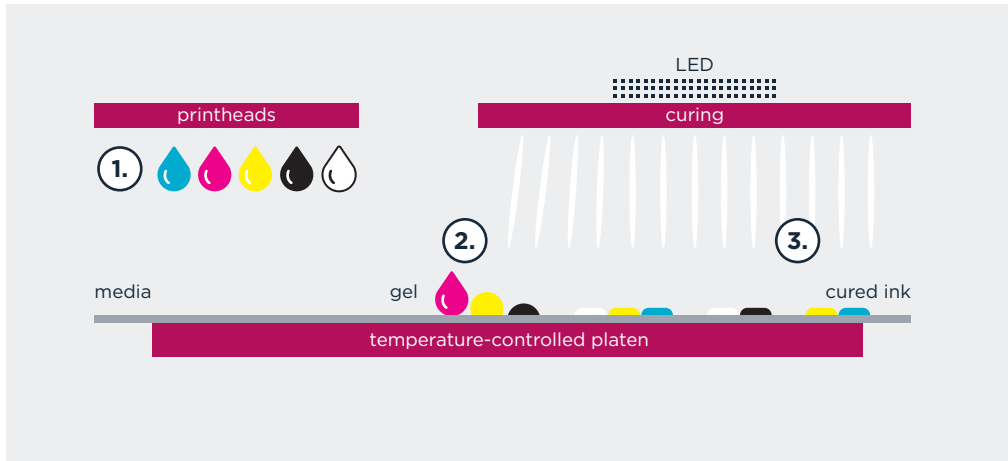


FIGURE 4: The 3 key stages of UVgel printing

1. Ink is jetted from the printhead as a high-temperature, liquid droplet.
2. When the ink droplet lands on the media, it instantaneously transforms into a gel dot, perfectly round in shape, and with very limited and controlled dot gain.
3. All the ink droplets that build up the printed image are cured with LED UV-light.



The UVgel process results in high-quality print output, thanks to optimal dot gain control at productive speeds.

**THE INNOVATIVE  
UVGEL INK  
TECHNOLOGY IS  
AN INSTANT-DRY,  
'PRINT-THEN-CURE'  
PROCESS.**

## Key benefits of the UVgel process

The innovative UVgel ink technology is an instant-dry, 'print-then-cure' process. As a result of this unique concept, UVgel technology delivers multiple productivity and quality benefits:

- The gel state of the UVgel ink droplet prevents coalescence (merging) between individual and adjacent ink drops, delivering optimal control over the dot to prevent spread (dot gain).
- By controlling dot gain, much more ink can be deposited in fewer passes, increasing productivity and speed.
- The highly controlled and stable dot gain, regardless of ambient conditions, creates a uniquely stable colour accuracy and repeatability.
- UVgel ink makes it possible to separate the image build up process (jetting the ink onto the media) from the curing process (fixating the ink layer sufficiently before the next ink layer is added). This enables us to also influence the finish of the output. Irrespective of the media, we can create the printed output with a high gloss or matte finish, including having both in one image.
- By eliminating the need to 'fix' the ink while the print process is taking place, productivity is substantially increased compared to other LFG technologies. In the case of evaporative technologies such as eco-solvent or latex, the solvent or water needs to be evaporated while building up the image.
- Compared to UV ink technology, UVgel does not require intermediate curing. In effect, the UVgel process means that the need for drying or curing no longer limits the print speed.

- Prints are instantly dry and ready for finishing. There is no evaporative drying process, saving both energy and considerable time.
- Prints are very robust, eliminating the need to laminate for a vast range of applications where this is traditionally otherwise a requirement.
- UVgel output complies with the strictest global health and safety requirements, such as full GREENGUARD Gold, AgBB and ASTM Type II. The inks and the prints are also completely odourless.

The dedicated Canon printhead, the UVgel ink, the platen and the curing concept are all developed in house and are proprietary, patented Canon technologies. They combine to create the unique UVgel technology, that is changing the Large Format Graphics industry.

## How is UVgel different to traditional UV?

LFG companies can experience breakthrough UVgel technology for a wider application range, with the additional unique ability to create matte and gloss effects, even in the same image.

UVgel technology has additional advantages in comparison with traditional UV.

The LED UV curing system used in UVgel technology can move independently of the printing carriage. This means that UVgel ink does not have to be cured intermediately, thereby giving the individual ink drops the opportunity to settle. This allows the ink to create a flat, smooth profile, perfectly suited for creating a matte and/or gloss finish, or for lamination, should that be required.

In contrast, traditional UV printing creates an uneven surface, by default. This is due to the multiple ink layers being individually cured, which results in a relief effect.

UVgel technology allows for a separation of the jetting from the curing process, resulting in a smooth ink layer and a dense, but thin image build-up.

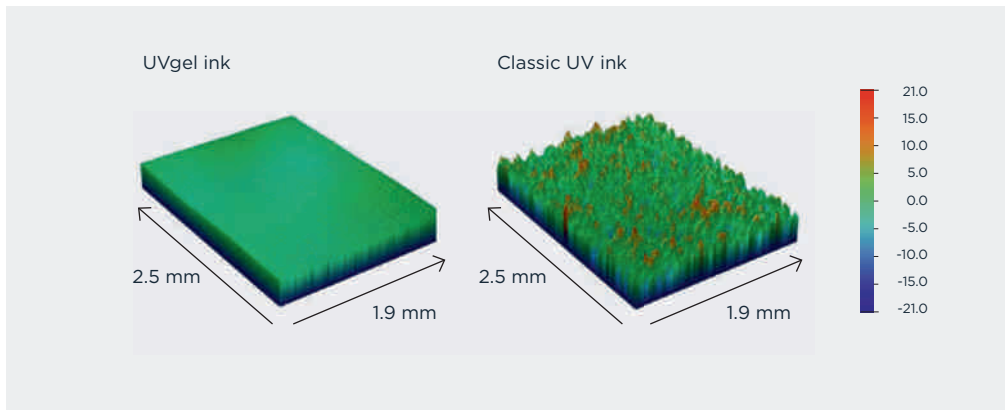


FIGURE 5: The different structures of UVgel ink and traditional UV ink

Prints can be finished with a matte or glossy look – or even both in one image – without changing the ink or the media, and without the need for an extra channel. UVgel prints are very robust; lamination is not always required. But, if necessary, lamination can take place immediately, thanks to instant-dry prints.

### Choose your finish: Gloss, matte or mixed matte and gloss with FLXfinish<sup>+</sup>

FLXfinish<sup>+</sup> is a unique technology offering LFG companies the ability to create prints that can be finished with a matte or glossy look – even in the same image – without changing the ink or the media and without the need for an extra channel.

The Colorado series printers are characterised by their two separate carriages:

1. The printhead carriage
2. The curing carriage

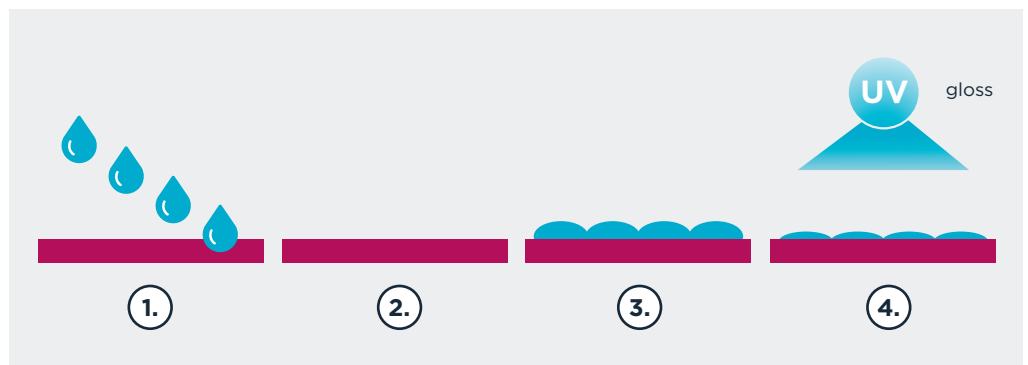


FIGURE 6: Creating a gloss finish

#### Stage 1

The media is transported under the printhead carriage, where the ink is jetted onto the media. No curing energy reaches the ink at this point, as the image is being built up while the ink remains completely uncured.

#### Stage 2

Although not exposed to any curing energy, the image is built up at full density with all its details and sharpness. The gel state of the ink prevents the other ink droplets from coalescing and mixing into each other.

#### Stage 3

Because it is a gel, the ink layer is able to settle and create a very thin, smooth, high-gloss ink layer.

#### Stage 4

By the time the image comes out from under the curing lamp carriage, the ink layer has been completely cured with high-energy LED UV-light.

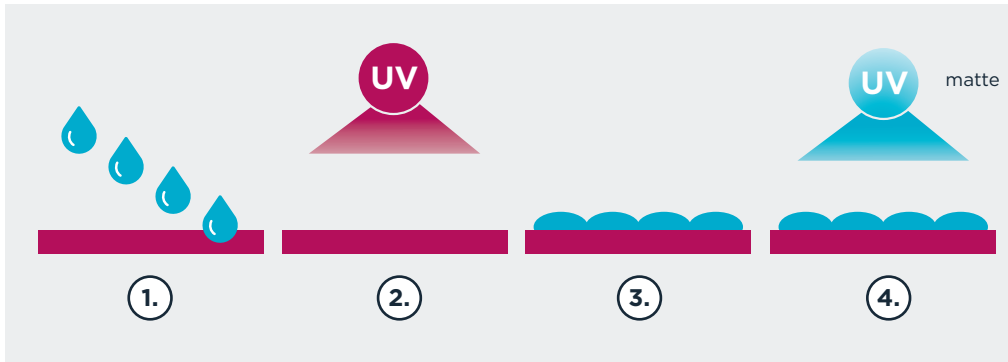


FIGURE 7: Creating a matte finish

#### Stage 1

In contrast to printing in gloss mode, where unprinted media is transported under the printhead carriage, to create a matte finish the image is built up by jetting the gel droplets onto the substrate.

#### Stage 2

The wet ink layer is flashed immediately with a low amount of LED UV-light, that is just enough to pin the droplets in place and fix their shape.

#### Stage 3

This low level of LED UV-light halts the ink spreading immediately after the droplet has hit the media, maintaining the ink droplet shape and resulting in an even, matte finish.

#### Stage 4

Unlike traditional UV inks, the matte finish created with UVgel has a softer, velvety texture. The 'gel' state of the ink droplets allows for a more continual 3D build-up of the ink layer, whereas traditional 'liquid' UV prints often have a coarse texture with a 'sparkling' effect.

UNLIKE TRADITIONAL  
UV INKS, THE MATTE  
FINISH CREATED  
WITH UVGEL  
HAS A SOFTER,  
VELVETY TEXTURE.



With the FLXfinish+ technology, it is possible to create special effects and highlight parts of a print with a gloss finish, without the need for an additional channel with varnish, or an extra printhead.

Being able to fixate the gel ink droplets immediately after jetting them onto the media also creates the ability to print onto a much wider range of media, including more porous and absorbent media such as soft signage textiles and even uncoated paper.

### FLXfinish+: Creating a matte and gloss finish, both in one print

UVgel has unique properties that gives you the possibility to choose between a matte and a gloss finish. UVgel even enables a print process where you can mix both finishes in one print. We have called this FLXfinish+.

This is a truly unique process. The media is not retracted or moved around between printing the gloss and the matte sections of the image. The carriage with the printheads can be split in two sections to print both the gloss and matte parts simultaneously, with an unused 'twilight' zone in between.



FIGURE 8: Creating both a matte and/or a gloss finish with the same ink set by using FLXfinish+ is unique to UVgel technology



FIGURE 9: FLXfinish\* enables you to create stunning, high-value applications that combine matte and gloss in a single image easily and productively.

As a result, the positioning of both finishes in the same image is aligned up to pixel level: no overlaps, no media moving around, no gaps. This results in pixel-perfect registration with zero tolerance, making FLXfinish\* ideal for high-margin applications.

THE POSITIONING  
OF BOTH FINISHES  
IN THE SAME IMAGE  
IS ALIGNED UP TO  
PIXEL LEVEL.

## How does UVgel technology create a constant and consistent very high print quality

Print quality is the result of many interacting parameters such as:

- Ink drop volume
- Dot gain on the media
- Coalescence with adjacent drops
- Spatial resolution
- Dot placement accuracy
- Number of ink colours
- Number of printing passes
- Ink film thickness
- Media used
- Colour management

Many of these are characteristics of the piezo-electric printhead system (e.g. native resolution, drop placement accuracy, control over drop volume, number of ink colours).

However, when assessing real-world print quality, the determining factor is how the final ink layer is formed on the media.

In this and many other respects, UVgel technology is completely different to evaporative ink technologies such as latex, eco-solvent and aqueous inks.

Factors behind the high image quality of UVgel are:

- The unique gel property of UVgel ink, which results in superior drop geometry
- The high colour gamut offered by UVgel inks
- Continuous nozzle performance monitoring, and predictive replacement, to ensure optimal and stable output
- The unique FLXfinish\* technology that gives users the choice of a gloss or matte finish, and even both combined within the same image
- The excellent colour consistency, over the full area of the print, and from print to print.

## Highly controlled dot gain with minimum coalescence

Every droplet of UVgel ink is instantly fixed to the temperature-controlled substrate, upon contact with the media, resulting in a limited and perfectly controlled dot gain. This controlled, well defined and repeatable round ink dot produces an inherently higher and more consistent print quality without coalescence of the ink between jetting and curing.

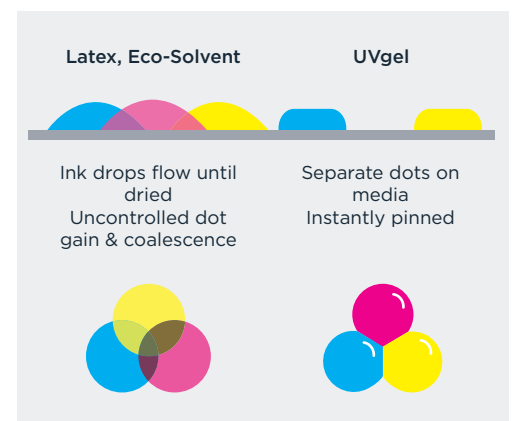
As a result, UVgel technology delivers a higher and more consistent print quality, irrespective of the type of media used.

This is in sharp contrast to evaporative ink technologies in Large Format Graphics, such as eco-solvent or latex, in which the ink drops flow on the media, growing in size and coalescing with adjacent drops in an uncontrolled way, before being dried by evaporation of the water or solvent vehicle. As a result, some evaporative technologies exhibit substantial dot gain and uncontrolled growth on the media.

With traditional UV LFG technologies, it is necessary to build up the printed image gradually, in multiple passes, which are followed by intermediate curing, to minimise the effect of ink coalescence. This has a substantial impact on productivity.

These limitations of traditional ink technologies increase at higher print speeds.

**AS A RESULT,  
UVGEL TECHNOLOGY  
DELIVERS A  
HIGHER AND  
MORE CONSISTENT  
PRINT QUALITY,  
IRRESPECTIVE  
OF THE TYPE OF  
MEDIA USED.**



**FIGURE 10:** Coalescence in the evaporative process (1.6 m latex/eco-solvent) and UVgel

## Highly controlled dot gain

UVgel ink has been developed specifically to deliver extended colour gamut, even exceeding existing roll-to-roll technologies.

## Controlled texture: Gloss

The gel property of UVgel ink means that the printed output has a smoother and thinner profile than with other UV-cured technologies. Thanks to the separate LED curing process, the UVgel printed image has a smooth, untextured surface. This creates rich, glossy prints with no lamination limitations.

## Controlled texture: Matte

The proprietary FLXfinish+ technology uses a split curing sequence to create a printed image with an even, balanced texture. This results in velvety soft, deep matte prints, without sparkle or sheen, irrespective of the media used. The resulting prints are ideal for indoor applications across a wide variety of different print substrates.

## Automatic nozzle compensation

Correctly performing nozzles are critical to inkjet productivity and image quality. Fine particles of dust or impurities can lead to a reduction in printhead nozzle performance, potentially resulting in white lines on the printed output. Canon's Piezo Acoustic Integrated Nozzle Technology (PAINT) is embedded in UVgel printhead technology. PAINT constantly monitors the nozzle performance and print quality. In the printheads, the nozzle status is continuously probed and checked by sending a small, electro-acoustic pulse to each nozzle and listening for a clean, uninterrupted 'echo'. This monitoring occurs without the need to fire droplets, thus eliminating the need to waste ink in order to check nozzle functionality. When a malfunctioning nozzle is detected, the affected nozzle is temporarily switched off and replaced by neighbouring nozzles. This whole

process is fully automated and actively runs in the background at all times. No operator intervention is needed.



## Colorado media step control

With all roll-to-roll printers, an important factor in print quality and application range is the accuracy with which the printer advances the media. Colorado series printers are built with a 750 kg steel frame for stability and reliable media handling. In addition, they also feature an automatic media step control system, to prevent even the smallest chance of banding.

Using practically invisible marks in the margin of the print, an optical device detects the actual movement of the media after every pass. Continuous media step feedback is sent to the media handler, to automatically correct the subsequent step size as needed, to ensure constant, flawless print output.



UVgel printing is a low-heat process. This makes it possible to print on a wide range of heat-sensitive, cost-efficient and even very thin media.

UVgel prints are dimensionally stable due to the fact there is no heat that could transform or influence the media, and also thanks to the ingenious constant media step monitoring technology.

UVgel prints are very robust, durable and weather resistant and, therefore, ideally suited for outdoor use.

UVgel 460 inks are flexible and so ideally suited for use in applications around curves and edges, such as vehicle graphics.

FLXfinish<sup>+</sup> offers a unique choice of a matte and/or gloss finish as well as excellent printing quality on porous media.

UVgel inks are completely odourless and fully certified for indoor use.

*[2] The platen temperature can be changed from the default temperature if this is advantageous for the specific customer's applications and media.*

### Low-heat process

UVgel technology does not use heat in its printing process as no heat is required for drying or evaporating the ink. UVgel ink drops are deposited on the substrate at 24-28°C<sup>[2]</sup>, controlled by the media platen. Furthermore, UVgel technology uses LED-curing, which means that there is no heat dissipation of the emitted light. The ink and print are instantly dry upon curing. As a result, with UVgel, media distortion is negligible, even with highly heat-sensitive media.

By contrast, evaporative technologies may heat the media to temperatures as high as 100°C. This often leads to media deformation and distortion.

This fundamental difference in technology makes UVgel ideal for applications requiring high geometric accuracy, such as wallcoverings. UVgel is also well suited to creating lower-cost applications on inexpensive, thin media.

### No water content

UVgel ink does not contain water. Compared with other technologies, this ensures improved dimensional consistency, by eliminating the problems associated with absorbing and swelling of media.

Due to its excellent interaction with a variety of substrates, including heat-sensitive media, UVgel is inherently versatile for a wide range of indoor and outdoor applications.

### Durability

UVgel technology's suitability for outdoor work is enhanced by the high durability of the LED-cured image. The finished prints offer improved levels of outdoor UV light fastness, washability and abrasion resistance compared with other technology inks.



FIGURE 11: Blue coffee machine wrapped with transparent cast vinyl and printed with UVgel white ink

### Flexibility

In combination with an exceptional mechanical and chemical resistance, the UVgel 460 inks are also flexible and have stretch, for easy application and removal around curves and edges.

### FLXfinish<sup>+</sup>

With the ability to choose between a vibrant high gloss finish or a velvety matte look, the Colorado series allows you to choose the ideal effect for a multitude of applications without having to change ink or media.

With the innovative FLXfinish<sup>+</sup> technology you can now mix both matte and gloss sections together within one file, creating well-defined, stunning prints.

By combining both finishes, you can apply the desired finish to your files where it has the most effect: highlight vibrant brand colours with a gloss finish or set for a muted soft background, or even create special effects, adding value to your applications in retail, interior décor, packaging, and more.

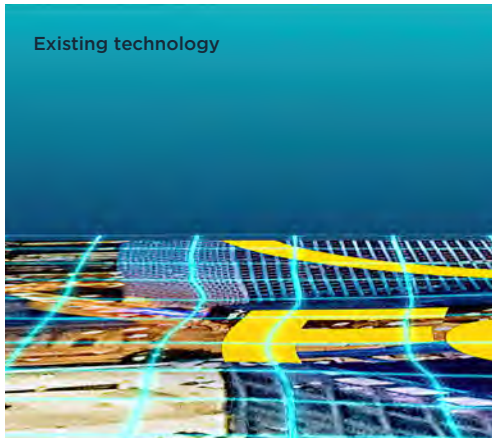


FIGURE 12: Evaporative process with high-temperature drying

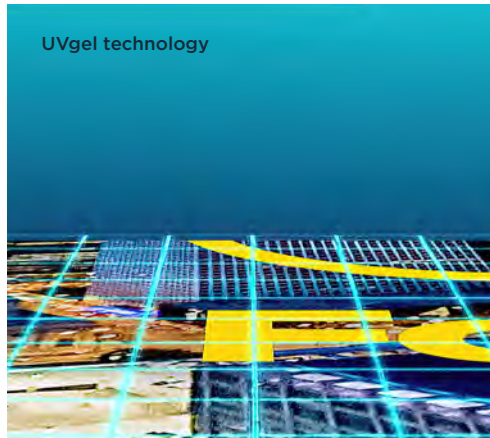


FIGURE 13: Non-evaporative process with low heat

## Porous media

With UVgel it is possible to print on porous media such as soft signage textiles, as well as uncoated papers and Tyvek®.

## Odourless & safe prints

UVgel technology has been developed to be odourless. This means it can be used in high-margin indoor applications, including in restaurants, living room spaces and health-sensitive environments.

## Enhanced productivity with automation

In order to achieve the desired quality, some technologies need to compromise on productivity. With UVgel, productivity is a given for any application and at a quality level that will astound your customers.

## Unattended printing

The continuous nozzle monitoring feature of the UVgel printheads enables unattended printing, and reduces waste prints.

## Colorado automation

Colorado printers use automation features to reduce operator handling time by up to a third compared to competitive technologies.

The dual-roll configuration of the Colorado series further enhances productivity, not only decreasing the time required to load media, but also enabling users to switch media quickly when producing mixed applications.

The heavy-duty drawer holds two rolls of media of the same or different substrate types. Both rolls can be fed into the print engine without operator assistance. The media thickness can be added to the media profile, and upon loading the media and profile, the printer automatically adjusts the settings accordingly, ensuring the best possible quality print and preventing printhead crashes. The new parameters are then stored into the media library for future use.

**Fewer passes**

With UVgel, the precise amount of ink required can be deposited in fewer passes. This is because dot gain is highly controlled and there is no coalescence or blending of adjacently placed ink droplets. Therefore, fewer passes are needed to set the image on the media, reducing the time required to produce the finished print.

**Immediate post-processing**

As UVgel is instantly dry and cured, prints are suitable for immediate post-processing and lamination, where required, further improving end-to-end productivity.

Workflow efficiency safeguards productivity and gives you the ability to create high-value personalised applications with ease: from design to production scheduling. The PRISMA XL Suite facilitates personalisation smoothly, ensuring neither quality nor speed are compromised. This offers enormous opportunities for print businesses to strengthen their reputation as a forward-thinking print provider, by utilising the power of digital print technology to harness the commercial potential of personalisation.

### Colorado series: reliability you can depend on

Engineered to the highest industrial standards, all models of the Colorado series meet the peak production requirements of businesses of all sizes. Produce high volumes of Large Format Graphics – including posters, banners, signage, POS, billboards, window graphics, decals and bespoke wallcoverings – and all within the short turnaround times demanded by today's customers.



FIGURE 14: Personalised wallpaper printed with UVgel technology, Caro Group

**THE PRISMA XL  
SUITE FACILITATES  
PERSONALISATION  
SMOOTHLY,  
ENSURING NEITHER  
QUALITY NOR SPEED  
ARE COMPROMISED.**

Canon's industry-leading digital solutions offer operational and commercial flexibility through shorter runs, optimised workflows, prototyping and variable-data personalisation, to help your business stay relevant, fresh and profitable.



reddot design award



DESIGN  
AWARD  
2017

### Smart automation

The smart automation and workflow software behind UVgel technology in Colorado series printers ensures maximum printer uptime and minimal operator intervention. In addition, automated maintenance in Colorado series printers further enhances end-to-end productivity, taking it to a next level compared to existing technologies.

### On the fly ink replenishment

Colorado series printers have large ink reservoirs that can be refilled during printing. A light on the printer indicates when a particular ink level is low and needs replenishing. Inks can be added during printing, ensuring no downtime for ink refills. This is thanks to a reservoir that provides a more than 2.5 litre buffer.

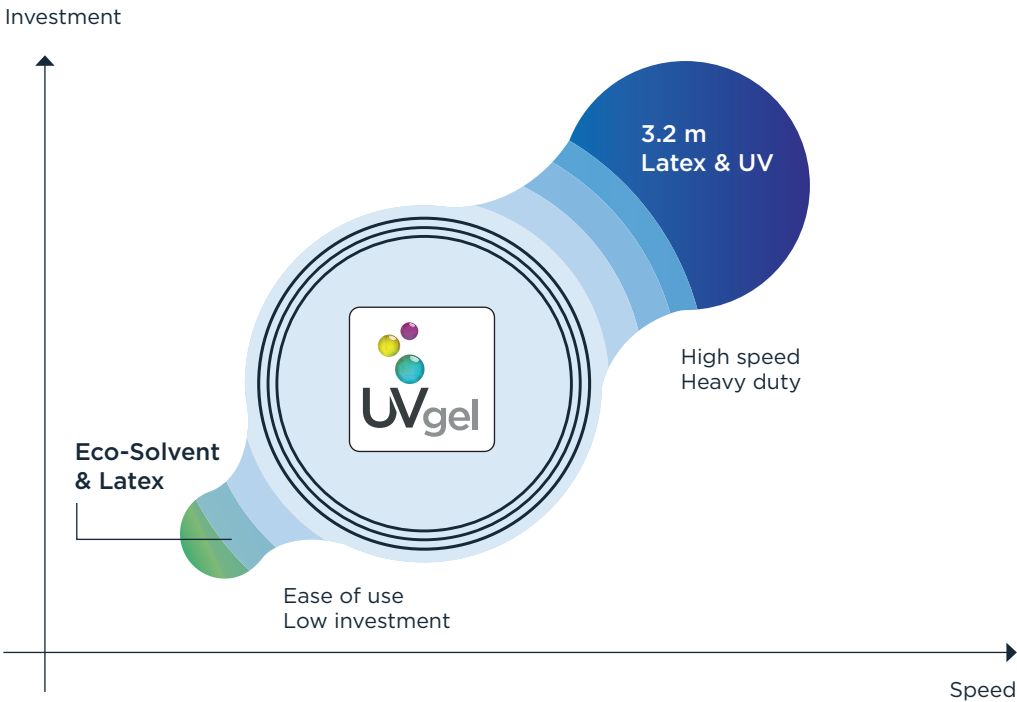


FIGURE 15: UVgel takes on a unique position in the competitive landscape.



Thanks to outstanding productivity, low ink consumption, the ability to print on inexpensive media, added-value applications and a high level of automation, UVgel technology offers an attractive Total Cost of Ownership.

**THE ACOUSTIC  
NOZZLE MONITORING  
TECHNOLOGY,  
PAINT, FIRES AN  
ELECTRO-ACOUSTIC  
PULSE RATHER THAN  
INK DROPLETS  
TO TEST THE  
PRINthead NOZZLES.**

## Total Cost of Ownership (TCO)

### Improved productivity

The productivity gains offered by UVgel technology enable LFG companies to deliver more finished jobs from a single printer without increasing staffing costs. This results in an accelerated return on the capital investment.

### Lower ink consumption

Benchmarking tests validated by Buyers Lab Inc. (BLI) have shown that UVgel technology can save customers an average of 40% of ink usage (including wastage) compared with 1.6 m latex or eco-solvent systems. This saving is achieved thanks to the highly efficient use of four colour inks. These unique UVgel inks deliver as wide a colour gamut as other roll-to-roll technologies that use a higher number of colours.

Because the acoustic nozzle monitoring technology, PAINT, fires an electro-acoustic pulse rather than ink droplets to test the printhead nozzles, ink wastage is significantly reduced. (See Appendix 1 for details of the independently validated tests that were carried out.)

### Less waste

The automatic nozzle compensation technology ensures that prints remain at saleable quality, even when nozzles are malfunctioning. This reduces waste and safeguards productivity. The system pre-empts quality defects by continually testing the nozzles. The operator can then carry out any necessary printhead maintenance proactively, and so ensure the required quality is produced.

### Reduced routine maintenance

The automated nozzle compensation also reduces the need for routine operator printhead monitoring and maintenance, freeing up valuable operator time for other tasks.

## Option to use less expensive media

The low-heat UVgel technology enables LFG companies to work with thin and heat-sensitive media. This means you can choose less expensive substrates when appropriate for the application and customer expectation.

## The Colorado series

The Colorado family comprises a series of 1.6 m roll-to-roll printers that utilize the patented UVgel technology and produce highly durable, odorless and instantly dry prints of high quality with a wide color gamut. The UVgel inks offer rich, colorful and razor sharp images. All Colorado models bring unique advantages and offer the customer the perfect tool to scale up their business and expand their horizons.

Canon UVgel technology is at the core of our Colorado roll-to-roll printing series printers.

Launched in 2017 the Colorado 1640 was the first printer to feature the groundbreaking UVgel ink technology and the first 1.6 m roll-to-roll printer developed to deliver unprecedented productivity, minimal maintenance, and excellent output quality on a broad range of media.

The Colorado 1650 was introduced in 2019. It features the same unrivalled speed and print quality, together with a flexible ink set, and now also includes FLXfinish technology, allowing for optimum application versatility with the ability to print with a matte or gloss finish, without changing inks.

In 2020, the UVgel Wallpaper Factory revolutionised the interior décor market by offering the first professional end-to-end automation solution for mass-customised, high-margin wallpaper production on demand.

In 2021, the Colorado 1630 was introduced, offering the UVgel technology at an interesting price point, thanks to a lower print speed and its modular architecture.

We brought the UVgel Print Factory in 2022 to the market to combine the productivity and the high level of automation of the Colorado series with a jumbo roll media input and a jumbo roll media rewinder output for a near continuous production.

Also in 2022, FLXfinish+ was launched as the successor and next level of FLXfinish, extending your application range to a whole new level: offering a choice between matte, gloss or mixed matte and gloss applications in one print, with perfect registration and easy to operate.

The Colorado M-series brought a fully modular, in-field upgradable concept and UVgel white ink to the market in 2023. This scalable series includes two base models (M3 and M5) offering a choice of output speeds, with the option to upgrade from one model to the other. Both printers can be easily configured to 'W' versions for white ink (M3W and M5W) to print white ink without worry.

## The Colorado M-series overview

A fully modular and in-field upgradeable platform.



Colorado M3



Colorado M3W



Colorado M5



Colorado M5W



UVgel Wallpaper Factory



UVgel Print Factory

The Colorado series is a family of 1.6 m roll-to-roll printers that utilise the patented UVgel technology to produce highly durable, odourless and instantly dry prints of high quality and with a wide colour gamut.

The UVgel inks offer rich, colourful and razor-sharp images that will stun your customers.

All Colorado printers offer unique advantages, to help you scale up your business and access new high-value commercial opportunities.



03

**MEASURING  
UVGEL  
PERFORMANCE**



# MEASURING UVGEL PERFORMANCE

03

## Tests under a wide range of conditions

### Performance parameters

Canon has conducted stringent tests to evaluate the performance of UVgel technology under a wide range of conditions. The results confirm that the Colorado series with UVgel technology sets new standards for quality, productivity, automation, application range and operating costs.

#### The tests covered six critical performance parameters:

- Colour gamut
- Colour accuracy
- Colour uniformity
- Repeatability and colour consistency
- Surface tackiness and susceptibility to smudging
- Print durability



FIGURE 16: Analysis & Measurement Department

All printers in the Colorado series meet the FOGRA39 colour space requirement.

## Colour gamut

### What is this and why is it important?

The colour gamut of a printer is the range of colours that can be printed on this specific device. Usually, the bigger the colour gamut, the better the output can be matched to the viewer's expectations.

The value of the colour volume is one factor that affects print quality. A second indicator of colour performance is how much of the colour space, of FOGRA39, for example, can be simulated by a printer.

### The tests

There are multiple ways to show the size of the gamut. For UVgel we measured:

- The maximum volume of the colour space
- The fraction of Pantone coated colours that can be addressed with the colour space of the printer

The printer gamut was measured in the Gloss High Quality print mode at a speed of 40 m<sup>2</sup>/hr. All measurements were made with a colourimeter using D50/2-degree and M1 lighting conditions. Specification printer gamut > FOGRA39.

### The results

The gamut of the UVgel technology is large enough to simulate most relevant industry standards, as is shown in the graph below.

THE GAMUT OF THE  
UVGEL TECHNOLOGY  
IS LARGE ENOUGH  
TO SIMULATE MOST  
RELEVANT INDUSTRY  
STANDARDS.

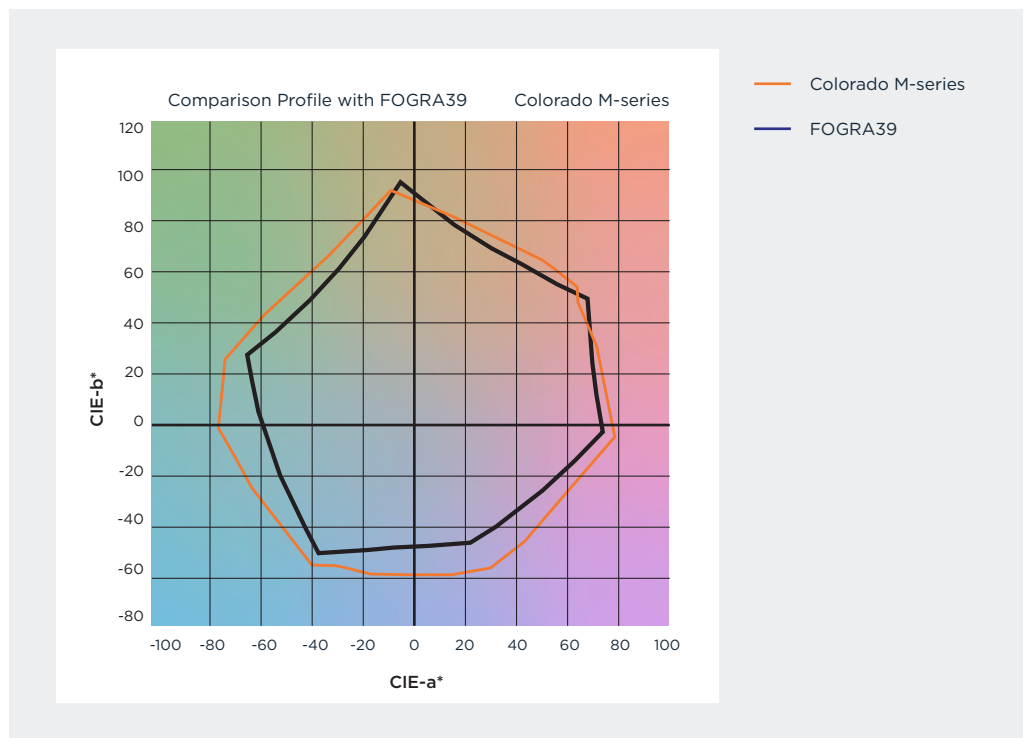


FIGURE 17: Colour gamut contour of maximum chroma colours tone lines for primary and secondary colours



## Colour accuracy

### What is this and why is it important?

Colour accuracy is a measure of how accurately a colour can be reproduced. When the colour to be reproduced is present in the colour gamut of the printer, the next step is to check if the colour accuracy of the system (controller, RIP, printer) is good enough to reproduce a colour correctly, based on the defined criteria for that colour, for example, FOGRA39.

### The tests

We evaluated the colour accuracy of UVgel and the Colorado M-series against the FOGRA39 input profile.

Measurements were taken directly after profiling the printer.

<b>Input profile</b>	FOGRA39
<b>Intent</b>	Absolute
<b>Printer profile</b>	'Enhanced colours' and no colour boost
<b>Media</b>	MPI2000 Avery Gloss White Vinyl
<b>Measurement</b>	D50, 2degr, M1 lighting

Patches are compared with the FOGRA39 reference file.

### The results

95% of all 1485 patches can be reproduced with an accuracy 2.9 dE00. This fulfils the requirement of 95% <4 dE00.



FIGURE 18: ICC swatch print with 1485 patches

UVgel technology colour accuracy is well within the Fogra target.

UVgel uniformity performance is good and is better than that of latex and eco-solvent.

THE UNIFORMITY  
WITHIN A PRINT IS  
GOOD, WITH 95% OF  
ALL PATCHES BEING  
REPRODUCED WITH  
AN ACCURACY  
OF GREATER  
THAN 1.07 DEOO.

## Uniformity

### What is this and why is it important?

When printing specific colours, they should appear the same, regardless of where they are printed, i.e., their position on the media, or on two or more similar prints. This is most obvious when printing wallcoverings: multiple tiles are printed consecutively, but will end up next to each other on a wall. There should be no colour difference between them.

This performance criterion is called colour uniformity: a measure of how reproducible the colour is within one print. Colour is measured on patches.

### The tests

Nine targets were printed to Fogra specification on a meter-square sheet. The 90th percentile of the patches must have a dE00 of 3.0 or less.

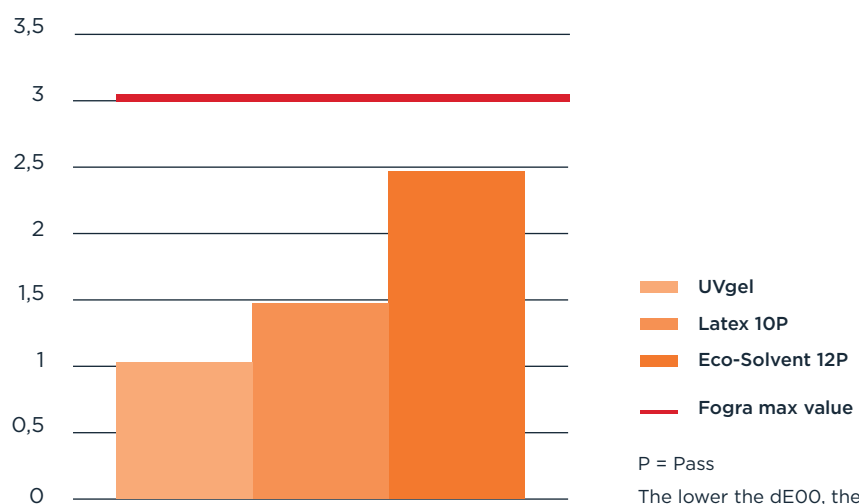
**Note:** Colour variations due to banding or printhead artefacts were not taken into consideration in this analysis.

### The results

The gamut of the UVgel technology is large. The following graph shows the results for a number of different types of media. The red line represents the Fogra specification. The lower the figure, the better the result.

The uniformity within a print is good, with 95% of all patches being reproduced with an accuracy of greater than 1.07 dE00. This is also better than latex and eco-solvent.

#### dE00 95%



MPI2000 (Avery Gloss White Vinyl)

FIGURE 19: UVgel colour uniformity

## Repeatability and colour consistency

### What is this and why is it important?

When a print is made, it is important to know the repeatability, or consistency of the colour reproduction.

### The tests

We measured prints both one hour and 24 hours after the reference print. Measurements were taken after profiling the printer.

<b>Test file</b>	1485 patch test chart ECI2002CMYK
<b>Time interval</b>	1 hour and 24 hours
<b>Media</b>	MPI2000 Avery Gloss
<b>White Vinyl</b>	
<b>Measurement</b>	D50, 2degr, M1 lighting

Patches were compared with the reference print.

### The results

95% of all patches fulfil  $dE_{00} < 1.53$ . Moreover, we can deduce from the measurement data that the ISO 12647-8 criteria are also matched:  
max.  $dE_{00} < 2.5$  for solids CMYKRGB and  
max.  $dE_{00} < 3$  for midtones CMYK.

The colour repeatability of UVgel technology is very high, and well within the ISO 12647-8 criteria.



FIGURE 20: ECI2002CMYK test chart with 1485 patches

UVgel prints printed with UVgel 460 inks have a stretchability of up to +85%. This is on par with latex and superior to most traditional UV inks.

## Flexibility

### What is this and why is it important?

Whether you're printing interior wallcoverings that need to go round corners, or plastic film for complex car wrapping, the flexibility of the cured inks will play a vital role in the final appearance of the application.

### The tests

Output printed with the Colorado has an elongation of up to +85%, being on level with latex technology and scoring better than most traditional UV inks found in high-end, high volume printing equipment.

### The results

A stretch figure of +85% means a 10 cm print can be stretched up easily to 18.5 cm without breaking or damaging the print or media. This allows for self-adhesive vinyl's (SAVs) and other media to be comfortably applied and removed including stretching and bending around curves and edges. As a result, it serves a wide scope of applications, including stretchable soft signage material and vehicle graphics.



The UVgel 460 inks of the Colorado series have been designed to bring extra flexibility and stretchability to the printed output, while maintaining the robustness that UVgel inks are so well-known for.

THE COLORADO  
SERVES A WIDE  
SCOPE OF  
APPLICATIONS,  
INCLUDING  
STRETCHABLE  
SOFT SIGNAGE  
MATERIAL AND  
VEHICLE GRAPHICS.

## Surface tackiness and smudge susceptibility

### What is this and why is it important?

The sooner a freshly printed output can be handled, for example by finishing devices, the better. To be able to turnaround jobs as quickly as possible, you need to keep drying time to a minimum. The goal is to ensure that media can be handled and finished without the risk of distortion to the image or smudging on the winder.

In practice, many graphics applications also require the ink surface to withstand mechanical load by rubbing, stacking or winding, for example. The tackiness of the ink top layer is, therefore, an important factor in smudge resistance.

### The tests

The System Michael Huber München carboning tester was used to quantify the tackiness of UVgel.

UVgel meets the <0.025 requirement for all supported media proving that UVgel inks are robust enough for standard post-processing.

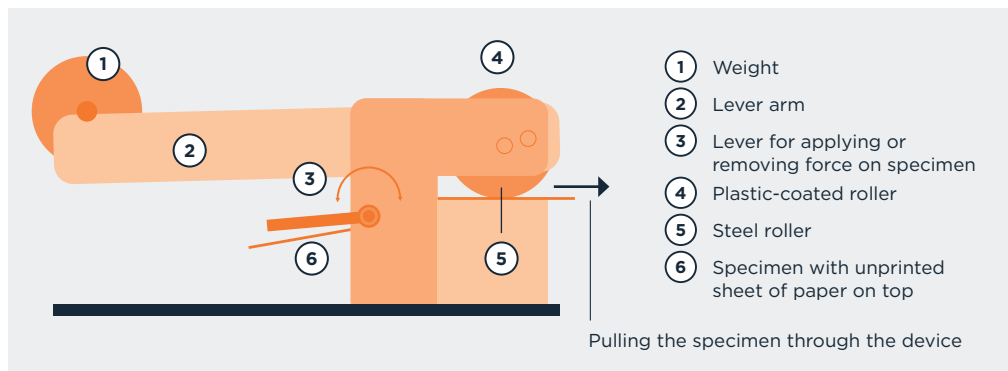


FIGURE 21: System Michael Huber München carboning tester

The test specimen was a strip partly printed with a coverage of 30% and partly printed with a coverage of 55%. An unprinted sheet of uncoated wood-free 80 gsm office paper was placed on top of the specimen and the stack of these two strips was pulled through the two rollers.

The optical density of the ink deposited on or transferred to the unprinted sheet was measured with a spectrophotometer. This represents the measure for surface tack/smudge. An optical density smaller than 0.025 (i.e. hardly any transfer of ink) is considered to be sufficient to ensure

post-processing and handling of the medium without risk of distortion of the image or smudging of the medium's rear surface on the winder.

### The results

UVgel meets the <0.025 requirement for all supported media. There is potential for higher values to be measured in the case of a medium with high roughness e.g. when fabric is used in banner media. There may also be specific media that suffer from smudge susceptibility. However, for most media, smudging will be within acceptable limits.

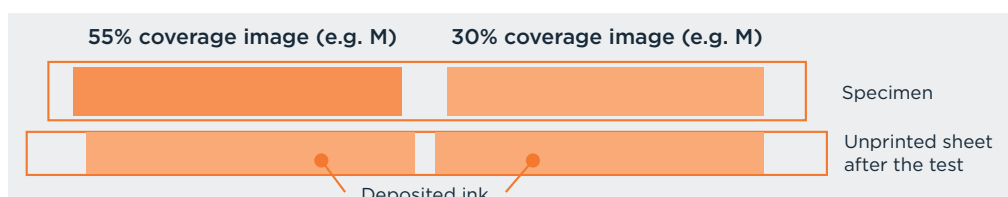


FIGURE 22: Surface tackiness and smudge susceptibility



UVgel prints have superior abrasion, washability, light fastness and weather durability properties.

## Print durability

### What is this and why is it important?

Durability when subjected to external factors is critical for many applications, both indoor and outdoor. Durability ensures that the print is fit for purpose and maintains its quality and performance characteristics over time.

Durability is defined as a combination of the following factors:

- Abrasion resistance
- Washability/scrubbability
- Light fastness and weatherability

### Abrasion resistance

Abrasion resistance is important in applications that are subjected to everyday contact, such as floor graphics, vehicle graphics or wall coverings.

**Note:** Abrasion robustness has an impact on ink stretchability in any ink technology: the higher the abrasion robustness, the lower the ink stretchability.

### The tests

To measure abrasion resistance, we use the Prüfbau Quartant abrasion tester.



In the test, the 200% ink areas of RGB were subjected to 1000 strokes against a defined counter paper. The abraded sample was judged on the following:

- Colour transfer to the counter paper according to ISO18947:2013 'Imaging materials - Photographic reflection prints - Determination of abrasion resistance of photographic images'
- A visual assessment of the worn sample with regard to ink transfer and visible damage

### The abrasion robustness scale is 0 - 5:

- 0 = white media visible
- 1 = strong buff marks/scratches
- 2 = buff marks/scratches
- 3 = light buff marks/scratches
- 4 = visible under angle
- 5 = nothing visible

## The results

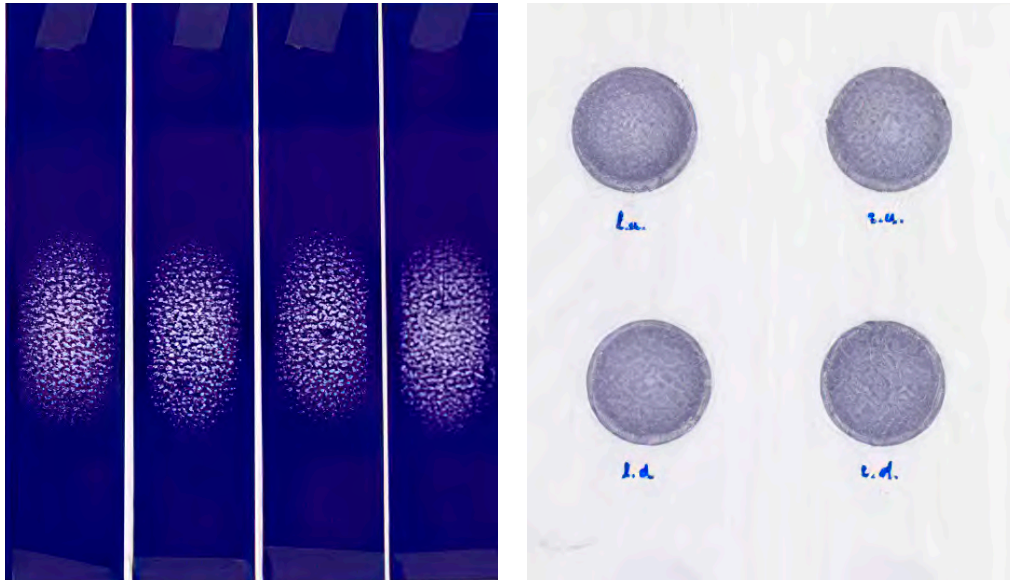


FIGURE 23: Examples of a poor abrasion resistance result

The Colorado series with UVgel 460 inks combines the ability to produce stretchable and flexible output that allows for vehicle graphics and soft signage, while featuring an exceptionally high resistance to scratching and abrasion compared to competitive ink technologies.

We compared UVgel technology with latex and eco-solvent, and observed the following outcome:

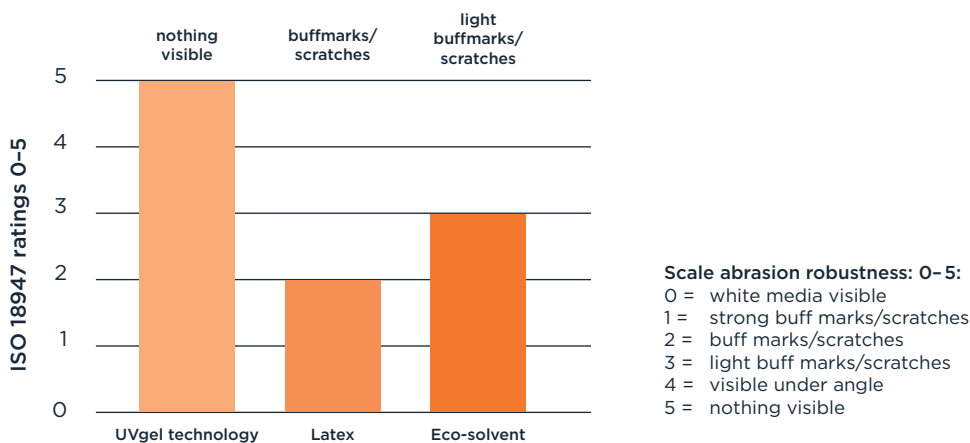


FIGURE 24: UVgel technology has a superior robustness, compared to other ink technologies

UVgel prints display the highest abrasion resistance compared with latex and eco-solvent prints.

**THE COLORADO SERIES COMBINES THE ABILITY TO PRODUCE FLEXIBLE OUTPUT, WHILE FEATURING A HIGH RESISTANCE TO ABRASION.**

### Washability/scrubbability

#### What is this and why is it important?

Printed products, for example wallcoverings, need to be cleaned from time to time. Washability/scrubbability is also part of the EN233 classification for commercial wallcovering products.

#### The tests

Washability/scrubbability of the ink/media combination is determined according to NEN-EN 12956/NEN-EN 259-1 including extra scrubbability using the Elcometer 1720 Washability Tester. This is also known as the Timperley test.



FIGURE 25: The Elcometer 1720 Washability Tester

The following measurements were carried out:

Test part	Rubbing head	Reagent	Cycles	Speed (c./mind)
Spongeability	Sponge (polyether foam)	Distilled water	20	30
Washability	Felt (97% wool fiber)	Soap solution	30	120
Extra-washability	Felt (97% wool fiber)	Soap solution	100	120
Scrubbability	Brush (polyamide 6.6.)	Abrasive paste	30	30
Extra-scrubbability	Brush (polyamide 6.6.)	Abrasive paste	100	30

TABLE 1: The washability/scrubbability measurements carried out

#### The results

The results are compared visually after each test on a typical test pattern, as shown on the right:

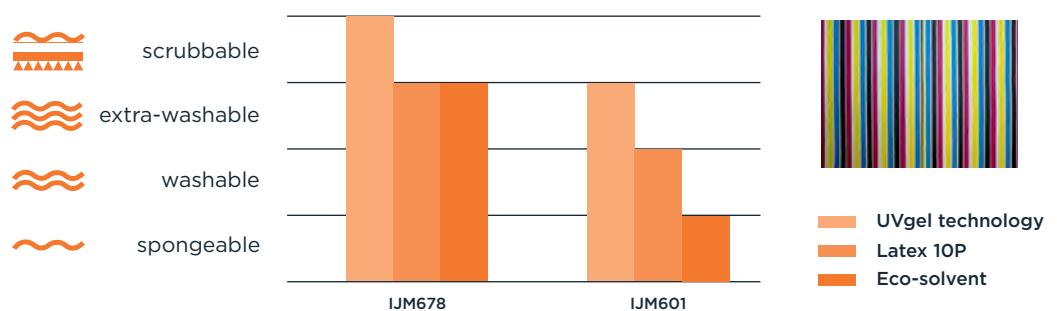


FIGURE 26: Centexbel wallcovering test for washability, and a typical test pattern

## Lightfastness and weatherability

### What is this and why is it important?

Light, water and heat are the most critical factors with respect to image degradation of outdoor prints. It is, therefore, important to determine the resistance of printed output to these influences.

### The tests

We used an accelerated-testing cabinet to produce faster results, as the current ink technologies have multi-year resistance.



FIGURE 27: Accelerated-testing cabinet and lightfastness test chart CMYK

The test target was measured at regular intervals using a spectrophotometer. From this data, the colour difference in dE was charted and assessed on the visibility of colour change (dE00) after 2700 hours.

### The results

The chart below compares the performance of UVgel with that of latex technology. Usually, a dE5 is considered the maximum acceptable colour difference.

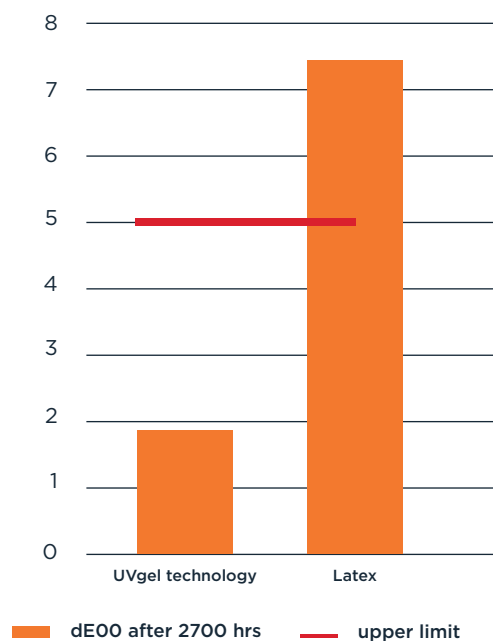


FIGURE 28: Colour fading results – the lower the figure, the better

UVgel shows excellent lightfastness and weather resistance.

THE COLOUR DIFFERENCE DUE TO LIGHT, WATER AND HEAT IS MUCH LOWER FOR UVGEL COMPARED TO LATEX PRINTS.

CERTAIN MEDIA  
MANUFACTURERS  
HAVE EXTENSIVELY  
TESTED THE  
COLORADO SERIES  
AND UVGEL  
TECHNOLOGY  
AND INCLUDE IT IN  
THEIR WARRANTY  
PROGRAMME.

#### Translation of results to colourfastness in years

The results are based on tests of unlaminated prints under laboratory conditions simulating exposure to direct sunlight. Fading time is estimated at between 3800 and 6588MJ/m<sup>2</sup> radiant energy per year, depending on the geographical position, latitude and climate conditions.

The table below translates the results of the dry Wear Of Materials (WOM) simulation test to the equivalent outdoor exposure, relative to the geographical position:

Geographical Location	Outdoor*, Unlaminated
Chicago, Illinois	Up to 3.2 years
Miami, Florida	Up to 2.5 years
Ottawa, Canada	Up to 4 years
Phoenix, Arizona	Up to 2 years
Novorossiysk, Russia	Up to 3.3 years
Lochem, the Netherlands	Up to 4.4 years
Changi, Singapore	Up to 2.7 years
Melbourne, Australia	Up to 3 years
Seosan, Korea	Up to 3.5 years
Choshi, Japan	Up to 3.5 years

*\*Test samples were done on MPI 2000 self-adhesive vinyl, unlaminated. Test results according to dry WOM procedure and geographical translation based on Outdoor Radiant Energy from AWSG Climatological Data.*

TABLE 2: Results of the WOM simulation test

Performance may vary depending on application conditions, as well as media performance. Outdoor applications are susceptible to more than only solar energy and light fading. External factors such as mechanical impact, coarse weather conditions and exposure to chemical or environmental influences can accelerate the aging process.

Canon advises the use of a protective laminate for applications with a prolonged exposure in a non-protected environment.



## Media certifications and warranties

The actual performance of any application is also heavily dependent on the media (and overlaminates) used. Certain media manufacturers have extensively tested the

Colorado series and UVgel technology – also with white ink – and include it in their warranty programme. The two most well-known such global players are 3M with their MCS Warranty System and Avery Dennison with their ICS Warranty Program.



The background is an abstract composition of organic, flowing shapes in shades of green and teal. Scattered throughout are numerous bubbles of varying sizes, some appearing as simple circles and others with more complex, textured surfaces. The overall effect is a sense of movement and natural growth.

04

**UVGEL AND  
SUSTAINABILITY**

## Why sustainability matters

### Sustainability benefits of UVgel ink technology

With climate control now a global priority, businesses are increasingly incorporating sustainability targets in their operations. And printing operations are no exception. As the environmental and social responsibilities placed on companies have broadened and increased over time, customers, partners and governments are demanding that companies meet ever stricter standards, to reduce their environmental impact.

Since its introduction in 2017, UVgel technology has been changing the way Large Format Graphics (LFG) printers look at their business. This proprietary technology has been developed to not only enable the creation of stunning applications but also to offer a more sustainable alternative to traditional offset in the growing LFG sector.

The unique Canon-developed UVgel ink technology offers a more sustainable option than other technologies. For you, your customers and our planet.



UVgel prints live up to the world's most stringent environmental standards, making them perfectly safe for use in sensitive environments such as hospitals, schools and other public places.

**ANY NEW  
TECHNOLOGY MUST  
CLEARLY  
DEMONSTRATE  
SOUND  
ENVIRONMENTAL  
CREDENTIALS.**

## Printed output

### VCL-free ink

VCL (vinylcaprolactam) is a chemical compound that has traditionally been included in the production of UV inks. Recognising the hazards of VCL and the call for its replacement, UVgel ink has been developed completely free of VCL, and is truly unique in this aspect.

### HAPs

HAPs (Hazardous Air Pollutants) is a collective name for a group of 187 specific toxic substances, a number of which are used in various printing processes and technologies.

TNO, the Netherlands-based organisation for applied scientific research that certifies products and issues independent evaluations of quality, has performed extensive testing on preliminary emissions both from the UVgel print technology and from the prints produced.

Concluding that no HAPs are emitted by either the printer or the prints, the test results state that working with UVgel technology and handling UVgel prints under normal conditions will not expose either printer operators or customers/consumers to HAPs.

### VOCs

VOC's or Volatile Organic Compounds are components in the ink that contain carbon and can easily evaporate during the printing process. UVgel is an ink technology that meets the strictest standards with its very low emissions, and is almost void of any VOC's.

## Maintenance fluids and solvents

In its operational process, UVgel technology does not require the use of any maintenance fluids or solvents, nor primers or protective overcoats.

In addition, the printers are equipped with our proprietary UVgel printheads, which have embedded the Piezo Acoustic Integrated Nozzle Technology (PAINT) to monitor nozzle performance. This patented technology eliminates the need for test runs and intermittent test prints to check the state of the nozzles.

## Odour

For any large format print to be used for indoor applications such as wallcoverings, for example, the printed output must be completely odourless.

Although measuring odour is by its nature a subjective rating involving a panel of people, printed output from UVgel printers has been formally evaluated according to the standard DIN EN ISO 16000-28 i. A., VDI 4302 and judged to be 'odourless'.

## Indoor certifications

Meeting the major indoor emissions certifications, such as AgBB and full GREENGUARD Gold as well as certifications required in individual countries (France and Finland, for example), prints produced with UVgel technology can also be used in more sensitive environments, such as schools and healthcare facilities.

## International certifications

### ASTM F793 Type II



ASTM F793 is the standard classification for wallcovering as prescribed by the American Society of Testing and Materials, an international standards organisation that develops and publishes voluntary consensus technical standards for a wide range of materials, products, systems, and services.

ASTM F793 has been adopted as the norm in the North American wallcovering and interior décor industry, but is also recognised and referenced globally.

Type II signifies fit for use in commercial areas with the potential for average to above average scuffing such as waiting rooms, classrooms, and hallways.

Various characteristics are evaluated such as colourfastness, washability, scrubbability, stain resistance, crocking resistance, break- and tear strength and other serviceability aspects as well as flame spread and smoke development.

Having been fully evaluated against the ASTM quality standards by an independent organisation for emissions

testing, wallpaper produced using UVgel ink complies with the ASTM F793 Type II Category V. For this particular evaluation, a combination of UVgel ink and Royson's Dreamscape 20 oz Oznaburg Back Wallcover was used; however, as long as any alternative appropriate medium fulfils the ASTM F793 requirements, using it in combination with UVgel ink will meet the ASTM F793 criteria.

### AgBB - Health-related Evaluation of Emissions of VOCs from building products



Building products, including wallcoverings, can be a major source of indoor air pollution by volatile organic compounds (VOC, VVOC and SVOC). The Committee for Health-related Evaluation of Building Products in Germany (Ausschuss zur gesundheitlichen Bewertung von Bauprodukten – AgBB) has developed criteria and subsequently an evaluation scheme for testing VOC emissions from building products to confirm their suitability for indoor use. Having been fully evaluated against the AgBB quality standards by an independent organisation for emissions testing, wallpaper produced using UVgel ink complies with all the requirements of the AgBB scheme. For this particular evaluation, a combination of UVgel ink on IJM601 Durable In- & Outdoor paper 212 g/m<sup>2</sup> was used; however, as long as any alternative appropriate medium fulfils the AgBB requirements, using it in combination with UVgel ink will meet the AgBB criteria. More information is available at:



[Learn more](#)

**PRINTS PRODUCED  
WITH UVGEL  
TECHNOLOGY CAN  
ALSO BE USED IN  
MORE SENSITIVE  
ENVIRONMENTS,  
SUCH AS SCHOOLS  
AND HEALTHCARE  
FACILITIES.**



**GREENGUARD Gold certification by  
UL Environment**

The GREENGUARD Certification Program gives assurance that products designed for use in indoor spaces meet strict chemical emissions limits and so contribute to the creation of healthier interiors. It focuses on emissions from building materials, in this case printed wallcoverings/wallpaper and signage. The maximum acceptable concentrations of VOCs are defined in a standard: UL 2818.

GREENGUARD Gold Certification sets stricter certification criteria that take account of safety factors to consider in the case of sensitive individuals (such as children and the elderly) and ensures that a product is acceptable for use in environments such as schools and healthcare facilities.

Having been thoroughly tested against the UL 2818 – 2013 Gold Standard for Chemical Emissions for Building Materials, Finishes and Furnishings, UVgel ink has been awarded the GREENGUARD Gold certificate.

More information is available at:



[Learn more](#)

**EN15102 – CE marking for decorative  
wallcoverings**

CE marking for wallcoverings is regulated by a European standard: EN15102:2007 Decorative wallcoverings – roll and panel form products. This standard has made CE marking on all wallcoverings mandatory since 2013. To ensure conformity with the standard, wallcoverings are tested for their mechanical strength, their reaction to fire and their sustainability, among other aspects.

Wallpaper produced using UVgel ink in combination with both IJM678 Self-adhesive Embossed Wall Covering and IJM601 Durable In- & Outdoor paper 212 g/m<sup>2</sup>, fully conforms with EN15102, having successfully passed all the tests conducted by CENTEXBEL, an independent institute officially approved for CE marking certification.

## Certifications in individual countries

### Finland – Emission Classification of Building Materials M1



Regarding the classification of emissions from building materials, Finland has its own voluntary certification process, which all manufacturers, importers and exporters of building products can apply for, but must do so locally in Finland. Certificates are granted by the Building Information Foundation (RTS, Finland's leading information service for the building and construction sector) in three categories, of which M1 is the highest and signifies the lowest emissions and highest cleanliness class for building materials. To be granted a certificate, a construction product has to pass an emissions test (including for ammonia, formaldehyde and carcinogenic compounds) and an odour test. The M1 classification does not overrule official building codes, but many developers, architects and design engineers favour M1 classified products when selecting materials for their projects.

As UVgel printers have been certified as complying with AgBB's requirements following tests conducted by an accredited testing laboratory for the M1 classification in Finland, wallcoverings produced with the same medium and ink therefore also comply with the M1 classification in Finland.

If, however, the medium required is different from those used in the AgBB tests, but nevertheless also complies with the AgBB requirements, using it in combination with UVgel ink will comply with the M1 classification in Finland.

Canon will support local customers, who are seeking to gain the M1 classification for their printed wallcovering, by providing all the necessary paperwork and guidance on completing it.

### France – Émissions dans l'air intérieur



It is mandatory for any wallcovering sold on the French market to meet the requirements of the "Émissions dans l'air intérieur" classification, of which the highest category is A+. A mark indicating conformity with the classification has to be applied to the wallcovering in addition to the European CE mark.

This self-declared classification must be made locally in France by the printer supplying the wallcovering or by the wallcovering manufacturer.

As UVgel printers have been certified as complying with AgBB's requirements following tests conducted by an accredited testing laboratory for the "Émissions dans l'air intérieur" classification, wallcoverings produced with the same medium and ink therefore also comply with the A+ category of the "Émissions dans l'air intérieur" classification.

If, however, the medium required is different from those used in the AgBB tests, but nevertheless also complies with the AgBB requirements, using it in combination with UVgel ink will comply with the "Émissions dans l'air intérieur" classification.

Canon will support local customers, who are seeking to gain the "Émissions dans l'air intérieur" classification for their printed wallcovering, by providing all the necessary paperwork and guidance on completing it.



[Learn more](#)

UVgel printers are safe to operate and are designed as a fully enclosed system, to have minimal ecological and health impact during operation. UVgel printers are energy efficient and reduce the need for plastic-consuming lamination.

**PRINTED OUTPUT  
OF UVGEL PRINTERS  
IS WELL TESTED  
AND HAS PROVEN TO  
HAVE VERY STRONG  
ROBUSTNESS  
PROPERTIES.**

## Equipment and operation

### Using UVgel printers

The UVgel ink technology and its handling, as well as the UVgel print engines, are designed to have minimal ecological and health impact on the production environment while in operation.

UVgel printers are fully enclosed and come equipped with internal filters and can be installed and operated in the foreseen space without dedicated extraction installed on or at the machines.

With UVgel, dot placement is fully controlled. This ensures consistently repeatable images over time, with minimal waste through misprints. There is also no need for wasteful, time-consuming calibration prints.

Radiation emitted while in operation is below the Threshold Limit Values for UV, Visible and IR radiation according to ACGIH institute standards.

Noise emission is tested according to ISO7779/EN27779 and verified to be maximum 66dB (A) at the operator position.

Compared to other ink technologies such as latex or eco-solvent inks, UVgel requires considerably less ink to build up the same image quality and colour intensity. With a saving of up to 40 % less ink consumed (see the BLI benchmark test results), this is not only an economical benefit, but also a clear ecological advantage.

## Printing on eco-friendly alternatives

Whether you're a young Print Service Provider just starting up or a large, industrial print factory, you are well aware of the impact your operation has on the environment. What was hot in the printing industry is now a commodity, therefore Canon provides reliable printing solutions that are able to print on a wide range of substrates, including PVC-free media, paper-based alternatives 100 % recycled or recyclable media, to support you in your efforts to provide your customers with a sustainable proposition.

Printed output of UVgel printers is well tested and has proven to have very strong robustness properties while performing exceptionally well in terms of both mechanical and chemical resistance.

This often results in customers choosing for a multitude of applications to omit the usual process of laminating the prints before applying.

Apart from bringing economic benefits as increasing profit margins for short-term applications by eliminating the time and cost of the overlamine, the simpler process will also take the extra plastic layer of laminate out of the end application.

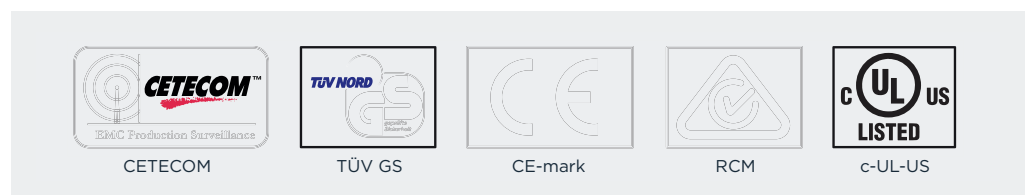


FIGURE 29: Safety/EMC marks and Environmental labels

## Canon circular economy manufacturing and recycling

Canon well understands the need for companies to minimise their use of natural resources and design waste out of their operating models. For Canon, this means paying attention to what happens to its products at the end of their lives and ensuring that their usefulness is prolonged wherever possible.

The average lifespan of a current 1.6 m large format printer on the market could be three to five years, after which it will be replaced and disposed of as electronic waste.

UVgel printers are engineered for a lifespan of up to one million square meters of output. Canon is committed to reducing the reliance on natural resources by choosing long-lifetime parts and using maximum recyclable materials such as steel, iron and keeping unsustainable plastics to a minimum.

UVgel printers are designed from the ground up to fit in Canon's Circular Economy Manufacturing program and to be eligible for remanufacturing after its first lifetime.

As a result, we will reduce our reliance on natural resources and by reusing existing parts and materials, we enable ourselves and our customers to maximise their own sustainability commitments.

UVgel printers are designed to fit in Canon's Circular Economy Manufacturing program and to be eligible for remanufacturing after its first lifetime. By reducing reliance on natural resources and by reusing existing parts and materials, we enable ourselves and our customers to maximise their own sustainability commitments.







05

APPENDIX



## Appendix I

### BLI-validated test report on ink consumption comparisons with the Colorado 1640

UVgel technology has a much more constant ink usage across different types of media compared to, for example, HP latex ink. As a result, it is possible to achieve an average saving of 40 % on ink usage versus the competition (including waste).

#### Test process

We evaluated the ink consumption of three 1.6-metre large format devices:

- The Colorado 1640
- Roland's seven-colour eco-solvent ink SOLJET EJ-640
- HP's six-colour latex ink Latex 570

All devices were serviced by a vendor-approved service agent before the tests began.

The evaluation comprised printing two test files (Onyx and Ink Consumption) twice on each device on Avery Dennison MPI 2000 media.

The Onyx test file was configured and printed as '4-Up', which measured approximately 11.18 ft<sup>2</sup> (1.04 m<sup>2</sup>).

The larger Ink Consumption file, measured approximately 21.53 ft<sup>2</sup> (2.00 m<sup>2</sup>).



FIGURE 30: ONYX test chart test file

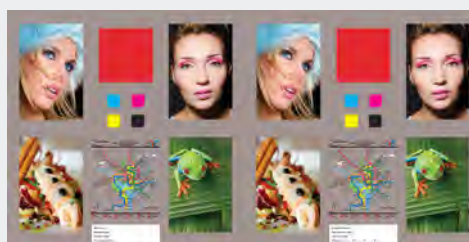


FIGURE 31: Ink consumption test file



FIGURE 32: Outdoor banner test file

Ink Consumption Testing  
Colorado 1640 vs. Roland  
SOLJET EJ-640 and  
HP Latex 570

IT IS POSSIBLE  
TO ACHIEVE AN  
AVERAGE SAVING  
OF 40% ON INK  
USAGE VERSUS THE  
COMPETITION.

The high-quality driver setting was used for printing the samples on the Colorado 1640, while two manufacturer-advised speed modes for vinyl/indoor quality were used on each of the other devices: 10 and 12 pass for the Roland unit and 10 and 6 pass for the HP unit.

Each manufacturer's published 10-pass MPI 2000 media profile was used, and the published MPI 2000 Canon high-quality profile was also used. However, because media profiles are not available for either the Roland EJ-640 unit 12-pass setting or the HP Latex 570 6-pass setting, their generic vinyl media profiles were used instead.

Lastly, a third Banner test file was configured and printed as '2-Up', which measured approximately 30.23 ft<sup>2</sup> (2.81 m<sup>2</sup>), and printed twice on each device on Starflex SFF-155 banner media.

The production driver setting was used for printing on the Colorado 1640, and, as there is no specific profile for the Roland device, a generic banner 10-pass media profile was used, which is the speed Roland recommends for printing on banner material. For the HP printer, the Starflex SFF-155 6-pass profile was used, as was a generic banner 4-pass media profile, which are HP-recommended banner print settings.

In addition, like-for-like colour management settings were utilised across all devices: in the Onyx RIP, which was used for both the Canon and HP devices, the CMYK ICC profile was set to EuroscaleCoated and the RGB profile was set to AdobeRGB1998.

The rendering intent for images was set to Perceptual (images) and the rendering intent for vector was set to Relative colourimetric for Roland SOLJET EJ-640), the CMYK ICC profile was likewise set to EuroscaleCoated and the RGB profile was set to AdobeRGB1998, while the rendering intent for images was set to Perceptual and the rendering intent for vector was set to Colourimetric.

The subsequent ink usage results that were provided in the accounting utility supplied by each printer manufacturer in the device's web server/Job Log immediately after printing each test file are recorded below.

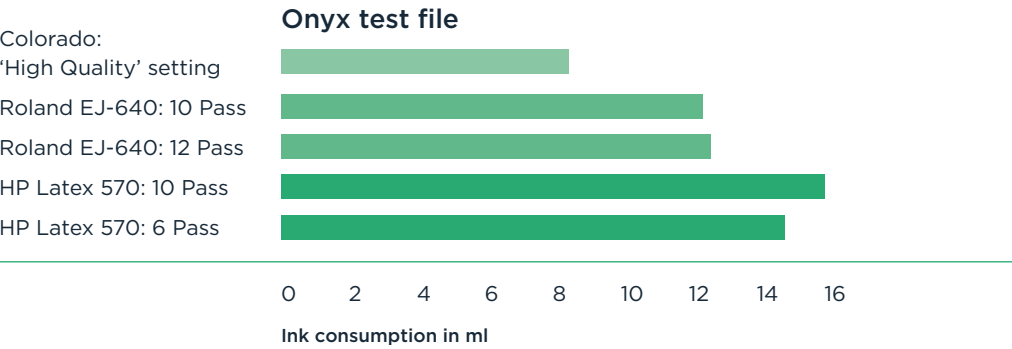
## Process summary

The tests were performed on equal media and print settings for all three devices, using supplier-provided print profiles and supplier-recommended speed modes. The above testing method and results were validated to be correct by Buyers Laboratory Inc.

Test results

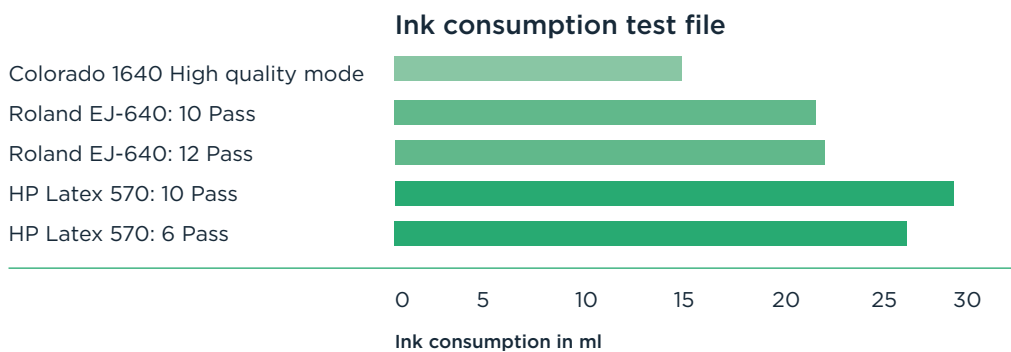
ONYX TEST FILE - Printed on Avery Dennison MPI 2000 Media					
Device	Media Profile Used	Print Driver Quality Setting	Ink Usage (in ml.)	Average Ink Usage for two print runs (in ml.)	Percentage Less Ink Used by Océ Colorado 1640
Colorado 1640	MPI 2000	High quality	8.43	8.43	-
	"	"	8.43		
Roland EJ-640	MPI 2000	10 Pass	12.24	12.24	31.13%
	"	"	12.24		
	Generic Vinyl	12 Pass	12.50	12.50	32.56%
	"	"	12.50		
HP Latex 570	MPI 2000	10 Pass	15.39	15.41	45.30%
	"	"	15.43		
	Generic Vinyl	6 Pass	14.35	14.37	41.34
	"	"	14.39		

TABLE 3: Onyx test file



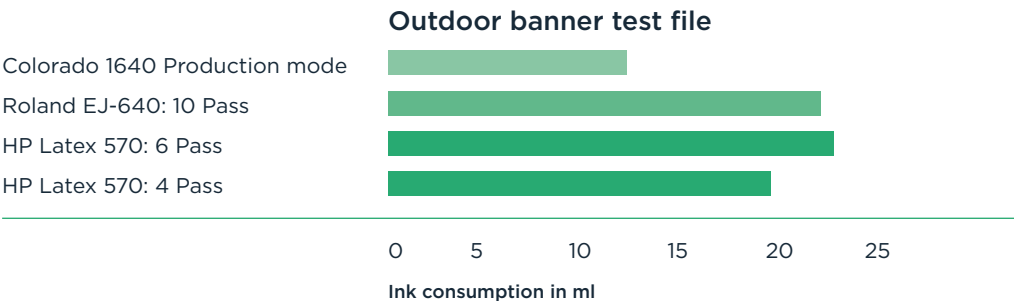
INK CONSUMPTION TEST FILE - Printed on Avery Dennison MPI 2000 Media					
Device	Media Profile Used	Print Driver Quality Setting	Ink Usage (in ml.)	Average Ink Usage for two print runs (in ml.)	Percentage Less Ink Used by Océ Colorado 1640
Colorado 1640	MPI 2000	High quality	14.53	14.53	-
	"	"	14.53		
Roland EJ-640	MPI 2000	10 Pass	21.77	21.77	33.26%
	"	"	21.77		
	Generic Vinyl	12 Pass	22.28	22.28	34.78%
	"	"	22.28		
HP Latex 570	MPI 2000	10 Pass	28.32	28.40	48.84%
	"	"	28.47		
	Generic Vinyl	6 Pass	26.05	26.05	44.22%
	"	"	26.05		

TABLE 4: Ink consumption test file - Printed on Avery Dennison MPI 2000 Media



OUTDOOR BANNER TEST FILE - Printed on Starflex SFF-15 Media					
Device	Media Profile Used	Print Driver Quality Setting	Ink Usage (in ml.)	Average Ink Usage for two print runs (in ml.)	Percentage Less Ink Used by Océ Colorado 1640
Colorado 1640	Starflex SFF-15	Production	12.49	12.49	-
	"	"	12.49		
Roland EJ-640	Generic Banner	10 Pass	22.19	22.19	43.71%
	"	"	22.19		
HP Latex 570	Starflex SFF-15	6 Pass	22.58	22.60	44.73%
	"	"	22.61		
	Generic Banner	4 Pass	19.63	19.71	36.63%
	"	"	19.78		

TABLE 5: Outdoor banner test file - Printed on Starlex SFF-15 Media





## Summary

- The Roland SOLJET EJ-640 device used 12.24 ml. of ink on average when printing the Onyx test file at the 10-pass setting, while 12.50 ml. of ink were used on average at the 12-pass setting.

In contrast, the Colorado 1640 utilised 8.43 ml. ink when printing the same file at the high-quality setting. In terms of percentage of ink used, the Canon device utilised 31.13% and 32.56% less ink, respectively, versus the two Roland print scenarios.

- The HP Latex 570 device used 15.41 ml. of ink on average when printing the same Onyx test file at the 10-pass setting, while 14.37 ml. of ink were used by the HP printer at the 6-pass setting.

Again, this is compared with the aforementioned 8.43 ml. of ink utilised by the Colorado 1640. In terms of percentage of ink used, the Canon device utilised 45.30% and 41.34% less ink, respectively, versus the two HP print scenarios.

- For the Ink Consumption test file, the Roland EJ-640 device utilised an average 21.77 ml. of ink at the 10-pass setting and 22.28 ml. of ink at the 12-pass setting.

The Colorado 1640 utilised 14.53 ml. of ink when printing the same file at the high-quality setting. In terms of percentage of ink used, the Canon device utilised 33.26% and 34.78% less ink, respectively, versus the two Roland print scenarios.

- The HP Latex 570 device utilised an average 28.40 ml. of ink at the 10-pass setting and 26.05 ml. of ink at the 6-pass setting when printing the Ink Consumption test file.

Again, this is compared with the 14.53 ml. of ink utilised by the Colorado 1640. In terms of percentage of ink used, the Canon device utilised 48.84% and 44.22% less ink, respectively, versus the two HP print scenarios.

- For the Outdoor Banner test file, the Roland EJ-640 used an average of 22.19 ml. of ink at the 10-pass generic banner setting.

The Colorado 1640 used 12.49 ml. when printing the same file at the production setting. In terms of percentage of ink used, the Canon device utilised 43.71% less ink than the Roland EJ-640.

- Lastly, the HP Latex 570 printer utilised an average of 22.60 ml. of ink at the 6-pass setting, and 19.71 ml. of ink at the 4-pass setting when printing the Outdoor Banner test file.

Again, this is compared with the 12.49 ml. of ink used by the Colorado 1640. In terms of percentage of ink used, the Canon printer utilised 44.73% and 36.63% less ink, respectively, versus the two HP print scenarios.



## Appendix II

### BLI-validated test reports on ink consumption comparisons with the Colorado 1650

As shown in Appendix I, customers of UVgel devices can expect significant ink savings compared to competition devices (including waste). The reason for this is that UVgel technology has a much more constant ink usage across different media compared to HP latex ink, for example.

To prove that the marketing claims about ink savings made for the Colorado 1640 extend to the Colorado 1650, we measured and assessed the actual ink usage of the Colorado 1650 according to the same procedure used by the Buyers Laboratories Inc. (BLI) in our previous assessment.

This addendum lists the measured ink consumption for the Colorado 1650 and illustrates the ink savings compared to the same competitive technologies as the original comparison (Appendix I).

#### Test process

We evaluated the ink consumption of the Canon Colorado 1650, and compared this to the devices in the original Colorado 1640 benchmark test described in Appendix I, namely Roland's seven-colour eco-solvent ink SOLJET EJ-640 and HP's six-colour latex ink Latex 570.

The evaluation comprised of printing two test files (Onyx and Ink Consumption) twice on each device, on Avery Dennison MPI 2000 media.

The Onyx test file was configured and printed as '4-Up', which measured approximately 11.18 ft<sup>2</sup> (1.04 m<sup>2</sup>).

The larger Ink Consumption file, measured approximately 21.53 ft<sup>2</sup> (2.00 m<sup>2</sup>).

The high-quality driver setting was used for printing the samples on Colorado 1650, in both high-quality gloss and matte quality. The most recent media profile was taken from the Canon Media Library.

Finally, a Banner test file was configured and printed as '2Up', which measured approximately 30.23 ft<sup>2</sup> (2.81 m<sup>2</sup>), and printed twice on Canon IJM650 banner media in both gloss production and matte production print modes with the IJM650 media profile.

**Note:** This is slightly different to the original benchmark, which used the Starflex SFF-15 banner material.

In addition, like-for-like colour management settings were utilised across all devices: in the Onyx RIP, the CMYK ICC profile was set to FOGRA39, and the RGB profile was set to AdobeRGB1998.

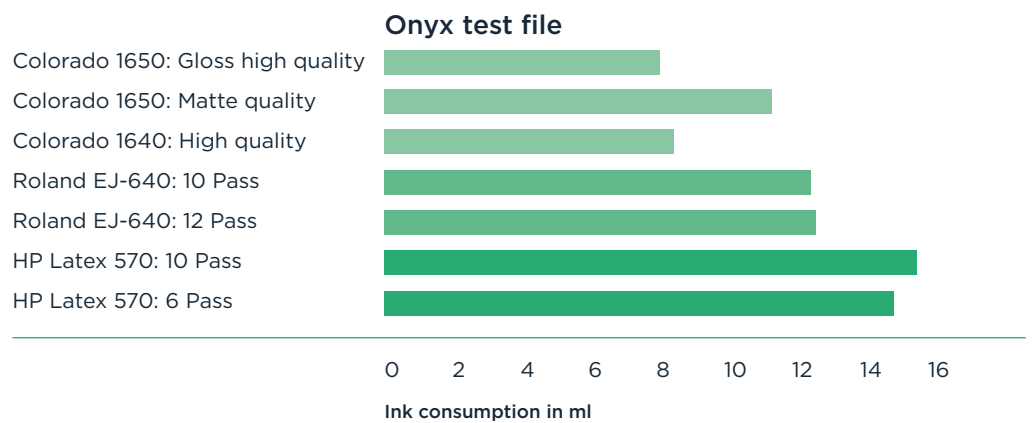
The rendering intent for images and vector were set to Relative colourimetric with black-point compensation.

The subsequent ink usage results for the Colorado 1650 that were taken from the device's web server immediately after printing each test file are recorded below alongside the results of the other devices.

Colorado 1650 Addendum  
to Colorado 1640  
benchmark test

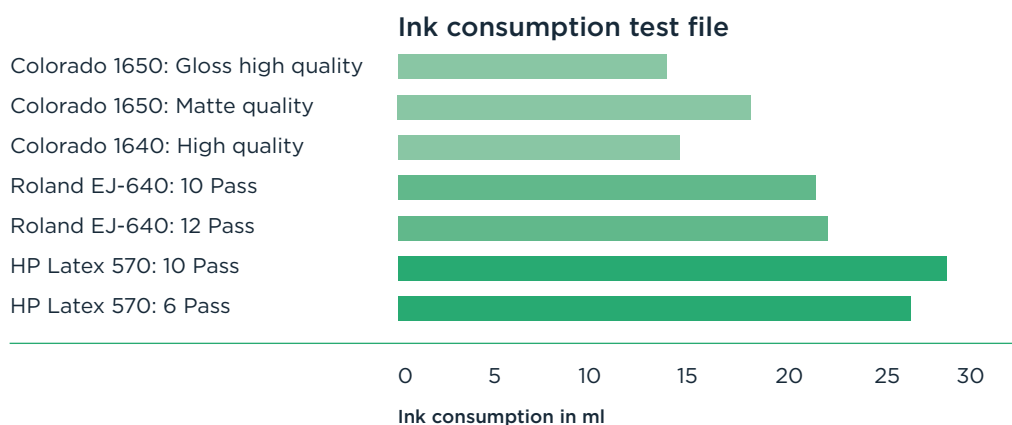
ONYX TEST FILE - Printed on Avery Dennison MPI2000 Media				
Device	Media Profile Used	Print Driver Quality Setting	Ink Usage (in ml.)	Average Ink Usage for two print runs (in ml.)
Colorado 1650	MPI 2000	Gloss high	7.89	7.89
	"	"	7.89	
	"	Matte quality	11.02	11.02
	"	"	11.02	
Colorado 1640 [from previous benchmark]	MPI 2000	High quality	8.43	8.43
	"	"	8.43	
Roland EJ-640 [from previous benchmark]	MPI 2000	10 Pass	12.24	12.24
	"	"	12.24	
	Generic Vinyl	12 Pass	12.50	12.50
	"	"	12.50	
HP Latex 570 [from previous benchmark]	MPI 2000	10 Pass	15.39	15.41
	"	"	15.43	
	Generic Vinyl	6 Pass	14.35	14.37
	"	"	14.39	

TABLE 6: Onyx test file - Printed on Avery Dennison MPI 2000 Media



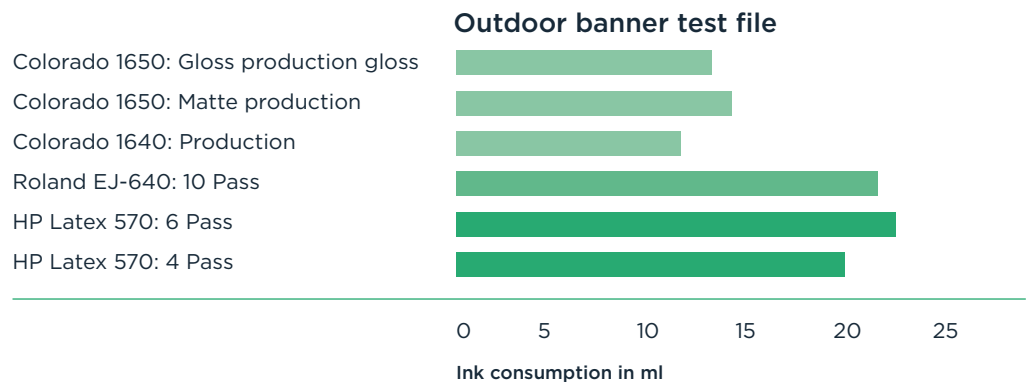
INK CONSUMPTION TEST FILE - Printed on Avery Dennison MPI 2000 Media				
Device	Media Profile Used	Print Driver Quality Setting	Ink Usage (in ml.)	Average Ink Usage for two print runs (in ml.)
Colorado 1650	MPI 2000	Gloss high	14.05	14.05
	"	"	14.05	
	"	Matte quality	18.21	18.21
	"	"	18.21	
Colorado 1640 [from previous benchmark]	MPI 2000	High quality	14.53	14.53
	"	"	14.53	
Roland EJ-640 [from previous benchmark]	MPI 2000	10 Pass	21.77	21.77
	"	"	21.77	
	Generic Vinyl	12 Pass	22.28	22.28
	"	"	22.28	
HP Latex 570 [from previous benchmark]	MPI 2000	10 Pass	28.32	28.40
	"	"	28.47	
	Generic Vinyl	6 Pass	26.05	26.05
	"	"	26.05	

TABLE 7: Ink consumption test file - Printed on Avery Dennison MPI 2000



OUTDOOR BANNER TEST FILE				
Device	Media Profile Used	Print Driver Quality Setting	Ink Usage (in ml.)	Average Ink Usage for two print runs (in ml.)
Colorado 1650	IJM650	Gloss	13.52	13.52
	"	"	13.52	
	"	Matte	14.16	14.16
	"	"	14.16	
Colorado 1640 [from previous benchmark]	Starflex SFF-15	Production	12.49	12.49
	"	"	12.49	
Roland EJ-640 [from previous benchmark]	Generic Banner	10 Pass	22.19	22.19
	"	"	22.19	
HP Latex 570 [from previous benchmark]	Starflex SFF-15	6 Pass	22.58	22.60
	"	"	22.61	
	Generic Banner	4 Pass	19.63	19.71
	"	"	19.78	

TABLE 8: Outdoor banner test file





## Summary

- Low ink consumption is a core characteristic of Canon's UVgel technology.

The Colorado 1650 printer has similar efficient ink consumption to that of the Colorado 1640: The Colorado 1650 achieves ink savings of an average 40% for the three test files when compared to the Roland SOLJET EJ-640 printer and the HP Latex 570 printer for the gloss print modes.

- Ink consumption in gloss mode for the Colorado 1650 is, on average, the same as for the Colorado 1640.
- The ink consumption for the matte printing modes is more dependent on the media and media profile, and ranges from an average of 5% higher compared to the gloss prints for the Outdoor Banner test print, to an additional 35% for the Onyx and Ink Consumption test prints on MPI 2000, compared to the equivalent gloss prints produced on the Colorado 1650.
- On the basis of a 50-50 split between gloss and matte printing for a typical Colorado 1650 customer, the average ink savings compared to the competitive devices and technologies in the test range from 25%, up to 40%.

## Conclusion

For all test prints, the ink consumption of the Colorado 1650 is significantly lower than the Roland SOLJET EJ-640 and the HP Latex 570 printer, with savings of up to 40%.

# NOTES



**Printed on the varioPRINT iX-series sheetfed inkjet press**

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