

Traffic Safety & Security Division

# Choosing the best digital traffic sign printing solution for your needs

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**U.S. traffic sign manufacturing is migrating from analog imaging methods to digital imaging methods. Driving this shift is a desire for a more economical on-demand option, as well as a growing interest in the ability to create low-volume custom signage for wayfinding, tourist information, and a variety of other purposes. With the wide selection of printers, inks, reflective sheeting types, and overlamine films commercially available, decision makers must weigh all the elements of a printing solution to find one that will meet their unique needs now and into the future. Sign fabricators faced with integrating digital printing into their workflow would certainly benefit from the guidance of proven experts in the field.**

Minnesota-based 3M, a leading technology company with more than 90,000 employees worldwide, is a global pioneer in transportation technology and traffic safety. For more than 75 years, we have worked relentlessly to advance the traffic safety industry. Today, 3M products are used to improve traffic safety in nearly every country in the world.

Specific to reflective traffic sign manufacturing, we at 3M have been consistent innovators since 1939, and with the increasing popularity of digital traffic sign printing, we are continuing this tradition. Over the past decade, we have introduced a number of digital printing solutions. Having successfully provided digital traffic sign printing systems in a number of regions of the world for nearly a decade, 3M is uniquely positioned to guide newcomers into this unfamiliar territory.

- Dec. 2015**  
Along with EFI, developed new UV-curable, six-head printer for traffic signs
- 2012**  
New inks for construction work zones
- March 2008**  
First UV-curable inkjet solution for traffic signs
- Sep. 2006**  
First digital printing solution specifically for traffic signs
- 1999**  
Leads industry in digital printing system for license plates
- 1997-1998**  
Release of first screen print ink to not require clear coat
- 1994**  
Release of 3M ElectroCut™ Film

Indeed, our efforts in formulating UV-curable ink, optimized in partnership with Durst Phototechnik AG for the traffic market, has resulted in one of the most successful digital sign printing systems in the world. 3M has long been recognized as a leader in sheeting; but more than that, 3M is an established leader in sign imaging systems.

How do we meet these high standards? Throughout our history, we have maintained our commitment to product quality through science. Since 1987, the 3M WRC (Weathering Research Center) has applied weathering technology to predict the durability of 3M products, including traffic signs. Using state-of-the-art weathering science – an interdisciplinary field that combines photochemistry, materials science, reaction kinetics and climatology – 3M scientists work to determine how solar radiation, heat and water affect the long-term durability of 3M products.



The 3M WRC is the world's largest accelerated weathering facility, operating approximately 100 artificial weathering machines 24 hours per day, seven days per week. At the 3M WRC, we use a range of light sources and methods to detect and quantify their subjects' sensitivity to light, heat and water. For real-world testing, we also coordinate extensive outdoor weathering programs in five major climates. Because product durability is a core promise of our brand, 3M invests the resources necessary to ensure that our traffic signs will dependably meet or exceed the durability requirements of customers.

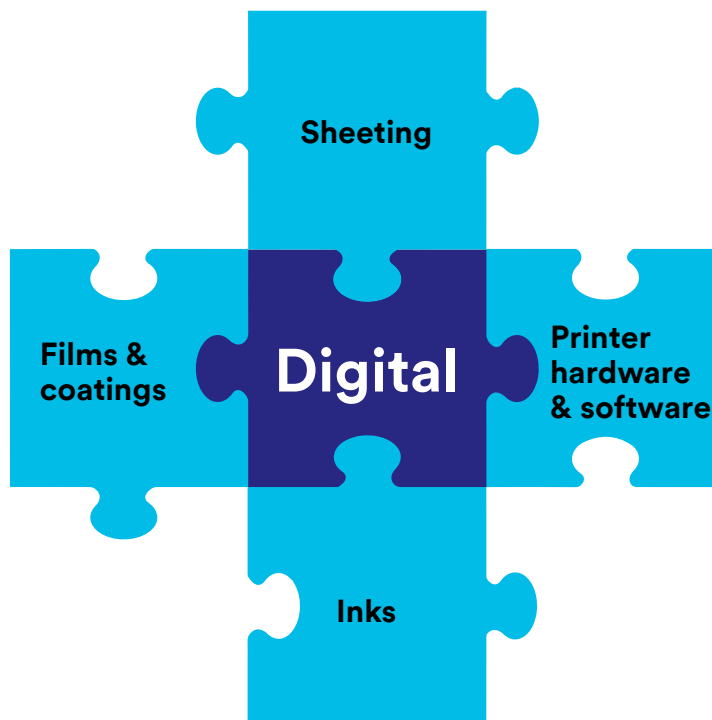


**3M™ MCS™ Warranty**

Our expertise in ink, along with our decades of experience in reflective sheeting, allows us to offer a comprehensive solution with the 3M™ MCS™ Warranty for traffic. This warranty grants sign fabricators the peace of mind that each element of the 3M solution has been optimized to adhere to strict standards of reflectivity, durability, and color.

## Looking for a Digital Traffic Sign Printing Solution?

In the highly regulated traffic sign industry, the requirements for color and retroreflectivity are strict. To ensure compliance with these exacting requirements, adopt a “whole-solution” approach. You are not just looking for a printer. You are looking for a printer, ink, and sheeting that are proven to work seamlessly together and to produce signs that last as long as you need them to. To that end, make sure that you benefit from a warranty that covers the finished image in addition to any of the solution components themselves.



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### Ask yourself:

***What are the intended applications for the system? How much regulated versus non-regulated traffic signage will I need to print?***

While the commercial sign market has employed digital printing methods for decades, this technology is relatively new to traffic sign printing. Many manufacturers with years of experience in the commercial market might claim that a solution that relies exclusively on combining process colors is appropriate for the traffic market as well.

Sign converters would do well to examine such claims closely. High-purity, highly saturated colors (such as those required for traffic signs) are difficult to achieve by mixing standard CMYK process colors. It is therefore typical for such process color printing to have a color gamut that compromises one or more traffic colors.<sup>1</sup>

For that reason, it is important to be clear on your priorities. Will traffic signage be your focus, with occasional fabrication for the non-regulated market? If so, look for a manufacturer with corresponding experience serving the traffic market. With your intended applications in mind, you will be better equipped to seek a solution.

<sup>1</sup>3M Company. 2007. Digital Imaging of Traffic Signs with 3M Reflective Sheeting. Information Folder, Saint Paul: 3M.

***What surface(s) do I need to print on?***

Do you need a roll-fed solution, sheet-fed solution or the flexibility of a hybrid printer that can handle both? Roll-fed printers, also called roll-to-roll printers, work just as the name indicates – by feeding a roll of material through the printer. Sheet-fed, aka flatbed printers, can print on flexible or rigid sheets of various materials. Finally, hybrid printers allow the considerable versatility of functioning either way.



Once that decision is made, consider the range of media on which you will need to print. Ink adhesion on more traditional media, such as vinyl graphic film, is a relatively straightforward matter. Reflective sheeting, on the other hand, presents challenges. The composition of the top layer of reflective sheeting can undermine ink adhesion. It is important that whoever provides your solution has carefully formulated their ink to bond with their materials, as well as performed ample testing to ensure years of durability.

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**Ask the printer manufacturer:**

***How fast does this printer print in the quality mode you require, and how will speed affect your turnaround times?***

While speed may seem to be a clear-cut metric, solution providers will sometimes present a printer's speed based on the lowest quality mode, or quote "up to" speeds. Be sure to discuss your specific needs and determine whether the system's real-world print speeds match those needs.

***Is it built for reliable, multi-shift operation in the volumes I require?***

If nonstop printing is in your future, be sure to inquire about the printer's duty cycle specifications. Industrial printers are generally priced, in part, in relation to the number of hours they can perform without maintenance downtime. If a price seems too good to be true, investigate whether its duty cycle will truly meet the rigors of your day-to-day printing needs.

***How many jobs can be queued up at a time? What happens when ink or media run out? How fast is the changeover between materials and between jobs?***

Do you want “hands-off” or continuous operation? Then you may want to find out if the printer in question supports these work styles. Some printer systems allow for multiple jobs to be queued at once, as well as on-the-fly ink replacement without stopping the print job. You might also investigate the time and ease of changing media. If your printer manufacturer can give you average times for media changeover, all the better.

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**Ask the ink supplier:**

***Are the inks designed to print regulated traffic signs?***

With a variety of ink types available, you should work with a solution provider that has performed adequate testing on the system as a whole, including the printer, ink and media. This is especially important if you hope to reliably meet the traffic sign industry’s standards for daytime color, nighttime color and reflectivity.



***How durable is the ink?***

The only way to know if your image will resist the elements is with extensive weathering testing. It’s important to understand the manufacturer’s warranty on the finished sign, and whether this includes the durability of the inks.

If a manufacturer claims to offer long-term durability, ask them how they verify the durability. At a minimum, make sure that the testing is consistent with the same level of performance required by NTPEP or other relevant testing agencies.

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**Ask the protective overlay manufacturer:**

***How does the protective overlay contribute to the durability of the finished sign?***

The value of a durable protective overlay is clear when you consider how long many DOTs expect their signs to resist the elements. An effective protective overlay adds years to the color and retroreflectivity of the finished sign product, while expediting graffiti cleanup and resisting solvents.

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**Other questions to consider:**

***What kind of warranty is available with the printer?  
Who will be servicing it?***

When you acquire a printer, the service provided by the warranty can actually come from a variety of sources. The vendor may service their own printers, or they may rely on the original manufacturer. Yet another possibility is the involvement of a third-party service provider, contracted by the vendor. Moreover, not all printer manufacturers have a global reach when it comes to service and support. Does yours?

Find out where your service is actually coming from and ask about the remedy process for a warranty claim. Such details are best discussed beforehand, rather than during the stress of a system outage.

***Does the solution provider have actual, in-use field performance going back several years using this digital system?***

There is no substitute for real-world performance. As the digital traffic sign printing market takes off, more and more solutions are being introduced. As you consider your options, ask to what extent the solutions have been proven in the field and how much experience the solution provider has in digitally printing regulated traffic signs.

***Is training offered with the cost of the solution?***

Finally, if you want to get your digital printing operations up and running quickly, consider the included training. If you have a question about the software, how easily can you get expert help over the phone? Are training sessions available upon delivery?

# What now?

As you can see, there are a number of factors to consider when migrating to digital printing of traffic signs. To help you navigate this new technological terrain, you need a manufacturer that offers an end-to-end solution specifically formulated for the traffic sign market – a manufacturer with established expertise in each element of that solution, backed by years of experience and scientific data.

Visit [www.3M.com/digital4traffic](http://www.3M.com/digital4traffic) to learn how you can get started.

## Author Bios

### Jennifer Lee, PhD

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Dr. Lee has 20 years of experience in developing digital imaging systems for traffic signage applications, with a particular emphasis on highly durable UV-curable ink jet inks. She holds a PhD in Organic Chemistry from the University of Minnesota and a BA in Chemistry from St. Olaf College.

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Gus is responsible for supporting customers using 3M's digital traffic sign printing systems. Gus has a BS degree in Mechanical Engineering from the University of Minnesota.

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