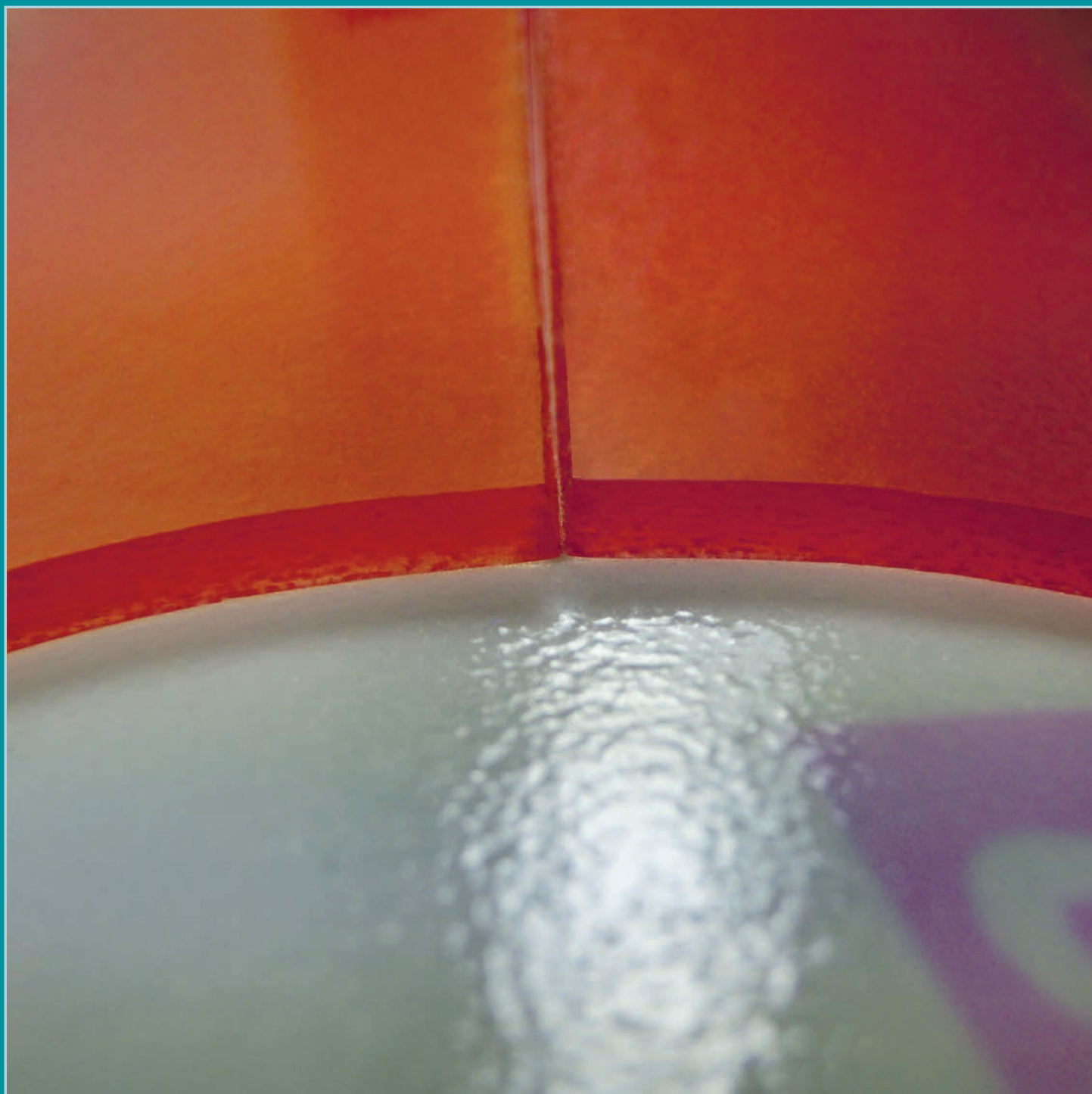


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# Flexo Gravure Global



# The liquid advantage

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*For nearly 40 years, MacDermid Printing Solutions has invested in the development, application and marketing of liquid photopolymers for flexographic printing applications. In this time, they have witnessed the introduction of digital platemaking and thermal processing, both of which have successfully competed with liquid platemaking. Despite the appearance of these new technologies, liquid technology remains alive and well, continuing to evolve while maintaining its ecological and economical strengths. Along with the digital revolution, an equally demanding sustainable revolution returned focus to the unique capabilities of liquid polymers.*

While obviously strong in liquid technology, MacDermid also has the unique vantage point of being a technology developer in multiple plate technologies such as analogue and digital platemaking, as well as solvent and thermal processing techniques. It is therefore much easier for MacDermid to directly study the ecological and economical advantages of liquid photopolymers. In fact, several years ago MacDermid went so far as to develop the »Environmental Footprint Calculator«, a tool which allows for direct technology-to-technology comparisons based on Life Cycle Analysis (LCA) data compiled from each of the platemaking technologies of interest (from manufacturing to finished plate). Table 1 highlights the advantages of a water-based processing system combined with the ability to achieve mass yields per plate far greater than any other process. It is this unique ability to reclaim and recycle unexposed liquid resin that fundamentally and uniquely distinguishes liquid platemaking technology.

The aforementioned economical and ecological advantages are brought together through in-position

platemaking technology, which is uniquely suited for use with liquid photopolymers. In-position plates are made by imaging one entire colour in register as opposed to preparing individual copy pieces and mounting them. During plate exposure, only the areas with copy are cured. The result is a plate with islands of copy adhered to a thin and light Polyester backing sheet. When using in-position plate technology, as much as 70% of the original cast polymer can be reclaimed, to minimising waste and resulting in more environmentally responsible practices. In-position plates' lighter weights reduce shipping cost and storage space requirements.

## M System: What is it?

The aforementioned evolution of liquid technology has culminated in the launch of the M System platform. This platform is based on the three core components of focus, leverage, and innovation. All three components are intertwined into a series of innovative technologies that are supported and guided by a dedicated service, production, and research team – leveraging years of liquid photopolymer experience into a unified technology and service architecture. This new platform is based on the sum total of product chemistry, platemaking equipment, a quality production environment, MacDermid's sales, service and support personnel, and their devotion to continuous improvement and innovation.

## Liquid photopolymers

The heart of the M System process is the photopolymer technology itself. Liquid photopolymer technology has grown from use in newspaper and master resins, to multiple print markets. M System products cover the corrugated, multi-wall bag, and stamp industries in addition to more unique elements such as sand-casting, coating plates, and even multi-layer plate capabilities. The full M System product line is outlined below.

## Corrugated

The top-of-the-line product in the M System line is LTL, which has proven to be the Gold standard for liquid platemaking in the corrugated market, especially when used at 6.35–7 mm (0.25"–0.28") thickness in combination with in-position platemaking techni-



ques. Its patented composition provides outstanding UV stability, low tack and clean printing. For those requiring a thinner version of LTL, LTT is optimised for use at plate thicknesses of 2.84 mm (0.11") and below.

For those with less stringent print demands, MLC 32 and MLC 25 are available, covering the standard durometer ranges of 25 and 32 Shore A. These materials are widely suited for multiple board types and plate thicknesses, with extremely wide exposure latitude to cover the most demanding combination of process and line work.

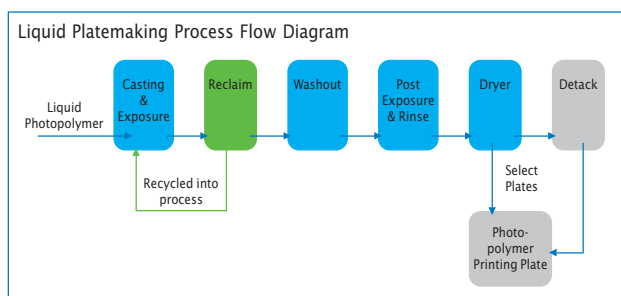
## Capping technology

Capping technology allows for the use of a second layer of photopoly-

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**Figure 1 (below):** The figure shows the liquid platemaking workflow, with the reclaim step highlighted in Green. The ability to reclaim unexposed resin differentiates liquid platemaking from other processes.

**Figure 2 (right):** The use of liquid in-position plates can result in as much as 70% of the original cast polymer being reclaimed.



mer on top of a soft or hard base photopolymer. In corrugated printing, capping not only increases the tonal range of the finished plate, it also reduces fluting to an extent that rivals or surpasses that of the leading »flat top dot« technologies in the industry. *MacDermid* offers two cap products, *M Cap 45* and *M Cap 55*, which differ in their hardness values, offering highly tunable print performance benefits.

**Multiwall bag**

Several high durometer, thin plate photopolymers round out the selection of products commonly used in the multiwall bag or paper sack printing segment. These photopolymers are built from the same patented technology used with *LTL* and *LTT*. *MWH* is a high resolution, 50 durometer product capable of 175 lpi (68 l/cm) imaging, highly competitive against the premium analogue sheet plates on the market today. For less demanding resolution, two UV stable formulations are available at 50 and 60 durometers: *MWB 50* and *MWB 60* have proven to be highly durable printing plates even on the most demanding paper stock, while still capable of 120 lpi (47 l/cm) imaging (especially when capped).

**Stamp/moulding photopolymers**

Rounding out the major segments of the *M System* product line are the stamp and moulding photopolymers. The workhorse products are *M Stamp 40* and *M Stamp 50*. While used predominantly as hand stamps, these formulations are also used in more unique applications such as Bronze/sand-casting, coating plates, and for printing on paper or envelope stock. Where clarity and colourfastness are required, such as hobby and craft applications, *M Systems* offers *M Clear*. It produces an extremely colourfast stamp that is renowned for its high strength. Finally, *MLD* is the latest generation moulding/master photopolymer that offers outstanding aging resistance for external applications in addition to improved flexibility over previous materials.

**Washouts**

*M System* offers a complete set of washout chemistry to process the photopolymers listed above. This chemistry is fully optimised for all *M System* products and provides crisp, clean images in combination with improved bath life and cleanliness. A three component system is used: *M Clean Detergent*, *M Clean Developer*, and *M Clean Defoamer*. Formulation guidelines are available through the »*M System* Technical Tip« series. However, since washout quality and effectiveness is directly linked with incoming water quality at each customer location, Technical Service experts for the *M System* work directly with each customer to maximise system performance.

To complete the plate processing optimisation, *M Clean PX* is added to the post exposure bath to ensure thorough polymerisation during this critical exposure step. *M Clean PX* enables better surface cure during the underwater post exposure step, which greatly enhances the results of the final light finishing step, where required.

**Ancillary materials**

*M System* also offers a complete set of platemaking consumables used in the creation of printing plates.

- *M Film Clear* and *M Film Matte* are used during the platemaking process as a barrier between the liquid resin and film negative. *M Film Matte* offers a matte surface that can alter the surface roughness of the finished printing plate. *M Film Clear* offers greater imaging



**Figure 3:** The latest generation exposure system, the *Liquiflex* system, takes platemaking to the next level of efficiency.

resolution in more demanding applications.

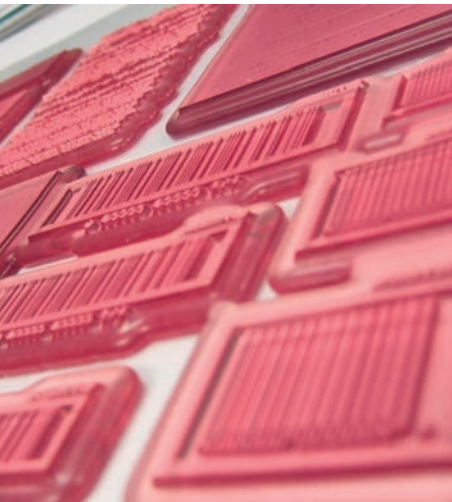
- *M Strate* is a coated Polyester backing used as the support layer for *M System* printing plates. Specifically designed for use with *M System* resins, it offers a combination of high photopolymer adhesion and anti-halation properties to maximise detail-holding in the printing plate.
- *M Strate AB* has a pressure-sensitive adhesive coating on the back for savings in plate mounting.

**Equipment**

With liquid photopolymer, the user is the plate manufacturer, so accurate, dependable platemaking equipment is critical to plate quality. *MacDermid* has pioneered many elements of liquid platemaking, such as in-position and multilayer platemaking, through the development of equipment. In addition, these platemaking systems are ideally suited for the increasing quality demands placed on platemakers today. Full production systems, complete with exposure unit, reclaim system, washout system, post expo-

**Table 1:** The table highlights the advantages of a liquid processing system combined with the ability to achieve mass yields per plate far greater than any other platemaking process.

Inputs			
	Baseline	Alternatives	
Product	Liquid Photopolymer	Digital Solvent	Digital Thermal
Gauge in mil (mm)	0.067" (1.7)	0.067" (1.7)	0.067" (1.7)
Impact Categories			
		Alternatives	
Energy consumption		Increased by 390%	Increased by 242%
Water consumption		Reduced by 29%	Reduced by 70%
Acidification of water		Increased by 367%	Increased by 267%
Global warming		Increased by 343%	Increased by 282%
Savings Comparison			
		Alternatives	
Cars operating for 1 year		Increased by 347.3 cars	Increased by 285.9 cars



Product	Market segment	Thickness in mil (mm)	Durometer	Tone range capability
LTL	Corrugated	0.112–0.280 (2.84–7.11)	32 Shore A	2–95%, 100 lpi (39 l/cm)
LTT	Corrugated	0.045–0.125 (1.14–3.18)	32 Shore A	2–95%, 120 lpi (47 l/cm)
MLC 32	Corrugated	0.112–0.250 (2.84–6.35)	32 Shore A	2–95%, 100 lpi (39 l/cm)
MLC 25	Corrugated	0.112–0.250 (2.84–6.35)	25 Shore A	2–95%, 100 lpi (39 l/cm)
M Cap 45	Capping resin	0.004–0.007 (0.10–0.18)	45 Shore A	2–95%, 120 lpi (47 l/cm)
M Cap 55	Capping resin	0.004–0.007 (0.10–0.18)	55 Shore A	1–95%, 175 lpi (68 l/cm)
MWH	Wide-web	0.045–0.125 (1.14–3.18)	50 Shore A	1–95%, 175 lpi (68 l/cm)
MWB 50	Wide-web	0.045–0.125 (1.14–3.18)	50 shore A	3–95%, 120 lpi (47 l/cm)
MWB 60	Wide-web	0.045–0.125 (1.14–3.18)	60 shore A	3–95%, 120 lpi (47 l/cm)
M Stamp 40	Hand stamp, wide-web, bronze/sand-casting	0.067–0.125 (1.70–3.18)	40 shore A	2–90%, 100 lpi (39 l/cm)
M Stamp 50	Hand stamp, wide-web, coating, bronze/sand-casting	0.067–0.125 (1.70–3.18)	50 Shore A	2–90%, 85 lpi (34 l/cm)
M Clear	Hand stamp	0.067–0.140 (1.70–3.56)	40 Shore A	n/a
MLD	Marking/moulding	0.067–0.250 (1.70–6.35)	95 Shore A/ 55 Shore D	5–85%, 85 lpi (34 l/cm)

sure, and light finisher, are available in sizes ranging from 30" x 40" (762 x 1016 mm) all the way up to 52" x 80" (1320 x 2032 mm). The latest generation exposure system, the *Liquiflex* system, takes platemaking to the next level of efficiency. Laser-guided glass adjustments eliminate the need for manual shim adjustments, and a touchscreen panel allows for unprecedented ease in liquid platemaking.

Changes in the larger market for Silver halide film have affected the availability of film processors and film negatives, and in response *MacDermid* has developed an alternative to film processing known as *M Jet*. This latest generation inkjet technology offers improved resolution capability and colour-to-colour registration compared to previous options. *M Jet* eliminates the need for film processing chemicals while allowing for the continued use of film-based platemaking technologies.

**Quality**

The *M System* products are produced at two separate locations globally. A multi-million pound facility in the USA has been utilised for nearly 30 years to produce high-quality liquid photopolymer resins. This facility is ISO 9000:14001 certified, and the close relationship between the manufacturing staff and the *M System* development and support team enables quick and consistent communication on market and customer needs. A second production facility, also ISO 9000:14001 certified, is strategically situ-

ated to serve the Australia and Asia markets.

**Service and support**

The global service and support team are a core component of *M System*. The team is comprised of specialists in liquid development, sales and support, with a majority having more than a decade of experience developing and working on liquid photopolymer technology. *MacDermid's* bookend strategy places significant emphasis on the dual elements of innovation and service. With this combined emphasis, one can expect a consultative relationship rather than merely a customer-supplier relationship.

**Continuous innovation**

The other element of the bookend strategy, innovation, is only truly successful when innovation is done with the customer in mind. The driving force behind the success of the *M System* platform is the understanding of the full span of relevant technologies – how chemistry affects photopolymer imaging, how photopolymer imaging affects dot shape, and how dot shape affects print results. *MacDermid* develops resins that image better, so that they print better. They design and manufacture equipment that enables easier platemaking and more consistent plate uniformity. Furthermore they develop methods that optimise reclaim efficiency to further enhance the economical and sustainability benefits of liquid and make consumables that enhance

resin imaging capabilities, delivering better print quality. They use product packaging that is more sustainable. These are examples of the types of innovation the industry has gotten from *MacDermid* for years.

The *M System* development focus is on ways for liquid to improve printing and platemaking, whether it pertains to quality, efficiency, economy, or ecology. Some innovations to expect the *M System* team to pursue in the coming years:

- More efficient and effective washout chemistries;
- New generation resins for corrugated and multiwall printing applications;
- Equipment upgrades designed to enhance platemaking efficiency and resin utilisation;
- New generation capping resins;
- New applications for liquid photopolymer resins.

According to the manufacturer, no system combines more expertise and leverages more printing experience than the *M System*. It is about focusing on liquid and its core benefits to the flexographic industry, leveraging experience and core technologies, and innovating even further in order to meet market needs.

**Table 2 (above): Photopolymer selection guide.**

**Figure 4 (left): In response to changes in the availability of film processors and film negatives, *MacDermid* has developed an alternative to film processing known as *M Jet*.**

**Table 3: Ancillary material selection guide.**

Product	Description
M Clean Detergent	Surfactant
M Clean Developer	Developer
M Clean Defoamer	Defoamer
M Clean PX	Post-exposure salt
M Film Clear	Clear cover film
M Film Matte	Matte cover film
M Strate	Adhesive-coated substrate
M Strate AB	Adhesive-backed version of M Strate