



AsahiKASEI

Mini-White Paper

Making Flexographic Printing More Sustainable and Efficient Introduction

Asahi Photoproducts, a pioneer in flexographic photopolymer plate development, has a long history of innovation in the field of flexography. This comes both from the expertise of Asahi Kasei chemical engineers and Asahi's dedication to listening and responding to the Voice of the Customer. With this in mind, Asahi Photoproducts, together with The Uteco Group of Verona, Italy, recently undertook a press trial at the Uteco Converdome, its state-of-the-art printing technology center. The purpose was to demonstrate the efficiencies and environmental benefits that can be achieved using Asahi's water-washable AWP flexographic plates as compared with conventional solvent-washable plates.

Asahi and Uteco have been collaborating on many types of printing trials and other activities such as customer open houses for more than 20 years. The test that is the subject of this white paper was the first time the companies have jointly undertaken an Overall Equipment Effectiveness (OEE) test of this nature.

Chemical innovation drives quality and productivity

At Asahi, the process begins with chemical innovation. More than 40 years of experience in producing and constantly advancing the development of photopolymers forms the basis for a range of plate types that delivers quality and efficiency for flexographic operations of all types. Asahi Kasei chemical engineers in Japan have produced a unique polymer that enables small and consistent dots to form on the plate. They have also utilized surface energy science to enhance the printing performance of Asahi's photopolymer printing plates. The ability of the innovative polymer to reproduce small dots consistently makes it a natural choice for printers who use seven-colour fixed palette printing for extended gamut or four-colour fixed palette printing for more economical operation. The accuracy of these plates is critical for process printing, especially with seven colours, where precise registration is critical.

In addition to the small dots and precise plate-to-plate registration that are a hallmark of Asahi plates, its unique Pinning Technology for Clean Transfer takes advantage of the low surface energy of the plates to transfer all remaining ink to the print substrate.

[Pinning Technology for Clean Transfer: The Details](#)

With a very high plate resolution designed for fine text and minimum dots fading out to zero, unique plate specifications allow a larger total colour gamut to be achieved, particularly in highlight areas, providing more design flexibility and enhanced graphic quality. Asahi polymer chemistry creates a low plate surface tension, which causes ink to form a globule and remain on the dot without running down the shoulders. This creates a higher ink profile with a large contact angle and high pinning point that delivers cleaner ink transfer from plate to substrate.

The Asahi engineered low surface energy plate design also facilitates low printing pressure, or “kiss touch” printing, which reduces dot gain and results in plates that last longer in the printing process. Less plate wear means reduced plate replacement costs—and improved profits—for the printer. Reduced ink filling-in at the mid-tone area during printing then also leads to fewer cleaning intervals and increased press production uptime. These were the characteristics the most recent print room test set out to validate.

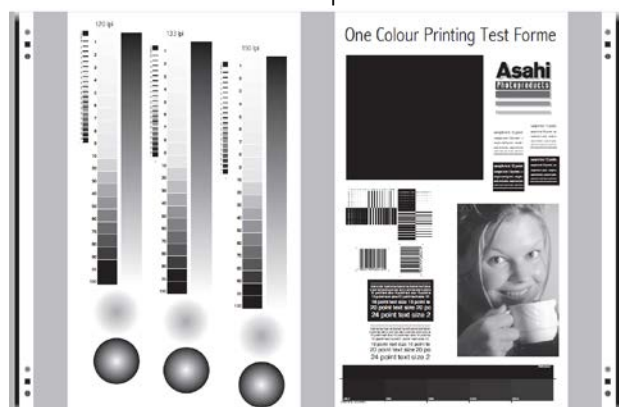


Figure 1. The test image focusing on vignettes fade to zero and solid ink transfer

Overall Equipment Effectiveness (OEE) Proof-of-Concept Printing Test

A single colour image as shown in Figure 1 was produced on a conventional solvent plate and an Asahi AWP water-washable plate with Pinning Technology for Clean Transfer. The Uteco Onyx XS CI press was set to standard printing conditions. The same components were used for both plates (anilox, tape, ink). The substrate used was OPP film and the ink system was a conventional NC solvent based ink.

A copy of the print test data collection sheet for the conventional plate is shown in Figure 2 below. The run length was 37,368 linear meters, which required a total running time of 173 minutes. Total press downtime for plate cleaning during the run was 47 minutes. Waste produced was 1,025 meters. OEE efficiency was calculated to be **72%**.

Asahi Photoproducts Simple Printer OEE Calculation Sheet			
Production Input Data		Calculated Data	
A	Shift length	173	min
B	Machine Make-Ready time	4	min
C	Meal or short break	0	min
D	Press down time (e.g. plate cleaning)	47	min
E	Designed machine press speed	300	M/min
F	Total Press run length	37,368	m
G	Wasted printed material	1,025	m

Customer input data only in blue boxes!

For further explanations please move the mouse over the "bue" entry boxes (red arrow in the box corner)

Supporting Calculation		Calculation	Calculated Data
H	Planned Production Time	Shift length - Breaks	$A - (B+C) = 169$
I	Operating Time	Planned Production Time - Job down time	$H - D = 122$
J	Good printed material	Total press run length - Wasted printed material	$F - G = 36,343$

OEE Calculation		Calculation	Calculated Data
K	Availability	Operating Time / Planned Production Time	$I / H = 72.19\%$
L	Performance	Total Press run length / Operating Time / Designed machine press speed	$F / I / E = 89.70\%$
M	Quality	Good printed material / Total Press run length	$J / F = 97.26\%$
N	Overall OEE	Availability * Performance * Quality	$K * L * M = 71.68\%$

Figure 2. The test data collection sheet for the conventional plate

A copy of the print test data collection sheet for the Asahi water-washable plate with Pinning Technology for Clean Transfer is shown in Figure 3 below. The run length was 38,000 linear metres. It required a total running time of 140 minutes. Total press downtime for plate cleaning was 8 minutes. Waste produced was 450 metres, and the OEE efficiency was calculated at **91%**.

Asahi Photoproducts Simple Printer OEE Calculation Sheet			
Production Input Data		Calculated Data	
A	Shift length	140 min	
B	Machine Make-Ready time	2 min	
C	Meal or short break	0 min	
D	Press down time (e.g. plate cleaning)	8 min	
E	Designed machine press speed	300 M/min	
F	Total Press run length	38,000 m	
G	Wasted printed material	450 m	

Customer input data only in blue boxes!

For further explanations please move the mouse over the "bue" entry boxes (red arrow in the box corner)

Supporting Calculation		Calculation	Calculated Data
H	Planned Production Time	Shift length - Breaks	$A - (B+C) = 138$
I	Operating Time	Planned Production Time - Job down time	$H - D = 130$
J	Good printed material	Total press run length - Wasted printed material	$F - G = 37,550$

OEE Calculation		Calculation	Calculated Data
K	Availability	Operating Time / Planned Production Time	$I / H = 94.20\%$
L	Performance	Total Press run length / Operating Time / Designed machine press speed	$F / I / E = 97.44\%$
M	Quality	Good printed material / Total Press run length	$J / F = 98.82\%$
N	Overall OEE	Availability * Performance * Quality	$K * L * M = 90.70\%$

Figure 3. The test data collection sheet for the Pinning Technology plate

Conclusion

The printing efficiency of the Pinning Technology for Clean Transfer during this test demonstrates a **26% OEE improvement** over conventional solvent plates. The significant contributing factors were that the plate with Pinning Technology for Clean Transfer enabled the run to be completed 33 minutes faster than the conventional plate. The Pinning plate required less press stops for cleaning, saving 39 minutes, and produced 575 linear meters less waste material.

Dot gain measurements were made throughout the run. Both plates began their respective runs with the same dot gain, and operator observation was used to determine when increased dot gain caused out-of-spec performance as would be the case in a typical flexographic operation. Dot gain measurements backed up the operator's decisions.

Additional Benefits from AWP Plates

In addition to the efficiency gains achieved on press with the Asahi water-washable plate, the quality and consistency throughout the run was much better than that achieved by the solvent-washable plate. It should also be noted that the time it takes to actually produce plates and have them ready to mount on press is a critical throughput gating factor in a flexographic operation, especially if a plate is damaged during the run and a new plate needs to be produced. Using the Asahi AWP plates results in plates being produced in one-third of the time normally required for the solvent platemaking process, and the plates only require about five minutes of drying time at a low temperature, two to three times faster than required for



solvent plates. The low drying temperature also results in excellent plate stability. Plates are compatible with water-, solvent- and UV-based inks.

From an environmental perspective, Asahi water-washable plates do not rely on harsh solvents, and the washing water is reused during plate processing being filtered and recycled through the plate processing system. The system is also free from the harmful volatile organic compound (VOC) emissions that are typically generated by solvent and thermal processes.

The entire AWP plate manufacturing process does not generate any waste other than unexposed polymer residues, which are collected as 'dry cake' and safely repurposed as a combustive agent for incineration waste plants.

Voice of the Customer

Creation Reprographics, based in Daventry in the UK, has been using the premium quality Asahi AWP flexographic plate system for the past three years with excellent results, which further validates results of the test that was run in the Uteco facility.

Matt Francklow, Owner of Creation Reprographics, said: "Sustainability is truly coming to the fore in print. With this high quality water wash plate, it's the final check for retailers. At Creation Reprographics, we have positioned ourselves in the premium segment of the market, competing head on with gravure in Europe and serving those customers that demand the best in the UK. Our AWP results are simply unrivalled – consistency, slightly raised ink density and better lay down, good minimum dot, and speed to press are all achieved - making the printer's job easy. The system works across all substrates, and we see a real demand for this level of performance in premium flexible packaging applications – a growth area in the industry. Converters looking to move away from gravure and offset are truly surprised by what AWP can achieve."

Contact monika.d@duomedia.com to receive the full Creation Reprographics case study or images.