



Digital Printing for Extrusion Blow Molded Articles

Digital Printing

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AGENDA



- **Delta Engineering**
- **Digital Printing**
 - ✓ The Decoration Challenge in Extrusion Blow Molding
 - ✓ Decoration Methods Today - An Overview
 - ✓ Digital Printing - How the Technology Works
 - ✓ What Digital Printing Delivers
 - Quality, Flexibility, Efficiency & Economic Considerations
 - ✓ Conclusion

ABOUT DELTA ENGINEERING



- **Founded in 1992**

- **Today:**

- ✓ A team of > 250 people, incl. > 40 engineers, spread across 3 sites:
 - Main R&D site in Belgium
 - Production site in Romania
 - Sales & support site in the USA
- ✓ Several sales representatives worldwide
- ✓ Part of the Delta Engineering Group (together with Isytech & Delta Application Techniques)
- ✓ Global player: worldwide service & support,...
- ✓ **Strong partnerships:** creating solutions for the future together





Specialist in lots of different (automation) solutions for the blow moulding industry:

- ✓ Quality control
- ✓ Packaging
- ✓ Barrier treatment
- ✓ (De)palletizing
- ✓ Conveying
- ✓ Bottle take-out systems
- ✓ Finishing
- ✓ ... and many more!



Digital Printing



THE DECORATION CHALLENGE IN EBM



Digital Printing in Extrusion Blow Molding

- Plastic packaging is not only a functional product. It is also an important communication and branding tool.
- At the same time, there is a growing demand for individual designs, smaller production runs, fast product changes, and cost-efficient production.
- In addition to traditional decoration methods, digital printing is becoming increasingly interesting.
- This is also interesting for extrusion blow molding as well, as it opens up new possibilities for design changes, personalized products, and smaller production volumes.

The key question is therefore:

Which decoration method is the best choice for which application?

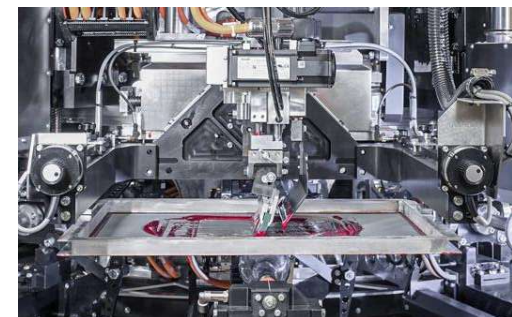
DECORATION METHODS TODAY

Article decoration during the blow molding process can be carried out in various ways

- In principle, it can be performed either directly during or immediately after the blow molding process
- Or as a separate processing step

Decorations methods like....

- IML
- Dual side labeling
- Screen printing



DECORATION METHODS TODAY



Criteria	DIGITAL PRINTING	IML	SCREEN PRINTING	2-SIDE LABELLING
Small batches	● Excellent	● Weak	● Moderate	● Moderate
Large volumes	● Moderate	● Good	● Good	● Good
Direct decoration cost	● Low	● High	● Low	● High
Personalization	● Excellent	● Limited	● Limited	● Limited
Setup time	● Very short	● Long	● Long	● Moderate
Prototypes / samples	● Excellent	● Low	● Low	● Moderate
Unit cost at high volume	● Good	● Very good	● Very good	● High
Durability	● Excellent	● Excellent	● Excellent	● Moderate
Premium appearance	● Very good	● Very good	● Good	● Good

DECORATION METHODS TODAY



Digital Printing:

- A very good choice for maximum flexibility, small to medium production runs, many product variations, and personalized designs.

IML (In-Mold Labelling):

- A good solution for large production volumes, high-quality, integrated product appearance.

Screen Printing:

- Especially suitable for durable, and good quality appearance, at large volumes

Two-Sided Labelling:

- Attractive when high flexibility and lower investment costs are more important than fully integrated decoration and maximum durability.

DIGITAL PRINTING – HOW IT WORKS

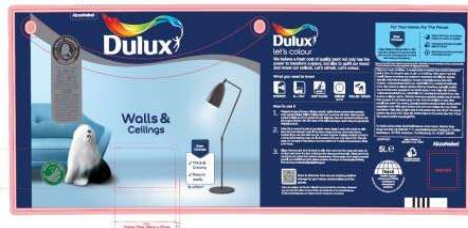


01



Digital Artwork

The design is prepared and sent directly to the printer:
no screens, or label tooling, or labels required.



02



Multi-Pass UV Inkjet

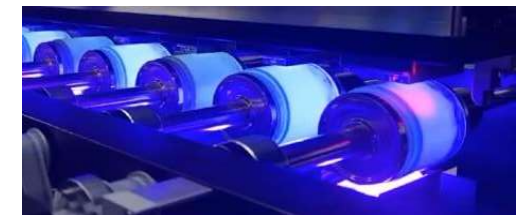
The printer builds the image in a single movement as the article rotates, applying ink directly to the curved surface.

03



Cured, Finished Print

UV-cured ink dries immediately, producing a durable, high-resolution print ready for the next process step.



DIGITAL PRINTING – HOW IT WORKS



Digital Printing

WHAT DIGITAL PRINTING DELIVERS

Technical Aspects



IML-level quality



Every cycle unique



Prints thin-wall articles



No print expertise needed



Almost zero waste

- Multi-pass technology
- Every cycle can be different - No line stoppages between different prints
- No article contact
- The quality of the artwork will be responsible for a good print result
- 0.5% waste ratio - compared to 3 - 5% for others



WHAT DIGITAL PRINTING DELIVERS

Marketing Aspects



Faster time to market



Cost-effective short & medium runs



Easy legal & label compliance



Improved storytelling on-pack

- Rapid design changes for new products & seasonal launches
- Economical small batches for customized designs or limited editions
- Safety warnings and legal text updated in minutes, not weeks
- QR codes add sustainability info and storytelling on-pack



WHAT DIGITAL PRINTING DELIVERS

Supply Chain Aspects



SKU simplification



Print-on-demand production



Shorter lead times



Reduced logistics & handling steps

- Eliminates separate label SKUs across languages, regions, and customers. Reducing complexity across planning and ERP systems.
- Reduced warehouse stock. No pre-printed label stock left obsolete by formulation or branding changes.
- Artwork updates go live “immediately” - no waiting on label production or tooling's
- No label transport, storage, or picking - simpler warehouse operations



WHAT DIGITAL PRINTING DELIVERS

Financial Aspects



Lower total packaging cost



No tooling or screen costs



Made to order



No stock write-off risk

- Reduced working capital and inventory risk. Elimination of label purchasing complexity. Vast majority lower direct decoration cost
- No minimum order quantities – cost effective for small & medium runs and frequent design changes
- Production aligned with actual demand, not forecasted label orders
- No stock buildup of multiple label versions across SKUs and languages. Lower warehousing cost



WHAT DIGITAL PRINTING DELIVERS

Ink Aspects



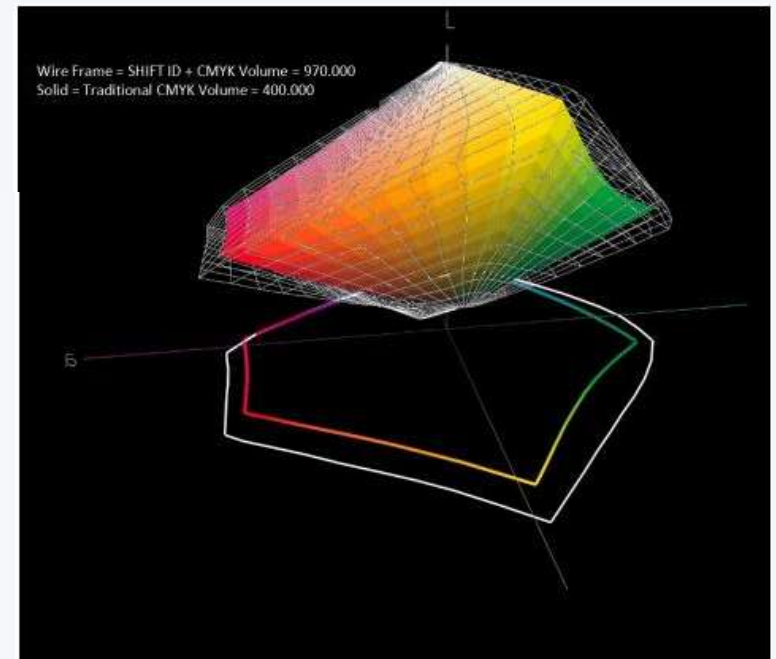
Thanks to development steps, additional color possibilities!



Color repeatability



Color matching, pantone colors!



WHAT DIGITAL PRINTING DELIVERS

Ink Aspects



Dedicated UV curing inks for different applications

- ✓ Industrial, polymer-based ink for pails & bottles
- ✓ Low migration ink for food containers (food grade for indirect contact)



Printing possible on HDPE, PP, PET

- ✓ Can print on PCR products as well
- ✓ The print finish can be matt, satin or high gloss



Status on recycling

- ✓ The ink is fully recyclable
- ✓ During the recycling process the ink will be mostly separated and the plastic will be reused as PCR



WHAT DIGITAL PRINTING DELIVERS

Machine Handling



User friendly HMI



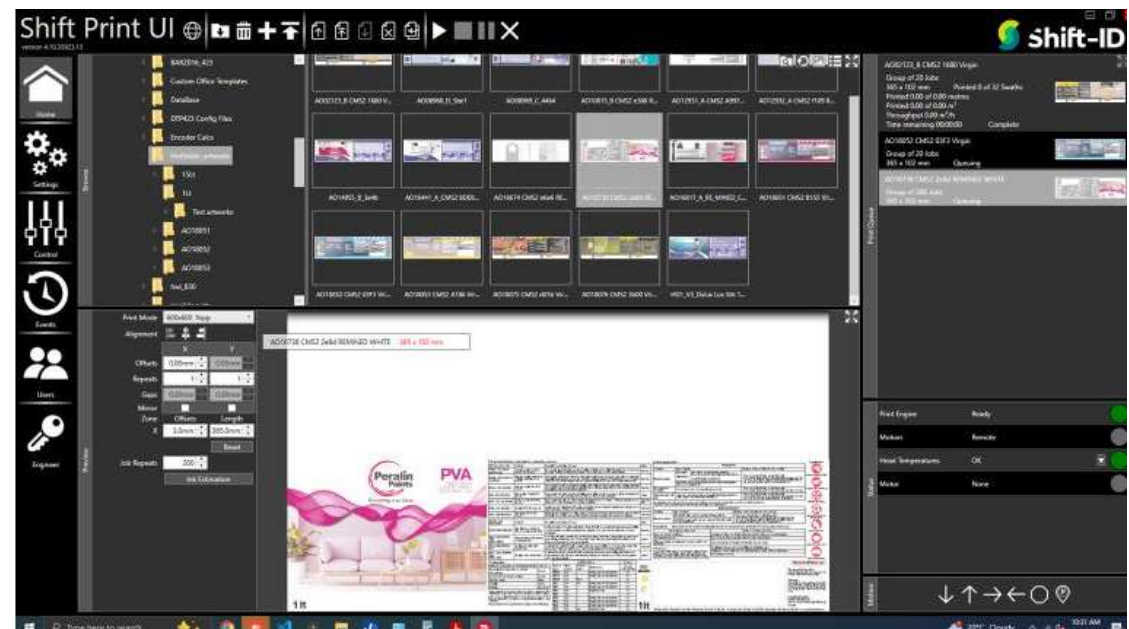
Platform to link orders automatically to the machine



Remote calibration of the color system



Easy to operate, print result depends on artwork quality



WHAT DIGITAL PRINTING DELIVERS

Video



Plasma Treatment → Printing → UV Curing
within a single movement

WHAT DIGITAL PRINTING DELIVERS

Machine Range



Machine	Type	Stations	Product	Article Diameter	Article Length	Speed BPH*
DTP281	Bottle/container printing	8	Bottles/containers	40 - 100 mm	up to 300 mm	1700 - 6000
DTP323	Lite Flexi Format Multi-Pass	2	Pails	110 - 490 mm	up to 400 mm	<u>Based on 2 station</u> 1L: +590 BPH 5L: +300 BPH 20L: +200 BPH
DTP423	Flexi Format Multi-Pass	2/4/6/8	Pails	110 - 490 mm	up to 400 mm	1L: 840 - 3360 BPH 5L: 360 - 1440 BPH 20L: 270 - 1080 BPH

* Speed is based on white articles (CMYK printing only without additional white printing) and without varnish (High Gloss)
Final speed based on article dimension and shape with dedicated artwork

WHAT DIGITAL PRINTING DELIVERS

Conclusion



Digital printing provides an efficient solution for:

- High-variation, low & medium volume production
- by reducing setup times
- and providing high-resolution
- “unlimited” color designs

within a single movement.





Thank you for your attention

