



Lysis Technologies Ltd.

Process design for graphics and coatings. Application in Rotomoulding

Nordic Arm conference 2020, Helsinki, Finland

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One of the 100 most Innovative UK companies





INTRODUCTION & History



Lysis Technologies Ltd.
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“A young, dynamic company providing innovative and technologically advanced, customised solutions”

Lysis Technologies Ltd is a Research and Development laboratory for bespoke products such as

- *Industrial inks and coatings for all challenging substrates **including polyolephines for Rotational moulding***
- *Enhancing products*
- *Flow promoters*



INTRODUCTION & History

Trusted Partners (LOGOS)



Presentation Overview

- *Graphics methods for Rotomoulded Plastics*
- *The benefits of a graphics system fit for purpose*
- *In mould graphics and coatings vs process*
- *Post mould graphics and coatings vs process*

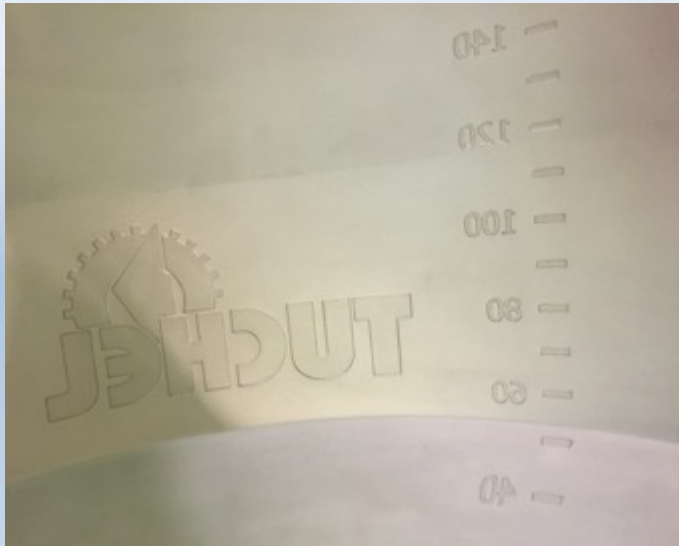
- *Summary*

Types of graphics for Rotomoulded Plastics

Engraved in plastic

Description: In or on mould with mobile plaques or hot stamped on plastic

- Permanent
- **Not** highly visible
- Intrusive
- might be time consuming depending on design size (post mould)



Types of graphics for Rotomoulded Plastics

Stickers (plastic, paper or similar)

- Usually non permanent
- Not fit for purpose
- Often not appropriate for PE/PP
- Might be economical (not always) depending on amount and colours
(artwork set up)
- On mould only
- Priming or surface conditioning might be needed
- Artwork can be customised



Types of graphics for Rotomoulded Plastics

Any Paint, (usually cellulose based ink in pots and spray cans)

- Non permanent
- Not fit for purpose
- Not appropriate for PE/PP
- Reason for using: Cheap and easy to buy (DIY shops)
- Post mould only
- Priming or surface conditioning still won't work....





Types of graphics for Rotomoulded Plastics



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Permanent moulded labels

- In or Post mould
- customised design
- permanent with some resistance limitation depending on make (T, chemicals)
- usually costly with extras involved (e.g. artwork set up)
- May leave ghosting (left overs) in the tool (in-mould)
- Needs to be first time right in most cases
- priming or surface conditioning maybe needed
- Challenging product to make as you have to handle: Cohesion for label, adhesion for plastic, contraction, expansion of moulding etc.



Types of graphics for Rotomoulded Plastics

Permanent Direct ink application (label-free)

- Permanent In or Post mould
- Application Flexibility (spray, stencils, screens, stamps etc.), special effects
- Recommended also for large surface areas such as coatings
- Usually more economical than other permanent graphic solutions
- Different technologies out there: solvent or oil based inks
- Multi-coloured designs possible but challenging
- Extra investment might be required (screens, stencils, applicators)
- Flexible product; keeps in mind moulding behaviour (Marine sector, tanks, buoys)





Benefits of a graphics system that is fit for purpose:



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Permanent labels & Permanent direct Ink

- Application fits operations e.g.
 - Quicker application time,
 - no need for extra capital investment/infrastructure,
 - Better value as losses are minimised
 - Often No pre-conditioning needed
- Colour matching and special effects
- High UV resistance (tested outdoors and pigments of high light fastness)
- Customised design
- Can predict usage, amount/numbers with supplier as well as troubleshooting



"Diffusion" zone

In-mould graphics and coatings

- Perfect finish as they are part of the product from the start of the process.
- Add extra step to the production time
- They need to be done first time right (however, ink can be removed)



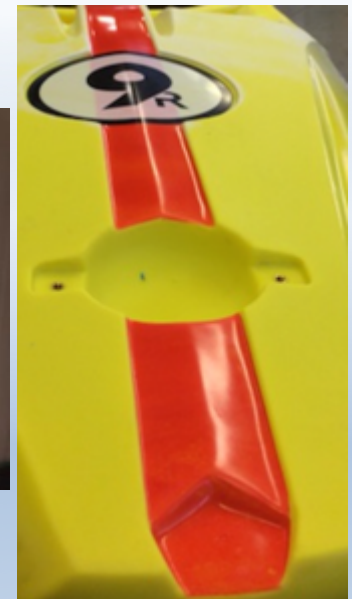
In mould screen
printed graphic



In mould spray coating



In mould
label



Combination of in mould
label and in mould ink

Some key parameters to keep in mind are

Accessibility:

- Area in the mould needs to be *accessible*.
- Separating the area from the rest of the mould:
 - modular mould
 - remove the part to be decorated in a safer and cleaner area (off-line ideally).
- If you still cannot access the desired area then consider post-mould



Health and safety:

- Condition of the mould (surface finish and quality)
- Temperature should not be too high; applying a graphic is a *manual procedure*.
- Standard H&S features should be considered (heavy lifting, work at height, secured heavy moulds etc.)



Contamination:

- Best practice: apply in a **contamination-free** environment. Minimizing the impact should be possible. Ways to achieve it: keep away from
 - plastic powder handling areas
 - packaging areas, etc.
- protecting part of the tool (e.g. masking tape, frame etc), esp when spraying to avoid depositing paint particles in unwanted parts of the tool.



Graphic design:

- Consider from *start of project* and mould design phase.
- Consider graphic dimensions and design, such as colours, shape etc
- Identify most appropriate area in combination with the right product design.
- Avoid “overdesigning” the product part to be decorated (e.g. no sharp corners, hidden edges, distorted graphics etc.)

Shape of mould(ing) surface:

- Graphic creation and application might also depend on moulding surface.
- graphics created with screen printing or stamping need usually a flat surface.
- Curved or spherical surfaces will require special stencils or labels that will take curvature into account

Mould finish:

- Very rough mould finish might impact graphic appearance. It is not unusual that air trapped, between the crevices and an in-mould label, will expand due to heat and will give defects.
- Direct ink application is a way to get away with this but again extremely textured mould surface might withhold part of the ink coating on the mould.
- Compatibility with enhancing products and mould release agents. That may affect the graphic transfer on the plastic finished part.

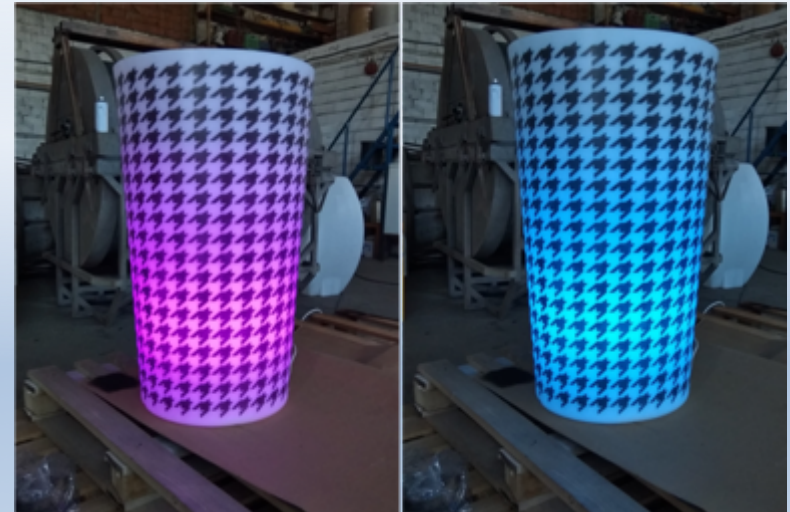


Powder properties:

- Plastic powder granule size
- Powder amount per moulding
- Might cause abrasion and graphic distortion

POST-MOULD applications

- Might offer more flexibility; not disturbing the main production time
- Done after the product is finished.
- Post-mould graphics can be applied even days after the moulding took place.
- Allows Customisation of final moulding or stock
- Can be used or highlighting embossed graphics (ink application)



Some key parameters to keep in mind are:

Health and safety:

- Some graphics and ink systems are necessary to be *flamed* after application.
- This ensures that graphic is fully encapsulated in the moulding, so a permanent finish is achieved.
- When handling open flame it is important to carry out risk assessments (RA). Avoid dangerous atmospheres in the vicinity (e.g. flammable materials such as solvents etc.).
- Wear PPE!





Post mould graphics and coatings



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Shape of moulding surface:

Methods chosen for the graphic to be created and applied also depend on surface of the moulding.

- Graphics done with screen printing or stamping need usually a flat surface.
- Curved or spherical surfaces will require special stencils or labels that will take this curvature into account
- *Consider graphic location at mould design stage*

Surface finish:

- On-mould graphics and coatings might not adhere on the PE/PP surface if the surface has chemical substances residuals (e.g. mould release agents). It is advised to first *remove and clean*.
- For solvent based inks a textured surface might promote and enhance adhesion.



Figure shows coating done on a PE buoy with solvent based ink.

Thickness of moulding:

- For mechanically cured graphics (flaming or high heat), surface needs to be thick enough to not get distorted.
- Usually very thin mouldings would bend and get damaged irreversibly when exposed to very high temperatures for long time.



Size of graphic/coating:

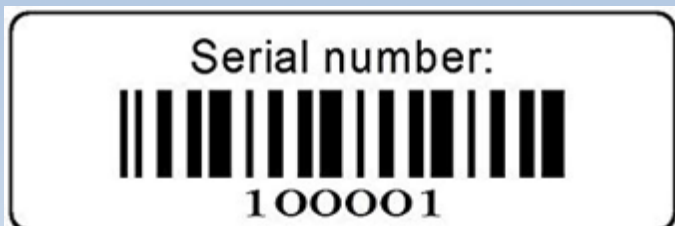
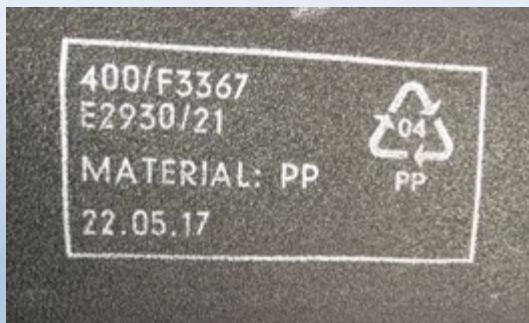
- Assess the size of coating or graphic.
- Is a solvent based or flame cured system better?
- Is there enough free surface to apply a graphic on (such as logos, technical information etc.)
- Do that at *mould design phase!!!*

*Number of graphics applied on a moulding.
They vary in shape and size. Moulding
surface is either curved or flat*



Reliable processes

- Application methods need to be reliable and repeatable.
- Monitoring procedures should be in place
- Other useful tools to ensure high quality is maintained:
 - SOPs (Standard Operating Procedures),
 - OPL (One Point Lessons) etc.
- Graphics and printing methods can be *part of this process*; by using graphics like serial numbers, dates, codes etc. printed to ensure traceability.





Summary



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Usage of permanent graphics on rotationally moulded parts has operational benefits:

- Adds **value** to the product,
- Increases **quality**, allowing more information and **personalisation** features to be included,
- Assists in **compliance** with legislation (e.g. maritime industry and traffic furniture colour coding)
- Makes production more **efficient**

Points of attention:

- Training
- Adjust quality monitoring
- Maintain procedures
- Work closely with supplier for troubleshooting, process changes or improvements and development



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