automotive interiors EXPO 2012

Foils vs. Lacquer – which one is the most promising material?

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Overview

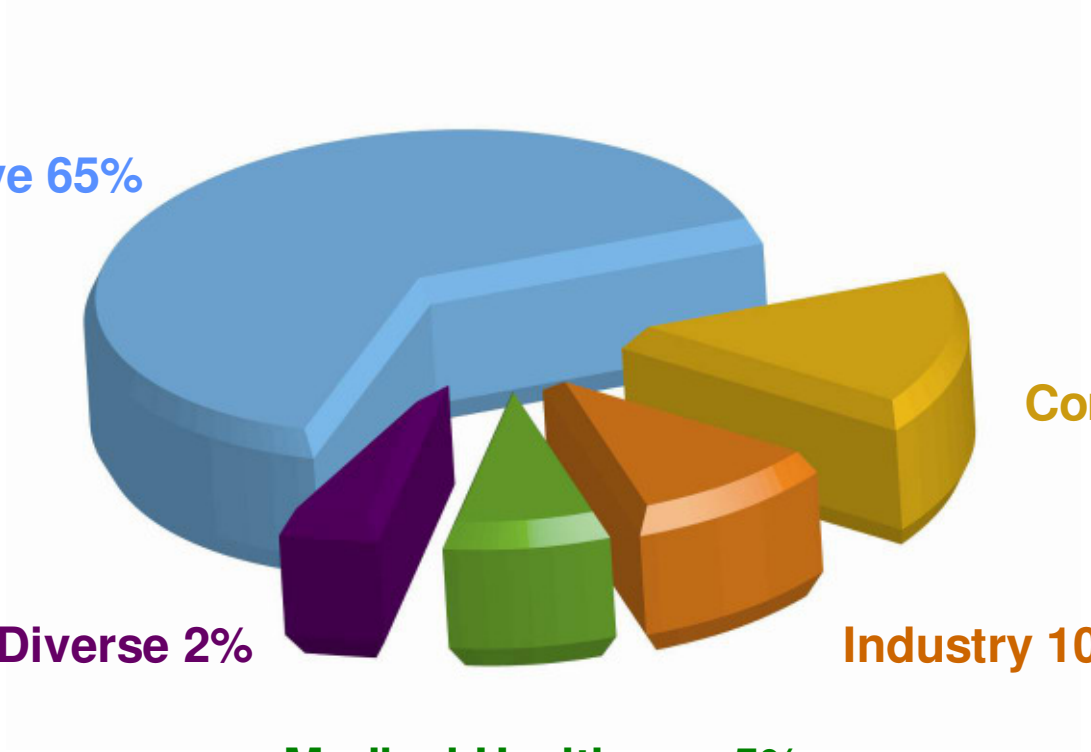
1. **Presentation of company group**
2. **Processes**
3. **Decoration options**
4. **Test results, tolerances, prices**

KH-Group: An International Technology Company

KH-Group – Facts & Figures:

- **System supplier for plastic components**
- **Headquarter in Helmbrechts/Baveria**
- **1200 employees globally (D, CZ, CN, Mex)**
- **Turnover 2011: 75 Mio €**

Production Fields Of KH-Group:



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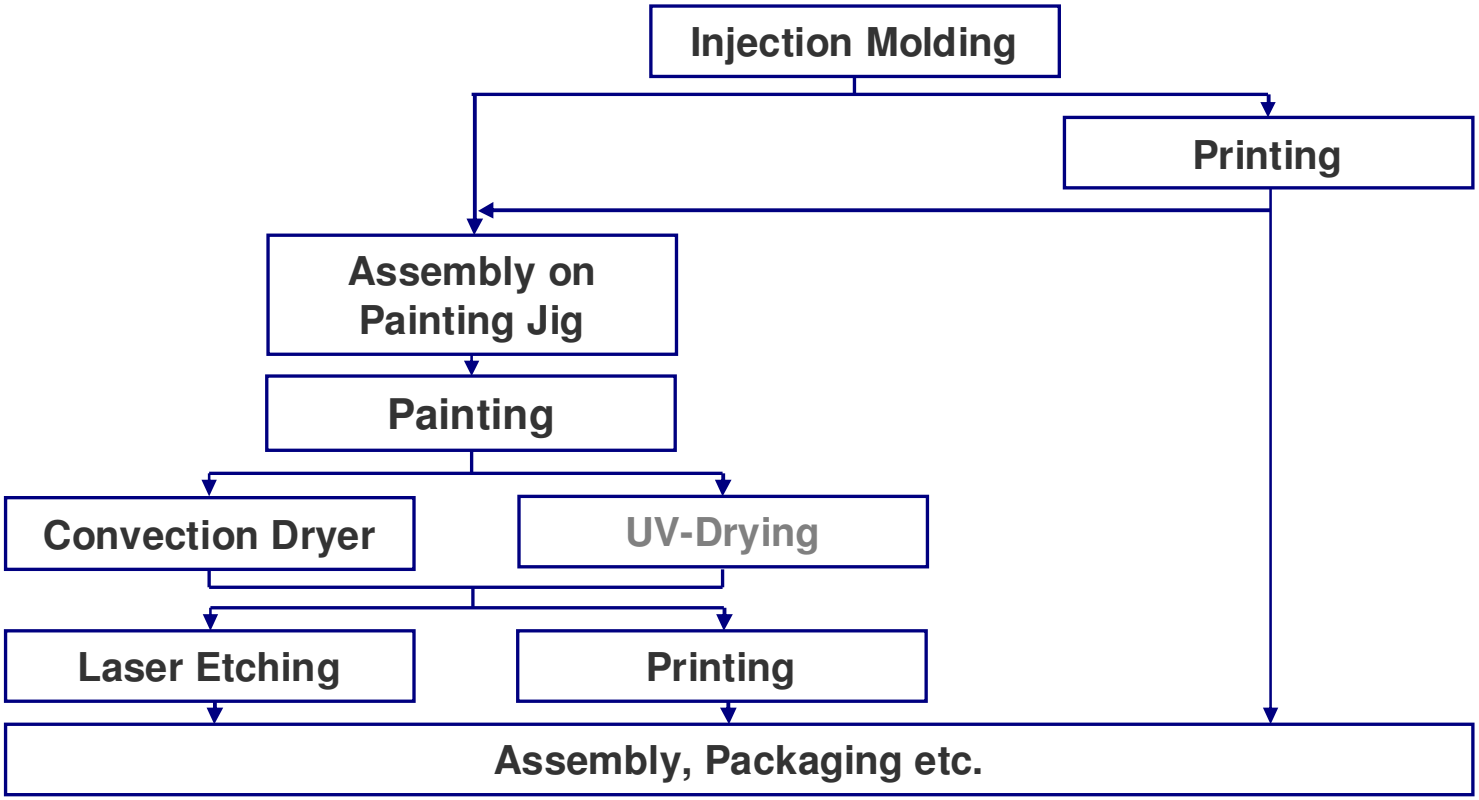
Overview On Process

Lacquer



Definitions Of Foil Technologies

IMD
In Mold Decoration

Decoration with transfer of paint layers from a foil on plastic surface (=Ink-Transfer)

IML
In Mold Labeling

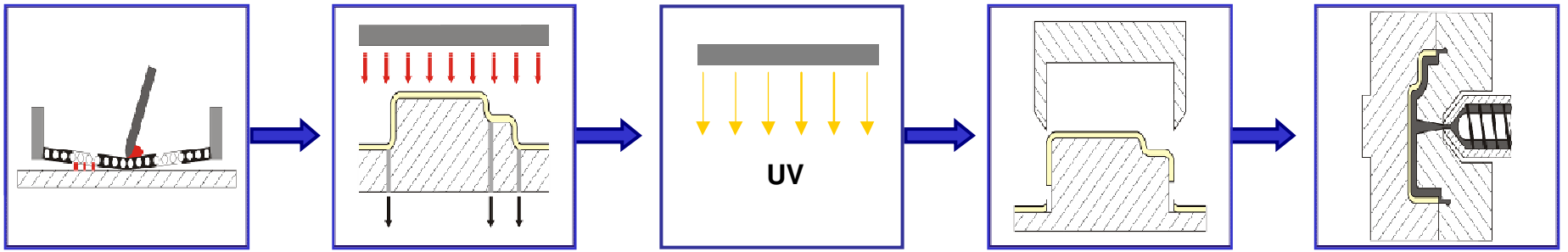
Decoration with a foil sheet inserted into a mold (forming of foil usually via High-Pressure)

Insert Molding

Decoration with a foil sheet inserted into a mold (forming of foil usually via thermo forming)

Overview On Process

IML Foil



Printing | **Forming** | **Hardening (optional)** | **Cutting** | **Molding**

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Decoration Options Lacquer

- Flat decoration with one unique colour

- Decoration in two colours with masking

- Tampon print under paint layer visible after laser etching

- Single decor by laser etching (day and night design) or tampon print (only day design)

Decoration Options Foil I

- Decoration in up to 15 colours with one single process
- Imitation of materials (wood, graphite, stone …)
- Single decor in same printing process
- Integration of search- and function illumination
- Black panel effect

Decoration Options Foil II

- Depth appearance (Mont-Blanc-Effect)
- Colour in reflected light and transmitted light differing
- Integrated display area
- Surface in high polished and matt on same part

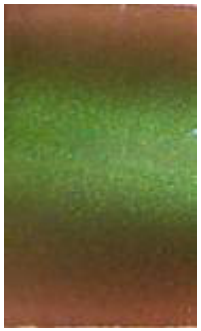
Decoration Options Foil III

- Doubble symbols on same position

Foils vs.Lacquer – which one is the most promising material?

Variety of Colour and Decoration


Metallic laquer


Effect laquer

Lacquer

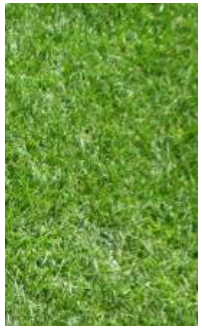
- Variation of colour by change of laquer
- Change of highlighted symbol by programming of laser etching process
- Change of printing logo by new cliche

Foil

- Variation of colour by change of printing colour
- Variation of decoration by change of printing screen
- No change of molding process by variation of foils
- All printable patterns (wood, stone, grahite, colour transition...)
- Restriction in material choice (substrate and foil)


Burl Wood


Carbon


Football grass

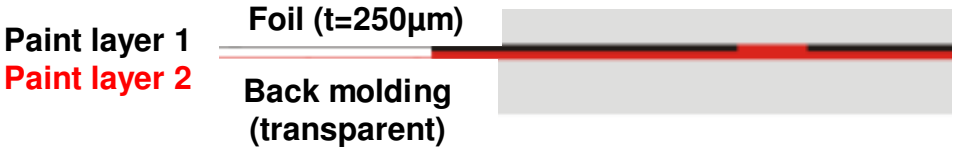
Foils vs.Lacquer – which one is the most promising material?

Surface/Haptics

Lacquer

- Noticeable recess at laser etched/printed symbols
- Point of attack for aggressive media at edges of laquer
- Laquer in matt to high gloss
- Softtouch systems available
- Good scratch resistance with UV-laquers
- Abrasion behavior according to properties of laquer

Foil

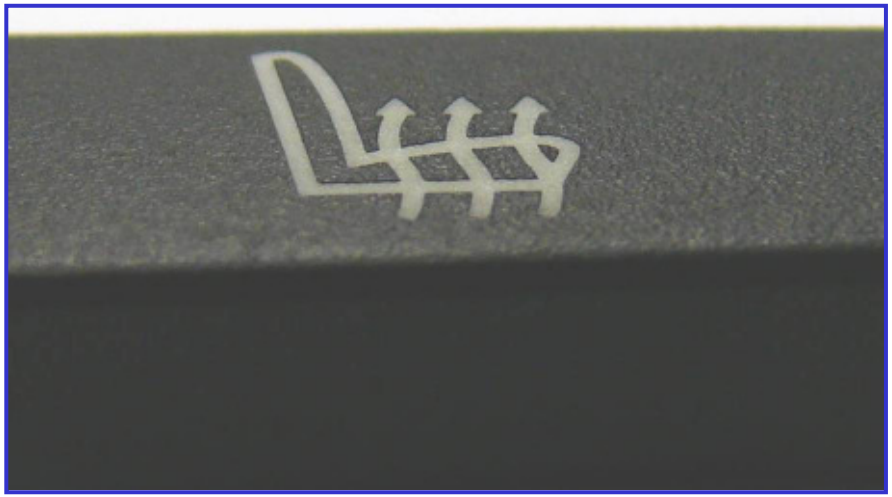


- Closed surface
- No point of attack for aggressive media
- Surfaces in 6 matt/glossy grades
- Softtouch foils
- Good scratch resistance by pre-coated foil
- Protection against abrasion of colour by thickness of foil
- Flow lines hidden by foil

Foils vs.Lacquer – which one is the most promising material?

Surface/Haptics

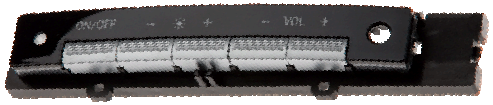
Lacquer



Foil

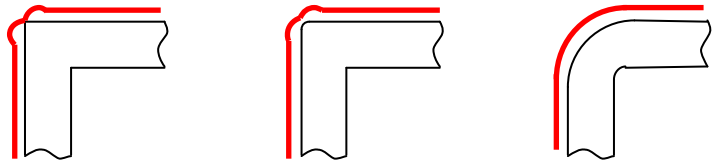
Foils vs.Lacquer – which one is the most promising material?

Part design



Lacquer

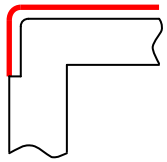
- Complex 3D geometries according to options of painting line
- Undercuts lacquerable
- Side walls lacquerabele according to options of painting line
- Smallest radius 0 (theoretical)
- Increase of radius by accumulation of paint at edges



- Partition against light leakage in openings for buttons

Foil

- 3D geometries
- Limited forming depth of foil
- Limited feasability for undercuts
- Smallest radius = 2x foil thickness
- Constant increase of radius according to foil thickness



- Partition against light leakage in openings by foil
- Total wall thickness reduced by thickness of foil (no thin wall parts possible)
- Location of injection points limited

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Pass of OEM Specifications

Lacquer

General statement not possible due to various specifications and test media defined by OEMs

- **Lacquer systems adapted to application and specification of OEM**

Foil

- **DBL and TL226 (with restriction)**
- **Weak point is hydrolysis- and creme resistance**
- **Basic properties**
  - ✓ **Coated: comp. painted surface**
  - ✓ **Uncoated: comp. substrate**

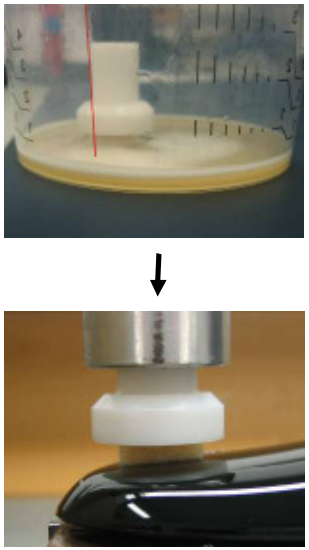
Abrasion Behavior And Scratch Resistance

	Lacquer		Foil			
	Standard	**UV-hardened surfaces**	**PC**	**PC + scratch resistance**		
Erichsen-Hardness	n. ok (noticeable recess)	ok (best result)	n. ok (noticeable recess)	ok (visible recess)	peak Ø1mm, 8N*	
Schmiss hardness	n. ok (shiny spot)	ok	n. ok (shiny spot)	ok	disc, 10N	
Belt abrasion	1,85m	>10m	2m	>10m	Abrasive paper, 3N	
Crockmeter	ok	ok	ok	ok	2k strokes dry felt, 9N	

* acc. DBL 7384 with 4N

Maintanance Resistance

	Lacquer		Foil	
	Standard	**UV-hardened surface**	**PC**	**PC + scratch resistance**
Cockpit cleaner	ok	ok	ok	ok
Stain remover	ok	ok	ok	ok
Plastic Cleaner	ok	ok	ok	ok
Solvent of hand sweat	ok	ok	ok	ok



acc. DBL 7384 with Crockmeter, 30 strokes, impregnated felt

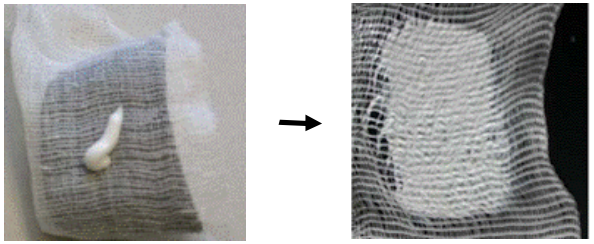
Chemical Resistance

	Lacquer		Foil	
	Standard	**UV-hardened surface**	**PC**	**PC + scratch resistance**
Cola	ok	ok	ok	ok
Orange juice	ok	ok	ok	ok

acc. DBL 7384 with 60°C/24h aging in circulating air, 3 drops

Creme Resistance

	Lacquer		Foil	
	Standard	**UV-hardened surface**	**PC**	**PC + scratch resistance**
Sun Creme	ok	ok	ok	ok
Hand Creme	ok	ok	ok	ok



acc. PV 3964 at 80°C/24h aging in circulating air, wetted gauze bandage

Production Tolerances

Lacquer

- Thickness of paint layer ± 3…5µm
- Laser etching ± 0,15 mm
- Tampon print ± 0,15 mm

Foil

- Misplacement of pattern ± 0,3 mm
- Excess length of foil ± 0,2 mm

Investment for tools and jigs

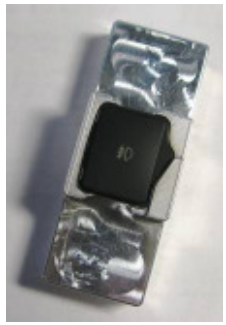
Lacquer

- Painting jig
- Painting mask
- Laser jig
- Printing jig and cliche resp. printing screen

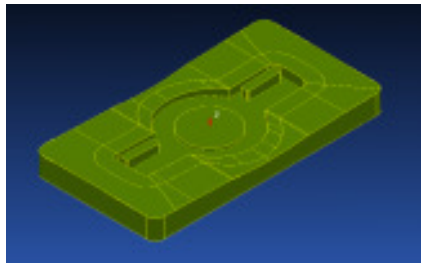
Foil

- Litho and printing screen
- Forming tool
- Cutting tool
- Slightly more complicated injection molding tools

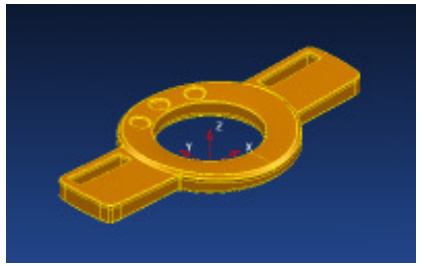
Painting jig



Laser jig



Frame For Forming Insert



Forming Core

Chain of Value Added

Lacquer

	Share of Value Added	Standard Scrap Rate
Molding	**40%** **30%**	3%
Painting **Standard** **High Gloss**	**25%** **45%**	5…15% 40…60%
Laser Etching	**23%** **17%**	1%
Printing	**12%** **8%**	3%

Foil

	Share of Value Added	Standard Scrap Rate
Printing	25%	4%
Forming	25%	4%
Cutting		
Molding Standard High Gloss	50%	5…8% 10…15%

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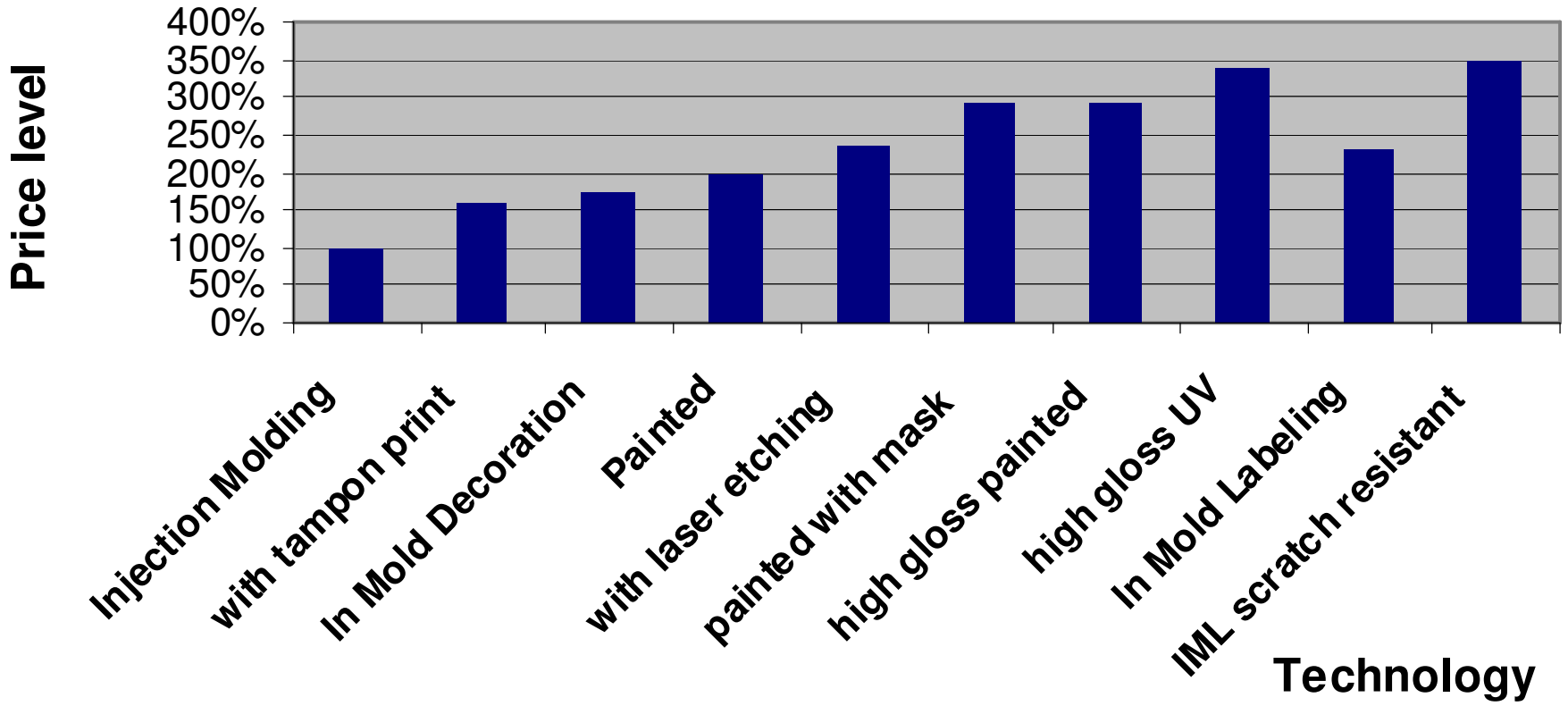
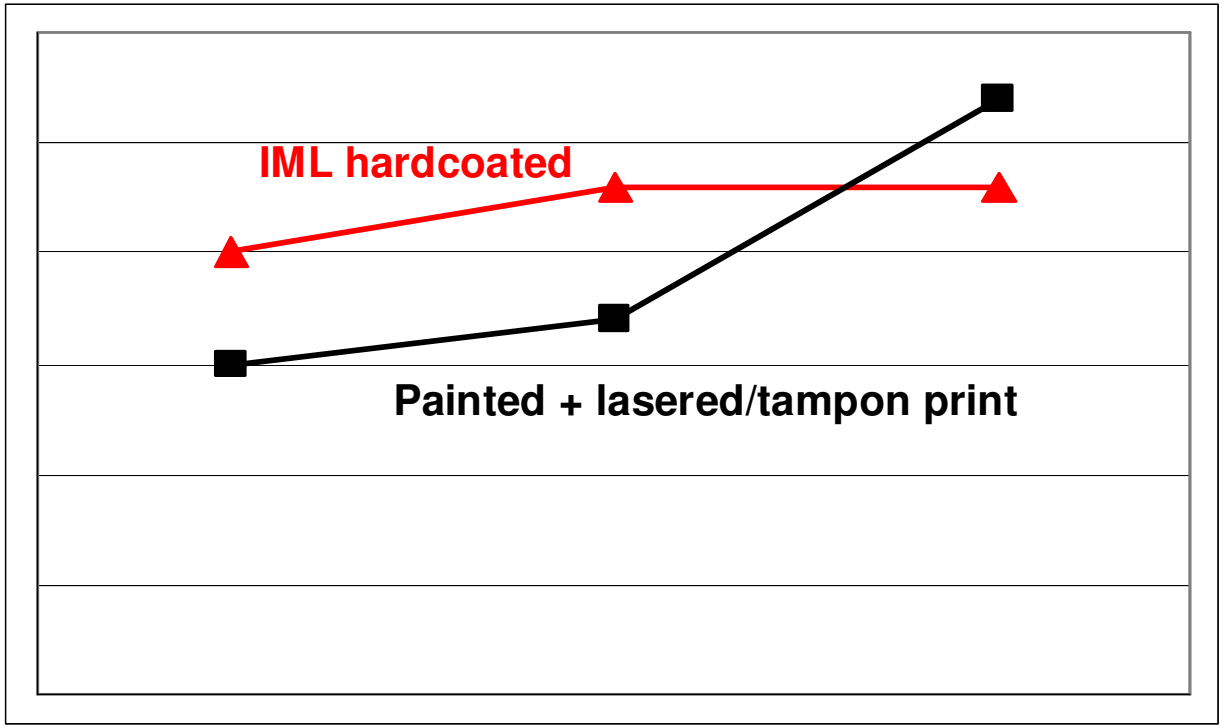
Price level according to process technology



Price level according to decoration level



Lacquer or foil?

…the most fitting material depends on your application!

The best is to use both technologies together:

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Fiat Punto Evo: Switchboard

- **Xtraform-foil**
- **2c back molded**
- **Assembly group with painted and laser etched buttons**

foliotec
DECORATION FOR PLASTICS

KTI

PERFECTION IN PLASTICS

Foils vs.Lacquer – which one is the most promising material?

Lancia Ypsilon: Radio/CD

- 3D In Mold Labelling
- 2C Injection molding
- Painting, laser eching
- Plating

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