10 Years JUPITER Digital Printing Lines, State of the Art and Outlook

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Hymmen GmbH Maschinen- und Anlagenbau
Who we are

History

- Family-owned and directed since 1892
- 4th generation with focus on new technologies for "continuously producing systems"

Core competencies

- Industrial production technology for large volume production of board materials or the surface finishing of boards (particle boards, MDF/HDF boards, etc.) or roll materials
- Main focus on woodworking industry
- Industrial digital printing lines (single pass) since 2007
During the last 10 years Hymmen made many important developments for digital printing in the decor industry.

The production of digitally printed material with Hymmen JUPITER Digital Printing Lines is valued at approx. 60 million m²/year.
2007
Start development

2009
First presentation on Ligna 2009
10 Years JUPITER Digital Printing Lines

2007
Start development

2009
First printing line
JPT-W 280

2009
First presentation
on Ligna 2009
With the first machine we decided to focus on modularity. Our own developed ink supply supports 4 printheads. This modularity was a key factor for further developments.

Until now Hymmen build more than 600 units
10 Years JUPITER Digital Printing Lines

2007
Start development

2009
First printing line
JPT-W 280

2009
First presentation on Ligna 2009

2010
First printing line
JPT-C 1400
Doors
UV-Coating
2010 First printing line JPT-C 1400 for doors

- Material: pre-coated doors
- Print width: 1.030 mm
- No of printheads: 60
- Post process: UV-topcoat
- Product: doors

With a printing width of more than 1000 mm the positioning and calibrating of 15 printheads over the width is mostly important. We needed 4 weeks for printhead alignment. Clever procedures and mechanisms helped to speed up the alignment time.

Today we need about 1-2 days for a similar machine.
10 Years JUPITER Digital Printing Lines

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development

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First printing line
JPT-C 1400
Doors
UV-Coating

2011
First printing line
JPT-C 2200
Boards
Melamine pressing
2011 First printing line JPT-C 2200 melamine pressing

- Material: pre-coated boards
- Print width: 2.055 mm
- No of printheads: 120
- Post process: melamine pressing
- Product: laminate flooring

The print width alone was unique, additionally this machine was the first machine that runs with the Hymmen Callisto ink.

Callisto ink is the only UV-curable ink that works in the melamine pressing process.

This machine prints every day between 40,000 and 50,000 m²
10 Years JUPITER Digital Printing Lines

2007
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2009
First printing line
Jupiter W-280

2011
First printing line
JPT-C 2200
Boards
Melamine pressing

2009
First presentation on Ligna 2009

2010
First printing line
JPT-C 1400
Doors
UV-Coating

2012
First printing line
JPT-W 1400
Paper
Melamine pressing
The machine is printing form roll to roll on paper for laminate using the Hymmen Callisto ink. Without the need of impregnation, the printed paper is later pressed with resin filled papers to a laminate.

The dry pressing process gives the most flexibility compared to the traditional process and is very economic.
10 Years JUPITER Digital Printing Lines

2007
Start development

2009
First printing line
JPT-W 280

2011
First printing line
JPT-C 2200
Boards
Melamine pressing

2013
First printing line
JPT-WS 280
Edgebands

2009
First presentation on Ligna 2009

2010
First printing line
JPT-C 1400
Doors
UV-Coating

2012
First printing line
JPT-W 1400
Paper
Melamine pressing
Material: ABS / PVC / PP
Print width: 137 mm
No of printheads: 16
Post process: UV-coating
Product: edgebands

With its specially developed steelbelt transport, the machine can be integrated into an exiting extruder line. This line was the first, that replaces directly analog printing units.

The colormatching time was reduced to 5-10 % by using this machine.
10 Years JUPITER Digital Printing Lines

**2007**
- Start development

**2009**
- First printing line JPT-W 280

**2009**
- First presentation on Ligna 2009

**2011**
- First printing line JPT-C 2200
  - Boards
  - Melamine pressing

**2011**
- First printing line JPT-W 1400
  - Paper
  - Melamine pressing

**2013**
- First printing line JPT-WS 280
  - Edgebands

**2013**
- First printing line with double printbars

**2014**
- First printing line JPT-C 1400
  - Doors
  - UV-Coating
To increase speed and to achieve a better reliability the machine is equipped with 2 colorbars per color. The 2\textsuperscript{nd} bar gives that kind of redundancy, that small print defects of print head are masked.

**Using double printbars is meanwhile standard for all Hymmen lines now.**
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2012
First printing line JPT-W 1400
Paper
Melamine pressing

2013
First printing line JPT-WS 280
Edgebands

2014
First printing line with double printbars

2015
First printing line with double printbars
176 printheads

Printing line with double printbars
Material: pre-coated boards
Print width: 1.510 mm
No of printheads: 176
Post process: UV-coating
Product: flooring

Outstanding: the Hymmen machine with the most printheads and the highest output capacity.

The machine can print more than 10 boards per/min with a size of 1.5 x 3 m
# 10 Years JUPITER Digital Printing Lines

<table>
<thead>
<tr>
<th>Year</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>2007</td>
<td>Start development</td>
</tr>
<tr>
<td>2009</td>
<td>First printing line JPT-W 280</td>
</tr>
<tr>
<td>2009</td>
<td>First presentation on Ligna 2009</td>
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<tr>
<td>2010</td>
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<td>First printing line JPT-W 1400 Paper Melamine pressing</td>
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<tr>
<td>2013</td>
<td>First printing line JPT-WS 280 Edgebands</td>
</tr>
<tr>
<td>2014</td>
<td>First printing line with double printbars</td>
</tr>
<tr>
<td>2015</td>
<td>Printing line with double printbars 176 printheads</td>
</tr>
<tr>
<td>2016</td>
<td>First printing line JPT-WS 560 wide edgebands</td>
</tr>
</tbody>
</table>
Material: ABS / PVC / PP
Print width: 411 mm
No of printheads: 54
Post process: UV-coating
Product: edgebands

As the big brother of existing JPT-WS 280 the machine is able to print up to a width of 540 mm onto extruded material.

This machine type is the first that will be delivered with the new Xaar 2001 printheads in the near future.
10 Years JUPITER Digital Printing Lines

- **2007**: Start development
  - First printing line JPT-W 280

- **2009**: First presentation on Ligna 2009

- **2009**: First printing line JPT-C 2200
  - Boards
  - Melamine pressing

- **2010**: First printing line JPT-C 1400
  - Doors
  - UV-Coating

- **2011**: First printing line JPT-C 2200
  - Boards
  - Melamine pressing

- **2012**: First printing line JPT-W 1400
  - Paper
  - Melamine pressing

- **2013**: First printing line JPT-WS 280
  - Edgebands

- **2014**: First printing line with double printbars
  - 176 printheads

- **2015**: Printing line with double printbars
  - 176 printheads

- **2016**: First printing line JPT-WS 560
  - wide edgebands

- **2017**: ?
Haptics is definitely one of the most important properties of flooring and furniture besides the optics.

In many customer meetings it became apparent that the customer estimates the printing quality of digital printing and wants to use its advantages. However, the complete product is crucial for the customer.

Meanwhile, the flooring and furniture boards produced with traditional processes all have a more or less structured surface. Many high-quality products have a synchronous structure.
Usually these structures are generated by textured sheets or texture films during the melamine resin pressing.
The direct printing of boards and subsequent lacquering with UV lacquers is currently only possible with rollers or a special transfer film process.
However, the flexibility of digital printing is facing the inflexibility of the analogue structuring process here.
Decors can be changed without loss of time, register lengths can be arbitrary. This is not possible with the analogue structuring process.

Therefore we need a digital method for structuring.
Assumptions for an industry-proven process

The following demands have to be fulfilled:

- Depth of 10 - 90 µm
- Synchronous to printed decor
- Surface quality must not be lost
  This varies depending on the product (furniture, flooring, etc.)
- Different gloss levels
- Creating a depth-structure instead of a positive structure
  (like real wood)
- Possibility to add the technology to existing conventional lacquering lines
Digital Lacquer Embossing (DLE)

This innovative technology takes place in 3 steps:
Step 1: A UV top coat layer is applied (roller application, pouring, injection or ...).
Step 2: A transparent medium is applied to the top coat layer which is not cured. This happens by means of the proven technology of the Hymmen JUPITER Digital Printing Lines.
Step 3: After applying the structuring medium, the curing of the top coat takes place by means of UV radiation.
Step 1: A UV top coat layer is applied (roller application, pouring, injection or ...).
Step 2: A transparent medium is applied to the top coat lacquer layer which is not cured. This happens by means of the proven technology of the Hymmen JUPITER Digital Printing Lines.
Step 3: After application of the structuring medium the curing of the top coat takes place by means of UV radiation.
Digital Lacquer Embossing (DLE)

- InkJet
- UV
- lacquer
- HDF
- print
Digital Lacquer Embossing (DLE)

- InkJet
- UV
- lacquer
- HDF
- print
Digital Lacquer Embossing (DLE)

InkJet

UV

lacquer

HDF

print
**Technical data**

<table>
<thead>
<tr>
<th>Feature</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Printing speed</td>
<td>15 – 50 m/min</td>
</tr>
<tr>
<td>Effective working width</td>
<td>up to 2.192 mm</td>
</tr>
<tr>
<td>Structure printing lines</td>
<td>1</td>
</tr>
<tr>
<td>Additional structure printing lines</td>
<td>optional</td>
</tr>
<tr>
<td>Structuring medium</td>
<td>Hymmen transparent</td>
</tr>
<tr>
<td>Typical application quantity top coat</td>
<td>40 - 70 g/m²</td>
</tr>
<tr>
<td>Typical application quantity structuring medium</td>
<td>0,5 - 2 g/m²</td>
</tr>
<tr>
<td>Intermediate drying</td>
<td>UV LED possible</td>
</tr>
<tr>
<td>Resolution</td>
<td>360 or 720 dpi</td>
</tr>
<tr>
<td>Printhead type</td>
<td>Xaar 1003 or Xaar 2001</td>
</tr>
</tbody>
</table>
The advantages:

- High flexibility
- No storage costs
- New design options
- No roller or press plate change
- Synchronous structure
- Option of integration into existing traditional lines
- Only one single pass printbar needed (up to 2,1 m)
- All proven properties of known lacquers are maintained (scratch resistance, surface hardness, chemical resistance)
Thank you very much!

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