HOMAG Group AG
efficient modeling with general building block library in 3D

Dürr Structure
Legal structure: 3 subgroups

DÜRR AG
- Dürr Systems GmbH
  - Paint and Assembly Systems
  - Application Technology
  - Clean Technology Systems

SCHENCK
- Carl Schenck AG
  - Measuring and Process Systems

HOMAG
- HOMAG Group AG
  - Woodworking Machinery and Systems

Siemens Industry Software
Structure of Dürr Group

<table>
<thead>
<tr>
<th>Paint and Final Assembly Systems</th>
<th>Application Technology</th>
<th>Measuring and Process Systems</th>
<th>Clean Technology Systems</th>
<th>Woodworking Machinery and Systems</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sales: € 1,078 m</td>
<td>Sales: € 526 m</td>
<td>Sales: € 582 m</td>
<td>Sales: € 136 m</td>
<td>Sales: € 915 m</td>
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<tr>
<td>EBIT: € 106 m</td>
<td>EBIT: € 55 m</td>
<td>EBIT: € 70 m</td>
<td>EBIT: € 8 m</td>
<td>EBIT: € 45 m</td>
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Customers & target groups

If your aim is process wood and wood-based materials efficiently, economically and to an extreme degree of precision, no look further than the HOMAG Group for precisely the right solution to your needs.

This wealth of specialist expertise means you can rely on a broad range of highly efficient machines, plants and systems – custom tailored for the industry and cabinet shops.
Living starts with our machines

**Business model**
- Manufacturer of machines and plants for woodworking and wood materials processing

**Company size as of 31.12.2014 (2013)**
- EUR 915 million sales revenue (prior year: EUR 789 million)
- 5,606 employees as of 31.12.2014 (prior year: 5,064 employees)

**Customer segments 2014 (2013)**
- Furniture producers 83% (84%)
- Producers of structural elements 14% (13%)
  (flooring, doors and frames, windows)
- Producers of timber frame houses 3% (3%)

Worldwide production, sales and service network

**Worldwide production, sales and service network**
- 15 production sites in 7 countries
- 23 Group-owned sales and service companies and 60 excl. sales partners

<table>
<thead>
<tr>
<th></th>
<th>FY 2014</th>
<th>%</th>
<th>FY 2013</th>
<th>%</th>
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<tbody>
<tr>
<td>Germany</td>
<td>3,857</td>
<td>69</td>
<td>3,810</td>
<td>75</td>
</tr>
<tr>
<td>Abroad</td>
<td>1,749</td>
<td>31</td>
<td>1,254</td>
<td>25</td>
</tr>
<tr>
<td>Total</td>
<td>5,606</td>
<td>100</td>
<td>5,064</td>
<td>100</td>
</tr>
</tbody>
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Siemens Industry Software
Products and services

Product range
- Stationary technology/CNC
- Edge processing
- Panel dividing saws
- Drilling/fitting/assembly
- Handling/packaging
- Laminating and sanding

Services
- Broad offering for service, training and spare parts

Sales revenue split 2014 (2013)
- Machines 49% (49%)
- Cells and production lines 30% (34%)
- Service 21% (19%)

Comprehensive technology breadth

Industrial manufacturers process chain

Cabinet shops process chain

Siemens Industry Software
Market development

- brand
- design
- High-quality
- configurable
- assembled
- medium segment
- Ø product to Ø price
- mass
- discount
- trademark
- Production to stock
- disassemble / packed

Our service offering

110 customized kitchen fronts within an hour ...

... with our production line.
The imperative use of simulation

- High variance of production data → batch size one production
- Diversity of output in each cell → decoupling necessary between the cells
- Complex installations with branched material flow

Usage of Plant Simulation in HOMAG Group

Customized projects:
- Reliable statements about productivity and throughfeed times
- Analysis and optimization of bottlenecks
- Sensitivity analysis
- Review of fault scenarios and minimization of consequences
- Comparison of plants in different variants

Sales department support:
- Support with basic concepts (easy to use Pack-And-Go models)

R&D support
- Feasibility studies

Requirements:
- Short lead times
- High dynamic

Simulation team:
- Michael Burzan / HOMAG Automation (location Hemmoor)
- Achim Pfrommer / HOLZMA (location Holzbronn)
- Eugen Witt / HOMAG (location Schopfloch)
- Michael Kratzert / HOMAG (location Schopfloch)
**Workflow of Module and Cell Development**

- **Customer**
  - Detailed system analysis:
    - Reliable statements about productivity and throughput times
    - Comparison of different concepts
    - Analysis and optimization of bottlenecks
    - Review fault scenarios and minimization of consequences
  - Customized project

- **Business Units → Engineering Department**
  - General building block library
  - Valid modules and cells

- **Business Units → R&D Department**
  - Validation and adjustment of parameters and process
  - Verifications improvement approaches

**The “HOMAG way” to efficient project processing**

**Model hierarchy:**

- Plant level
  - n-production cells

- Cell level
  - n-machines

- Machine-level
  - n-modules
The “HOMAG way” to efficient project processing

Standardized model templates:
- Cooperate look and feel
- Specified framework topology
- Clear and structured namespace
- Simple production data management via import-wizard
- Global analysis functionality
  - Automatic standardized pdf-reporting
  - Multi-language ability
  - Automatic parameter documentation
- Analysis and verification of production data
- Sales people proofed model handling

Module structure:
- Module corresponds with a real machine unit and follows the same structure
  - R&D and project department speak about the same things
  - Easy implementing of PLC logic
  - Identical track record for validation
- Strict separation of functionality and steering logic
  - Quick configuration of the module
  - Simple change of different steering strategies
- Defined interface to predecessor and successor modules
  - Fast buildup and replacement of modules
- Efficient and transparent parameterization via user interface
The “HOMAG way” to efficient project processing

Module structure:
- Interaction between modules via design pattern
  - No coding necessary to trigger specific functions
  - Observer, commando and strategy
- Integrated module documentation
  - Avoidance of redundant data management
- Internal specified analysis
  - Automatic notification by global analysis
- User defined parameter validation
- Generic module structure to composite complex machinery

Reasons for 3D-Visualisation

- Explanation of functions in the 3rd dimension are very easy
- A picture is worth a thousand words \( \rightarrow \) a moving 3D environment is round in terms
- Support the right professional impression
Advantages of the new Plant Simulation environment

- Simulation objects and 3D - information in one class library
  - Clear orientation in class library
  - Easy workflow by using the context and ribbon menu

2D and 3D two different worlds

One well-arranged environment

Advantages of the new Plant Simulation environment

- Structured and performant 3D data by using .jt-format
  - Changes of 3D drawing can be done directly in Plant Simulation

Structured and performant 3D data by using .jt-format

Changes of 3D drawing can be done directly in Plant Simulation

Easy and coherent coding

**Old coding**

```c
--- send 3D Information
ScaleX := max(0.05, (0.015*length));
ScaleY := max(0.05, (0.015*height));
scalentr := "Y" + ta_str(scaleX) + " " + ta_str(scaleY); 
R.encMessage("scale", scalentr);
```

**New coding**

```c
--- send 3D Information
void_3D.Scale := makebox3d(0.015*length, 0.015*height, 0.015);
```

intricate search

2 clicks to edit 3D data
Dynamic creating of 3D graphics

- High effort of creating conveyor and transport graphics
  - Different in length, width, height and style
  - Frequently adjustment during the planning process

- Solution: using the new structure of PlantSimulation V12
  - Portioning the graphics in basic parts
  - Central administration of basic graphics in collaboration software
  - Generalize dynamic creating via simtalk according parameters
  - Coupling rotation and position 2D → 3D according to layout
  - Relevant reduction of editing time
  - Corporate identity style

Round trip through a HOMAG plant

Video
Presentation of the LIGNA exhibition 2015

- Presentation of hole plant in stereo 3D
- Virtual extension of exhibition space
- Using Plant Simulation as marketing tool
- Over 4000 visitors in the Innovation Center
- Survey results: how interesting was:
  - Training of employees on virtual machines/plants?
  - Virtual integration of prospective machines in existing factories?
  - Virtual testing of new production concepts?

Survey Results:

- Training of employees on virtual machines/plants:
  - High: 63%
  - Medium: 34%
  - Low: 3%

- Virtual integration of prospective machines in existing factories:
  - High: 52%
  - Medium: 34%
  - Low: 14%

- Virtual testing of new production concepts:
  - High: 57%
  - Medium: 20%
  - Low: 23%

Thank you for your attention!

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