From electrical harness engineering to interactive manufacturing

Use engineering data to digitalize your electrical harness production
• strange situation overview
• Harness production challenge
• Interactive harness production with EasyWiring
• EasyWiring benefits
• How it works
• EasyWiring architecture
• EasyWiring implementation
• Use of manufacturing nailed formboards
  • Printed scale 1:1 wiring diagram
  • Working instruction on paper

• Plenty of smart engineering data available
• Common exchange standards (HCV, KBL (STEP AP212), XML.....) are available.
• Smart geometrical 2D items can be layered.
More and more complex

More options to manage

Pressure on the prices

Flexibility requested by customers

Training the operators

Higher quality requirements

Wire Harness production Challenges
Digitalization of the harness production is a response
## EasyWiring Key Benefits

### Interactive Harness Assembly Board

<table>
<thead>
<tr>
<th>Your benefits</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Boost productivity</strong></td>
<td>• Quick set-up of harness on the board</td>
</tr>
<tr>
<td></td>
<td>• Fast operator training due to easy to understand instructions</td>
</tr>
<tr>
<td></td>
<td>• Reduce rework and testing time</td>
</tr>
<tr>
<td></td>
<td>• Very fast access to needed information</td>
</tr>
<tr>
<td><strong>Improve quality</strong></td>
<td>• Predefined steps allow consistent processing method</td>
</tr>
<tr>
<td></td>
<td>• Reduce errors thanks to guided work steps</td>
</tr>
<tr>
<td></td>
<td>• All assembly steps are traceable</td>
</tr>
<tr>
<td></td>
<td>• Validation and control of the whole assembly process</td>
</tr>
<tr>
<td><strong>Highly flexible</strong></td>
<td>• Quick and flexible set up of any harness configuration – faster prototyping</td>
</tr>
<tr>
<td></td>
<td>• Smart quick clamping system on the board</td>
</tr>
<tr>
<td></td>
<td>• Modular design and adaptable size of the assembly board</td>
</tr>
<tr>
<td><strong>Shop floor layout optimization</strong></td>
<td>• One assembly board for hundreds of different harnesses</td>
</tr>
<tr>
<td></td>
<td>• No more wooden boards on inventory</td>
</tr>
</tbody>
</table>
EasyWiring process overview

Data import
- DXF harness drawing
- Electrical elements
  - Cables
  - Contacts
  - Cables ties
  - Sleeves
  - Terminators/ connectors
- Tools in production & settings
- Pictures & videos
- Wiring rules

Prepare
- Wire support accessories
- Position of the information window
- Define the working steps and their order
  - Routing
  - Place sleeves
  - Stripping
  - Crimping pining
- Metrology and tooling management
- Define qualifications
  - Operators profiles and rights
  - Jobs allocation
  - Tasks allocations
  - Production scheduling
  - Get the reporting statistics and the traceability information

Harness Assembly
- get the DXF drawing
- Set the accessories on the screen
- do the assigned production tasks
  - get step by step the needed information
  - validated the steps
  - can report free text note information

• All information and data flow can be easily input and handled by Customer → Ready to use
**Dataflow overview**

**Customer Data**
- Production File + Drawing - scale 1:1
- Library common parts (xml)
  (cables, connectors, tools...)

**EasyWiring Preparation SW**
- Create the tooling
- Create the parts
- Create the harness models

**EasyWiring Database**

**EasyWiring Production SW**
- Manufacture harnesses

**Data Feedback**
- Traceability
- Monitoring
- Extract production data

**Laurent PRAT LASELEC**

January 11, 2019
cable holders positioning
General reduction of production time

Harness design & manufacturing work steps

- Preparation: 30 min
- Setup wooden board: 60 min
- Training: 30 min
- Production: 4 h
- Harness Change: 30 min

Time saved With Easy Wiring

- Preparation: 8 min
- Setup EasyWiring board: 20 min
- Training: Learning by doing: 20 min
- Production: 3 h 00
- Harness Change: 20 min

Time Saved: 36%
• One assembly board for hundreds of different harnesses
  • Several harnesses can be managed from the same board
  • Each module can easily be moved (lockable wheels)

• No more wooden boards on inventory
  • Nails replaced by numerous adapted accessories (Wire layout, grips, Wire comb, connector support, harness clip and elastic retainers) bases on suction cups
  • Easy to remove, to store and fix
  • Reusable for various harnesses

Free 6 m² storage by replacing only 10 wooden boards! EasyWiring can replace hundreds of them.
• EasyTouch for a faster interaction while producing harness with many wires

• EasyContinuity: in-line testing reduces routing and pinning errors.

• EasyWiring light for mass production of harnesses with a stable configuration.
Technical Data

- **Display Area**: board length

- **Screen protection surface**:  
  - Glass
  - Thickness: 10 mm
  - Heat resistant 250°C

- **Accessories**: various shapes are available, as well as a customized solution upon request
  - **Suction cups vertical force**:  
    - 4 to 5 kg for suction cups of 36 mm diameter
    - > 8 kg for suction cups of 55 mm diameter

---

<table>
<thead>
<tr>
<th># module = display length</th>
<th>75” TV</th>
<th>86” TV</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Length</td>
<td>Height</td>
<td>Length</td>
</tr>
<tr>
<td>1 module</td>
<td>1,65 m</td>
<td>0,928 m</td>
<td>1,928 m</td>
</tr>
<tr>
<td></td>
<td>64,96”</td>
<td>36,53”</td>
<td>71,06”</td>
</tr>
<tr>
<td>2 modules</td>
<td>3,33 m</td>
<td>0,928 m</td>
<td>3,856 m</td>
</tr>
<tr>
<td></td>
<td>131,1&quot;</td>
<td>36,53&quot;</td>
<td>142,12&quot;</td>
</tr>
<tr>
<td>3 modules</td>
<td>5,01 m</td>
<td>0,928 m</td>
<td>5,784 m</td>
</tr>
<tr>
<td></td>
<td>197,24&quot;</td>
<td>36,53&quot;</td>
<td>217,13&quot;</td>
</tr>
<tr>
<td>4 modules</td>
<td>6,69 m</td>
<td>0,928 m</td>
<td>7,712 m</td>
</tr>
<tr>
<td></td>
<td>263,39&quot;</td>
<td>36,53&quot;</td>
<td>290,16&quot;</td>
</tr>
<tr>
<td>5 modules</td>
<td>8,37 m</td>
<td>0,928 m</td>
<td>9,64 m</td>
</tr>
<tr>
<td></td>
<td>329,53&quot;</td>
<td>36,53&quot;</td>
<td>363,19&quot;</td>
</tr>
<tr>
<td>6 modules</td>
<td>10,05 m</td>
<td>0,928 m</td>
<td>11,568 m</td>
</tr>
<tr>
<td></td>
<td>395,67&quot;</td>
<td>36,53&quot;</td>
<td>436,22&quot;</td>
</tr>
</tbody>
</table>
## Hardware Module Configurations

<table>
<thead>
<tr>
<th>Upgrade</th>
<th>75”</th>
<th>86”</th>
</tr>
</thead>
<tbody>
<tr>
<td>Light</td>
<td><img src="light.png" alt="Image" /></td>
<td><img src="light.png" alt="Image" /></td>
</tr>
<tr>
<td>Stand</td>
<td><img src="stand.png" alt="Image" /></td>
<td><img src="stand.png" alt="Image" /></td>
</tr>
<tr>
<td>Double Stand</td>
<td><img src="double_stand.png" alt="Image" /></td>
<td><img src="double_stand.png" alt="Image" /></td>
</tr>
<tr>
<td>Motorized</td>
<td><img src="motorized.png" alt="Image" /></td>
<td><img src="motorized.png" alt="Image" /></td>
</tr>
</tbody>
</table>

**Light**:
- Light configuration includes a light source.

**Stand**: 
- Stand configuration includes a stand for the display.

**Double Stand**: 
- Double Stand configuration includes two stands.

**Motorized**: 
- Motorized configuration includes motorized components for ease of use.
Recap Key Benefits
Productivity quality at the methods level

Methods Engineer

- Define Interactive guidance in accordance with the awaited throughput
- Get traceability information automatically collected
- Work directly with existing technical data
- Define the management of the tooling
- Easily manage several harnesses with the same board
Productivity quality at the operator level

- Interactive guidance in accordance with the awaited throughput
- Traceability data automatically collected after each operation
- Effective with a fast access to the needed information
- Get reliable updated information
- Learn quickly with full detailed guidance
Many thanks for your attention!

laurent.prat@laselec.com