Digital Timber Construction
New Possibilities with Digital Technology

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www.architekt-robeller.de
www.architektur.uni-kl.de/dtc
Beam

33. B.C.

Beam - Plate

1920

Plate - Plate

1990
Buri, H. Origami Folded Plate Structures, EPFL IBOIS 2006-2010
Hinged Joints
Rigid Joints

Buri, H. *Origami Folded Plate Structures*, EPFL IBOIS 2006-2010

Hahn, B. *Analyse eines räumlichen Tragwerks aus Brettsperrholz*, EPFL IBOIS 2009
Integral Assembly Guide + Connector
Wood

Cross-laminated wood

Only across finer

All sides!
Roche, Robeller, Humbert, Weinand, On the semi Rigidity of Dovetails, EJWP 2014
<table>
<thead>
<tr>
<th>Material</th>
<th>Quantity</th>
<th>Thickness</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>CLT 40 mm</td>
<td>3</td>
<td>12.5 / 15 / 12.5 mm</td>
<td>I-I</td>
</tr>
<tr>
<td>CLT 45 mm</td>
<td>5</td>
<td>5 x 9 mm</td>
<td>I-I-I</td>
</tr>
<tr>
<td>LVL 39 mm</td>
<td>13</td>
<td>13 x 3 mm</td>
<td>II-III-III-II</td>
</tr>
</tbody>
</table>
2.6 Materials comparative analysis

![Graph showing moment as function of rotation for all materials used](image)

**Table 5: Characteristic values for 45 mm CLT compared to CLT 40 mm as reference**

<table>
<thead>
<tr>
<th>Material</th>
<th>Yield (°%)</th>
<th>Ultimate (°%)</th>
<th>Ultimate (°%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CLT 40 mm</td>
<td>10</td>
<td>12,5</td>
<td>12,5</td>
</tr>
<tr>
<td>CLT 45 mm</td>
<td>15</td>
<td>5</td>
<td>9</td>
</tr>
<tr>
<td>LVL 39 mm</td>
<td>13</td>
<td>13</td>
<td>3</td>
</tr>
</tbody>
</table>


Building section and production timeline
A Double-Layered Timber Plate Shell
Anderson, S. Eladio Dieste, Innovation in Structural Art, p.80
Citricos Caputto Fruit Packing Plant, Salto, Brazil, 1971-72, 1968-87
Full size support structure

Re-use of support structure = identical form
X-equilibrium (dimensioning)

- $\mu_{frott} = 0.6 \Rightarrow W_{\text{block}} \geq \frac{R_{F,\text{ELU}}}{\mu} = 6.58\text{kN}$
- $M_{\text{block}} = 700\text{kg}$
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