New generation ThermoWood® - How to take ThermoWood® to the next level

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COMMERCIAL STATUS OF THE ThermoWood® BUSINESS (1/3)

The International ThermoWood Association (ITWA)

- Established in 2000, in 2008 the name was changed to be International ThermoWood Association

- The purpose of the ITWA is to:
  - Increase knowledge concerning thermally modified timber
  - Enhance the conditions under which thermally modified timber is produced and used by means of harmonisation

- Key activities:
  - Lobbying
  - Communication
  - R&D
  - Supervise quality control of the ThermoWood® production

- Number of members: 15 (13 producers, 2 kiln manufacturers)
COMMERCIAL STATUS OF THE ThermoWood® BUSINESS (2/3)

ThermoWood SALES PRODUCTION

1000 m$^3$

<table>
<thead>
<tr>
<th>Year</th>
<th>Basic product</th>
<th>Further processed</th>
</tr>
</thead>
<tbody>
<tr>
<td>2001</td>
<td>18799</td>
<td></td>
</tr>
<tr>
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</tr>
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<td>2008</td>
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</tbody>
</table>

Legend:
- Basic product
- Further processed
COMMERCIAL STATUS OF THE ThermoWood® BUSINESS (3/3)

ThermoWood® end uses

Over 80% of the consumption going to:

- Exterior cladding
- Exterior decking
- Internal walls and ceilings panels
- Internal flooring
KEY FINDINGS FROM THE PAST 12 YEARS (1/5)

McDonalds’ headquarters in Helsinki

- Built 1997
- Photos 2007
- ThermoWood Pine 220 °C

Conclusions
- Excellent Stability
- No Decay
- Good condition
KEY FINDINGS FROM THE PAST 12 YEARS (2/5)

Reference case: Broughton Fields Primary School, UK

General Building information
- Broughton Fields Primary school completed Autumn 2004

Building details
- No eaves, some protection under canopy’s
- Brick facade in lower sections of wall
- 1st cladding board about 2.5m above ground
- 10mm air gaps between each board & also on corners

Material
- ThermoWood Spruce treated at 210°c 21 x 95
- Smooth planed boards with bevel edges

Fixings and Coatings
- Stainless steel oval head nails by nail gun
- Fixings through the face
- No surface coatings
Main observations

- Overall appearance is weathered & grey on all elevations, very consistent and uniform appearance except under canopy’s.
- Areas protected by canopy’s have retained the original colour quite well, sign of water staining where drainage from canopy occurs.
- No sign of decay fungi.
- No significant cupping or signs of swelling / shrinkage.
- Some patches of green algae forming on lowest boards of North elevation where water drops from the roof are splashing up from metal ledge.
- Significant surface shakes and early wood erosion.
- Quite significant wasp attack.
KEY FINDINGS FROM THE PAST 12 YEARS (4/5)

The ThermoWood Cladding project - BRE, UK – dimensional stability
Maximum cupping over 48 months of coated and uncoated cladding

CUPPING

Age, month

0 0,5 1 1,5 2 2,5 3 3,5 4 4,5

WRC TW Pine TW Spruce Spruce Zu Azole Pine
KEY FINDINGS FROM THE PAST 12 YEARS (5/5)

ThermoWood creates a good living environment

- Warm surface
- Smooth feel
- Low emissions
- Nice appearance

The Finnish emission classification of building materials (product age 28 d)

TVOC EMISSIONS OF ThermoWood

- M1
- M2
- M3

The Finnish emission classification of building materials (product age 28 d)
WHERE TO FOCUS DEVELOPMENT IN THE FUTURE (1/3)

Enhancing superior properties

- Thermal performance
- High stability
- Biological durability
- Appearance & well being

Thermal Conductivity

<table>
<thead>
<tr>
<th>Material</th>
<th>Thermal Conductivity (W/mK)</th>
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<tbody>
<tr>
<td>Pine</td>
<td>0.12</td>
</tr>
<tr>
<td>Spruce</td>
<td>0.12</td>
</tr>
<tr>
<td>Sawdust, Spruce</td>
<td>0.12</td>
</tr>
<tr>
<td>TMT Pine</td>
<td>0.08</td>
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<tr>
<td>TMT Spruce</td>
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<tr>
<td>TMT Sawdust, Spruce</td>
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<tr>
<td>Insulating wool</td>
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<tr>
<td>Polystyrene</td>
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</table>
WHERE TO FOCUS DEVELOPMENT IN THE FUTURE (2/3)

Improving technical surface performance

- Improvement of surface durability & performance

- On micro level it would appear that there is still significant dimensional movement which causes surface checks

- Softness of fibre leads to rapid erosion of early wood – how to improve this?

- How to reduce surface cracking, erosion, to greatly extend the maintenance free period?

- The problems of regular maintenance and surface deterioration are common for all timber cladding – we need to lengthen the maintenance intervals
WHERE TO FOCUS DEVELOPMENT IN THE FUTURE (3/3)

New End use development

- High insulation windows and doors
- ThermoWood fibre as insulation material
- Timber conservatories / winter gardens
- Glue laminated products for furniture
- Recreational structures
- Treatment of alternative wood species
CONCLUSIONS AND NEXT STEPS

Products and Properties

- Biological durability in UC 3 applications is well proven
- Overall dimensional stability very good
- Micro surface performance needs improvement
- Need to exploit other properties such as insulation properties
- Need to widen applications in suitable end uses

The ThermoWood® business environment

- Continuation of development of ITWA very important – leading to further
- Globalisation of the production and sales
- Further strengthening of the widely registered ThermoWood® brand & trademark
- ThermoWood® has clearly established its position as a leading modification business
Thank you for your attention!