Protection of continuous (wood board) presses with low-pressure water mist
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Application

- Particle boards are used a lot in many kinds of constructions.
- The process is to “glue” and press particles (e.g., wood chip) to boards that are having different material properties in terms of weight, stiffness, strength, hardness, color, etc.
- Large production machines (continuous production)

1. Raw material prepared
2. Converted into particles
3. Particles dried
4. Particles classified
5. Blended with a resin and additives
6. Particles/resin/additives blend (“binder”) is formed into a mattress
7. Hot pressed to compact the particles together
8. Cooled and finished

Background

- Continuous presses create special hazards:
  - Hot surfaces
  - Hydraulics
  - Combustible material:
    - Chip size varies from larger to almost dust kind
    - Resin has combustible components
    - Used additives can be combustible (or fire retardant)
Project

- Project initiated by (an) earlier fire(s) within wood industry
- IFAB’s tasks:
  - development of a fire test protocol (together) with VdS for representative test scenarios
  - in order to test suitably a low-pressure water mist system protection
- Manufacturer of the low-pressure water mist system had previous special knowledge using water mist systems mainly for spark extinguishing systems to prevent dust explosions

Main design aspects

- Replicate the possible fire scenarios in the respective machine
- 4 different test structures
- Various fire scenarios (8)
- Fire loads at various positions
- Repetition of (successful) tests
- Free Burning (proof of sufficient fuel amount)
- Acceptance criteria:
  - Extinguishment within 15min
  - All temperatures below 100°C after 3 min of activation
  - Fuel for minimum 15min
Water mist system

- Nozzle lay-out, type and flow rates are the property of the manufacturer
- Operating pressure under 10 bar
- Pure water without additives
- An integrated technology together with special detectors

Fire Scenarios

1. Drip Tray
   - 2000 x 800 x 800mm
   - two different distances between nozzle and fire load
   - pool:
     - 1.6m²
     - 15l heating oil on 60l wood chips
   - spraying obstacle
Fire Scenarios

2. Upper & Lower Heated Tunnel
   - 2500 x 2200 x 2000mm
   - three-part pool:
     • 4.8m²
     • 40l heating oil on
       200l wood chips
   - spraying obstacle

3. Press Inlet & Outlet
   - 1250 x 2200 x 2000mm
   - two different distances between
     nozzles and fire load
   - one pool:
     • 2.4m²
     • 20l heating oil on
       100l wood chips
   - spraying obstacle
Fire Scenarios

4. Middle of the Press
   - 4000 x 1000 x 600mm
   - different nozzle layouts
   - five pools:
     • 2,3m² plus two oil soaked mats
       (vertical, 0,25m² each)
   - spraying obstacle

Measurements

• Temperatures
• System pressures
• Oxygen concentration
• Visual recordings

• Accredited laboratory (processes)
• VdS
Testing

- 12 tests (incl. repetition)
- Free burn test
Results

- free burning proof of sufficient amount of fuel (>15min burning duration)

Results

- Typical result
Summary

- Continuous presses for particle boards create special hazards in wood industry
- Need to protect wood presses results from earlier fires within wood industry
- IFAB developed a fire test protocol
- Different geometries, fire hazards and potential layouts of water mist systems were considered

Tests were made in close cooperation with VdS and provider of mist systems, originally applied on spark extinguishment
- Low pressure water mist system was developed that all design fires could be extinguished within 15min
- Temperatures were reduced quickly (<3min) and kept permanently below 100°C
- No re-ignition
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