

WBC RESEARCH THEMES

A. Improved Performance and Functionality

Successful research projects will address the fundamental study of product functionality, improved short or long-term performance and evaluation methods. Projects focus on specific products or assembled systems.

1. Improved Performance and Durability	<ul style="list-style-type: none"> a. Strength, stiffness, and creep response b. Dimensional stability c. Mold/fungus resistance d. Insect resistance e. Moisture resistance f. Fire performance g. Thermal resistance h. Under extreme conditions i. Natural Disasters j. Full-scale weathering
2. Functionality	<ul style="list-style-type: none"> a. Energy efficiency b. Insulation c. Electrical conductivity d. Thermal conductivity e. Gas barrier f. Fire resistance g. Products that serve more than one function h. Fasteners and connections
3. Performance Evaluation	<ul style="list-style-type: none"> a. Examination of failure mechanisms b. Improved test methods c. Evaluating energy efficiency of products or assemblies d. Improved understanding of filler properties and resin/filler interactions e. Investigating alternatives for the IB test
4. Newly-developed products associated with coatings, treatments, insulation, etc.	

B. Alternate Materials Technology

Successful research projects will address the use of non-traditional materials or combinations of materials to produce wood-based composites. Use of alternate technologies may establish the viability of alternate raw materials for improved product performance and/or lower costs. Outcomes of research for this theme will support individual member efforts to improve existing products, develop new products, or identify new markets.

1. Raw Materials	<ul style="list-style-type: none"> a. Increased use of (high-density) hardwood species, especially beech in Germany b. Combining wood with other lignocellulosic and non-lignocellulosic materials c. Addition of high performance materials for special applications (example: use of carbon fibers in bridges or other structures) d. Materials with low/no formaldehyde emissions e. Lignin-based byproducts f. Alternative feedstock for use in existing products g. Non-petroleum chemical feedstock h. Non-organic binders
2. Sourcing	<ul style="list-style-type: none"> a. Regional differences in lignocellulosic supplies b. Input streams that do not compete with traditional wood composites
3. New Market Development	<ul style="list-style-type: none"> a. Substitution of wood-based materials into traditionally non-wood markets b. Evaluating new materials that have lower embodied energy (the sum of the energy required to produce the material) than traditional wood composites c. Markets that extend beyond North America d. Natural fiber insulation materials

C. Adhesive Technology

Research focused on adhesives and adhesion is a mainstay of the WBC research agenda. This research theme focuses on understanding the interaction between wood and adhesives as well as fundamental knowledge that can support member efforts to develop new and improved resins or products.

1. Wood-Adhesive Interaction	<ul style="list-style-type: none"> a. Mechanisms of adhesive transport across and into wood b. Adhesive distribution and penetration c. In the presence of surface modification d. Wood/adhesive chemistry e. Thermoset and thermoplastic adhesive systems
2. Novel Adhesive Technology	<ul style="list-style-type: none"> a. In response to potential future regulations or industry trends b. Adhesion in aggressive environments (high temperature, humidity, salt, etc.) c. Investigating the effects of fillers on adhesive performance d. Fundamentals of bonding chemically or physically modified wood e. Novel or improved adhesive application methods f. Expanded functionality of adhesive systems
3. Performance	<ul style="list-style-type: none"> a. Methods for evaluating the adhesive bond b. Assessment techniques for long-term durability c. Novel analyses of bondline response to extreme treatments

D. Impact of Process

Portions of the manufacturing process can adversely affect wood quality and adhesive performance. The complexities of mechanical processing, moisture in wood, and pressing must be better understood to help manufacturers balance productivity and quality. Areas that could benefit from fundamental study include:

1. Moisture	<ul style="list-style-type: none"> a. Impact of wood moisture levels on adhesive bonding and performance b. Influence of steam on pressing and product properties c. Influence of changing furnish moisture content on pressing and product properties
2. Hot Pressing	<ul style="list-style-type: none"> a. Effect on press time and temperature on wood degradation b. Understanding the complex interaction of press temperature and time on adhesive cure, properties and product performance
3. Emissions	<ul style="list-style-type: none"> a. Process modifications to reduce formaldehyde emissions b. Methods for reducing post-manufacture formaldehyde emissions
<ul style="list-style-type: none"> 4. More efficient use of key raw materials 5. Novel process methodologies 6. Effect of refining technologies on fiber properties 7. Impact of resin blending technology on adhesive consumption and product performance 8. Influence of temperature and time during processing on adhesive bond performance 9. Effect of processing parameters on wood viscoelasticity 10. Reduced energy input into manufacturing of wood-based composites 11. Dynamics of the extrusion process 	