



BAKELITE
SYNTHETICS

Wood Adhesives

Products and Services for the Wood Products Industry

For over 60 years Bakelite Synthetics has supplied thermosetting resins to manufacturers throughout the wood products industry. Our longstanding success rests on our reliability, consistent quality products, technical expertise, and our commitment to offering solutions. As a result of our focus on value creation and knowledge of the industry, we continue to provide innovative products and services that help meet the new challenges facing our customers.

Our extensive portfolio of adhesives includes products for wood applications including particleboard, medium density fiberboard (MDF), hardboard, structural panels, plywood, oriented strand board (OSB) and laminated veneer lumber (LVL). Beyond our resin and adhesive product portfolio, we offer services and products to help our customers' plants optimize production and address the needs of emissions testing.

A Leader in Sustainability Solutions

Bakelite Synthetics products aid our customers in addressing many emission certification programs related to ultra-low-emitting formaldehyde (ULEF) and no added urea-formaldehyde resins (NAUF) standards including:

- the EPA Toxic Substances Control Act Formaldehyde Emission Standards for Composite Wood Products (EPA TSCA Title VI)
- the California Air Resources Board (CARB) Airborne Toxic Control Measure (ATCM).

Specifically, LEAF® C2 resin and other Bakelite® resins and scavengers are designed as ultra low-emitting formaldehyde-based resins for MDF and composite panels. This portfolio of solutions can contribute

toward Leadership in Energy and Environmental Design (LEED®) and LEED® v4.1 credits. These Bakelite Chemicals products can also help meet other green building requirements such as GREEN GLOBES® and the National Green Building Standard™ of the National Association of Home Builders.

These products may be melamine-urea-formaldehyde (MUF), Melamin-Formaldehyde (MF), or phenol-formaldehyde (PF) based.

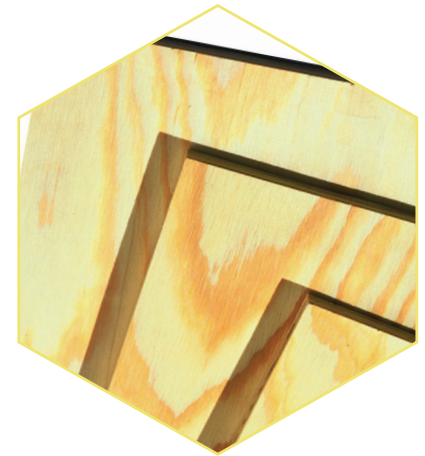
Other Bakelite Synthetics products are used in wood structural panels manufactured according to PS 1-09 or PS 2-10 (or by CARB-considered equivalent standards) and labeled bond classification Exposure 1 or Exterior. Bakelite Synthetics also has materials used in structural wood products manufactured according to ASTM D 5456 (for structural composite lumber), ANSI A190.1 (for glued laminated timber), ASTM D 5055 (for I-joists), ANSI PRG 320 (for cross-laminated timber), or PS 20-15 (for finger-jointed lumber).



Plywood Resins

RESI-BOND® Ultra and RESI-MIX® Ultra adhesives provide the flexibility to glue veneers with a wide range of moisture content without sacrificing performance, resulting in less waste from rejects. When veneer moisture sorts are strategically located in panel lay-ups, pocket moisture ranges of 2%-30% can be used effectively.

RESI-MIX® ready-for-use adhesives combine neat liquid PF resins with extenders and fillers. These adhesive systems work across a broad range of veneer moisture and assembly conditions and can be customized to meet product requirements and mill conditions. Bakelite Synthetics provides RESI-BOND® PF resins as a neat liquid for mills that prefer in-plant mixing.



LVL Adhesives

Bakelite Synthetics produces RESI-MIX® ready-to-use mixed adhesives specifically formulated for LVL. Products certified to comply with ASTM D2559, ASTM D7247 and CSA 0112.6/0112.9 are available as well as adhesive systems possessing fast tack development

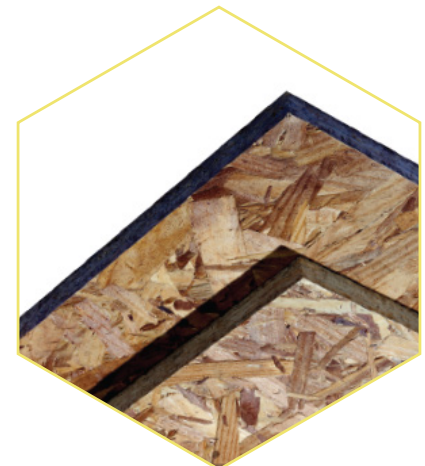
for LVL layup lines that employ a prepress operation. These PFbased adhesives can be custom-formulated to meet challenging mill conditions. They perform in a broad range of processing and hot-pressing conditions, including batch and continuous pressing operations; conventional hot presses and RF heating; and lay-up lines with and without pre-heaters.



OSB Resins

Whether a manufacturer is producing value-added OSB or commodity grades, Bakelite Synthetics has proven adhesive solutions. RESI-STRAN® liquid PF adhesives are available in face and core resin formulations and can be customized for resin cure speed in both multi- and single-opening presses. WOODWELD® powder PF resins are offered in both face

and core formulations and typically allow for lower resin application rates. Our PF-based adhesive combination system, which can be tailored to individual mills, provides the flexibility for more efficient application. This system helps reduce the moisture content going into the press and can eliminate the need for release agents, affording customers alternatives to pMDI in the surface layer. The use of this system has resulted in substantial cost savings for our customers.



RESI-BOOST® Gen2 Technology

Much more than a second generation of our original RESI-BOOST® adhesive, RESI-BOOST® Gen2 helps reduce costs and increase throughput while retaining bond quality. Trials show significant advantages in increased throughput, lower glue application rates, and contributions to energy savings while maintaining performance. As a result, RESI-BOOST® Gen2 can potentially save or generate millions of dollars per mill. Our customers have achieved a 17% decrease in cycle time without increasing press temperatures and resin usage reductions of 12% over conventional resins, while maintaining effective bond strength.

Like original patented RESI-BOOST® adhesive, RESI-BOOST® Gen2 reduces the threat of overpenetration of the adhesive, leaving more resin solids on the surface, enabling lower glue application rates, lower glue usage and lower glue cost. Wood failures increase, providing the potential for downfall improvements. RESI-BOOST® Gen2 exhibits more resistance to dry out and increased timeout, meaning it lasts longer before pressing.

We can't promise these results for every mill, every mill is different. However, trials with multiple mills have shown that the addition of RESI-BOOST® Gen2 to their adhesive can significantly improve a mill's operation and reduce costs.



Beyond Adhesives – Services from Bakelite

We go beyond providing quality adhesive products. We have the hands-on expertise to help our customers optimize productivity.

Customer Inventory Tracking and Prediction (CIT) is a technology solution that predicts resin usage to optimize plant operations. CIT utilizes a mill's new or existing digital level monitoring of its resin tanks and transforms the data, based on that mill's unique operations, into a dashboard to be used to optimize order profiles. Based on the previous two-week usage or as recent as one-hour usage, the system can recommend canceling, moving, or placing additional orders - predicting resin usage 12 days or beyond, as needed for optimal efficiency. Optional features of CIT include email alerts for order cancellation, tank cycling, projected inventory going below minimum or to zero, or a bad tank sensor. The service can help a plant to reduce working capital, downtime, quality issues related to tank rotation, and costs related to rushed and/or canceled orders.

Bakelite **Process Modeling**, real-time statistical modeling of process parameters, can identify opportunities for improvement and variation-reduction. Bakelite Process Modeling can drive improved throughput, substantial savings in raw materials, greater troubleshooting efficiency, "what-if" modeling of proposed parameter changes, and improved data capture for benchmarking and decision-making.

Dynamic Microchamber (DMC) for wood panel emissions testing. The DMC correlates to the Large-Scale Chamber Test method (ASTM E1333) and the Small-Scale Chamber Test (ASTM D6007-14). This computer-integrated formaldehyde test system is approved by CARB and the U.S. EPA as an alternative small-scale test method for conducting quality control testing of formaldehyde emissions. The majority of the Composite Panel Association's qualified producers utilize the DMC as their primary testing method. Continuous enhancements of the DMC have kept up with the need to test emissions from ULEF resins. Bakelite Synthetics is the exclusive technical service provider for the DMC. Our service program includes calibrations, upgrades, repair service, training, and parts. These services can be accessed at www.bakelite.com



Next Generation Synthetics



Learn more about the vision, products and history of bakelite on our website

bakelite.com

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