



New Primer Improves Adhesive Bonds

The Forest Products Laboratory has developed a new primer that improves the bond performance of resorcinol-based adhesives used to glue wood to plastic laminates or preservative-treated timbers. This primer, hydroxymethylated resorcinol (HMR), also helps enhance the bonding durability of other adhesives, such as one-part polyurethane resins and epoxies, to wood.

Traditional resorcinol-based adhesives used to manufacture structural glued-laminated timber (glulam) do not work well for more challenging applications where strong, durable bonds to wood are needed. These applications include bonding wood to

- fiber-reinforced plastic surface laminates to create stronger, less-massive beams for timber bridges and
- Southern Pine timber used for bridges and other structures that has been treated with preservatives, such as chromated copper arsenate (CCA).

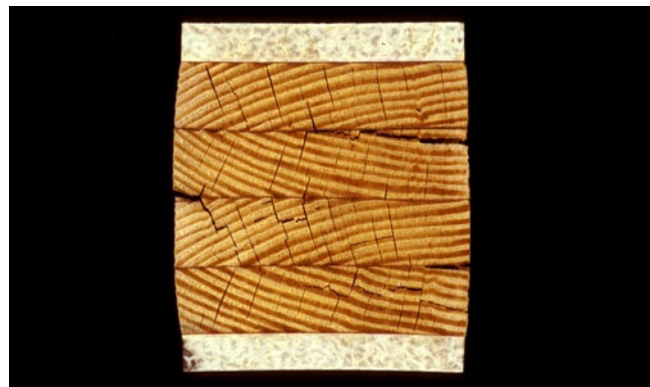
Earlier HMR formulations were effective but had short storage and pot lives. Batches had to be used 4 to 8 hours after mixing. The new, improved formulation, however, allows partial reaction and then unlimited shelf life. When activated, the primer can be applied either immediately or within about 7 hours of activation, with durability-promoting abilities equal to the original formulation. Once primed, the wood forms strong bonds even if bonded days later.

Research results demonstrate that the bonds formed between wood primed with HMR and fiber-reinforced plastic surface laminates meet laboratory-modified procedures set by the American Society of Testing and Materials for wood beams exposed to exterior (wet-use) conditions. Results also showed that, in some cases, these bonds were stronger than the wood itself—the bulk wood failed during testing while the HMR-primed adhesive bond held (see photo).

The capability of using HMR to bond wood to plastics and timber treated with preservatives presents an opportunity for making strong and durable engineered wood composites. Currently, researchers at the University of Maine are using HMR to construct beams for engineering studies.



Glulam beams supporting the deck of a wooden bridge.



End view after testing of engineered beam with fiber-reinforced plastic laminate glued to HMR-primed wood surface.

References

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Christiansen, A.W.; Vick, C.B.; Okkonen, E.A. 2000. A novolak-based hydroxymethylated resorcinol coupling agent for wood bonding. *In: Proceedings, Wood adhesives 2000; 2000 June 22–23; South Lake Tahoe, NV: Forest Products Society: 245–250.*

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