

# LAMINATED ROOF SYSTEMS:

## "BACK TO THE FUTURE"

BY PHILLIP GEORGEAU

**T**wenty-first-century roofing contractors are facing issues never before encountered by previous generations. They are caught at the intersection of many antagonistic forces caused by climate change, new regulatory compliance, new building envelope requirements, and spiraling petroleum prices.

Contractors have somehow survived the asbestos abatement crisis and the asphalt vapor and coal tar issues. Now they are coping with "Proposition 65," cool building requirements, and hurricane wind mitigation issues.

Soon, contractors will be facing new OTC constraints placed on solvent-release adhesives, primers, and contact cements used in cold-process mod-bit and fully adhered single-ply roofing. OTC stands for the Ozone Transport Commission, which was authorized by the EPA to regulate air quality in several east-



*Photo 1 – High-solids, low-VOC, sheet-bonding adhesives can be applied easily with inexpensive equipment and minimal environmental impact.*

ern states. These new regulations would restrict the use of solvents in most con-

struction adhesives to less than 200 grams per liter. The OTC rules on consumer items have already been adopted by Michigan. After conferences this summer with several Great Lakes states, the OTC will likely put these rules into effect for professional-grade products, as well. A change to a more liberal government this year may quickly drive the OTC constraints to a national level.

Adhesives are an essential element in roof construction, but green construction issues are frequently in conflict with the realities faced by contractors.

Prior to 1952, roofs on steel decks were fully adhered, "laminated" systems. The adhesives used were basically hot-melt



*Photo 2 – Sheet-bonding adhesives can provide superior performance to mechanical fasteners while maintaining roof membrane integrity.*



*Photo 3 – New thermosetting foam and moisture-cure adhesives have been developed that will char before they melt, solving the fire-hazard problem.*

asphalt or “thermoplastic” systems. When GM’s Willow Run transmission plant burned down, the thermoplastic adhesives (asphalt) melted and ran down into the plant, causing a rain of fire throughout the building and shutting down GM’s transmission production for months. Insurance companies paid dearly, and to this day, Factory Mutual will not endorse the use of any adhesives to bond insulation to steel decks.

Out of this one fire, a huge roofing fastener industry developed. As a result, wind-uplift performance became totally dependent on the number of screws used between the insulation and the deck. As wind-uplift requirements increased, the number of screws installed per square increased. (Imagine building a modern airplane wing with similar requirements.) Contrary to Factory Mutual’s devout beliefs, a screw cannot be placed at every point of contact in a low-slope roof.

New thermosetting foam and moisture-cure adhesives have been developed that will char before they melt, thus eliminating the Willow Run rain-of-fire phenomenon. These adhesives are environmentally and OTC compliant and are actually less labor intensive than the new FM screw placement requirements. Thermosetting adhesives and a minimal screw pattern can achieve wind-uplift performance of more than 200 pounds per square foot.

In response to hot-kettle and carcinogenic asphalt-vapor concerns, the industry introduced solvent-based asphalt adhesives. These typically contained 45% solvent and released

about one gallon of petroleum distillates into the atmosphere per square. The new OTC rule will force a reduction in solvent to less than 20%. This alteration will increase viscosities and change the application properties of solvent-release adhesives in cold weather. These are still thermoplastic adhesives, and they can melt in fire conditions and “creep” or become displaced when bituminous membranes shrink.

New thermosetting adhesives that contain no solvents are entering the market. They don’t



*Photo 4 – New thermosetting foam and moisture-cure adhesives can make the roof safer while providing superior wind uplift performance compared to mechanical fasteners.*

# OPINION




melt or creep at elevated temperatures; and, because of their high solids and elastomeric properties, these adhesives add about 25 mils of rubber between mod-bit cap and base sheets, forming a durable, four-ply, waterproof system.

The same adhesives can be used to laminate SecureRock®, Dens-Deck®, or other recover board to an iso-board or EPS-insulated deck. Upon these solid surfaces, mod-bit and many forms of single-ply roofing, including EPDM, can be fully adhered with new thermosetting moisture-cure adhesives.

The use of this new family of reactive thermosetting adhesives would resolve environmental and OSHA issues once and for all. Wind uplift and other durability requirements would also be significantly improved!

The use of new adhesive technology will bring our industry back to the realm of lam-

inated roof concepts that existed prior to the Willow Run fire. These would be stronger, more resilient, and waterproof roofs constructed with minimal mechanical attachment. If Willow Run had been constructed with thermosetting adhesives in 1952, Factory Mutual would be listing

adhesive-attached insulation and laminated roofs in 2008. By specifying laminated roof systems built with thermosetting adhesives, the engineers at Factory Mutual would be going “back to the future.” 

## Phil Georgeau

Phil Georgeau has been an industrial chemist for nearly 40 years. He is currently president and principal shareholder of Chem Link Inc. His industry experience began as a product development engineer with U.S. Plywood in its Weldwood Chemicals Division. He has continued in this field, with an emphasis on construction adhesives and sealants, at St. Clair Rubber, Contech-Sonneborn, Megaloid Chemical, Imperial Adhesives, and Chem Link. Georgeau holds six patents in the area of adhesives, sealants, and construction materials, including two patents for ChemCurb penetration seals.

