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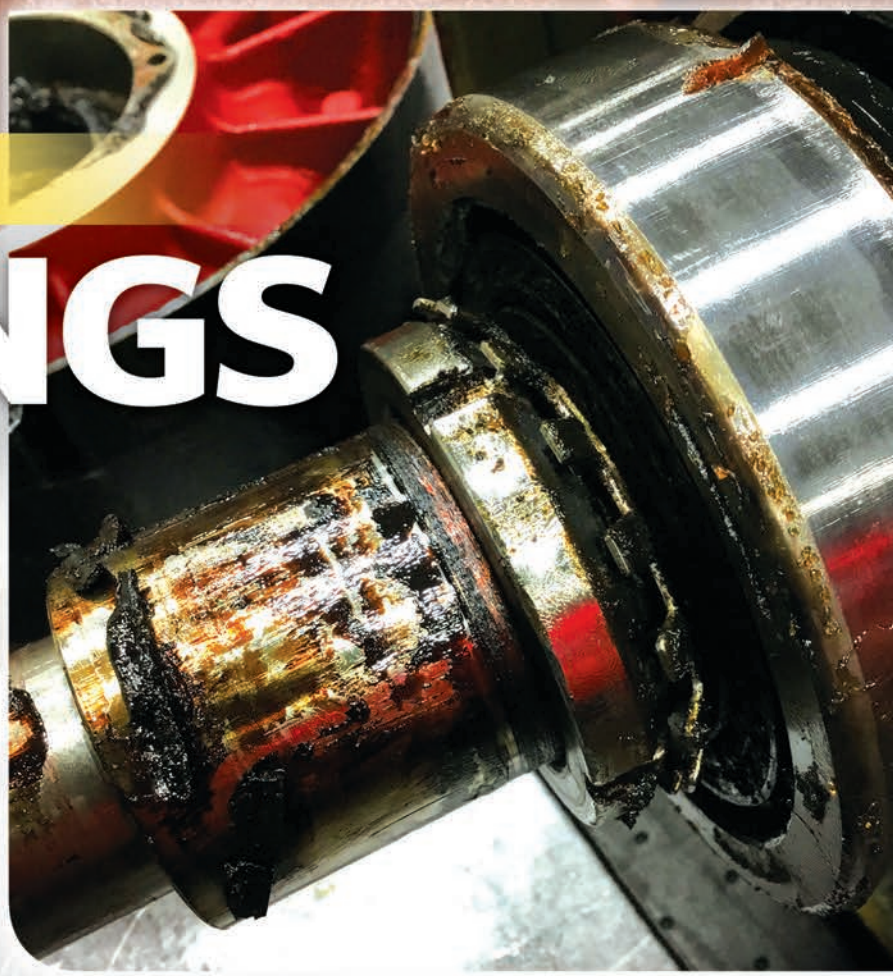

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By Stephen J. Knauth, *HMT Manufacturing*

Mixer keeps hot-melt adhesives cool

Hot-melt adhesives are **environmentally friendly** compared to the alternatives

North Chicago, IL-based HMT Manufacturing produces hot-melt adhesives and laminating systems that join almost any material, such as fabric, wood, melamine, foil and cork, to virtually any substrate, including plywood, polystyrene, rubber, steel and foam. Customers range from makers of building materials and recreational vehicles to woodworkers and retailers.

Most of HMT's adhesives are cast as films, which the customer places on the substrate and then covers with the laminate. HMT's Advantage Laminating System then applies infrared heat to melt the adhesive immediately before the materials pass between rollers that compress them. With no cure time required, the composite can be cut or machined immediately, maximizing productivity.

The company blends heat-sensitive hot melt adhesive ingredients using a rotary batch mixer that imparts no shear or heat into the material and produces uniform blends quickly, while requiring minimal maintenance.

The making of hot melt adhesives

HMT first blends the ingredients, primarily pellets of hydrocarbon resins and polyethylene waxes, as well as a mineral-based powder filler, a job handled since 1994 by a model 700-TS-40-MS rotary batch mixer from Munson Machinery. Its horizontal vessel rotates on external trunnion rings located at each end, eliminating the need for an internal shaft and precluding material contact with bearings and seals.

Proprietary mixing flights (also called lifters or baffles) within the vessel create a gentle four-way tumble-turn-cut-fold mixing action that creates uniform blends with no segregation or heat generation.

"It doesn't hurt our material or overheat it, which is important to us. I've checked the temperature of the material going in and coming out, and it's always the same," said Glen Bennett, HMT plant manager.

IN THE MIXING ROOM a rotary batch mixer distributes resins, waxes and fillers uniformly in 1,000 lb. batches. Courtesy Munson Machinery

CLEAN-OUT DOORS allow unrestricted access to the mixer interior. The horizontal vessel rotates on external trunnion rings located at each end, with no internal shaft or bearings contacting material. Courtesy Munson Machinery

HMT MANUFACTURING'S hot-melt adhesives are cast as films for laminating virtually any material to almost any substrate. Courtesy Munson Machinery

The mixer, which has a useable batch capacity of 40 cubic feet, operates in a dedicated room that also houses a belt conveyor, bag breaking station and screw conveyor. Here, an operator transfers 55 lb. bags of ingredients from pallets to the belt conveyor, which terminates at a bag dump station into which material is dumped. An integral screw conveyor transfers the material into the inlet of the mixer while it is rotating. Once the last bag is added, the mixer continues running for 20 minutes.

"Some batches are actually done in about five or 10 minutes, but we find that 20 minutes is ideal for all our formulas," Bennett said. "It's also a comfortable speed for the operator." When necessary, minor ingredients can be added manually through a side door.

At the end of the cycle, the operator flips a switch, actuating an air cylinder that opens the mixer's stationary outlet. With the vessel continuing to rotate, the 1,000 lb. batch discharges through a collapsible chute into a mobile bin. Dust collection pickups are located at the mixer's outlet, at the screw conveyor's discharge, and at the bag breaking station. The mixer itself operates dust-tight with a single radial seal preventing dust leakage.

THE MIXER discharges uniformly blended product into a mobile bin, which is wheeled to low-pressure extruders and the hot-melt casting process. Dust is collected during discharge. Courtesy Munson Machinery

Once filled, the bin is wheeled to low-pressure extruders, which feed the mixture into the hot melt film-casting process. HMT has eight standard formulas, each with six or seven ingredients. The plant averages six batches a day.

Although some ingredients are slightly sticky, the mixer empties itself completely, and no cleaning is required between batches, Bennett says. "It stays remarkably clean inside. After some 40,000 batches over 27 years, you'd think we would see buildup, but there's virtually nothing. That's a big plus when switching from formula to formula to formula all day long. I don't have to worry about contamination."

Bennett has not detected any wear inside the mixer from the abrasive mineral-based filler, although dust has prompted the company to make two repairs. The first was replacing the packing seal at the mixer's inlet where the screw conveyor discharges. "It wasn't affecting the performance, but it allowed dust to drift," Bennett says. The second was replacing the air cylinder that opens the discharge gate after the seals wore out from contact with the abrasive dust.

"All the bearings are original. We lube them a couple times a year, and the drive chain," Bennett said. The company also added a vacuum to remove dust from the mixer instead of just blowing it off.

A 'green' alternative

HMT's hot-melt adhesives are also environmentally friendly compared to the alternatives, such as white glue and contact sprays. "White glue is inexpensive, but it's messy and involves a lot of wastewater," says Bennett. Contact sprays, he added, involve unpleasant fumes and wasteful overspray. In contrast, hot-melt films are 100% solid adhesive, so there is little waste and no cleanup.

HMT powers its entire operation using on-site solar panels and wind turbines so another advantage has been the mixer's low energy consumption per amount of material blended. "We've been green for 35 years, and that's become a big factor in the building industry," Bennett said.

"There is not a batch in the last 27 years that hasn't gone through that Munson mixer," Bennett said. "It's built for heavy-duty work. The longevity has more than surpassed our expectations."

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