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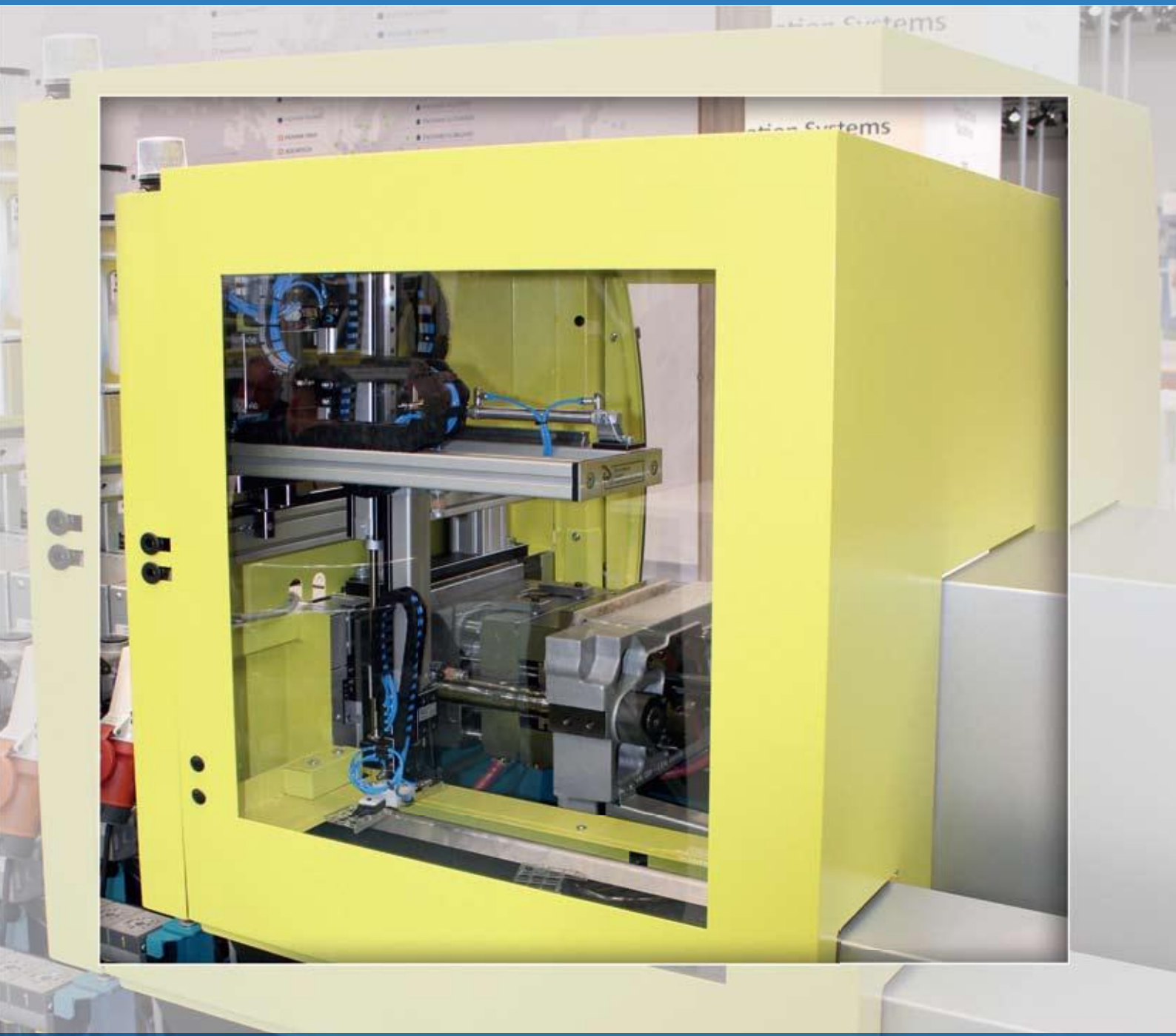

Photos source: RAPP ADVERTISING, INC.

Five minute blending of compounds going on four decades

Continuous rotation of mixer drum during discharge prevents stratification of ingredients having disparate sizes, shapes and bulk densities, and empties the batch rapidly in a steady stream.

Plastics Engineering Company manufactures a wide range of custom-formulated moulding compounds and industrial resins. A big share of its production is dedicated to novolac and resol thermoset moulding compounds — also known as phenolic resins — which it sells under the PLENCO trademark. These resins are highly adaptable and used across many applications. As a result, the company tailors its products to each customer's requirements. That could entail adjusting the molecular weight, moisture content, viscosity, pH, particle size, reactivity and other properties.

Immediately prior to packaging, the resins are blended with reinforcements, minerals, fillers and/or liquid additives, a task performed by two model 700-TSC-180-MS Rotary Batch Mixers which have been in service since 1983.

Five-minute tumbling prevents degradation

The mixers have no agitators, internal shafts or related bearings or seals. Instead, a horizontally oriented vessel rotates on external trunnion rings located at each end. Ingredients flow into the vessel through a stationary inlet at one end and discharge through a stationary outlet at the other. Within the vessel are mixing flights, also called baffles or lifters, which create a gentle four-way tumble-turn-cut-fold mixing action that produces on-spec blends in 3 to 5 minutes. Randy Block, a mechanical engineer at Plastics Engineering, says, "We get a good, thorough blend without degrading the product."

To fill the vessels, a pneumatic conveyor transports resins from compounding units to a holding hopper, which also separates out dust. When enough material accumulates in the hopper, it is discharged to one of the mixers as it slowly rotates.

After the mixer receives a dose of powdered additives from a loss-of-weight hopper above, a valve stops the flow and the mixer makes a pre-set number of revolutions. When called for, liquid additions are pumped through spray nozzles onto a wide bed of moving material within the mixing vessel. At the end of the batch cycle, the mixer's discharge gate opens while the vessel is still rotating. This allows the mixing baffles to guide the batch toward and through the discharge gate with little or no residual. "They do a good job of moving the material quickly and efficiently," Block says. "If we've got a straight dry material, there isn't much to clean out."

The gentle mixing action is critical, Block says, because it preserves product quality. "We get a good thorough blend but we don't degrade the product. If we used a typical paddle mixer, we would grind the granules against each other and create dust. That doesn't happen here." Continuous rotation of the drum during discharge prevents stratification of ingredients having disparate sizes, shapes and bulk densities, and empties the batch rapidly in a steady stream. "That's important because it minimises wait times at the packing stations," Block says. "Because of that quick discharge, we are more efficient when packing bulk containers."

Continuous rotation of the drum during discharge prevents stratification of ingredients having disparate sizes, shapes and bulk densities, and empties the batch in a steady stream

"We've made the same product as a 2,268 kg order and as a113,398 kg order," Block says. "And blending is just as uniform on short runs as it is across larger ones," Block says.

The hinged access doors at either side of the vessel provide access to all material contact surfaces for cleaning and visual inspection

The mixing flights also create a dynamic bed of material, ideal for incorporating liquid additions. "We get a good consistent dispersion. The product doesn't get too wet in some parts and less wet in other parts," Block says. "A typical paddle mixer would give us a less even coating."

Since their installation in 1983, the mixers have rarely been idle. Over the last 12 years, one mixer has had 34 hours of downtime and the other just 4.5 hours.

"The longevity of the machines is a testament to my predecessors, who selected them," says Block. "We've been pleased with the lack of downtime and maintenance costs. They're quality pieces of equipment and just plain reliable." smi

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