

Consistent Volatile Removal Yields Better Extruded Sheet

Vacuum venting is used on many sheet extruders to draw off residual monomers, other volatile organic compounds, and moisture. Most use the same kind of low-cost, tried-and-true style of vacuum pumps. But when those standard pumps weren't doing a reliable job, one processor decided it was worth upgrading to more advanced technology.

Food packaging producer Central Fine Pack Inc., Fort Wayne, Ind., can't afford mistakes when it comes to making sheet product with consistent appearance and mechanical properties. This extruder and thermoformer of polypropylene and polystyrene food-service items like deli containers, trays, plates, bowls, and lids needs vacuum venting to remove volatile processing additives that it compounds into PP. Otherwise, the vapors might oxidize the sheet and cause a visibly rough surface, as well as weaken the impact strength of the sheet, says production manager Russ Stephens. The company also uses vacuum venting to remove blowing agents when repelletizing PS foam for incorporation into foam sheet.

Central Fine Pack switched to a more advanced type of vacuum pump well known by resin suppliers but rare in sheet extrusion because of its higher cost, says Scott Livingston, application engineering manager for vacuum-pump maker Busch, Inc., Virginia Beach, Va. For Central Fine Pack, the investment was justified by savings in downtime and scrap and by avoiding the environmental costs incurred with older vacuum technology.

A WORKHORSE TURNS FICKLE

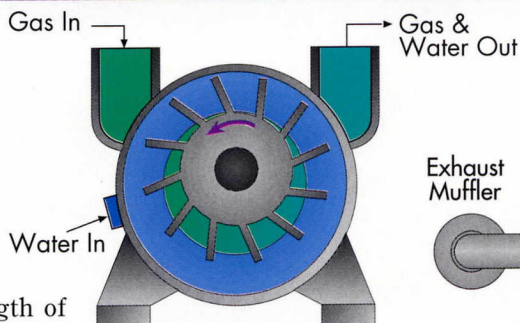
Like most sheet producers, Central Fine Pack had been using traditional liquid-ring vacuum pumps to vent each of its nine extruders. Liquid-ring pumps draw the process gases

into a compression chamber partly filled with water. The pump ejects a mixture of process vapors and water. This contaminated waste water must then be treated and disposed of, which can be time consuming and expensive.

The problem with the liquid-ring pumps was constant vacuum fluctuations that were affecting product quality, Stephens says. The company had been using a water skimmer to pull out as much of the contaminants as possible from the waste water before it was recycled to the vacuum pumps. But if any volatiles remained in the

vacuum seal and reduces friction between the pump wall and rotating vanes. The vanes continuously slide on the oil film, which is discharged with the process vapors into an exhaust mist eliminator. A solvent is periodically injected into the pump cavity to remove any solid contaminants that may have

CONVENTIONAL LIQUID-RING VACUUM PUMP

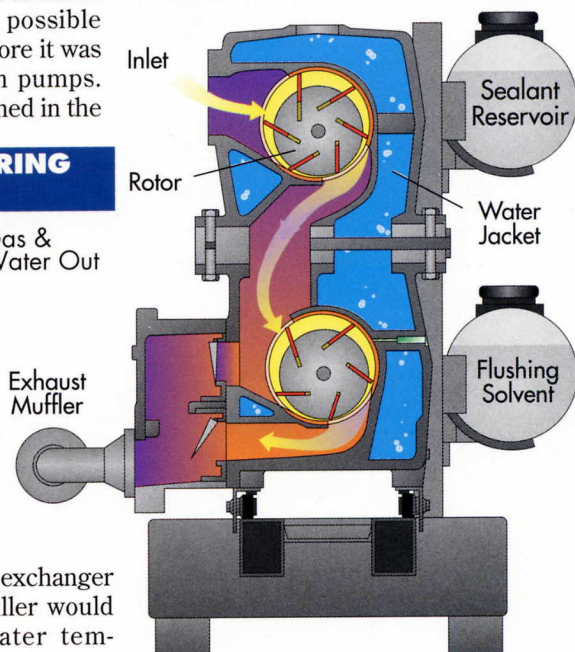


recycled water, the heat exchanger in the pump's water chiller would plug up. A rise in water temperature caused evaporation that reduced the pump's capacity and produced inconsistent vacuum levels. The result was inconsistent sheet product, scrap, and downtime.

To eliminate these problems, Central Fine Pack replaced its nine liquid-ring vacuum pumps with three Busch Huckepack model 441-014 once-through-sealing (OTS) pumps. The vacuum of these pumps is rated at 29.9 in. Hg, versus 24-28 in. Hg for the liquid-ring pumps, Livingston notes.

OTS pumps eliminate water contamination since no water comes in contact with the process vapors. A small amount of oil from an external reservoir is continuously metered into the pump cavity, where it forms a film on the cavity wall that creates the

ONCE-THROUGH-SEALING VACUUM PUMP



been deposited. The solvent is discharged along with the oil. Central Fine Pack pays another company to remove the small amount of waste oil.

PROBLEMS SOLVED

Since they were installed in early 1995, OTS pumps have eliminated water-treatment and disposal costs for Central Fine Pack. Vacuum fluctuations also disappeared, along with resulting scrap and downtime. "These pumps provide a more consistent, deeper vacuum than the pumps we previously used," says Stephens. "This has improved product quality, machine efficiency, and overall productivity." The units paid for themselves in a year, he adds.

□□—Mikell Knights