

PREVENT POLYMER DESTRUCTION

At high production temperatures, the quality of polymers manufactured by Allied Colloids, Inc. (Suffolk, Va.) starts to suffer. The problem is that at temperatures above 85C, the polymer's molecular weight decreases, severely affecting its performance in wastewater treatment.

The polymer works by attaching itself to material in the wastewater, and sinking the mass to the bottom of the stream. With a lower molecular weight, the polymer is less effective at weighing down the suspended matter. Thus, greater quantities of the polymer are needed to treat the wastewater, driving up the cost of treatment. For this treatment to be cost effective, Allied Colloids needed to find a way to produce the polymer without thermal degradation.

Crucial to polymer production, is the water-solvent evaporation stage, performed under vacuum conditions. At deep-vacuum levels, less steam-generated heat is needed to drive off the water and solvent, says John Kasmak, process engineer at Allied Colloids. This helps to keep temperatures low and insure that the polymer quality is not destroyed.



At Allied Colloids, use of the COBRA C400 has been a success. In addition to generating vacuum levels need to maintain polymer integrity, this environmentally friendly.

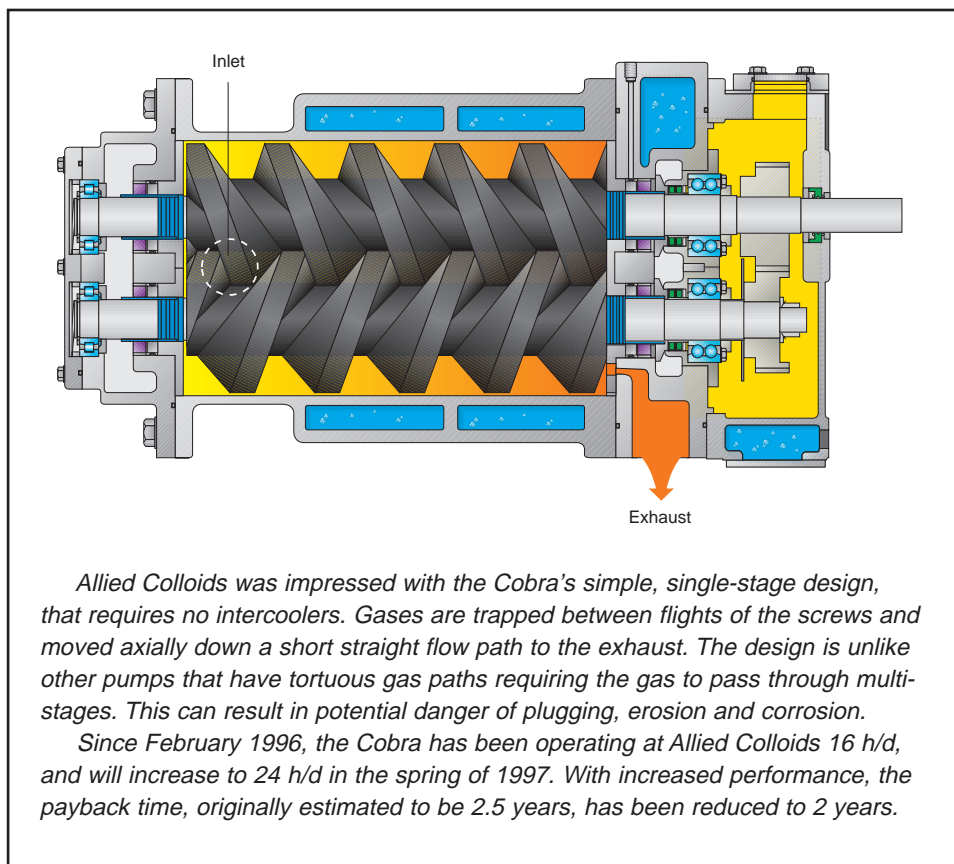
A dry screw vacuum pump produces vacuum levels that stave off thermal degradation

Typically, the firm uses an oil-sealed pump or a liquid-ring vacuum pump as a source of vacuum. However, oil-sealed pumps usually have a vacuum level of 0.5 torr and liquid-ring vacuum pumps, a level of 50 torr. At these vacuum levels, the lowest attainable temperature is 93C. At 8C over the desired temperature,

these vacuum pumps were unacceptable.

After examining other alternatives Allied Colloids chose the Cobra C400 dry screw vacuum pump from Busch Inc. (Virginia Beach, Va.). Unlike the other pumps, the Cobra can reach vacuum levels as low as 7.5×10^{-4} torr. At this level, the polymer can be processed at temperatures less than 85C.

Although the capital cost of the Cobra is higher than the oil-sealed and liquid-ring vacuum pumps, it makes up for the difference in waste disposal costs. The Cobra operates oil-free, generating no waste, whereas the other two pumps produce waste that must be treated off-site. Typical disposal costs are \$400/drum for an oil-sealed pump, and \$250/drum for a liquid-ring pump.



Allied Colloids was impressed with the Cobra's simple, single-stage design, that requires no intercoolers. Gases are trapped between flights of the screws and moved axially down a short straight flow path to the exhaust. The design is unlike other pumps that have tortuous gas paths requiring the gas to pass through multi-stages. This can result in potential danger of plugging, erosion and corrosion.

Since February 1996, the Cobra has been operating at Allied Colloids 16 h/d, and will increase to 24 h/d in the spring of 1997. With increased performance, the payback time, originally estimated to be 2.5 years, has been reduced to 2 years.