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WMRC Technology Update

Roller Mill Coolant Recovery

B-Line Systems, Inc., located in southern Illinois, manufactures metal support systems used in electrical and mechanical systems for conduit, process piping, wiring and other equipment.

B-Line's initial interest in membrance filtration was to reduce their wastewater disposal. In its present operation B-Line was disposing of 30,000 gallons of oily wastewater per year at a cost of $18,600 annually.

A demonstration project using a single 0.2 micron tubular filter successfully separated 99 percent of the oil from the wastewater. However, the demonstration indicated that there was a greater opportunity in recovering the synthetic coolant for reuse. Laboratory testing had indicated that the filtrate from the membrane filter contained 18 percent roller mill coolant and 82 percent water. The recovered solution mixture was almost identical to B-Line's 5:1 coolant mixture.

The success of the demonstration induced B-Line's management to conduct a 30-day pilot study with a larger membrane system.

The objective of the pilot study was to determine how much roller mill coolant could be recovered and the economic incentive to do so.

A pilot membrane system equipped with four tubular membranes with a molecular cutoff weight of 100,000 to 300,000 was used for the on-site pilot study.

Laboratory analysis of the membrane permeate indicated that the membrane recovered 65 percent of the coolant while removing 87 percent of the oil and grease.

Implementation of membrane filtration technology in B-Line's roller mill operations and their press operations will save the company approximately $46,000 per year. The payback on the project is expected to be less than seven months.

For More Information contact:

Ken Barnes
Pollution Prevention Program
Waste Management and Research Center
1 East Hazelwood Drive
Champaign, IL 61820
217-244-9940

as an insulator; once the object is covered, it can take no more paint.

The atomizing for an electrostatic spray gun can be air, airless, or rotary atomized. Air atomized spraying has a transfer efficiency of 60 to 70%, airless runs from 70 to 95%, and rotary goes from 80 to 90%.

The disadvantages are: only one coat is possible, only conductive materials can be painted, it's more expensive, slower and has higher maintenance costs, is limited to chargeable paints, and the surface of the object must be extremely clean. Because the gun uses electricity, this method presents a possible shock hazard. Another problem with electrostatic spraying is that the paint is attracted to all grounded objects, not just the object to be painted–the conveyor and conveyor protection systems in assembly line painting, the paint booth ceiling, the spray gun and the spray gun handler. Work has been done on developing a electrically charged paint repelling panel to protect against stray paint. A repelling panel is not 100% effective, but it does cut down on problems from stray paint.

Powder Coating

This uses the same principle as electrostatic spraying, but sprays something a little different, powder paint. The object then moves through an oven, and the powder melts into a smooth, durable coat. Overspray can be reused, and no other pollutants are created or released because the powder contains no solvents. The equipment for powder coating is expensive, so it may be economical only for larger businesses. Objects that are powder coated must be able to withstand the oven curing, about 350°F for 30 minutes, without any loss of strength. Most metals, except aluminum, can be powder coated.

A variation of this is plasma powder coating. The powder is fed into an extremely hot gas stream–5,000° to 15,000°F–and is then sprayed at the object. Application and curing occur at the same time. Plasma powder coating is for large objects that can't fit into a conventional curing oven or that would lose tensile strength in a conventional oven. Overspray cannot be reused because it hardens. Because of the high temperature spray, protective equipment is required.

Another variation is flame sprayed powder coating, where the powder is melted with a high temperature flame. Again, it is for large objects and overspray cannot be reused.

Powder coats can also be applied by a fluidized bed of powder. Air is mixed with the powder, essentially creating a dense cloud of paint powder. The object to be painted is preheated, dipped into the bed, and then cured.

The paint powder itself comes in two varieties, thermoplastic and thermosetting. Thermoplastic paints melt repeatedly on exposure to heat and set again on cooling. Thermosetting paints undergo a chemical change during curing so they become stable.

For Further Information

Chemical Coaters Association International
513/624-6767
www.finishing.com/CCAI/index.html

National Paint and Coating Association
202/462-6272
www.paint.org

WMRC-Champaign
217/333-8940
www.hazard.uiuc.edu/wmrc

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