

Kitchener firm finds the best possible waste water solution

A MESSY DIVORCE IS not as good as a friendly separation, which in turn, is not as good as a happy marriage. A similar sequence can be applied to waste waters in a plant: Discharge of untreated water is not as good for the environment as treated water. The best solution, however, for both the environment and the plant, is recycled water.

That's the solution chosen by Waterloo Furniture Components (WFC). The Kitchener, Ontario-based furniture parts manufacturer expects to save more than \$50,000 a year by implementing an environmental project that first determines the individual city water usages in the plating department, then recycles Lamella clarifier effluent back to the plating line process.

"This is a very important project for us, not only because of the amount of water consumed, but also because of its price that escalates each year: 92 cents per cubic meter in 1989, \$1.17 in 1991 and predicted to increase significantly in 1992," says Gilbert Pereira Jr, a chemist with WFC. "The recycling was possible because modifications to the process resulted in discharged water with much less than one ppm zinc and chromium."

The Lamella clarifier process (see Figure) was also modified. The process uses coagulation and flocculation for the removal of suspended solids and clarification of waste waters. Waste waters contain various amounts of finely dispersed, or colloidal, suspended solids, that do not settle with ease because they are electrically charged, and repulse each other. Coagulation is the process

by which these particles are neutralized. This electrical charge neutralization is achieved by the addition of small amounts of special chemicals. The molecules of the additive collide with the suspended particles and adsorb on their surface.

Flocculation is the process by which these now electrically neutral particles collide, agglomerate and settle. They form microflocs which combine to macroflocs — large particles that settle fast at the bottom of the tank.

The selection of the chemical additives is very important and sometimes difficult. It depends on the nature of the suspended material, and on the variation of effluent composition. Some chemicals propagate coagulation, while others produce flocculation. Alum and iron salts are substances that enable both, while polyaluminum chloride is a more recent development with more power. Polymeric flocculants, although more expensive, are very effective.

WFC uses an anionic flocculant that is a fine particle size polymer combined with viscosity modifiers and wetting agents. There are some typical suspended solids for different industries. For example, waste streams from mining contain colloidal clay and silica. Electroplaters produce inor-

ganic particles. Pulp mills and food processing plants have mainly organic types of suspended solids.

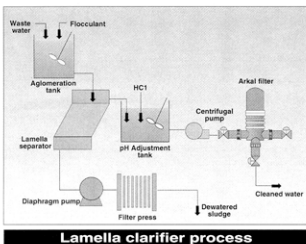
Alum (aluminum sulphate) is widely used to remove suspended solids, turbidity and colour. The addition of a polymer can improve the settling properties of the floc. The addition of lime (calcium hydroxide) or caustic soda is sometimes needed for pH control.

Polymeric flocculants (polyelectrolytes) are high molecular weight, linear chain, water soluble polymers with thousands of ionically charged sites. Polyacrylamide is one example of an anionic polymer.

The Lamella clarified water is discharged into the pH adjustment tank where the pH is decreased from 10 to 7-8 with the addition of hydrochloric acid. This is done to eliminate calcium carbonate scaling, to eliminate suspended solids development due to pH shock in the water rinse tank, and to meet process or discharge requirement.

Most of the floc formed in the Lamella settles, and is dewatered by the filter press. Small amounts of it go with the clarified water. They are used to plug up some parts of the system, especially the controls and indicators. Discharge to the sewer also gave the occasional problem of meeting municipal standards. It had to be removed by filtration.

The Arkal filter was adapted for this application with the help of Jet Fluid Systems, also of Kitchener. The filtration media has both surface and depth properties, thus enabling the removal of a wide variety of suspended solids. Different filtration degrees were tried and 130 micron was found to be the best. The filter cleans itself automatically, at intervals of about one hour, when enough floc accumulates on the filter media, and the duration of the backwash is only 15 seconds. The signal is given by a pressure drop and timer controller. □



Lamella clarifier process