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Cycletime Tips - General

Volume 1: Water Treatment Program: What's in it for me?

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Part two of two. Part one was published in the August issue of CycleTime® TIPS.

Many shops express concerns about reducing costs of a part by alternate material choices or by better efficiencies of the molding process. During the subsequent studies, we usually find a cooling issue in the process can be wasting profit dollars. Another division of Ashland Specialty Chemical Company, Drew Industrial Division, has produced an article on water treatment of cooling systems. We are reprinting it in this issue of CycleTime® TIPS. We hope that this will give some insight to our customers to better understand their cooling problems.

We will now discuss the three basic cooling systems that are encountered when providing cooling water for the thermoplastic industry. Also described are the general treatment requirements for each type system.

Open Recirculating Systems
Open systems generally utilize a cooling tower that cools recirculating water by evaporation. As water evaporates, dissolved and suspended solids concentrate. The number of times solids are concentrated defines the "cycles of concentration" that are controlled by bleed-off.

Open systems are subject to corrosion, deposition, and microbiological growth. Corrosion shortens the life of the cooling system, and the corrosion products, which consist of metal oxides (iron and copper), contribute to deposition. Corrosion inhibitors therefore are fed to the recirculating water to control corrosion. They typically limit corrosion rates to less than 3 mpy (milli-inches per year) and contain one or more of chromates, molybdates, phosphates, zinc, azoles, and other organic compounds. Chromates seldom are used any more because of their toxicity, and zinc usage sometimes is restricted.

The best current technology uses molybdates, phosphates, and organic corrosion inhibitors because they exhibit low toxicity.

Substances that contribute to deposition are introduced in water and in air. Waterborne materials cause deposits of calcium carbonate, calcium sulfate, and silica-- and sometimes iron oxides, silt, and organic matter. Airborne materials enter the recirculating water by being scrubbed from the air in the cooling tower. This contamination consists of sand, dirt, dust, oil mists, grass cuttings, leaves, insects, bacteria, and algae. The last two contaminants contribute to microbiological growths that eventually form deposits.

Microbiological growth is controlled by the addition of a toxicant (microbiocide). Most cooling systems use a non-oxidizing biocide in addition to or instead of a halogen to

control bacteria and algae. Biocide applications are usually guided by the chemical characteristics of the cooling water.

Closed Recirculating Systems

Closed recirculating systems are used to cool molds, air compressors, and hydraulic systems. These systems, similar to those in automobiles and trucks, provide cleaner waterside conditions than open recirculating cooling water that is used to cool equipment directly. They generally are more trouble free and easier to treat because the water doesn't contact the air as in a cooling tower and doesn't cycle up. Little if any makeup water enters the system unless major leaks are present. As a result, deposition normally is not a problem in closed systems.

The potential for corrosion is high in closed systems and is controlled by using high levels of products containing borate/nitrate, molybdate, and sometimes silicates or organic corrosion inhibitors.

If corrosion isn't controlled, abrasive metal oxides (iron and/or copper) form that can cause pump impellers and seals to fail. They also form deposits that can interfere with water flow and heat transfer. A cleaning solution can be used as a remedial treatment to dissolve and/or suspend metal oxides.

Closed systems, especially those treated with borate/nitrate or all-organic corrosion inhibitors, are subject to bacterial growth because these compounds are used as food. If such growth is allowed to progress unchecked, it can form slime deposits that reduce water flow, interfere with heat transfer, and generate under-deposit corrosion problems. It is best to control the bacteria by adding a non-oxidizing biocide.

Once-Through Systems

As the name implies, water is passed through a system or piece of equipment only once and is discharged essentially unchanged, except for an increase in temperature. Treatment is not always needed if water quality is fairly good (for example, municipal water). Water from lakes, streams, and wells can contain high levels of bacteria, algae, iron, organic matter, and mud that require the addition of a biocide and/or a specific dispersant.

Thermoplastic operations usually have few man-hours available to administer water treatment programs. Unless chemicals are properly applied, however, their value is diminished: chemicals are wasted and results are poor. There is no easy path to good water treatment. The most beneficial program utilizes the talents and capabilities of a reputable water treatment service company in response to each customer's specific needs. Professional water treatment companies such as Drew Industrial are available to provide cost-effective and environmentally acceptable products.

Should you wish to evaluate the status of your cooling system, your General Polymer Representative can contact the Drew representative for your region.

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