

# **BLOWN FILM TROUBLESHOOTING HOW TO LOOK GOOD!**

Where does the profit come from in your company? From the operators who make the product! There are four key secrets to success in this business; a) train the operators; b) maintain the equipment; c) find your niche; and d) look beyond your own backyard.

We often avoid training operators to troubleshoot because it is difficult to do. There are three key steps in troubleshooting: 1) identify the problem; 2) find the root cause; and 3) choose the right solution. Identifying the problem includes keeping accurate records, taking the right samples and using the same language to describe the problem. Here are examples of common appearance problems in film.

## **GELS**

There are several types of gels. Non-discolored pinpoint gels that are randomly dispersed may be a mixing problem in the extruder. Higher mesh screen packs do not filter out these gels. It improves mixing by increasing back pressure and residence time in the extruder. Patterns are important. Lanes of clear and gel rich film in the machine direction may be a die mixing problem. Try adjusting melt or die temperatures. Overheated resin may cause discolored gels. This may be due to excessive shear in the extruder, too long a residence time or too high a melt temperature. If the transition zone temperature overrides, a humped or reverse temperature profile may reduce frictional heating. If no extruder temperature zone overrides, the melt temperature may be too hot. Try to reduce the melt temperature by lowering the first two barrel zones. Excessive moisture of decomposition into a gas causes lenses. Check for contaminants and damp resin.

## **Melt Fracture**

Do not confuse melt fracture with applesauce. Poor dispersion causes applesauce. It is a mixing problem in the extruder. See the Gels Section for solutions. Mild melt fracture looks like hazy film. More pronounced melt fracture exhibits distortions in the transverse direction. LLDPE is particularly sensitive to melt fracture at critical shear rates. Melt fracture is usually produced in the die lips. It sometimes occurs in the die spirals. Try raising the top zone die temperature slightly. Be careful not to overheat the die lips; excessive die build up will result. Other solutions include raising the melt temperature, adding processing aid or using a wider die gap.

## **Optics**

Haze, gloss and clarity are the terms used to describe film optics. Semi-crystalline resins such as polyethylene form larger crystals if cooled more slowly. Die lip surfaces are not perfectly smooth. Most haze in LDPE and LLDPE film is due to "micro gauge bands" rather than crystal size. Increasing the frost line height for LDPE and LLDPE film allows the film to smooth out the "micro gauge bands". Haze and gloss improve as a result, but clarity may suffer slightly. Patterns are important as well. Excessive cooling in the die ports, a dirty die or dirty air ring may cause a jagged frost line and hazy lanes in the machine direction. Increase the bottom die zone temperature slightly to compensate for a chilled die port. Clean the die and air ring lips as required. For high optical LDPE or LLDPE film, consider using two air rings stacked one above the other. It keeps the bubble stable with very high frost lines. A side benefit is increased bubble cooling capacity at a fraction of the cost to install internal bubble cooling (IBC).