Surging

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Most surging in single-screw extruders can be relegated to three major problems: first is inconsistent feed rate; second is channel plugging in the melting zone due to too aggressive compression; third, there is the issue of a pumping section that is not sufficiently filled to develop stability. These will vary with increasing screw speed generally worsening as speed is increased.

The cause of the surging can usually be determined by analysis of the surge and comparison to the drive amperage fluctuation. A feed inconsistency usually results in a surge frequency that is both varying in frequency and amplitude. It also can be directly associated with a proportional change in the frequency and amplitude of the drive amperage. Keep in mind that there is a delay between the surge and the amperage fluctuation since they essentially occur at opposite ends of the screw. Unfortunately a surge due to channel plugging has many of the same characteristics. The difference is that a plugging surge usually produces a more rapid pressure and amperage change. Another difference is that the compression zone of the screw will often show a tendency to have a substantial barrel zone override when channel plugging is occurring. Finally, a surge due to inadequate fill in the pumping section will be very consistent in frequency and amplitude. It also will have little or no effect on drive amperage.

One problem with this type of analysis is that with R the tendency towards digital instrumentation it is difficult, if not impossible, to accurately observe the frequency or amplitude of the pressure or amperage. Consequently, troubleshooting of this type may require some additional instrumentation. All that is required is a clamp on DC or AC amp meter and an analog pressure instrument.

– Jim Frankland, Milacron

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