

Melt block problems (Consultant's Corner)

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A melt block is when output and motor amps rapidly fall, and may or may not return to normal. Some possible causes and their remedies are as follows:

a) Sticking to the screw root. This usually happens when the line is stopped with the screw full; even a few minutes may be enough for some systems. (Leaving the extruder full is often done to keep oxygen from getting down to the hot breaker-plate area where it may promote degradation and contamination.) When an extruder is stopped, the feed end of the screw gets hotter as it equilibrates with the hotter output end. If the sticking isn't too bad, it may disappear in a short time and output will return to normal. If it doesn't go away, try purging with the same material in pieces larger than pellets — e.g., heavy pipe or sheet chopped small enough to enter the flights but still large enough to resist quick melting and pull stuck material off the root. Another technique for large machines is to grind notches in a length of steel strapping and use it as a poker in the first few flights, like a plumber's snake. The best remedy is prevention, never stop the machine totally full, but either empty the screw or at least run the feed zone empty to prevent root-sticking. For a few plastics, such as uncrystallized PET and certain very soft plasticized PVCs, sticking may happen no matter what is done, and for these materials the feed end of the screw must be internally cooled.

b) Obstruction in the feed passage. This isn't really a true melt block, but has the same effect. Material may either stick to the feed throat walls or clump and sinter in the hopper. It is not likely to go away once it starts. If sticking is seen on the throat walls, it is easily cleaned off, but effort must be made to prevent recurrence. If water is circulating around the feed passage, check to see that the lines are not clogged. Feel the hopper to see if too much heat is conducting back into it, and if a dryer is used, make sure the hot-air temperature is both uniform and low enough. If a hopper-dryer shows signs of abuse, fix its inside and straighten its outside, as once an impatient operator beats on it to loosen a block, its inner cone may shift and cause further blockage.

c) Second-zone surge. Sometimes, pellets reach the compression zone before they are softened enough to be properly compressed. In that case, what melt there is gets forced between the particles and the mass begins to slip on the barrel wall and lock up on the screw. This happens to a degree in most extrusions, but sometimes the situation gets severe, with the extrusion almost stopping. This is cyclical, with a period of from 0.5 to 5 minutes, as eventually the locked mass gets hotter and softer, and the pressure differential builds up across the block and blows it through. The output then returns to normal, but only until the cycle repeats itself with the new and cooler pellets. Barrier screws, if properly matched to resin throughput and melting needs, are quite good at avoiding this sort of thing. Without such a screw, it still may be possible to reduce surge by changing rear-barrel temperature (either way), or by raising the feed temperature.

—Allan L. Griff

See also:

- [Feed screw temperature control \(STC\) in the single screw extruder](#)
- [Melt blockage due to false start up will cause dramatic rate drop](#)
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