



## Cycletime Tips - General

### Volume 24: Pressure Drops That Can Limit Press Pressure

By Jim Cardinal

In plants throughout Michigan, process monitoring equipment assists in evaluating not only the cycle, but also the hydraulic response of the press. It's hard to explain to a customer that a brand new press cannot produce enough melt pressure to maintain velocity control.

There are several reasons why this can occur, but the ultimate reason is that the buyer of this large piece of capital equipment lacked sufficient data to purchase a press that would do the job properly. A common reaction, to this sad news, is to "kill the messenger?" And that could be me!!!

The missing data is the intensification ratio and melt pressure required to fill the part. This ratio, along with the maximum hydraulic pressure that the machine can develop, determines the maximum melt pressure the machine can deliver. Appropriate melt pressure in conjunction with an abundant pressure differential across the flow control valve, will ensure velocity control. The buyer that understands pressure drops throughout the system and velocity control will purchase his equipment with enough melt pressure.

Listed below are several items that consume large pressure drops in injection molding machines:

- **Hot Runner Filters:** These filters are installed for good reason — to prevent contaminants from entering the hot drop gate areas. They work well, but consume much of the melt pressure before even entering any cavities. The pressure drops on some of these filters are as high as 3,000-5,000 psi.
- **Extended Nozzles:** There are many reasons to use these extended nozzles. But remember, they consume large amounts of melt pressure. Recently one required 4,000 psi just to get the material through it. The machine had an intensification ratio of 10:1. The total melt pressure the machine could deliver was 20,250 psi. This mold had a hot manifold that consumed another 6,600 psi of melt pressure. That left only 10,250 psi to fill the thin-walled cavities, which was not enough. The press was pressure limited and the owner was livid!
- **Mixing Nozzles:** A mixing disk in the nozzle can consume 4,000 psi melt pressure. The helix types also produce some large pressure drops. One operation, using a hot manifold in conjunction with a mixing nozzle, had a total pressure drop from both units equaling 11,000 psi before entering the cavity. The machine had an intensification ratio of 10:1, therefore again the pressure is limited.
- **Hot Runner Systems:** It's a known fact that these systems consume pressure. Rarely does anyone take this pressure drop into account. If asked what the

pressure drop is on their system, the response is often either, “I don’t know” or “3,000 psi, I guess.” The reality is often shocking. It is anywhere from 4,000 to 9,000 psi consumed just through these manifolds. Process pressure can certainly be limited because of these large pressure drops.

Please learn from these unfortunate examples and determine, by data, how much melt pressure you will require on your injection molding machines. I want General Polymer customers to purchase the press that will do the best job for them.

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