Product:

Decoupled Assist ™

View:

DECOUPLED ASSIST ™ is offered to correct the deficiencies of all process control options which utilize more than one transducer to transition between fill, pack, and hold. Traditional methods of molding are an outdated approach that has been exhausted as a controls option for quite some time. Currently in the global market sophisticated polymers are being developed and produced that far exceed the controls capabilities. This inability to accommodate the material needs results in a lack of transferring intended material properties into part performance.

Introduction:

Considering a technology to be the most accurate method of molding after introducing an opening of 10% error (transferring when the cavity is 85%-95% filled) is unacceptable. Mind you this error doesn't include the deficiencies of machine components (non-return valve leakage, screw slip, injection speed linearity, mold capability, load sensitivity, etc). Benchmarking a machine one time to become a world class molder doesn't guarantee that you are consistently producing quality parts over an extended period of time. The key to success is to automatically benchmark your machine every cycle in real time to compensate for machine component deficiencies and the non linear behavior of the melt. It is very costly to execute machine certification between every cycle!

DECOUPLED ASSIST ™ combines fill, pack, and hold, to eliminate uncontrollable material viscosity changes and density differentials occurring when switching from sensor to sensor. This method compensates for the nonlinear behavior of the melt with nanometric resolution in millisecond time, which optimizes the process control of injection to produce the highest quality parts with the most consistent density in the least amount of time. The DECOUPLED ASSIST ™ process is developed by determining what is happening to the plastic inside the mold throughout the entire molding cycle in real time and then controlling fill, pack, and hold jointly to produce consistent quality parts. Processing from the plastic's point of view in real time proves to be the most reliable technique for producing quality parts.

Description:

This method of injection utilizes the closed loop control system known as Intellimold. This approach allows users the freedom of a velocity profile while limiting injection with a resulting internal melt pressure. Thus eliminating pressure spikes created while executing a decoupled cycle. The resulting pressure set point (IMP) can be set between 0 PSI and 20,000 PSI depending on the material suppliers recommendations. The process relies on real time measurements acquired from the injection nozzle and the last place to fill in the mold cavity. The transfer method can be set conventionally (position, time, and cavity pressure) in conjunction with internal melt pressure. This assures that users have control of their cycle through the entirety of fill, pack, and hold as well as the transitions between the defined segments. The transition between the last fill segment and the first pack segment by means of IMP assures that there is a controlled transition down to the material supplier's 2nd

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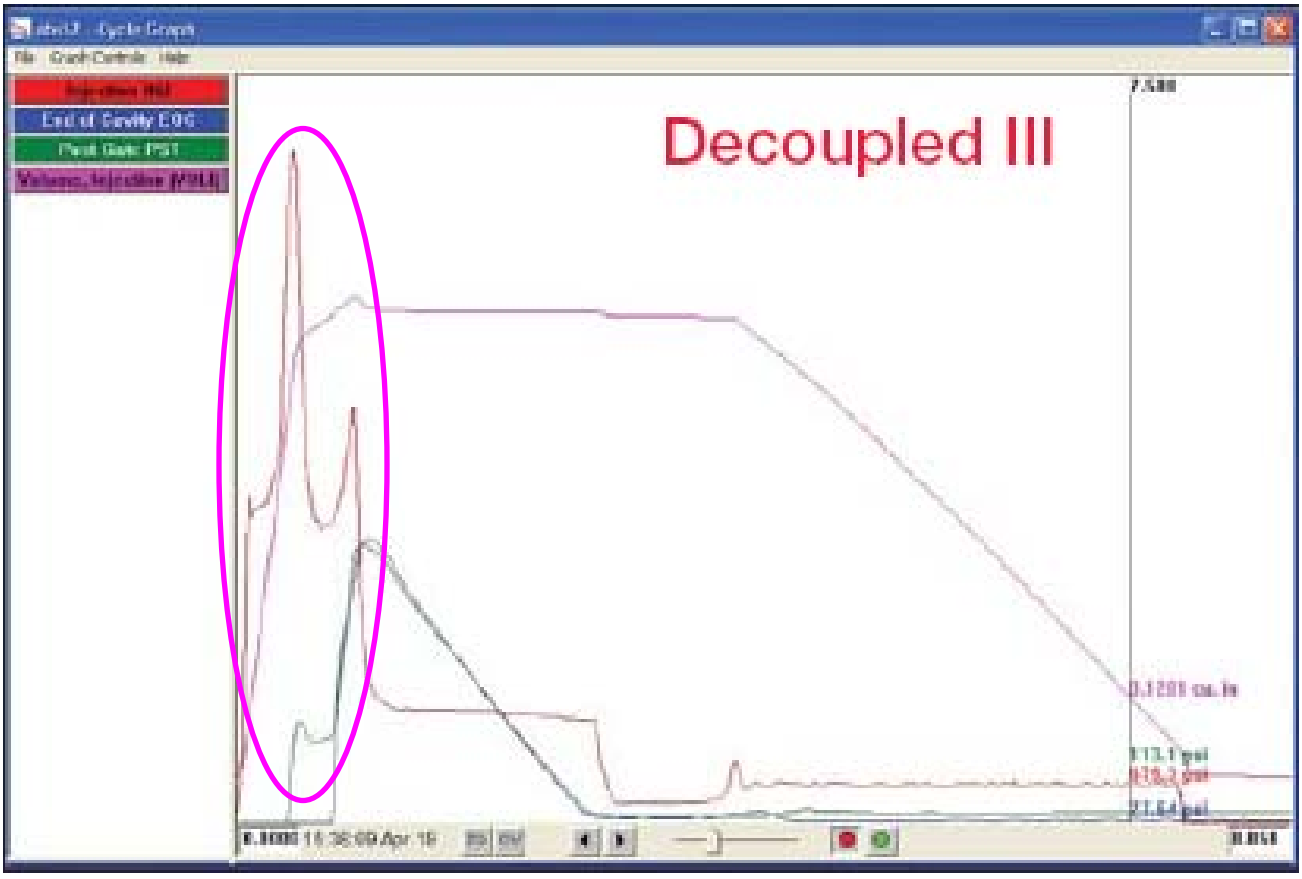
stage pressure requirements in order to create conditions for the material morphology to relax from the deformation created during fill.

Data:

Figure 1 was issued in the most recent RJG newsletter. This graph represents the latest evolution of decoupled processing known as Decoupled III. For reference; the blue curve represents cavity pressure at the last place to fill, the green curve represents post gate pressure, the magenta curve represents the volume of material entering the cavity versus time, and the red curve represents melt pressure. Focusing on the highlighted area of the graph, one can see that while transferring from fill to pack and from pack to hold there are severe pressure spikes. These spikes in pressure can be seen in all velocity, pack, and hold segments of the graph. The induced stress and excessive shear promote degradation and cause a loss of properties. Figure 2 represents an execution of Intellimolds **Decoupled Assist ™.** For reference; the light blue curve represents IMP, the red curve represents melt pressure, the burgundy line represents post gate pressure, and the gold curve represents cavity pressure. Focusing on the highlighted area you can see that there are no pressure spikes resulting from transfer because Intellimolds IMP limit has been set to prohibit this from occurring. This creates smooth transitions between fill pack and hold as well as between velocity profile segments.



(Figure 1)

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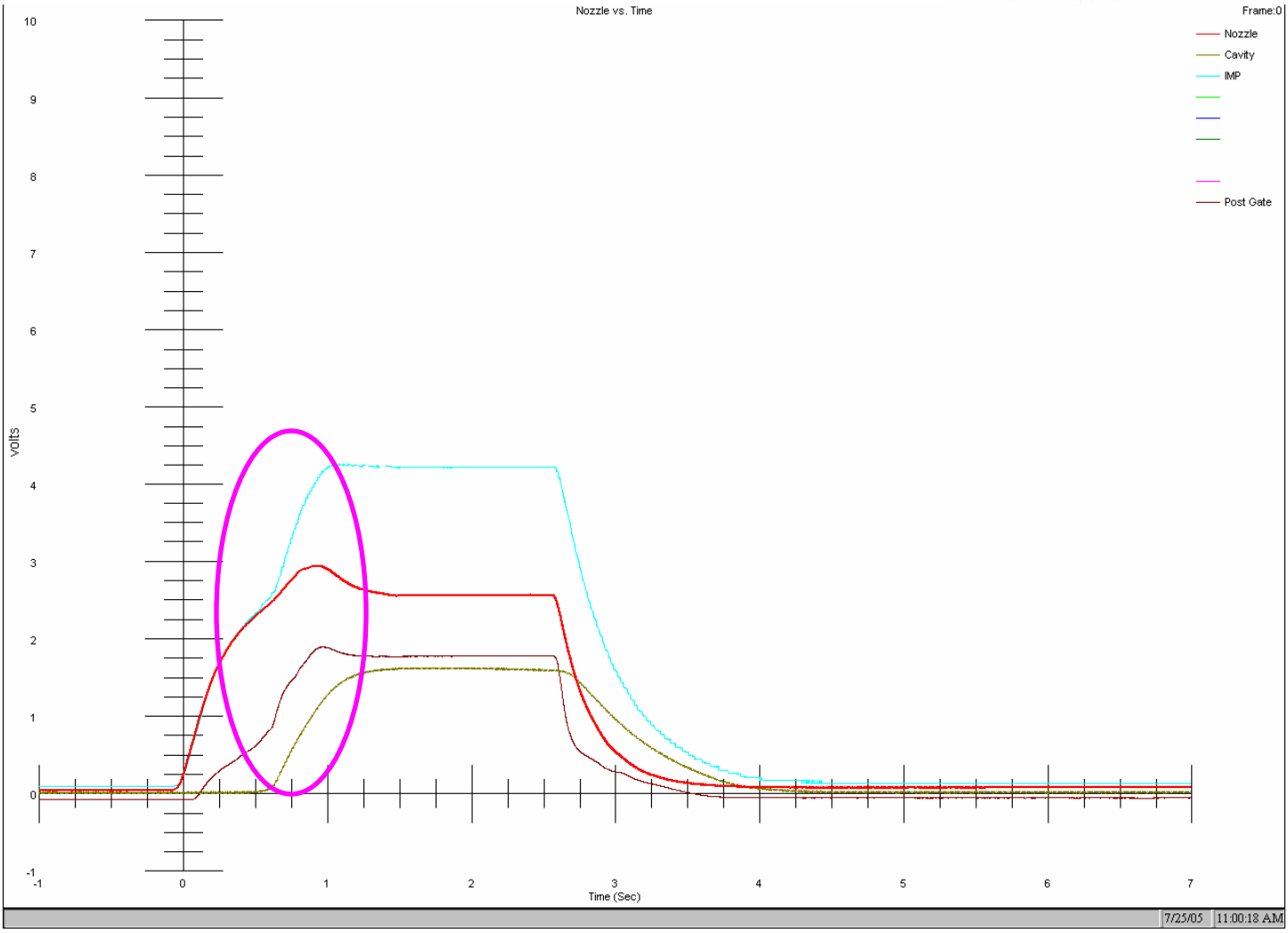
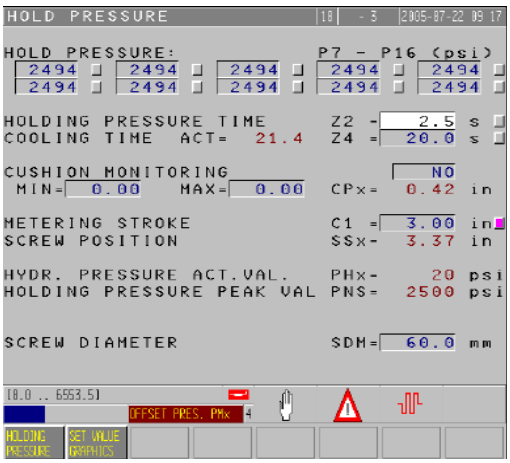
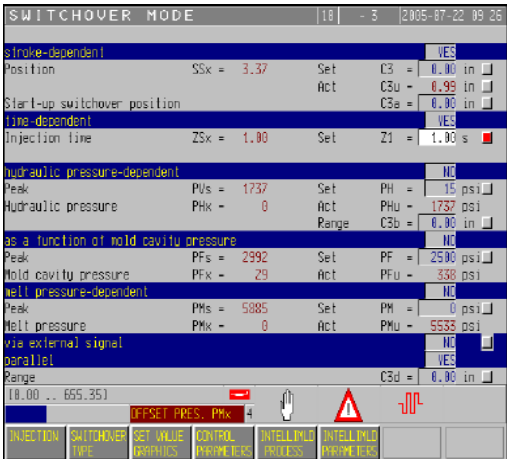


(Figure 2)

Below are the parameters that correlate to the Intellimold trace.





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Required Components:

You will need a sensor package, signal conditioning unit, and one of the IMC (Integrated Melt Controller) systems to achieve decoupled assist. An optional pneumatic system is also available depending on the type and size of product you are molding.

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