

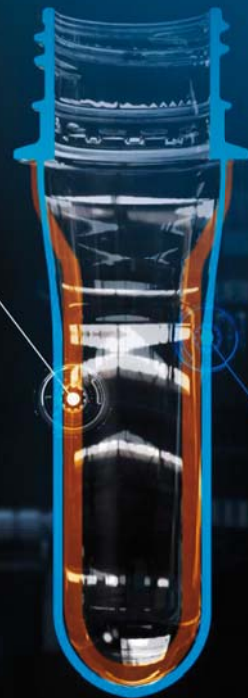
XTREME: ONE GIANT STEP CLOSER TO THE PERFECT PREFORM

SIPA's XTREME injection-compression molding technology is like no other in its ability to make high performance thin walled PET

bottle preforms. What's more, it does so in a highly energy-efficient way, and just as fast as traditional injection molding technology. This

remarkable achievement is due to its continuous, non-sequential mode of operation. XTREME technology uses a carousel (wheel)

STANDARD PREFORM



XTREME PREFORM

system in which individual molds are fed by a continuously running extruder. The carousel rotates at high speed, with all mold opening and closing movements, as well as transfers, driven by cams, making it impossible for any mistakes to be made when setting up the machine.

A typical XTREME preform for a 0.5-L bottle is immediately distinguishable from its injection molded counterpart by its perfect injection gate. What is not so obvious is the difference in wall thickness. The base of the XTREME preform is 33% thinner than its rival: 1.0 mm versus 1.5 mm. Extra length and lower thickness together provide for a more optimal stretch ratio when the preform is made into a bottle. In fact, L/T ratios achievable with XTREME technology are indisputably the highest in the industry.

To achieve such lightweight preforms with very thin wall thickness using standard injection molding, a massive amount of pressure would need to be used – something like 1500 bar when measured at the machine nozzle. That puts an almost incredible amount of stress on the polymer.

By contrast, XTREME technology running with the same output requires a melt pressure of only 270 bar – less than 20% as much. The main reason why it is possible to fill the molds using XTREME technology using such low pressure is the floating core. With injection molding, when melt is injected, the molds are already closed and the core position is fixed. So if you want a preform with a base thickness of 1.5 mm, all the melt has to pass through a passage 1.5 mm thick before it can fill the cavity (since, of course, the injection point for the preform is at the base). With XTREME technology, when the melt is injected, the cavity is slightly open and the melt passage is therefore far wider, at 10 mm. Then the core moves into its final position, forcing the melt up the cavity walls.

The net effect is a much more gentle treatment of the melt. All this means that acetaldehyde (AA) levels are reduced by up to 40% compared with traditional injection molding, and resin intrinsic viscosity (IV) falls far less: over 70% less in fact. Obviously, this improves the mechanical properties of the bottle.

Improved distribution of material around the base of the preform also enables improved cooling, with no crystallization in the gate area. Furthermore, there is no sign of the “crown” gate typical of injection molded preforms.

Not only do preforms made with XTREME technology have optimal L/T ratios, they also have optimal designs overall, with a much better distribution of material throughout the part than can be achieved with injection molding. So while the base is much thinner, the lower sections of the walls are actually thicker, which has another important influence on the mechanical properties of the finished bottle. In addition, XTREME preforms have thinner walls just below the support ring, where in injection molded versions there is an excess of material. As much as 0.6 g can be shaved off the weight of the preform in this area alone.

