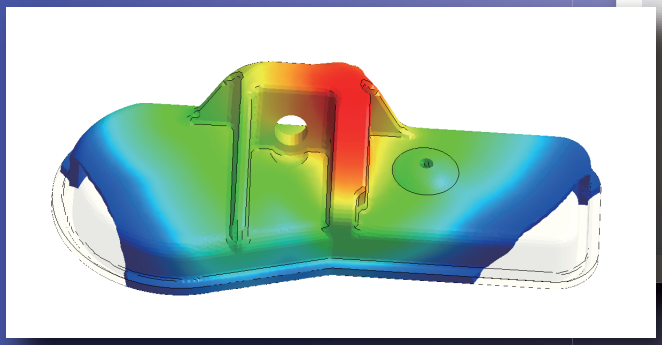


Extreme Tool and Engineering Eliminates Molding

Customer: Extreme Tool and Engineering
Country: USA
Industry: Mold & Die
Solution: Moldex3D Advanced Package;
Flow, Pack, Cool, Warp, 3D Coolant CFD

Image Courtesy of Extreme Tool and Engineering

Founded in 1998, Extreme is a premier engineering and mold manufacturing facility that is a leading provider of innovative turnkey plastic product development services.
(Source: http://www.extremetool.com)

Executive Summary

There were a lot of uncertainties surrounding Extreme's molding process before they used Moldex3D - What will the fill time be? Can our press generate the needed sprue pressure? How much clamp force will we need? Is the shot size appropriate for the barrel? To reduce these uncertainties, Extreme decided to look at Moldex3D's solutions that can help provide greater confidence prior to actual manufacturing.

Challenges

- Find the appropriate venting locations
- Find the appropriate coolant temperature
- Obtain the effective packing time in order to meet the specification of shrinkage

Solutions

Utilizing Moldex3D Advanced package (Flow, Pack, Cool, Warp) and 3D Coolant CFD to find the optimum conditions in the molding process.

Benefits

- Find the areas requiring venting
- Minimize the part shrinkage
- Optimize the cooling time and cycle time

Case Study

Extreme chose Moldex3D to help eliminate uncertainties arising from the molding process. They would like to utilize Moldex3D to find the area where additional air venting is required, the press needed, the maximum clamp force, reasonable filling time and predict product warpage before the mold trials.

From the filling /packing simulation, they knew the filling pressure was well below the maximum, the maximum clamp force was acceptable, and the maximum shear rate was below the limit. Therefore, they conclude that the press was able to meet their needs (Fig. 1).

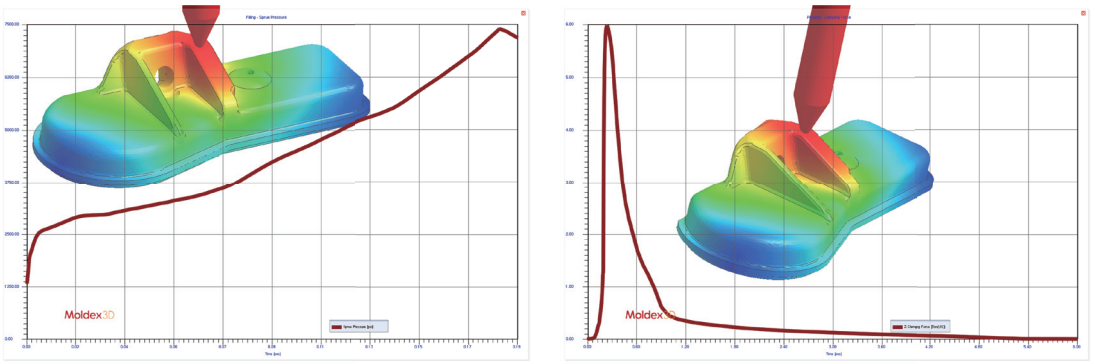


Fig. 1 From Moldex3D filling /packing simulation, Extreme knew their press was acceptable.

Moldex3D simulation results of the melt front also helped Extreme make educated decision as to where to vent and also drive the tool design right from the start. Thus, they didn't have to wait till short shots occur in the first sample to make adjustments or corrections (Fig. 2).

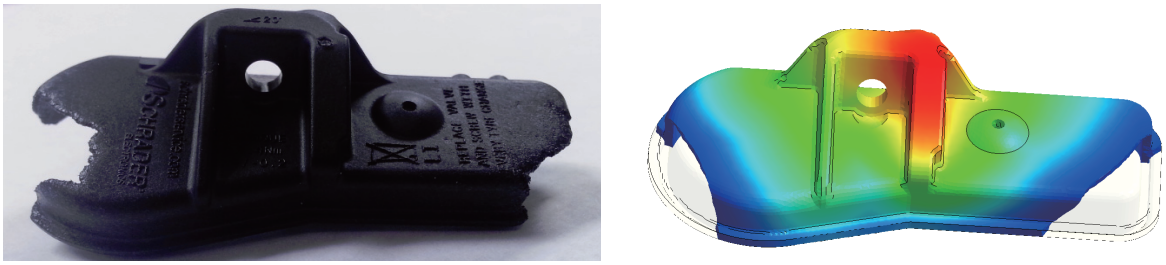
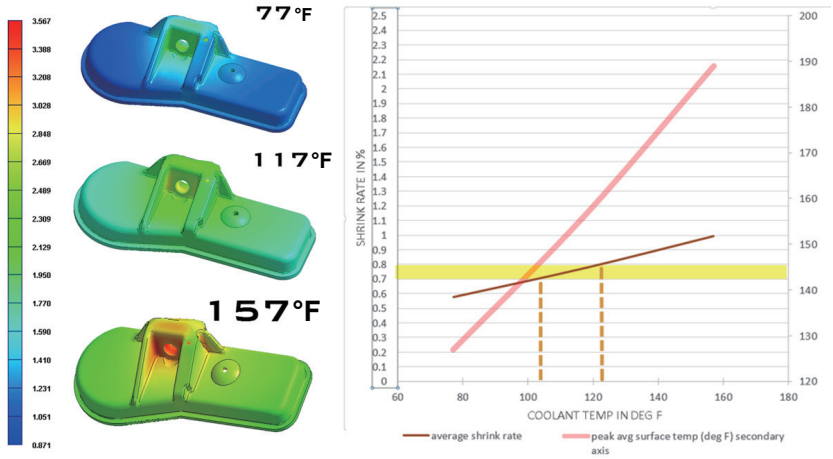


Fig. 2 Moldex3D's short shot analysis correlates to the actual result.

Extreme then changed the coolant temperature, which led to much lower average surface temperature. They simulated 3 different coolant temperatures and observed their influence on the part surface temperature and shrinkage. As a result, they found at 117°F, the shrinkage meets the required specification (Fig. 3).

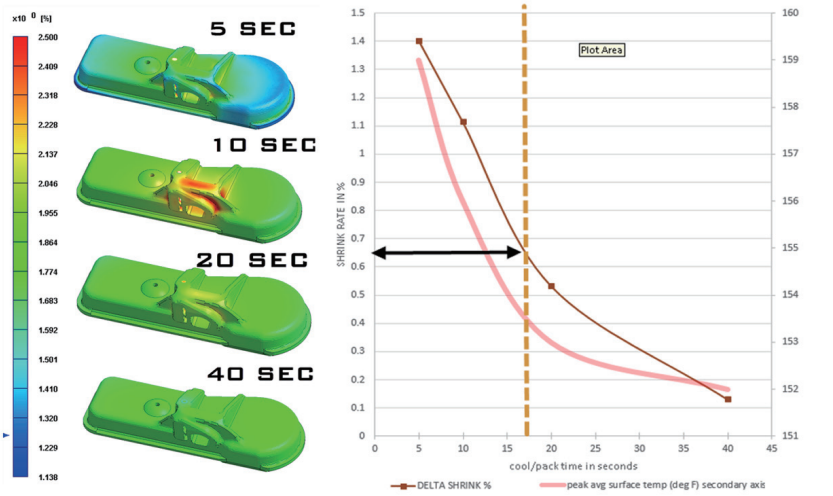


Shrink Rate v.s. Coolant Temp.

Keeping all other processing constant and changing only coolant temp., it is found that a coolant temp. of 117°F, put the peak average surface temp. at 156°F, and puts the average linear shrinkage values in the range specified on material spec. sheets.

Fig. 3 According to the simulation of 3 different coolant temperatures, 117 F degrees was found the most desired.

Next, Extreme increased the packing time. They simulated 4 different packing times and observed the shrinkage results. It was found 17s could be a good compromise (Fig. 4).



Shrink Rate v.s. Cool/Pack Time

Looks like holding the part longer results in a decrease in variation of shrink values, so that to say the shrink rates are more uniform through the part the longer you hold on to it. Around 17 seconds seem to be a good compromise.

Fig. 4 The packing time of 17s was found a good compromise for shrinkage.

Results

Moldex3D simulation software provides tools to examine potential problematic areas in parts and helps Extreme make well-informed decisions. Extreme used the information obtained from simulation to optimize cooling and determine cycle time. This also helped them avoid costly mold repair and reworks, and the simulation can further guide future designs with confidence in accuracy.

CoreTech System Co., Ltd.
Headquarters
8F-2, No.32, Taiyuan St. Chupei City
Hsinchu County 302, Taiwan
Tel: +886-3-560-0199
E-mail: mail@moldex3d.com

Moldex3D Northern America Inc.
27725 Stansbury Blvd., Suite 190,
Farmington Hills, MI 48334, USA
Tel: +1-248-946-4570
E-mail: sales.us@moldex3d.com

For more information, please visit www.moldex3d.com