Linear AMS provides engineering, manufacturing and consulting services to industries where precision and performance are essential. With a successful track record in tooling, molding and contract manufacturing, Linear’s strengths have always been in engineering and design, short production times and troubleshooting customers’ toughest problems.

**THE CHALLENGE:**

DESIGN AN EFFECTIVE CONFORMAL COOLING SYSTEM TO REDUCE COOLING TIME

In today’s demanding business environment, the ability to produce parts faster and more efficiently is always the top priority for manufacturers.

In this Case Study, Linear used Moldex3D mold simulation software to validate a design to significantly reduce cycle times and improve part quality. The manufacturer needed to produce a higher volume of parts without incurring the costs associated with additional molds and presses.

The cooling process in plastic injection molding traditionally involves longer than optimal cooling times, prolonging the cycle time and ultimately impacting manufacturing volume. Conventionally drilled cooling lines in molding tools have many limitations.

Linear’s Additive Manufacturing (AM)-built molds with Conformal Cooling inserts are superior to conventionally machined molds. With their Conformal Cooling technology, the heat/cooling lines in the tool follow the contours of the part. They can be placed an optimal distance from the part surface, allowing the mold to maintain a constant temperature. This technology is ideal for challenging mold geometry, deformed parts and varying wall thicknesses.

To challenge conventional thinking, the experienced and creative design engineers at Linear AMS utilized Moldex3D mold flow simulation software to look for a way to design an effective conformal cooling system that would reduce cooling time and allow the manufacturer to produce more parts without taking more time.
CASE STUDY  
CONFORMAL COOLING  

PROCESS:

Designing the Optimum Conformal Cooling Layout

Moldex3D eDesign software was used by the design specialists at Linear AMS to analyze the conventional cooling process. (Fig. 1) Significant heat accumulation was discovered in the middle area as well as the shaft. (Fig. 2)

To improve cooling time, Linear’s designers altered the cooling system to conform to the shape of the part. This innovative modification allowed for improved cooling in the middle, the shaft and the outer sides of the part. (Fig. 3)

Using the Moldex3D software to simulate the revised cooling design, Linear’s analysis of the modified cooling channels design showed a much more uniform temperature distribution compared to the original design. (Fig. 4)

As a result, Linear’s designers were able to successfully reduce the cycle time from 65 seconds to just 35 seconds, allowing the customer to produce a higher volume of parts without the need for additional molds or presses.

RESULTS:

Substantial Reductions in Cooling Time Result in Lower Manufacturing Costs

- Cooling time was reduced by 69%, providing a competitive advantage in the market
- The client was able to produce a higher volume of parts without adding additional molds and presses into the process.

CONCLUSION: With their advanced design capabilities and experience with Moldex3D eDesign software, Linear’s AM experts are able to make cooling cycle time reduction predictions that are consistently accurate, resulting in significant manufacturing savings for their clients over time.