



USA Luge

Use Case – Composite Forming Tools

Customer Profile

USA Luge is the organization responsible for developing and selecting the U.S. national competitive luge race teams. Luge is both the name of the competition and the sled used in the race. Representing the United States at international racing events, the USA Luge team has earned almost 600 medals in elite level and junior international competition since 1994.

Challenge

Luge design plays a critical role in race outcomes where the difference between winning and losing is measured in thousandths of a second. Testing different sled designs and making adjustments as quickly as possible is crucial to develop the fastest sled in the shortest amount of time. Additionally, each sled on the team should be designed to accommodate the unique physical characteristics of the various riders for optimal performance. However, sleds made with traditional manufacturing techniques take weeks to produce, limiting the quantity that can be made and tested before the season's start.

Solution

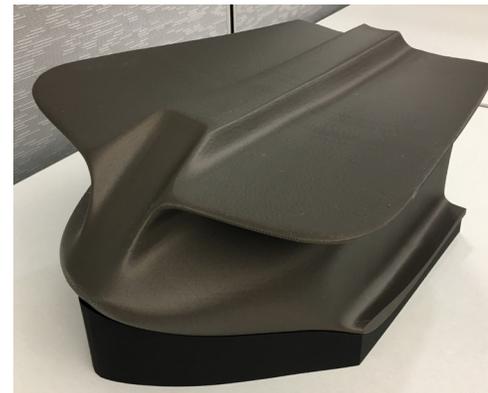
Instead of using traditional, time-consuming fiberglass lay-up tooling, the USA Luge team 3D printed a sled mold with FDM® technology using ASA thermoplastic. The mold design was adapted to fit the riders and finished in a few days. To make the complex doubles tower which the front rider sits on, the team 3D printed a lay-up mold using ST-130 sacrificial tooling material. The mold is wrapped in carbon fiber and after cure, the 3D printed material is washed away in a solution bath leaving the composite shape.

Impact

Using 3D printed composite lay-up tools saved USA Luge five months in the development of a single sled – from six months down to four weeks. With an off-season that is only five months long, this gives USA Luge much more time to build, test and validate multiple designs. 3D printing's design freedom also makes the low quantities and high customization much less costly than traditional lay-up tooling methods.



The 3D printed lay-up mold for the main sled pod, made with ASA thermoplastic.



The mold for the tower assembly, printed from soluble ST-130 material.

Sled Production Time Savings



83% Reduction
6 months to 4 weeks