



Commercial Products Manufacturer

Use Case – Carbon Fiber Prototype Tool Handle

Challenge

The development of a new hand-held tool by a leading commercial products manufacturer required prototyping the handle design. The handle's configuration is important because it must support the tool while providing good balance and user comfort.

Traditional prototyping meant developing a casting, using a \$12,500 mold, or machining handles from solid aluminum billet. Both methods posed costly and time-consuming restrictions. Additionally, both processes meant the handle design would need to accommodate typical manufacturability constraints such as draft angles, cutter size and axis movement. This limited the design options.

Solution

Engineers used FDM® polymer additive manufacturing instead of machining or casting due to its design freedom and fast, cost-effective prototyping capabilities. To ensure the prototype handles would have sufficient strength and stiffness, engineers used carbon fiber ABS-CF10 material, since standard ABS allowed too much flex. ABS-CF10 combines ABS plastic with chopped carbon fiber, 10% by weight. The result is a composite material 50% stiffer than standard ABS, providing sufficient rigidity for the prototype handle.

Impact

For this particular manufacturer, 3D printing 10 different prototype handles using carbon fiber ABS-CF10 cost \$200 in material. Compared to the \$12,500 casting mold cost, 3D printing represents a 98% cost savings. Although the casting mold could generate up to 5000 handles, it can only produce a single handle configuration. Design changes would require another mold tool, unlike 3D printing, which can produce multiple designs for significantly less cost. The time to produce the first 3D printed handle was 12 hours, compared to 1 – 3 weeks to machine a prototype or develop a casting tool. This represents an 85-95% time savings.

In total, the use of additive manufacturing resulted in significant time and cost savings over traditional prototyping methods, helping accelerate product development.

Prototyping Time Savings



85%-95%

3DP vs Cast Prototype Cost Savings



98%