

Technology Opportunity

Rapid Prototyping Laboratory at Marshall Space Flight Center



NASA's Marshall Space Flight Center (MSFC) in Huntsville, Alabama, is using state-of-the-art equipment to produce prototypes for NASA and private industry. Although many major U.S. firms are experimenting with various aspects of rapid prototyping, MSFC is using its unique capabilities to help small businesses save both time and money on their "design-to-product" costs.



Potential Commercial Uses

Rapid prototyping technologies being developed for the space program have many uses in the commercial industry. When a concept is in the "selling" stage, a plastic model can be produced to serve as a visual aid. Wind tunnel models, used to provide performance tests, can be produced at lower costs than traditional methods.

Benefits

Startup costs of a new product line can be drastically reduced. Consequently, these savings to industry can be passed on to the consumer. For example, a wind tunnel model that once cost \$40,000 and took months to produce can now be created for \$400 or less—in just a few short weeks.

The Technology

Marshall's Rapid Prototyping Center has four machines designed for creating three-dimensional products from computer-aided drawings.

- A Fused Deposition Modeler is used to make investment master castings, particularly wind tunnel models. Wax or plastic material is fed from a spool, melted by a heated tip, and deposited layer-by-layer to build up a three-dimensional model. Future research with this device will include high-strength polymers and fiber-reinforced materials.



- The Sanders Three-Dimensional Printer produces high-detail, high-surface-finished investment master castings. This machine has two inkjet heads—one deposits build material while the other deposits support material for overhangs. The current build material is an investment casting resin and the support material is a soluble wax that is easily dissolved from the finished part.
- A Stereolithography device produces wind tunnel models and other visual aids. Building from a computer-aided design file, this machine uses laser technology to build parts with photocurable resins. Models are created layer-by-layer with the directed laser, then post-cured in an ultraviolet oven. This technique is used mainly for concept modeling, but can also be used for investment casting.
- The Ballistic Particle Machine rapidly produces solid models, using an inkjet process. Micro-droplets of a low-strength wax material are fired from an inkjet head onto a surface, building up to a three-dimensional part. This technique is best suited for producing concept models.

Technology Transfer

More information about MSFC's Rapid Prototyping capabilities is available through Marshall's Technology Transfer Office. Representatives from this office can help you determine how this technology can best be used to help your company grow and prosper.

■ Contacts

Technology Transfer Office
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Additional information about NASA's Technology Transfer Program and a Technology Transfer Agreement are available on the World-Wide Web:

(<http://techtran.msfc.nasa.gov>)

Key Words

Rapid Prototyping
Concept Models

Investment Casting
Technology Transfer

