



Application of Rapid Prototyping and Wire Arc Spray to the Fabrication of Injection Mold Tooling



Objective

This effort will fabricate real injection tools with rapid prototyping and wire arc spray metal forming. Rapid prototyping is a layer-by-layer based additive manufacturing process for constructing three-dimensional representations of a computer design from a wax, plastic, or similar material. Wire Arc spray is a metal spray forming technique which deposits thin layers of metal onto a substrate or pattern. This effort will provide an in-depth development effort between NASA, Boeing, and University of Alabama in Huntsville (UAH), utilizing multiple materials to provide optimum performance for an injection tool, in which real injection tools will be fabricated with rapid prototyping and wire arc spray metal forming. It will provide an in-depth development effort between NASA, Boeing and UAH, utilizing multiple materials to provide optimum performance for an injection tool. A second tier of the project will include the development of stronger, higher temperature materials to be used in the Z402 rapid prototyping system. Ceramic power media and water soluble binders will be experimented with in order to rapidly prototype stronger, high temperature metal spray mandrels.

Why Needed

Currently, most injection molds are machined from aluminum or tool steel in order to survive hundreds of thousands of injections with various plastic materials. Typically, the machining of tooling is expensive and time consuming, requiring on average \$20-80k and several weeks of lead-time. The proposed approach will demonstrate that prototype tooling, good for thousands of injections, can be fabricated in a few days for an order of magnitude lower cost factor. This technology may be applied to the fabrication of multiple material turbomachinery and propulsion hardware, i.e. rectangular nozzles, integrated cooling channels, etc.

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Sponsor

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