

ALTERNATIVE MANUFACTURING METHODS TO RAPID MIM TOOLING

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ABSTRACT

One of the impediments to the implementation of MIM is the high cost and long lead time to produce MIM tooling. These barriers have limited the ability to economically produce low production quantities or provide proof-of-concept parts. For these reasons much attention is being given to rapid tooling manufacturing methods to reduce the cost and time required for tooling. Many of these technologies use alternative materials which are easy to manipulate (polymers, filled polymers, metal powder) and additive manufacturing methods (stereolithography, slip and impression molding). However, the end product generally lack in ability to reproduce fine detail and hold dimensional tolerances. In addition, the costs are still high and the services are not readily available.

Mold manufacturing using traditional manufacturing technologies may still offer the best combination of cost, quality, and time when applied to alternative mold materials. Multi-axis CNC milling coupled with powerful CAD/CAM software can produce detail and tolerances in the tenths of thousandths (inches) in brass, aluminum, and steel. The cost for these technologies have plummeted in recent years and these services are readily available and affordable. Soft metal molding commonly used in the jewelry industry can be applied to short run MIM as well.

This paper will review the use of traditional manufacturing methods for making high quality short run MIM tooling and present several examples of actual applications.

INTRODUCTION

Rapid Prototyping is not a new technology. However it is still an emerging technology. The original intent of rapid prototyping (RP) was to produce a part by a purely additive process. That is, rather than starting with a bulk of material and cutting away excess material to produce a part, RP builds the part using essentially only the material present in the final part. In addition, RP is intended to be a totally flexible process where all parts can be made using the same basic tools or method. No fixed or specialized tooling is necessary. The manufacturing strategy for most RP is to divide the part into planes of finite thicknesses