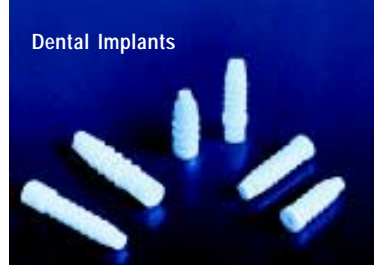
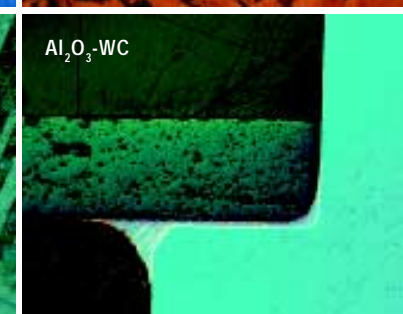
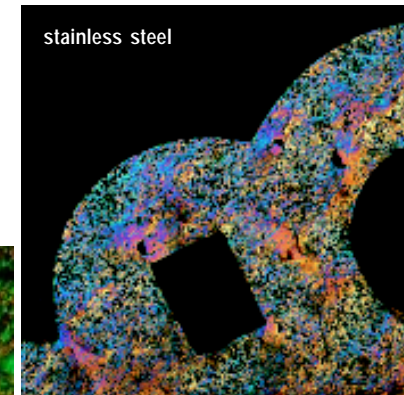
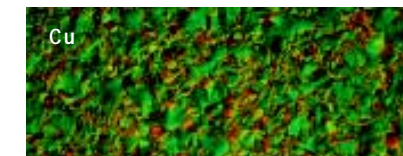
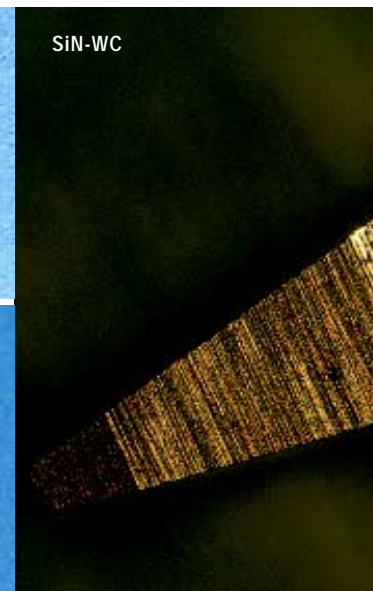


Small Precision Tools is part of the SPT Group of Companies and shares in the research and development, technical know-how and manufacturing capabilities of The SPT Group



Fabrication of Small, Precision, Complex Ceramic and Metal Parts by Injection Molding



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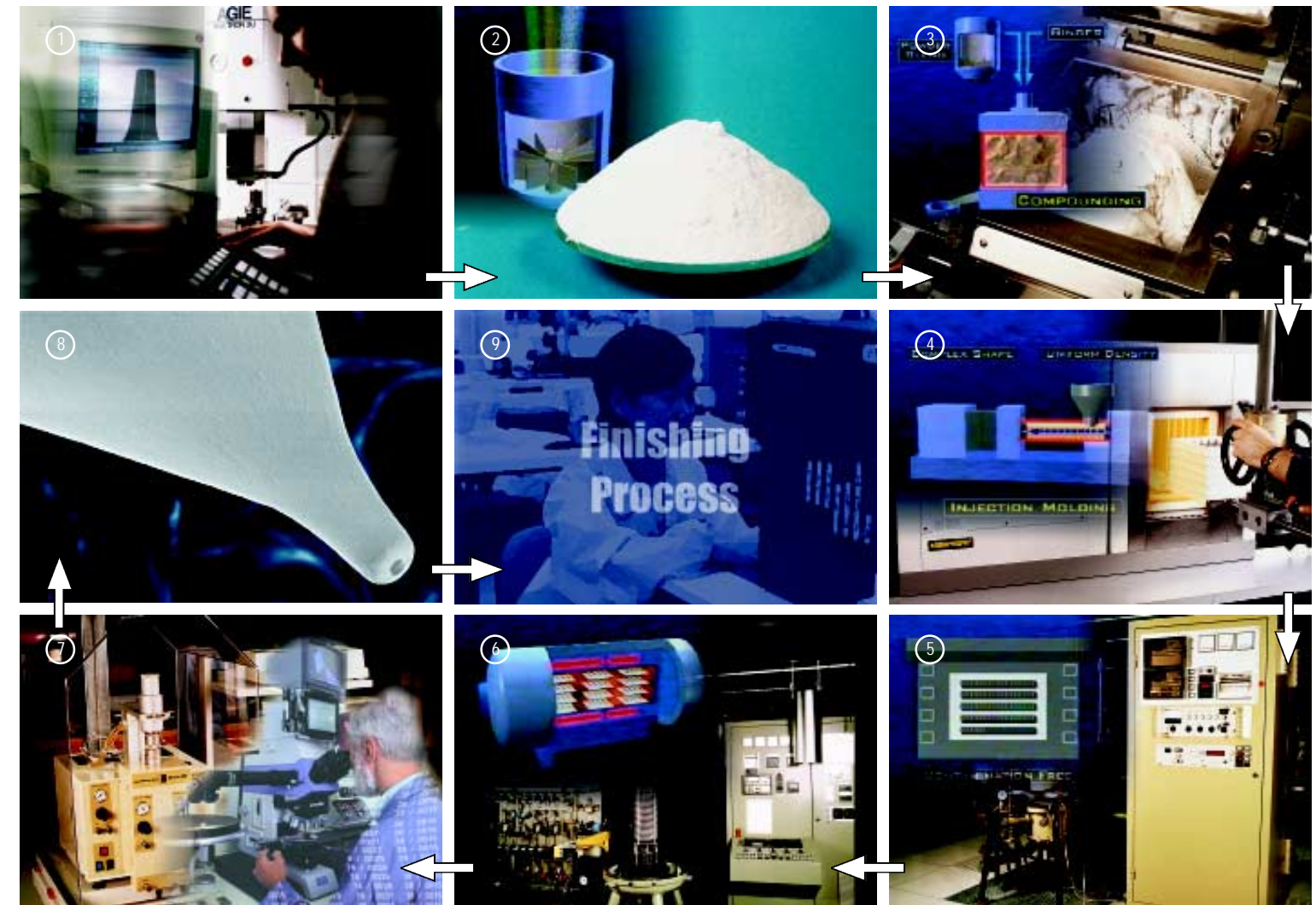
www.smallprecisiontools.com



ONE STOP SOLUTIONS PROVIDER



Small Precision Tools has the capability to form small, precision, complex parts by injection molding combined with the unique advantages that sintering offers to select material properties.



- | | | |
|---------------------------|-------------------------|------------------------------------|
| 1 Product and Mold Design | 3 Feedstock Preparation | 6 Controlled Atmospheric Sintering |
| 2 Powder Preparation | 4 Injection Molding | 7 Dimensional & Structural Control |
| | 5 Debinding | 8 Sintered Ceramic Part |
| | | 9 Grinding - Polishing - Assembly |

The Advantage

Small Precision Tools' injection molding process offers a high degree of reproducibility. Complex parts in ceramic and metals can be shaped in one operation with diverse geometry, threads, different profiles, undercuts, sharp edges, and different wall thickness.

Injection molding should be considered where conventional machining methods are too expensive, or where the designer can combine 2 or more parts into a more complex one.

The Application Horizon

Today, the Small Precision Tools' injection molding process is applied in the instrumentation, textile, automobile, printing, electronic assembly, communications, aerospace, optical, medical, dental and chemical industries. Cost effective applications are found in relatively small parts demanding complex machining operations; and where volume production requires a large investment in machine tools.

The Raw Material

The number of available raw material grows in parallel with the increasing field of applications.

In the field of high-tech ceramics:

High purity of doped oxides, carbides, nitrides and borides.

Metals and Alloys: Austenitic stainless steel, iron alloys with 2 to 70 percent nickel, special alloys with magnetic properties, nickel-cobalt, chromium-copper, iron alloys and exotic materials.

Adding HIPping to sintering will maximize density; and CVD coating improves the surface properties.

The Molds

Molds for the Small Precision Tools' process are designed for every part by CAD. The powder particles, which are measured in microns, demand wear-resistant and precise tooling.

The Process

Small Precision Tools' injection molding process is a combination of powder, injection molding, and sintering technologies. To obtain the necessary chemical and physical properties, powders are selected by size and shape and complemented with additives. Every particle of the powder is coated with an inorganic binder, which transports the powder for molding and gives the final form rigidity.

The binder is removed by evaporation and exothermic reaction, leaving only a small fraction behind. The formed part, depending on the powder used, is then sintered in an oxidizing or reducing atmosphere, or in a high vacuum at temperatures of up to 2400° C.



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