

**COORSTEK**  
*Amazing Solutions.*



**PRECISION INJECTION  
MOLDING**

## ADVANCED MATERIALS AND PROCESSES...

### Removing Technological Barriers – For Over 90 Years!

From the specialized porcelain labware first made in 1915, to modern electronic devices, CoorsTek uses advanced technology, materials, manufacturing, and assembly to remove technological barriers for design engineers worldwide.

### Injection Molding

Ideal for high-volume production of complex, tight-tolerance components, injection molding offers significant advantages over conventional forming methods:

- Cost-effective technique for complex designs
- Ability to produce net or near-net shape parts
- Very tight tolerance control
- Polymer insert molding over metal, ceramic, and plastic
- Low-cost, high-volume manufacturing runs
- High-strength properties – up to 30% gain over conventional
- Variety of advanced materials available to meet numerous application needs

### Injection Molding Process

**Material Production** – Our experts help you choose from a multitude of advanced materials including technical ceramics, high-performance plastics, and advanced metals.

**Molding** – State-of-the-art injection molding machines heat feedstock to a flowable state and pressure inject it into a steel mold. The part then is cooled until solid and ejected from the mold.

**Debinding** – Some materials may require either thermal or chemical bath debinding prior to the sintering process.

**Sintering** – In kilns capable of exceeding 1600° C, ceramics and metals are sintered to full density, removing any remaining binders or organics.

**Annealing** – Advanced plastics are annealed for optimum properties and low stresses.

**Finishing Operations** – If needed, operations such as tumbling, polishing, or machining are available to meet customer specifications.

**In-Process and Final Inspection** – Throughout the manufacturing process, quality controls ensure components meet customer requirements. CoorsTek offers on-line Statistical Process Control and is ISO-9002 certified.

### Design Guidelines

**General** – Process intended for components with complex geometries or large-volume runs. CoorsTek engineers offer component design assistance to maximize the advantages of the injection molding process.

**Geometry** – Injection molding can produce complex shapes that would normally require secondary operations. Generally the more complex the geometry, the more advantageous injection molding will be over other fabrication methods. Following are some general guidelines:

- Thin, uniform cross sections are best
- External tapers and undercuts are permissible; internal contours and undercuts are feasible
- Flat surfaces are ideal for support during sintering of ceramics. However, when design does not permit, special saggars can be molded with the part to add extra support

**Extremely Tight Tolerances** (up to ± 0.05%) – CoorsTek design engineers help determine appropriate tolerances.

**Inherent Features** – Draft angles, ejector pin marks, parting lines, gate marks, flow lines, and mismatches are some of the features that may be evident on parts.

CoorsTek engineers will work with you to minimize the effect of these features on the functionality of the part.

Ceramics		
ALUMINAS	ZIRCONIAS	CARBIDES
• AD-998 (Nom. 99.8% Al <sub>2</sub> O <sub>3</sub> )	• YTZP (Y <sub>2</sub> O <sub>3</sub> Partially Stabilized Zirconia)	• WCNi (Tungsten Carbide Nickel)
• AD-995 (Nom. 99.5% Al <sub>2</sub> O <sub>3</sub> )	• TTZ (MgO Partially Stabilized Zirconia)	• WCCo (Tungsten Carbide Cobalt)
• FG-995 (Nom. 98.5% Al <sub>2</sub> O <sub>3</sub> )	• ZTA (Toughened Alumina ZTA)	• SiC (Silicon Carbide)
• AD-95 (Nom. 95% Al <sub>2</sub> O <sub>3</sub> )		<b>SPECIALTY CERAMICS</b>
• AD-94 (Nom. 94% Al <sub>2</sub> O <sub>3</sub> )		• Porous Materials
		• ESD-Safe Materials

Plastics	
HIGH TEMPERATURE POLYMERS	FLUOROPOLYMERS
• PEEK	• PFA
• Polyimide (TPI)	• FEP
• Polyetherimide (PEI)	• ETFE
• Polyethersulfone (PES)	• ECTFE
• Liquid crystal polymer (LCP)	• THV

Metals
• Titanium
• Stainless Steel