Wunder-Mold

Ceramic Injection Molding

Presentation

CERAMIC INJECTION MOLDING *'CIM'*

Ceramic Injection Molding (CIM) is a process similar to plastic injection molding, but instead of polymers, it uses fine ceramic powders such as alumina or zirconia combined with a binder system. The binder enables the powder to flow and hold its shape during molding. After molding, the part undergoes a secondary process followed by high-temperature sintering. This final step fuses the ceramic particles into a highly dense and exceptionally durable component-only sapphire and diamonds are harder.

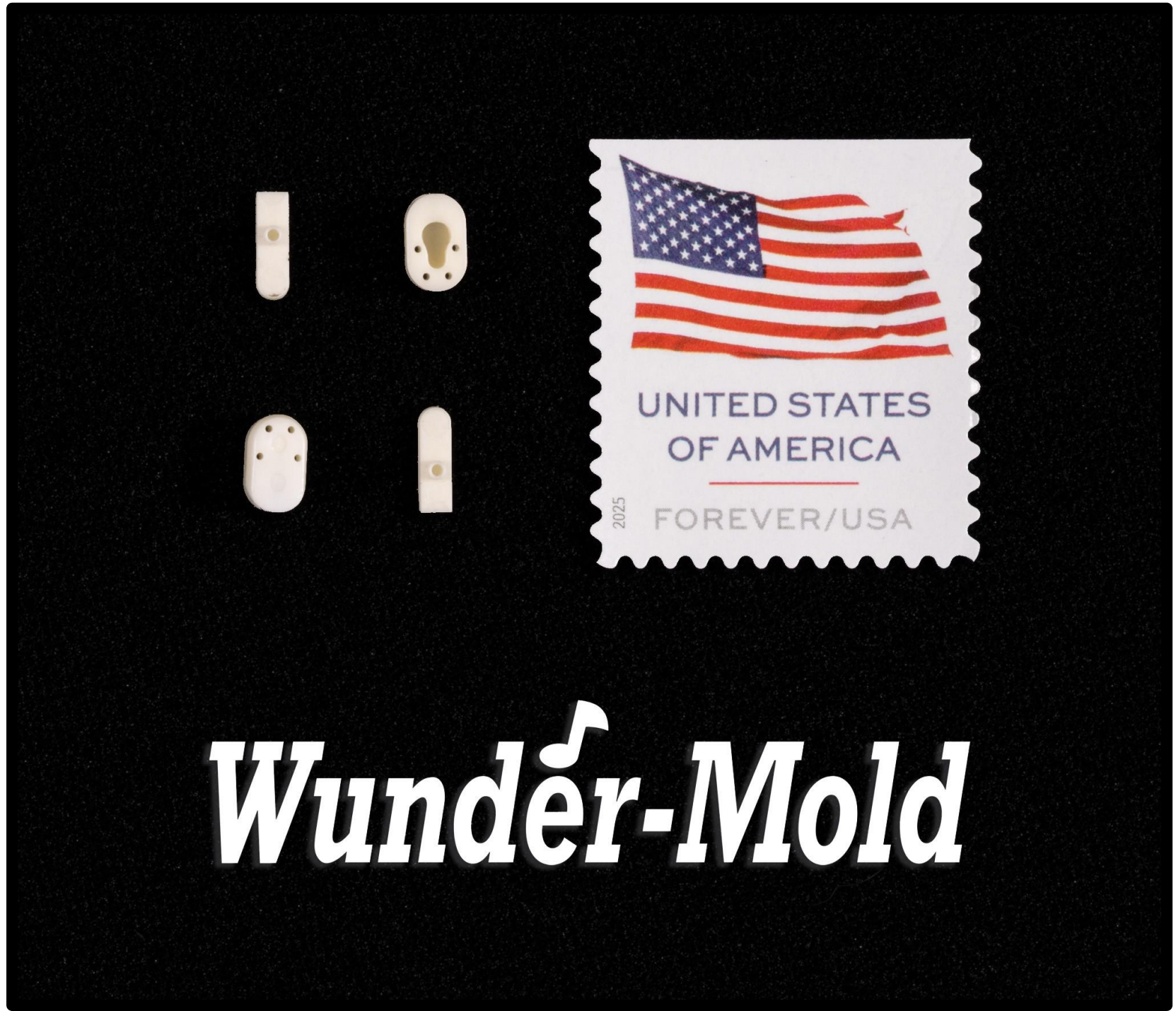
Wunder-Mold, located in Vacaville, California, is ISO 9001 certified and pioneered CIM technology nearly 30 years ago, provides end-to-end capabilities including tooling, production molding and secondary machining—all under one roof.

Learn more about CIM here:

Expert Alumina Ceramic Injection Molding Company Near Me | Wunder-Mold

101 On Ceramic Injection Molding | Wunder Mold Custom Ceramic Parts

The example parts shown on the following page demonstrates the precision achievable with CIM, featuring four molded locator holes measuring just 0.016 inches in diameter.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ALUMINA VS. ZIRCONIA VS. ZIRCONIA-TOUGHENED ALUMINA (ZTA)

Selecting the right material for Ceramic Injection Molding (CIM) is a critical step, as each ceramic system offers distinct performance advantages and trade-offs.

Alumina is widely used for its excellent hardness, abrasion resistance, thermal stability and heat dissipation, all while maintaining a relatively low material cost. It is often the baseline choice for a broad range of industrial applications.

Zirconia, by contrast, is valued for its exceptional fracture toughness, impact resistance and high flexural strength. It performs especially well under cyclic loading and demanding mechanical conditions where long-term durability is essential—though at a higher material cost.

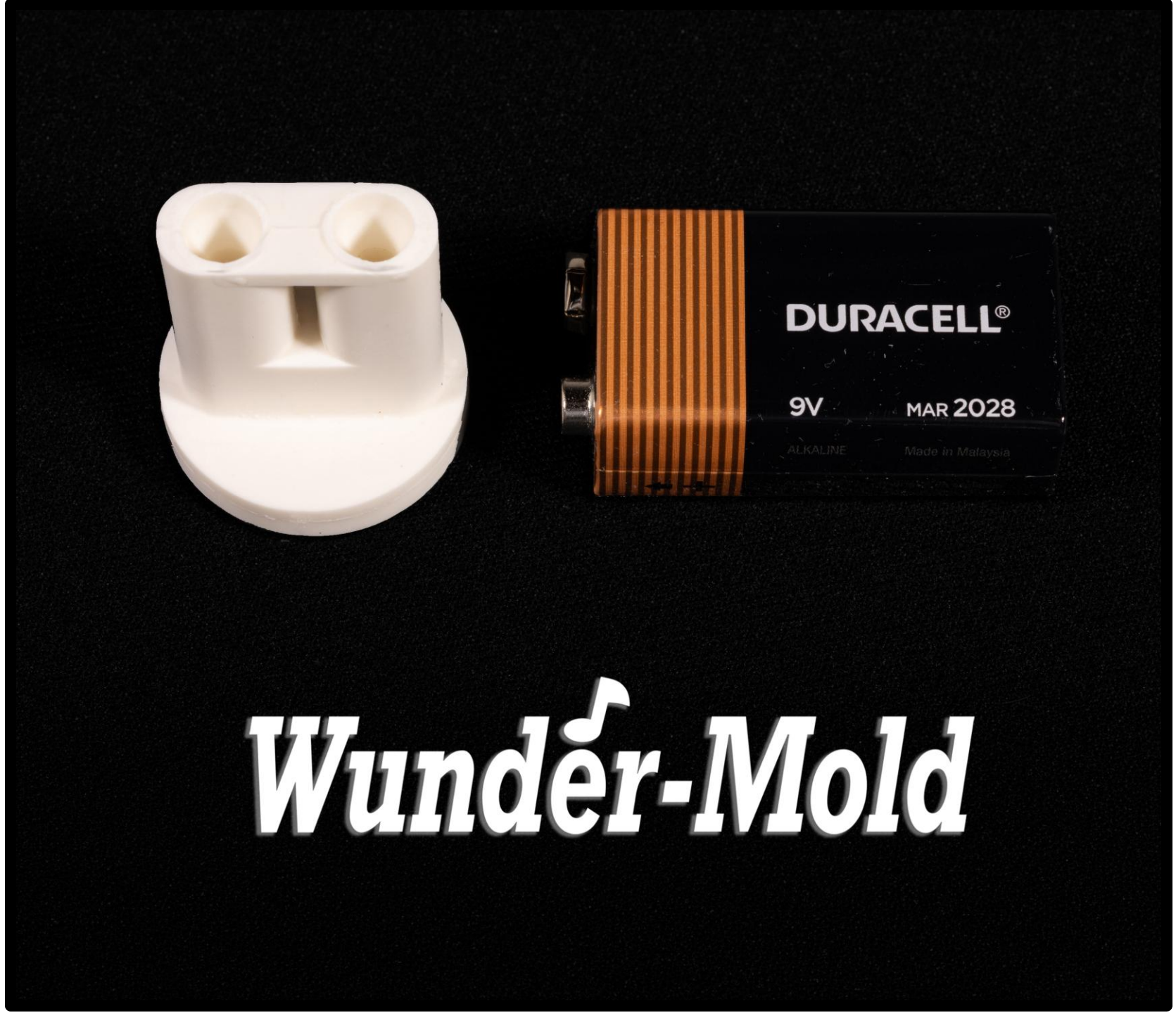
Zirconia-Toughened Alumina (ZTA) often represents the “sweet spot” for many applications. It combines much of zirconia’s toughness improvement with alumina’s hardness, thermal performance, and cost efficiency. As a result, ZTA is commonly used in medical implants, pump or valve components and cutting tools where full zirconia performance may not be necessary or cost-effective.

Lear More about CIM here:

Expert Alumina Ceramic Injection Molding Company Near Me | Wunder-Mold

Alumina vs. Zirconia in Advanced Applications | Ceramic Parts Manufacturers

Complex ceramic geometries, like the example shown on the next page, are often ideal candidates for CIM.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WHAT MAKES CIM ADVANTAGEOUS?

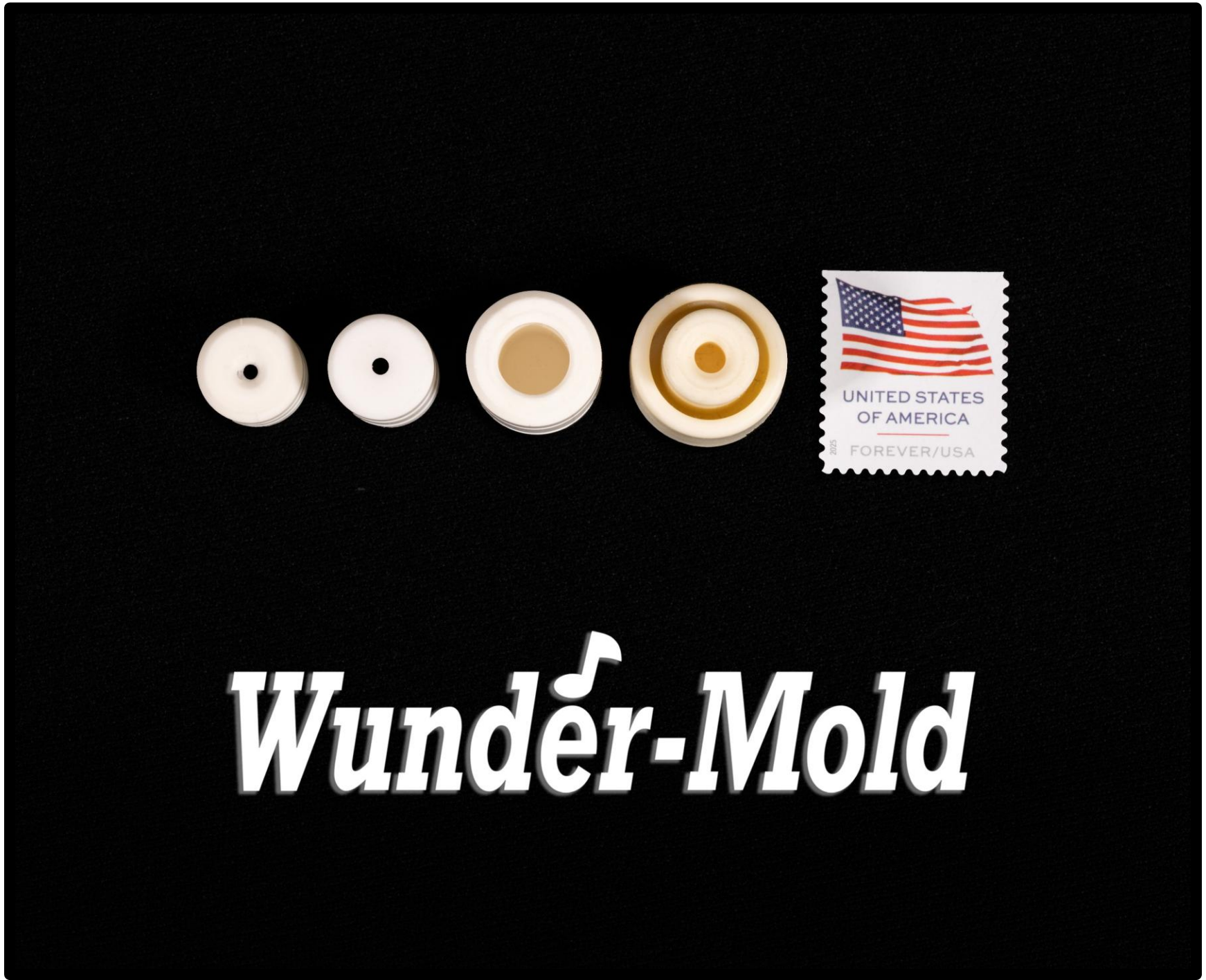
Ceramic Injection Molding (CIM) combines the design flexibility of plastic injection molding with the exceptional performance of advanced ceramics. This process enables complex geometries while delivering material properties that are difficult—or impossible—to achieve with metals or polymers alone.

Key advantages of CIM include:

- **Extreme wear resistance & hardness** – typically 10 to 30 times harder than stainless steel
- **Cleanliness & biocompatibility** – well suited for medical and semiconductor environments
- **Electrical insulation & RF transparency** – ideal for electronic and communications applications
- **High-temperature capability** – maintains strength and dimensional integrity up to 1400°C
- **Dimensional stability** – holds tight tolerances through repeated thermal cycling
- **Reduced weight** – CIM components are often 40–60% lighter than stainless steel
- **Corrosion & chemical inertness** – resistant to acids, alkalis, and solvents
- **Safety in explosive environments** – non-sparking ceramic materials offer critical advantages
- **Excellent repeatability** – ideal for high-volume production of complex geometries

Lean more about CIM here: Why Repeatability Matters in Custom Molded Ceramics

The sliding fittings shown on the next page features an Ra surface finish of 15 µim, demonstrating the precision and consistency achievable with CIM technology.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FROM MACHINED PARTS TO CIM:

As production volumes increase, traditionally machined ceramic, stainless steel, or titanium parts can quickly become cost prohibitive. In many cases, transitioning to CIM with dedicated tooling can reduce total part cost significantly—sometimes by up to 10x.

For applications requiring annual volumes in the several thousand range—especially 5,000 to 10,000+ parts—CIM becomes a highly compelling manufacturing solution.

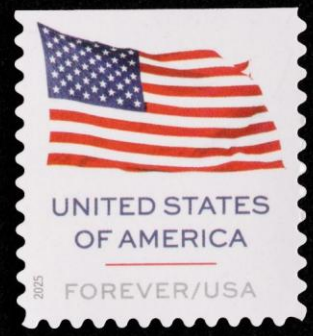
CIM is especially well suited for applications requiring:

Exceptional hardness and wear resistance
Excellent thermal and chemical stability
Complex internal geometries
Integration of features that are difficult to machine
Cost-effective repeatability for precision components
Demanding flatness requirements
Reduced secondary machining requirements
Thin-wall design capability
Tight tolerance & consistent dimensional control

Learn about CIM here:

Top Questions to Ask Before Ceramic Injection Molding

The PCB terminal block shown on the next page demonstrates the fine detail and complexity achievable with CIM



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WUNDER-MOLD, INC. –
CERAMIC INJECTION MOLDING LEADERSHIP

Wunder-Mold, Inc. was founded in 1996 by William A. Martindale, who famously said in 1996, “I needed something to do at age 79.” The company began as a traditional plastic injection molding operation and quickly evolved into one of the few firms specializing in Ceramic Injection Molding (CIM), becoming a recognized global leader in the field.

Steeped in experience, Wunder-Mold focuses on finished engineered ceramic components. Advanced machining and diamond-tool finishing capabilities allow tolerances as tight as +/-0.0002”.

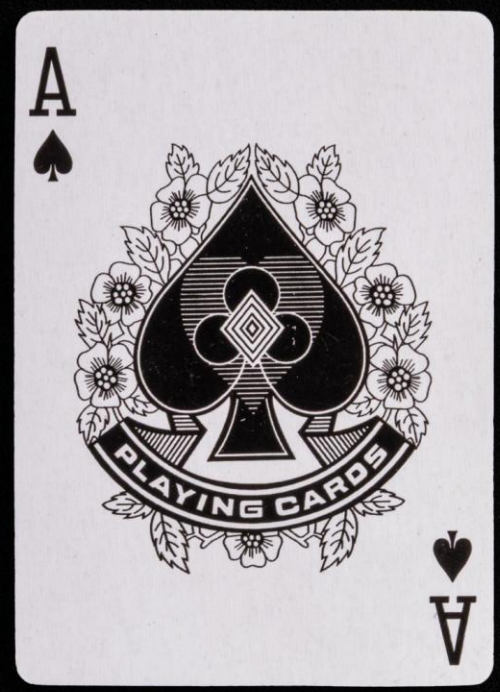
Ceramic Injection Molding (CIM) enables the production of high-precision components with complex geometries that are often difficult or costly to achieve using traditional manufacturing methods. Applications requiring extreme wear resistance, dimensional stability, electrical insulation, chemical resistance, or high-temperature performance are ideal for CIM.

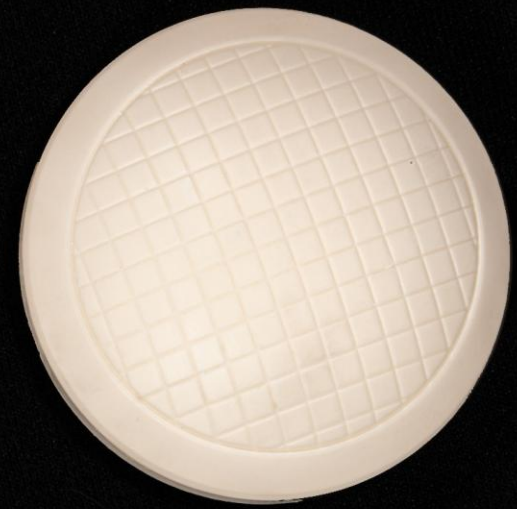
Learn more about

Expert Alumina Ceramic Injection Molding Company Near Me | Wunder-Mold

Why High-Stress Applications Choose Injection Molded Ceramics

The low-volume cover shown on the next page was developed to shield an expensive sensor assembly. By converting the design to CIM, the customer achieved a highly durable and cost-effective solution, making Wunder-Mold the winning choice. Thank you!





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