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New Directions for METAL MOLDING

Injection processes utilize magnesium, ceramics

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New Directions for Metal Molding

While metal injection molders anticipate new developments in binder systems, molders of injected magnesium look forward to the day when hot runner systems reduce cycle times and give greater control of mechanical properties.



Thixomolded® magnesium parts, manufactured by Thixotech, Inc. (Calgary, Alberta) for automotive applications.

By Robert S. Seeley

The firearms industry, with its difficult-to-machine, small parts, was one of the first to embrace metal injection molding (MIM). Remington Arms Company's Powder Metal Products Division, for example, has been producing MIM parts for some 20 years. And while other market sectors have—to greater or lesser extents—followed suit, providers of MIM services say that many engineers remain unaware of what MIM can achieve with small, complex, high-volume parts. Simply put, MIM needs to become better known.

"They (engineers) usually have only mild exposure to the technology, and underestimate what it can do,"

says Matthew Marley of **Remington Arms Company, Inc.**, Powder Metal Products Division (Ilion, New York).

Collectively, the processes of metal injection molding and ceramic injection molding are known as powder injection molding (PIM). The Metal Injection Molding Association estimates the North American PIM market at \$245 million—\$125 million for metal parts and \$120 million for ceramic parts. An estimated 25 MIM shops operate in the United States, half of them being captive shops and the other half custom shops. While the market is seeing its strongest surge in the automotive sector, activity is also strong in medical devices, elec-

tronics, and telecommunications.

"Metal injection molding offers cost savings due to its near net-to-net-shaping capabilities, and its smooth, as-sintered surface finish, typically a minimum of 32 RMS," says Maryann Wright, engineering supervisor at Remington's Powder Metal Products Division. "Often, two or more individual components may be molded and processed as one component."

Turning to MIM for its ability to produce small, complex-shape, high-volume parts, the automotive industry consumes parts by the millions. Metal injection-molded parts function in airbag systems, ABS brakes, steering columns, and fuel injectors, among other systems. Cellular phones are another popular application because they demand small, three-dimensional, high-volume parts.

Advanced Forming Technology (AFT), Firestone, Colorado, makes millions of side pins for the flip-top covers of Motorola cell phones. With volumes in the millions, MIM permits significant savings by eliminating extra steps in machining and inspecting, says Chris Rista, AFT senior sales/marketing manager. Metal injection molding is also attractive for intricate non- and minimally invasive surgical instruments. "These parts would be astronomically expensive to machine," Rista says.

Other applications span a sizable range. For example, in producing a ratchet, Remington's Powder Metal Products Division molded the head, the gears, and the dogs across 14 different size gears and four different size heads, and made them interchangeable. Parts ran to the tens of thousands.