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Magnesium *Flair*

Less ductile than steel, magnesium alloys require special screws and tightening methods.



Because of its large flank angle, the Mag-Form screw can be inserted and removed multiple times without damaging the threads. Photo courtesy Textron Fastening Systems

Magnesium is an attractive material for auto parts. It's 36 percent lighter than aluminum and 78 percent lighter than steel, yet it has a better strength-to-weight ratio than either metal. It's also highly moldable. Magnesium parts can be die-cast with walls as thin as 0.8 millimeter and draft angles of less than 0.5 degree. A large magnesium casting can often replace a steel fabrication comprised of many parts.

Automotive assemblers use magnesium alloys to make a host of parts for the interior, chassis and power train, including transmission housings, transfer cases, intake manifolds, support brackets, steering wheels, and instrument panel frames. Since 1990, the use of magnesium alloys in automotive applications has increased 20 percent annually, and a typical vehicle now contains 8 pounds of the metal.

Automotive assemblers aren't the only manufacturers who are taking advantage of magnesium's unique properties. The metal is increasingly being used in consumer electronics, power tools, lawn and garden equipment, sporting goods, aircraft and weapons systems. In fact, the use of magnesium alloys in manufacturing is expected to double over the next decade.

Flair

"Magnesium is no longer an exotic material," says fastening consultant Thomas S. Doppke of Sterling Heights, MI.

Unfortunately, while engineers have decades of experience fastening steel parts, there is much less knowledge about assembling magnesium parts. Threaded fasteners that work in steel or aluminum parts may be inappropriate for magnesium parts. The same can be said of screwdrivers. Torque, angle and speed settings that were appropriate for installing screws in steel parts may not work with magnesium parts.

Magnesium is not as ductile as steel, and that can cause problems when using

**"Fastening magnesium is like fastening glass."
—Thomas S. Doppke, fastening consultant**

threaded fasteners to assemble parts made of the metal. "Magnesium is brittle. It's like fastening glass," explains Doppke, a former engineer with General Motors Corp. "You can't use thread-cutting screws, because the threads break off. You can't use pierce nuts, because you can't bend the metal into the grooves. It doesn't work. The magnesium cracks."

"People think magnesium acts like die-cast aluminum or zinc, because [magnesium alloys] include those elements," adds Bob Schneider, program

■ By **John Sprovieri**
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