

## Lighter Magnesium Improves Power Tool Performance

### Wielding the Power of Lightweight, Durable Magnesium Tools

The power tool industry increasingly relies on die-cast magnesium components to offer durable, lighter weight designs that are easier to handle and manage over long work shifts – an important feature, especially for framing and construction crews on the job site.

Renowned power tool manufacturers, such as Stanley-Bostitch, Bosch/SKIL and Milwaukee Electric Tool Corporation, rely on magnesium alloys to greatly reduce a tool's weight without sacrificing power. Users may think that lighter weight means less power, but the opposite is true: using lighter die-cast magnesium for a pneumatic tool's housing or a worm drive power saw's gear case allows the design to accommodate a larger, more powerful motor for the same or less weight.

The Bostitch RN46-1 Coil Roofing Nailer, from Stanley Fastening Systems, is a prime example of an ultra-lightweight – 4.9 pounds – pneumatic tool that boasts the highest power-to-weight ratio of any roofing nailer, delivering 410 inch-pounds of energy. "We recently developed 'best in class' magnesium tools with greater features and benefits from framing and finish nailers that deliver lightweight, powerful performance to the professional," said Chris Dutra, Director of Product Management for Stanley Fastening Systems.

The Stanley-Bostitch motto "Built to Work™" applies to the magnesium housings used in their entire line of magnesium nailers and staplers, which achieve their lighter weight using magnesium alloy AZ91D. Bostitch product engineers chose magnesium because of its light weight and durability characteristics. Global Products Manager Dan Burgjohann explains, "Shaving off one pound makes a ton of difference to a professional framer after a long shift."

The die-cast magnesium components, combined with an over-molded rubber grip, offer Bostitch users maximum ergonomic comfort with minimal fatigue during prolonged hours of use. The magnesium housings are designed to improve the tool's overall feel and balance.



Lightweight Stanley-Bostitch Coil Roofing Nailer is ergonomically designed for professional roofers. Used to install asphalt shingles, the RN46 model is shown above. © Photo courtesy of Stanley-Bostitch. Used with permission.

### Streamlined Framing Nailers Feature Lightweight Magnesium

Three innovative Bostitch framing nailers also lighten the load for framers. Their F-Series nailers—F33PT, F28WW, and F21PL—all have lightweight magnesium housings for job site durability that deliver 1,050 inch-pounds of power, with many on-board features.



Magnesium cast housings provide user-preferred lightness, balance, and durability for the Bostitch F-Series of pneumatic framing nailers. The 7.9-pound F33PT (left) paper-tape nailer holds 85 nails; the 7.7-pound F28WW (center) wire-weld nailer holds 100 nails; and the 8.1-pound F21PL (right) plastic-collated nailer holds 65 nails. Magnesium power tools are preferred by construction crews for their improved feel and balance. © Photos courtesy of Stanley-Bostitch. Used with permission.

The magnesium die-cast housings combine with other innovative enhancements in power tool design, such as a push-button depth-of-drive to control how far a nail is driven. Bolt-on wear guards with rubber skid pads further protect the magnesium housings on the job site. The three models offer wire-, paper-, or plastic-collated drive nails, depending on what is stocked in the lumberyard or home center.

“Bostitch changed over to magnesium from aluminum a few years ago in its pneumatic nailer line for its reduced weight,” said Bostitch Territory Manager Harry Brown, “Professional contractors choose magnesium power tools based on their lighter weight, quality, and durability.”

The lighter Bostitch magnesium oil-free brad nailer and narrow crown stapler have in-line magazines for better handling, balance and accuracy. Better ergonomics are possible when weight is reduced, resulting in less user fatigue issues during work shifts.



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## Worm Drive Saw's Magnesium Gear Case The Premier Choice for Construction

For heavy-duty use on construction sites, contractors prefer the lightness of the powerful handheld worm drive power saw. Worm drive gears have thicker, larger teeth to maximize contact areas in high-torque applications. The top-selling magnesium worm drive saw comes from SKIL®, which is part of the Robert Bosch Tool Corporation, Mount Prospect, Illinois. Their Mag77, 7-1/4-inch Worm Drive SKILSAW® has 15 amps of power and uses magnesium alloy AZ91D gear and



The 7-1/4-inch Worm Drive power SKILSAW® SHD77M features magnesium alloy AZ91D for both the gear and motor housings, shaving a full two pounds off the unit's weight. © Photo courtesy of SKIL-Robert Bosch Tool Corporation. Used with permission.

motor housings to deliver lighter weight with easier handling.

Power tool retailer Berland's House of Tools, specializing in servicing building trades in the greater Chicago Illinois area, sells more Mag77s than any other worm drive. Berland's Vic Romano notes that over the long term, magnesium's lighter weight is what makes SKIL's worm drive saw so popular, "The SKIL Mag77 is our top selling worm drive power saw. Because the magnesium gear case is lighter, contractors prefer the saw's feel."

The lighter SKIL saw's magnesium housing incorporates an upgraded motor without making the unit too heavy, thus enabling an increased power output of 4,600 RPM. The overall benefit of using magnesium cast housings is that it shaves two full pounds off of the worm drive's weight, from 16.4 pounds in their SHD77 model to 14.4 pounds in the Mag77.

Gregg Mangialardi, SKIL's group product manager/saws, explains the significance of the two-pound weight drop: "Weight is one of the most important aspects of a power tool to a professional. Framers will make 50 to 150 cuts per day on two-by-fours or two-by-sixes, and that saw's weight is critical to minimizing fatigue."

Both the Mag77's gear and motor housings are magnesium. These two castings are securely bolted together by four screws. Mangialardi notes that the gear chamber is pressure-tested for leakage. The magnesium housings are hot-chamber die cast, and the castings are painted in a powder-coat process and machined to precise tolerances. The machining processes used include boring, facing, drilling, and tapping.

### Magnesium Provides Shear Endurance

The Milwaukee Electric Tool Company's new 18-Gauge Shear model 6852-20 features a heavy-duty die-cast magnesium alloy (AZ91D) gear case that allows for a durable, lightweight design with superior balance. The powerhouse shear has a tactile grip handle that provides user comfort and a 360-degree swivel head for optimal positioning, regardless of the cut angle. The Shear's variable speed trigger, at 0-2,500 strokes per minute (SMP), allows smoother acceleration as needed. The power shear is just 4.1 pounds, running at 6.8 amps.

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According to Roger Neitzell, Advanced Engineering Manager at Milwaukee Electric Tool, gear cases for their power shear, power drills, and Sawzall® reciprocating saws are hot-chamber die cast magnesium. "We use magnesium for two main reasons: lighter weight and the reduced costs from better dimensional accuracy with minimal or no machining," Neitzell says, "Our customers are constantly looking for lighter weight, more compact tools. Every tenth of a pound you can reduce the weight makes a difference. With magnesium, you can make thinner-walled sections, which uses less material – that's a dual weight reduction in density and geometry."

### Magnesium's Strength Proven for Outdoor Power Cutting



Husqvarna K750 Power Cutter's high-efficiency dual-charge 5hp engine delivers lower emissions and good fuel economy. © Photo courtesy of Husqvarna AB. Used with permission.

Heavy-duty outdoor cutting applications require tough equipment. Professionals rely on magnesium-based chain saws, clearing saws, and power cutters from Sweden's Husqvarna AB for durable tools that are considerably lighter than their aluminum counterparts. Magnesium alloy AZ91D is best from a weight/power ratio perspective, and according to Håkan Herbertsson, Husqvarna's Production Strategy Manager, magnesium is replacing composite materials in professional chain saws, since it has better strength and heat conductivity.



Thanks to magnesium, SKIL's® Worm Drive Power Saw is lighter, allowing a powerful 15-amp motor to cut through more material in less time, day in and day out. © Photo courtesy of SKIL-Robert Bosch Tool Corporation. Used with permission.



The Milwaukee Electric Tool Corporation's 18-gauge Shear's lightweight magnesium gear case design provides superior balance and durability in this compact and mobile power tool. © Photo courtesy of Milwaukee Electric Tool Corporation. Used with permission.

#### Fast Facts

- » Die-Cast magnesium power tools realize significant weight savings: 37 percent lighter than aluminum and 62 percent lighter than titanium.
- » AZ91D is the preferred magnesium alloy for power tool components.
- » The lightweight feel of magnesium power tools is preferred by professionals and do-it-yourselfers.
- » Magnesium housings and gear cases allow for ergonomic designs that offer better balance and comfort.



(Left): The Husqvarna K960 Power Cutter makes cutting metal, concrete, and steel easy with its lightweight magnesium alloy crank shaft and cutting arm. (Right): Powder-coat painted crank case components are measured. © Photos courtesy of Husqvarna AB. Used with permission.

"The magnesium crank cases and other structural components are cast and surface-treated against corrosion, and then powder-coat painted and machined. All magnesium scrap, except chips and low-grade scrap, is recycled in-house and reprocessed as liquid metal, which saves energy, since ingot remelting is not required," Herbertsson said. Husqvarna's foundry in Sweden has been casting magnesium for more than 40 years, using the cold-chamber die-casting method. Magnesium components are also supplied by companies in Taiwan, China, and the United States.

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On the job, the K960 cuts deep through concrete tube and many other construction materials; its light and durable magnesium parts help reduce vibration and make long shifts less fatiguing for workers. © Photo courtesy of Husqvarna AB. Used with permission.

Husqvarna's forestry clearing saws combine magnesium's low weight with high-powered motors, developed for professional use under demanding conditions. The saws remove trees and bushes in land and forest management applications.

Husqvarna's power cutter line handles stone, concrete, and steel cutting. These powerful engines efficiently reduce vibration, and a three-stage system filters away cutting dust from the intake air. The K960 has a 6.1 horsepower engine with dual charge technology for low emissions and high efficiency. The K960's crank shaft and cutter arm are cast in magnesium.

Husqvarna's chain saw line includes powerful saws for professional logging, as well as lightweight chain saws for pruning trees. The line relies on durable cast magnesium crank cases to maximize performance and reliability.

### Why Magnesium?

In addition to magnesium's excellent strength-to-weight ratio for die-cast components, the ultra-light metal offers significantly better heat dissipation than plastics, the best vibration dampening of any metal, ease of machining, electromagnetic shielding, and the major environmental advantage of being recyclable.



Magnesium makes the clutch cover, oil pump housing, and extra heavy-duty crank case in this Husqvarna 385XP 6.3hp professional chain saw steady and reliable for felling trees and logging, combining light weight, at 15.4 pounds, with high power. © Photo courtesy of Husqvarna AB. Used with permission.



To learn more about the benefits of designing products with magnesium, contact the **International Magnesium Association**  
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