CUTTING PERFORMANCE REDEFINED

Debunking the myths surrounding rescue tool cutting forces.

HURST JAWS OF LIFE®

www.JAWSOFLIFE.com

Essential Elements in Cutting Capability

Typically, rescue cutters have been marketed by maximum cutting force. The standard has been - the more, the better.

While cutting force and operator technique is very important, cutter blade design, which includes blade geometry and composition in conjunction with the manufacturing, forging and heat treating processes, is a key factor when determining a tool's ultimate cutting capability.

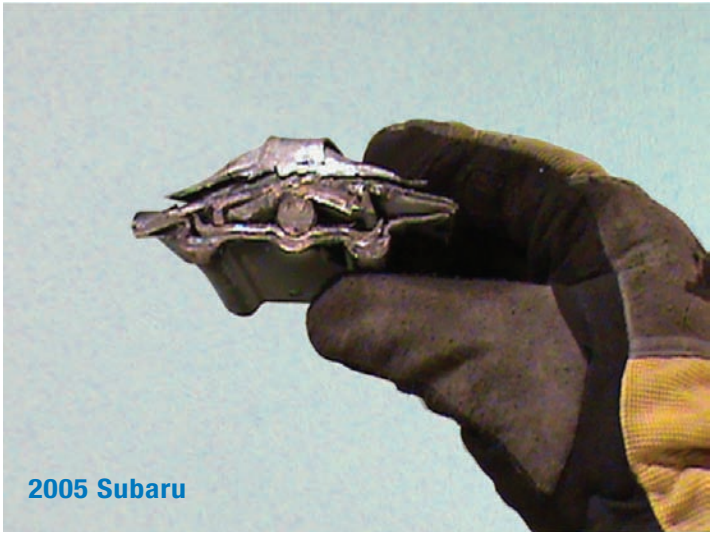
Because it comes down to saving lives, Hurst Jaws of Life® is dedicated to ensuring that rescuers, and those making equipment decisions on their behalf, understand the key elements that dictate cutter performance. We believe you deserve to be armed with the facts, so you can choose the best rescue tools for your community.

Drawing Capability

Often overlooked is the cutter blade's ability to draw material to the rear of the blade, which is a key component in cutting capability. An effective cutter draws the metal to the rear of the blade where the cut force is greatest.

Cutting Force at the Right Point

Today's modern vehicles use highly advanced types of steel in their construction. These highly reinforced structures do not compress into a tight bundle like the A-Posts, Roof Rails and B-Posts of passenger vehicles built in the 80s and 90s. Instead, when the cutter blades make contact with the high-strength outer layer of steel in today's significantly larger posts, they are immediately up against the ultra-high-strength press-hardened Boron sheet metal and Martensite Boron Steel which lines the inside diameter of the structure. All of this means that when cutting large diameter posts on today's vehicles, maximum cutting energy is required at the tips of the blades at near full open position.



2005 Subaru

2011 Mercedes

These advanced types of steel do not cut. And, compression of these structures is limited, which results in fracturing at greater than half their original diameter.

Real World Capability v. Laboratory All Star

Cutting Force Calculations

There is some confusion in the marketplace regarding how cutting forces are calculated, why advertised cutting forces may vary from NFPA (National Fire Protection Agency) guidelines, and how some manufacturers inflate cutting force measurements for marketing purposes.

In the Hurst Jaws of Life testing lab, our engineers calculate force measurements based on known facts, and then conduct real-world tests with production-grade tools to verify the data. And finally, we make sure our products are tested, retested, and tested again, until we are completely certain they can handle even the toughest emergency rescues. This data is then published internally and shared with customers.

Some manufacturers go the other direction. They push equations to the brink when calculating force measurements in order to market higher cutting forces – even going so far as to publish cutting force numbers that could never be attained in the real world.

NFPA Compliant

There is also confusion regarding the meaning of NFPA Compliant. To be clear, the NFPA does not provide certifications. The organization publishes a list of standards which independent labs, such as TUV and UL, use to certify that a product meets those standards.

The NFPA publishes a respected process for testing and making claims based on a cutter's ability to cut different size and shape metals. These ratings are published as A7, B6, etc. These letters and numbers represent different types and sizes of raw metals – specifically solid round bar, flat bar, square tube, round pipe and angle iron – that must consistently be cut 12 times in a row with no damage to the cutter blade or the tool. All compliant cutters will feature a label stating NFPA 1936 Compliant.

This standard provides the industry with a valuable starting point, but it is important to remember that rescuers cut vehicles and other implements to free trapped and injured people in environments that are far from the pristine nature of a lab. Rescuers do not cut perfectly round bar stock at 1¾ inches, as would be the case with a tool listed as an A9 in NFPA tests.

It is also important to note that the NFPA has not issued a standard for cutting Boron type materials.

Cutting Technique

With most of the current hydraulic cutters, the most successful tool position for cutting through a highly reinforced B-Pillar post is parallel with the vehicle's body ring. In this position the blades are able to close more before coming into contact with the metal, which generates more force than if the tool was fully open and perpendicular to the vehicle. This means the tool is positioned in the window, which could potentially block access to the injured occupant for medical care or worse, the rescue cutter could rotate inward making contact with the patient.

S 700E

S 700

Hurst Jaws of Life® S 700 Series

The new Hurst Jaws of Life® S 700 series cutter design has improved blade geometry, which enables the forged shock resistant tool steel blades to attain their maximum cutting capability at a 5-inch opening. The blades on the Hurst Jaws of Life S 700 Series cutters feature a 7.3-inch opening in the fully open position and are specifically shaped to generate a high degree of power at the tip of the blade, making them more suitable for cutting the larger diameters and stronger steel being encountered by rescuers today.

The tip of the blade on the new S 700 series cutter has a punch-like design. Placing the crook of the inside cutter blade on the pillar-post weld flange, the tip of the outside blade is able to more easily punch through the highly reinforced areas of the A Pillar-posts and B-posts while maintaining the tool's position outside the vehicle. This new cutter blade design eliminates the tendency of the tool to rotate into the passenger compartment.

Additionally, the S 700 series cutter blades have three distinct cutting angles. As the blades close, the press-hardened Boron sheet metal and Martensite steel cracks and fractures. As the cutters continue to close, blade angles change resulting in improved draw of the post material to the strongest cutting area at the rear of the blades.

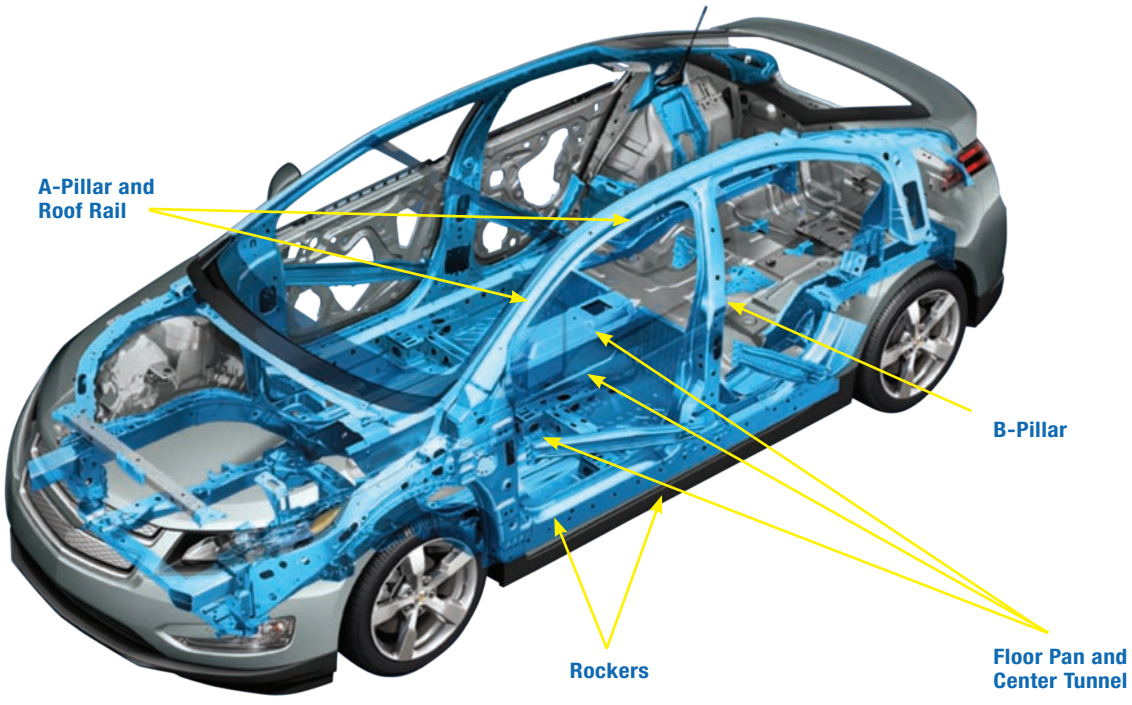
All Hurst Jaws of Life cutter blades, including those on the new S 700 series, feature a forged shock-resistant tool steel that has been uniquely heat treated using a four-step tempering process, which makes the blades dent and chip resistant while maintaining blade ductility. This is crucial when cutting today's high-strength steels.

The S 700 series' extrication capabilities include shipboard damage control, structural collapse, aircraft egress and hundreds of other real world challenges. The S 700 series is fully equipped with built-in safety features, such as dead man controls, hand-guards, and preset internal relief valves.

The Hurst Jaws of Life S 700 series includes the S 700E and S 700 Cutter. The S 700E is part of the eDRAULIC line of rescue tools. These tools were engineered to free rescue workers of power units and heavy hoses, eliminating the set-up time associated with traditional rescue tools.

eDRAULICs feature the same impressive forces of standard hydraulics in a self-contained platform and provide operators with the freedom to operate in battery mode or plug into a power source for continuous operation. These tools are powerful enough to stand alone as a complete rescue set, or to be used as a supplement to add portability to any existing rescue tool system. The eDRAULIC product line includes a spreader, a ram, two cutters and combination tool including the S 700E that delivers more cutting force in the relevant work area than other cutters on the market.

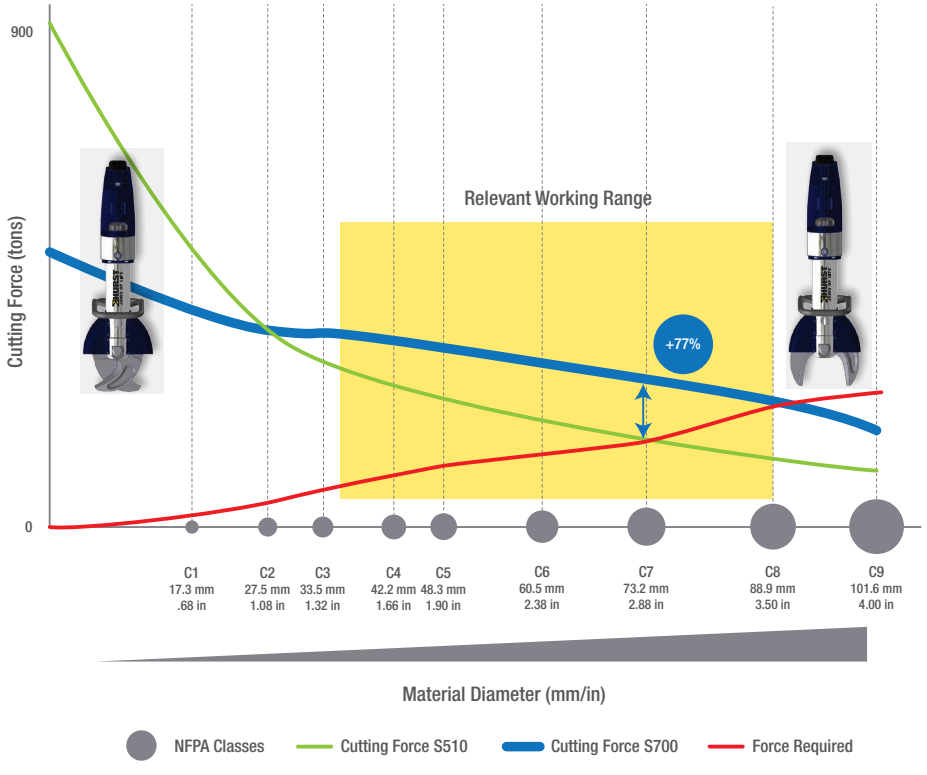
WHERE IS HIGH-STRENGTH STEEL TYPICALLY FOUND IN TODAY'S VEHICLES?



Note: Locations and characteristics of high-strength steel may vary depending on the vehicle. These material variations may include any combination of Martensite steel, Boron press-hardened steel, ultra-high-strength steel, high-strength steel and dual-phase steel.

Maximum Cutting Force

Most of the hydraulic cutters on the market today achieve their advertised maximum cutting force as the blades' leading edges cross past each other nearest to the blades' pivot point. This means the cutter's weakest point is when the blades are in the full open position.



CUTTING PERFORMANCE

The Hurst Jaws of Life® S 700 Series cutter offers up to 77% more cutting power exactly where profiles of a car body are cut. The theoretical maximum cutting force for many cutters applies at a material diameter close to zero, which is an irrelevant figure in real world applications. It also shows that maximum forces for traditional cutters apply at small material diameters where the force which is required to cut the material is very low (red line).

HURST JAWS OF LIFE®

Cutter S 700

Blade Opening	7.3 in/185 mm
Dimensions: l x w x h	31.1 x 11.8 x 10.2 in/790 x 300 x 258 mm
Weight	47.0 lbs/21.3 kg
Certification	A8/B9/C8/D9/E9

Cutter S 700E

Blade Opening	7.3 in/185 mm
Dimensions: l x w x h	36.4 x 11.8 x 11.4 in/925 x 300 x 290 mm
Weight*	54.1 lbs/24.5 kg *Weight without cable plug or battery
Certification	A8/B9/C8/D9/E9

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