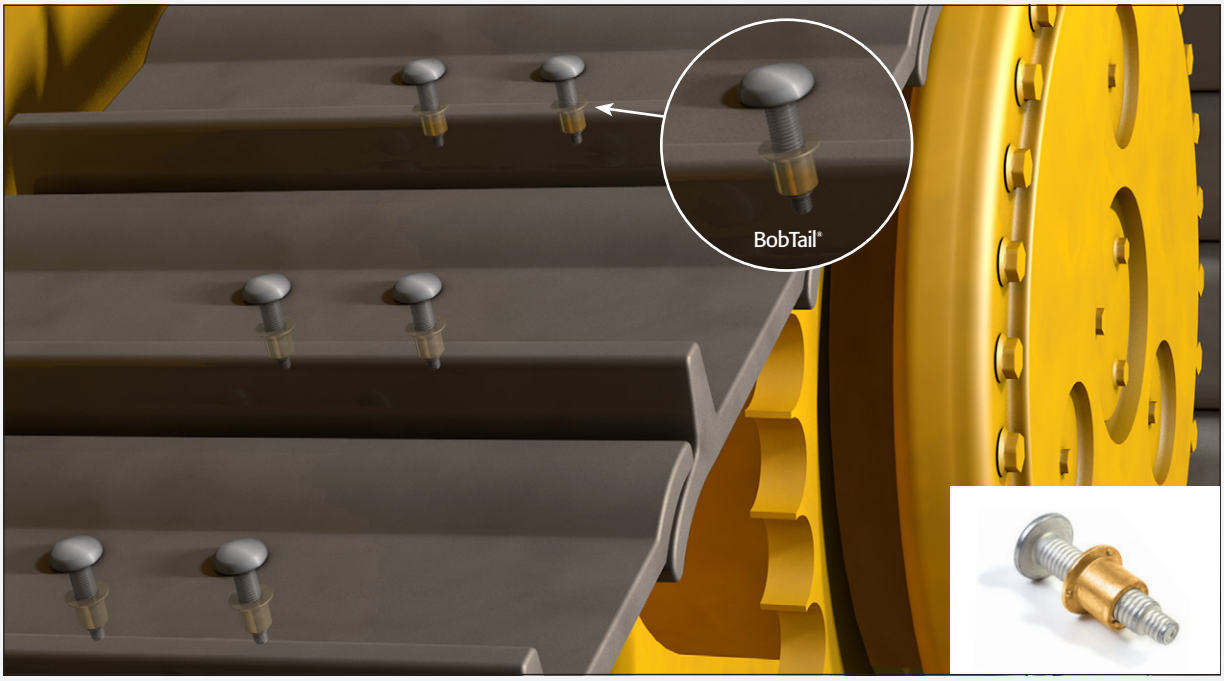
HOWMET AEROSPACE

Huck® Fasteners for Heavy Equipment

Alternative to Welding
Vibration Resistant
Quick Installation

Heavy-Duty Fastening for Heavy Equipment



High-strength, fast and easy installation, along with unmatched vibration resistance are what make HuckBolts® the smart choice for heavy equipment assembly applications, whether for agriculture, mining, or construction.

High Clamp Allows Welding Replacement and Lighter Equipment

In many applications, HuckBolts have been proven superior to all other forms of assembly for speed and accuracy of installation, safety, environmental friendliness, and overall productivity.

HuckBolts can also contribute to lightweighting of equipment by allowing aluminum to be used instead of steel. While replacing steel with aluminum is an excellent strategy for lightweighting, the problems associated with welding aluminum have often precluded its use. However, the strong clamp performance of HuckBolts provides the joining power to attach aluminum elements without welding. Because Huck fasteners offer higher clamp than conventional fasteners, fewer or smaller diameter Huck fasteners can be used, further reducing weight. And HuckBolts deliver shear and tensile strength exceeding that of conventional nut and bolt fasteners.

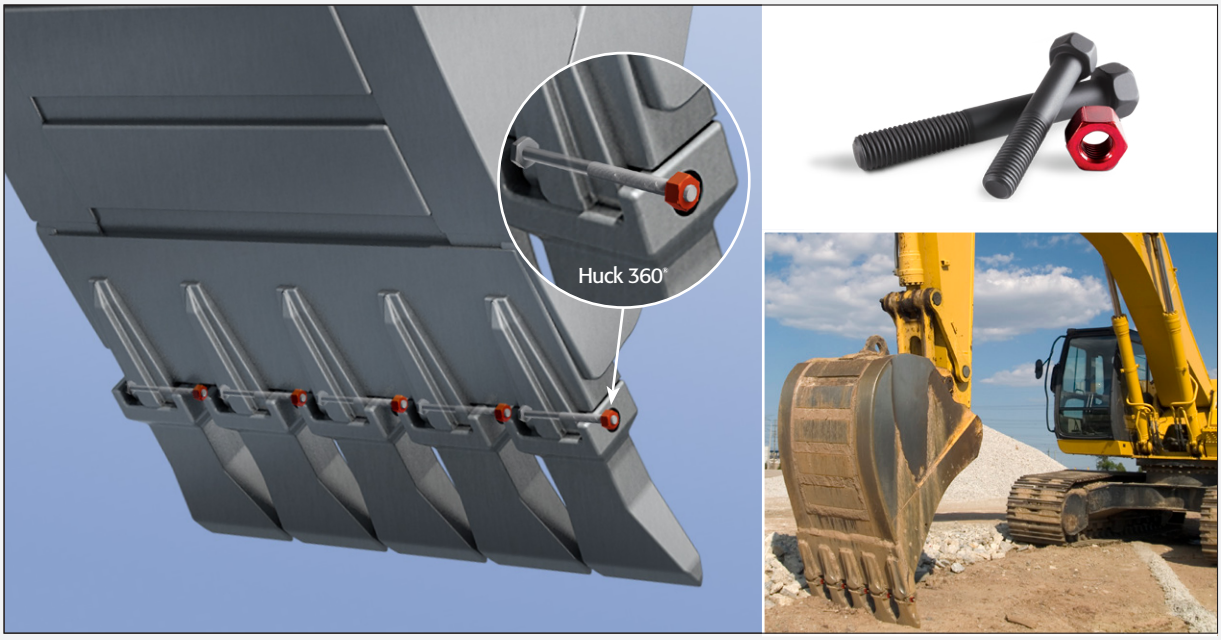
These engineered fasteners are installed using a unique direct-tension/swaged-on method, providing for a smooth, jolt-free installation. The potential for repetitive stress syndrome, often experienced with torque wrench installations, is virtually eliminated. In addition, as compared to welding, using Huck fasteners does not require highly trained installation personnel, and provides for fast, safe, and accurate assembly.

High-Performance on the Job

Whether in the mine or on the construction site, hydraulically powered equipment encounters tough, vibration-intensive conditions. Dozers, excavators, and other heavy equipment need the high-strength, vibration-resistant hold only HuckBolt® fasteners can deliver. HuckBolts consistently provide extremely high shear and tensile strength, and are proven to hold tight in extreme, high-vibration environments such as mining and construction. In addition, HuckBolts are highly reliable for use in equipment cabs, doors, floors, and other attachments.

Safety and Productivity During Assembly

In many assembly applications, HuckBolts have been demonstrated to be superior to welding in terms of speed and accuracy of installation, safety, and overall productivity. Quick, easy installation means improved productivity.



Huck Fasteners For Heavy Equipment Assembly

HuckBolts®

Huck 360®

The Huck 360® nut and bolt system is designed for applications where the joining performance of a HuckBolt® is required, but removability and/or standard tooling are also requirements. The only Huck fastener requiring torque for installation, this breakthrough system delivers 5 times the fatigue life of a standard threaded bolt. The Huck 360 can be installed and removed 300% faster than conventional locknuts, adding to the efficiency and productivity of a wide range of assembly operations.

Available Sizes: 3/8", 7/16", 1/2", 5/8", 3/4", 7/8", 1", 1-3/8"
10mm, 12mm, 14mm, 16mm, 20mm, 24mm, 36mm

BobTail®

Engineered to meet the challenges of a wide range of heavy equipment assembly applications, Huck® BobTail® offers high performance, vibration resistance, and reliability in a unique, pintail-less design.

Available Sizes: 1/4", 5/16", 3/8", 1/2", 5/8", 3/4", 7/8", 1",
12mm, 14mm, 16mm, 20mm

Materials: Steel, Aluminum, Stainless Steel

Headstyles: Round, Truss, 90° Flush, Flanged, 98T

U-Spin®

U-Spin® HuckBolts help speed up production with a simple, virtually foolproof installation process that's fast and precise. In fact, U-Spin can be installed in 45-60 seconds – roughly half the time it takes to install conventional U-bolts.

Available Sizes: Sized to customer requirements

Materials: Steel

Advanced Huck Tooling

Huck offers a full line of advanced, pneudraulic and heavy-duty hydraulic installation tools and nose assemblies that work with each engineered fastener. Supporting Huck hydraulic tooling is Huck's line of Powerig® power units.

Model
BTT57

Model
2620

Powerig®
Model 940

U-Spin®
Installation
Manifold

Huck Structural Blind Fasteners

BOM®

The Huck BOM® (Blind, Oversized Mechanically locked) fastener is so strong, one can do the work of up to four conventional fasteners. Its unique push-and-pull installation design makes it ideal for oil and gas industry use.

Available Sizes: 3/16", 1/4", 5/16", 3/8", 1/2", 5/8", 3/4"

Material: Steel, Stainless Steel

Other Structural Blind Fasteners

When only one side of the joint material is accessible, performance-engineered Huck structural blind fasteners are the smart choice. Each Huck blind fastener offers unique features that make it ideal for certain applications. Offering the industry's best range of shear and tensile strength, Huck structural blind fasteners include HuckLok®, Magna-Lok®, Magna-Bulb®, and Auto-Bulb™.

Available Sizes: 3/16" – 1/2"* **Materials:** Steel, Aluminum, Stainless Steel*

Headstyles: Protruding, Truss, 100° Flush, 100° Oval Countersunk, Countersunk*

**Not applicable to all Huck structural blind fasteners*

Related Howmet Fastening Systems

KEYSERT® Solid Thread Inserts

Keysert® solid, one-piece, key-locking inserts are used to repair damaged threads or for use in original equipment. The Keysert® locking keys provide a positive mechanical lock, which prevents rotation due to vibration or torsion. Keyserts are available in carbon or stainless steel, with internal thread diameters ranging from #6 through 1-1/2" and external diameters ranging from 5/16" to 1-7/8".

Recoil® Wire Thread Inserts

Recoil® threaded inserts deliver positive locking performance and long thread life. Made from 304 Stainless Steel as a standard, Recoil inserts are also available in a wider range of materials including Inconel, 316 Stainless Steel, and Phosphor Bronze. Recoil sizes range from #2 through 1-1/2" *(inch series)* and M2 through M39 *(metric series)*.

Marson® Blind Rivets

Proven in a wide range of assembly applications, Marson™ blind rivets are available in Buttonhead, Large Flange, and Countersunk headstyles in a wide range of materials and sizes ranging from 3/32" to 1/4".

Marson® Rivet Nuts

Marson® offers a wide selection of rivet nuts that provide permanent thread placement in thin materials while reducing the surface damage that can occur with other fastening methods. These rivet nuts are available in a wide variety of styles, with grip ranges from 0.020" to 0.500".

Huck Fastening Technology

Vibration Resistance: How Huck Does It.

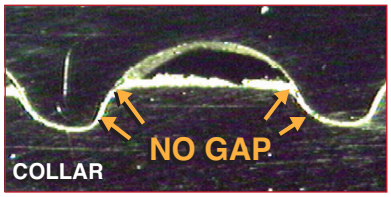
Huck engineering. It's what makes a HuckBolt a HuckBolt. And, it's what gives each C50L® BobTail,® and Huck 360® its strength and vibration-resistant properties – the highest level of vibration resistance you'll find in the industry.

Eliminating the Gap.

In conventional nut and bolt installations, gaps between nut and bolt threads are a source of potential loosening. The HuckBolt design practically eliminates these gaps, by featuring full metal-to-metal contact between the swaged-on collar and the pin. This unique swaged connection provides unwavering vibration resistance, even in the most vibration-intensive environments.

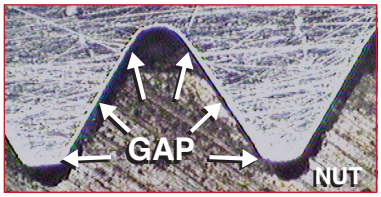
Gap Elimination Comparison

HuckBolt®



The swaged collar forms over the lock thread, and eliminates the gap.

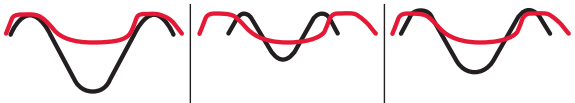
Standard Bolt



Regular nuts and bolts have gap, which allows for loosening by vibration.

When compared with conventional nuts and bolts, HuckBolts have a much larger cross-sectional area and larger root radius, resulting in a much stronger and more secure joint. In fact, HuckBolts have up to 30% more bolt cross-sectional area, and up to 5x larger root radius than regular bolts, depending on the bolts used.

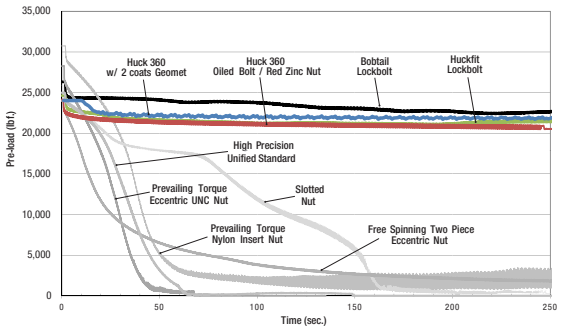
Bolt Thread Comparison



BobTail vs 5/8-11 UNCR	BobTail vs 5/8-11 UNFR	BobTail vs M16 x 2
30% More Bolt Cross-Sectional Area	12% More Bolt Cross-Sectional Area	18% More Bolt Cross-Sectional Area
5X More Root Radius Than UNCA Threads	8X More Root Radius Than UNFA Threads	5X More Root Radius Than Metric Threads

Transverse Vibration Comparison

Huck Fasteners vs. Locking Nut Designs



Huck vs. Conventional Joining

As compared with conventional torqued-on nuts and bolts and when contrasted with welding, Huck fasteners offer consistent clamp that is designed into the fastener itself – clamp integrity is not dependent on the tool or the operator.

Huck fasteners offer a combination of a reliable, vibration-resistant joint, and a safe, efficient installation process. Even in the most vibration-intensive applications, Huck fasteners are proven to never come loose, and maintain strength and structural integrity for the life of the joint.

Huck Vs. Torque
Clamp: The True Measure of Joint Integrity.

Torque has long been the standard by which tightness of a joint was measured. However, clamp has been proven to be the true indicator of whether or not a joint exhibits high-strength and long life. Only HuckBolts, which use the direct tension/swaging method of installation, deliver that consistent clamp. To prove it, Huck engineers tested conventional nuts and bolts and established that even when torque is consistent, clamp isn't. The result of that testing is found below.

TORQUE @226FT-LB*

GRADE 8 FASTENER	CLAMP LBF TEST 1	CLAMP LBF TEST 2	CLAMP LBF TEST 3	CLAMP LBF TEST 4	% VARIATION
Free Running Nut	15,000	20,000	21,000	18,000	40%
Nylon Lock Nut	21,500	18,000	18,000	24,000	33%
Stoverized Lock Nut	26,000	21,000	28,500	23,000	36%

*Results based on 5/8" diameter bolt.

Because HuckBolts are not subjected to torsion during installation, they can safely be taken to higher preload values than conventional bolts. This installation requires direct tension only, while conventional bolts are under a combination of tension and torsion during installation.

Conventional bolts develop torsional forces from friction and geometric factors between the mating threads, resulting in a reduction of yield and tensile strength of 10% to 20%.

Huck Vs. Welding
HuckBolts Change The Equation.

While welding has long been utilized to deliver a secure joint, there are several strong reasons to consider a proven alternative – direct-tension, swaged-on HuckBolts. Fastening with vibration resistant HuckBolts instead of welding offers five key benefits over welding: safety, simplicity, speed, cost-savings, and structural integrity. Utilized over more than 60 years in the harsh trucking and rail industry environments, Huck fasteners have proven they perform.

HOWMET AEROSPACE

Howmet Fastening Systems

Industrial Division Brands

HUCK marson RECOIL KEYSERT Camloc SIMMONDS SNEP

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