



**SmartBolts®**

**Visual Indication  
System**



We are the world's leading provider of visual tension indication technology. Our technology, trademarked as the Visual Indication System™, measures tensile force by associating the elongation of a fastener with a distinct color spectrum. We develop, manufacture and embed this technology with a wide range of fasteners, generating the SmartBolts® product line for industrial and OEM markets.







We start with high-quality bolts and convert them to SmartBolts.

“ **100% QUALITY TESTED**

Each SmartBolt is rigorously and individually tested.

“ **CERTIFIED**

Our engineers develop designs tailored to meet customer requirements.

“ **MEETS THE TOUGHEST STANDARDS**





Provides a **visual color indication** of the actual tension on the fastener.

**More accurate** than a torque wrench, since variable friction factors are not involved.



Indicator is **re-usable** and should work for the service life of the fastener.

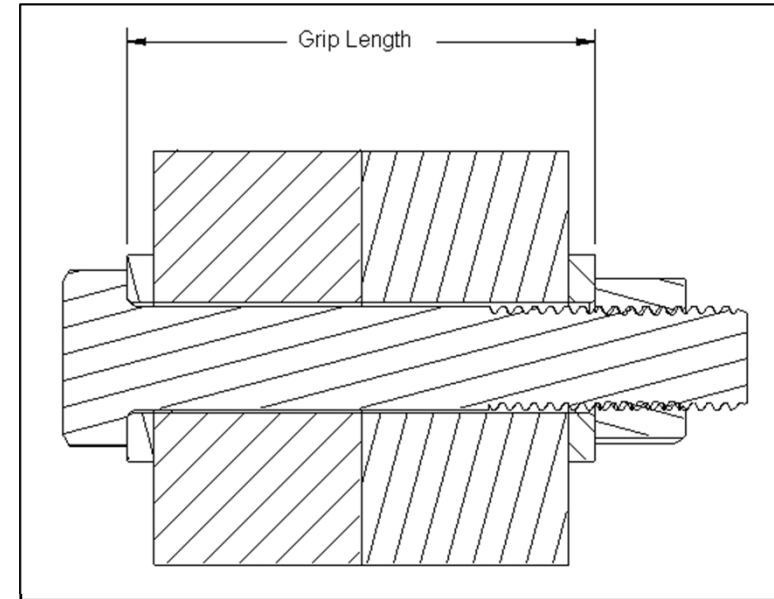
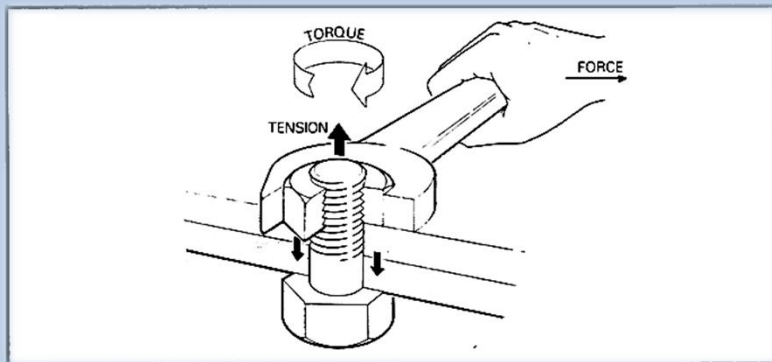
Indicator mechanism is **customized** during the design process to indicate at the required tension for the application.



**Tension** is an axial force opposing clamp force.

**Tension** is what holds your bolted joint together.

**Torque** is a rotational force.

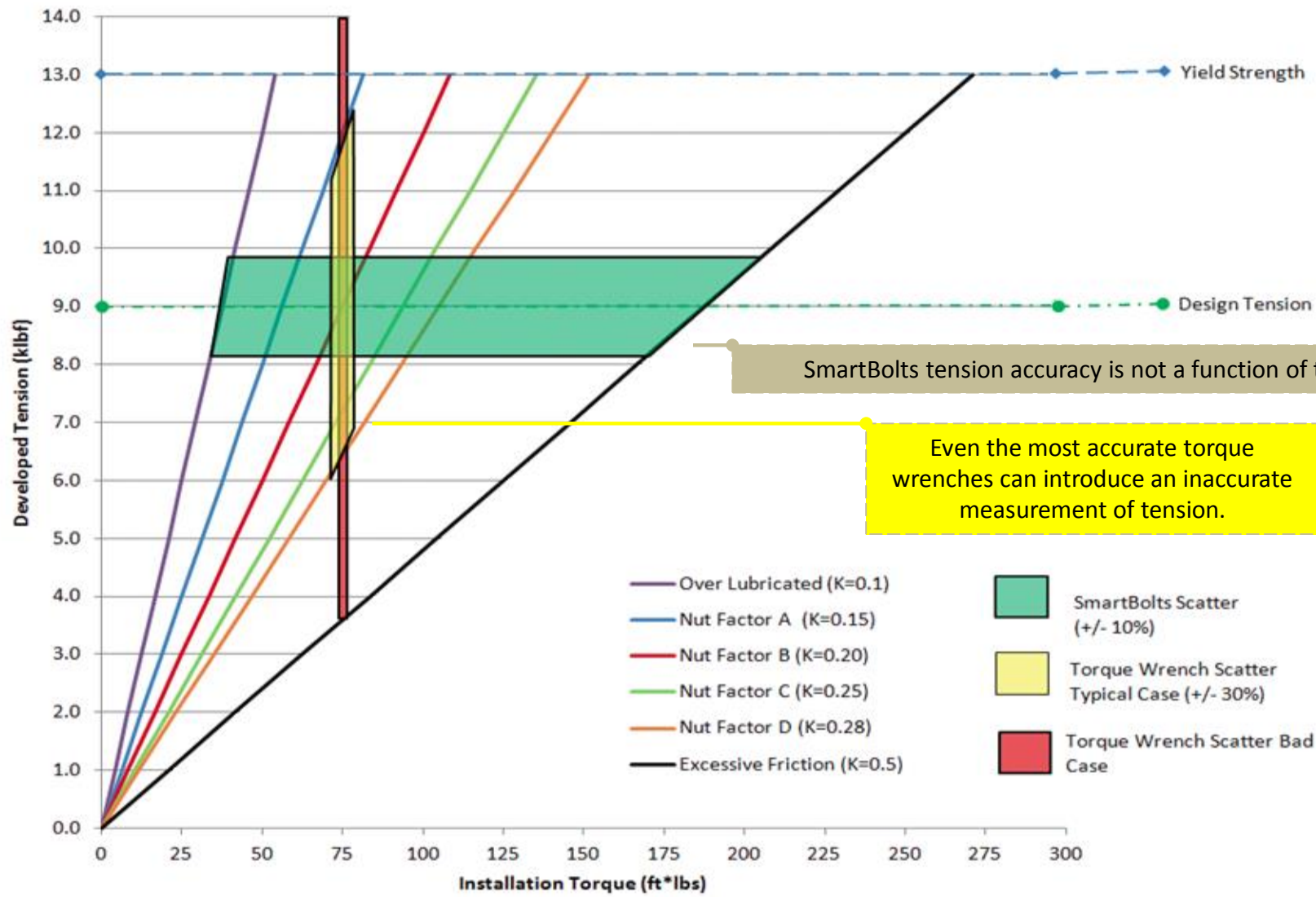


The torque/tension relationship is **unknown**.

you had a way to **measure tension directly?**

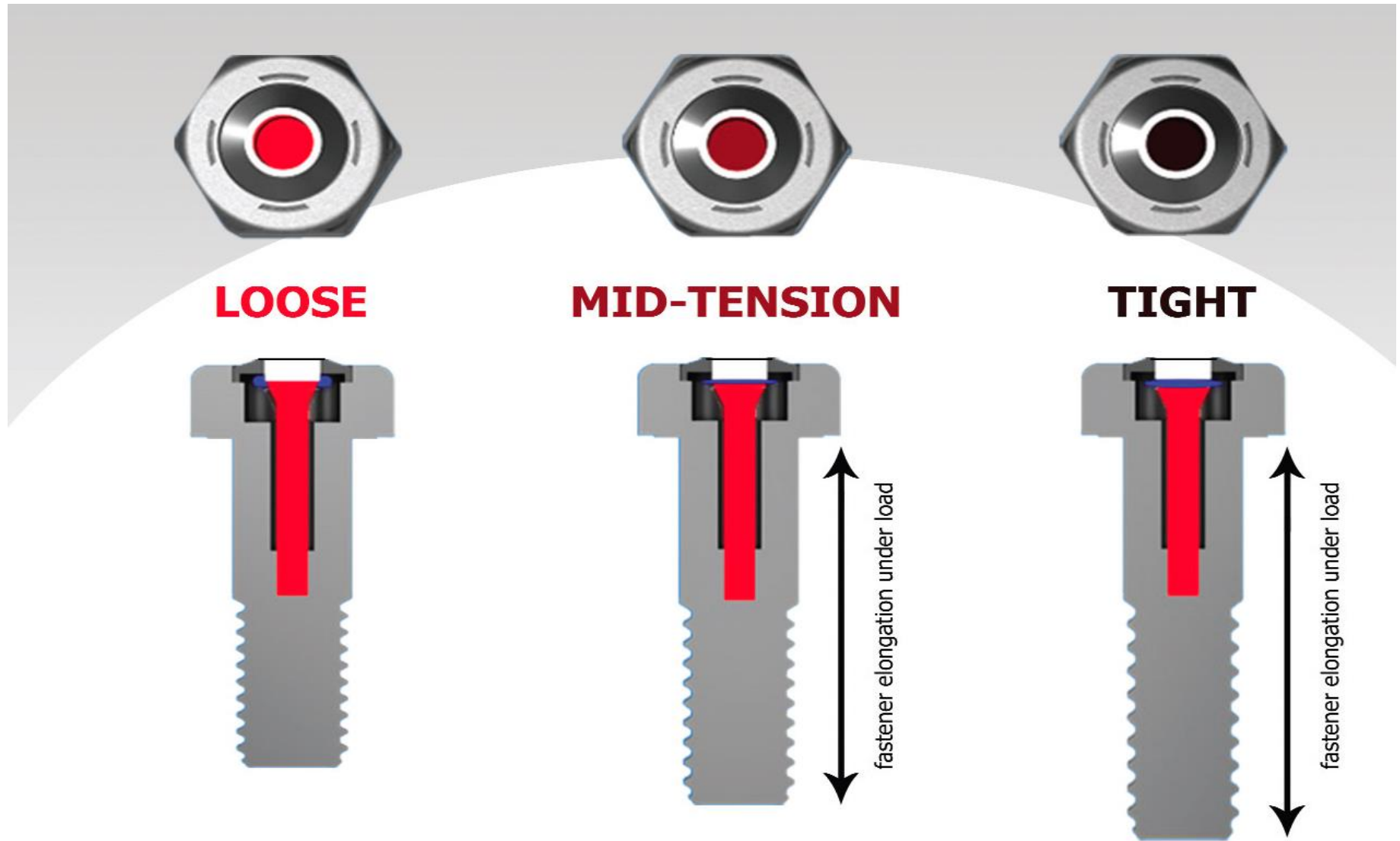


## Torque Tension Relationships for a 1/2"-13 SAE Grade 5 Zinc Plate Bolt



13

9





The smallest standard SmartBolt has a **7/16"** shank, or **1.25 inches** in length (**M10 x 30mm**).

The largest standard SmartBolt has a **1-1/2"** shank, or **12 inches** in length (**M36 x 300mm**).

**Any plating or thread type.**

Standard SmartBolts are made from hex-head bolts or cap screws.

We can convert other externally-threaded bolts.

We can convert studs and socket-head bolts, with some limitations.





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Know for certain that your bolts are **doing their job.**

Take the guesswork out of safety.

**Immediate** and **accurate** verification of tension.

SmartBolts are **accurate to within 10% of design tension** and measure actual fastener elongation under load.

Bolts fitted with our indicators can be used and re-used time and again with an expected useful life of **20+ years.**

**Save now** on installation and **save later** on maintenance costs.

The cost of SmartBolts is a fraction of that of strain-gaged bolts or other products performing an equivalent function.



Ensure **critical joint performance**

**No special tools or training required**  
for installation or maintenance

**Reduce maintenance costs**

Enhance **safety**

Significantly **increase “up-time”** in  
applications

Accurately measure joint tightness  
based on **principle of tension** as  
opposed to torque





## **Save on Design**

Incorporating SmartBolts into your design may mean less of everything, saving you and your customer time and money.

## **Save on Installation**

SmartBolts unique design eliminates the need for special tools or wiring during installation.

Simply tighten the bolt until the indicator turns the proper color and move to the next one.

## **Save on Maintenance**

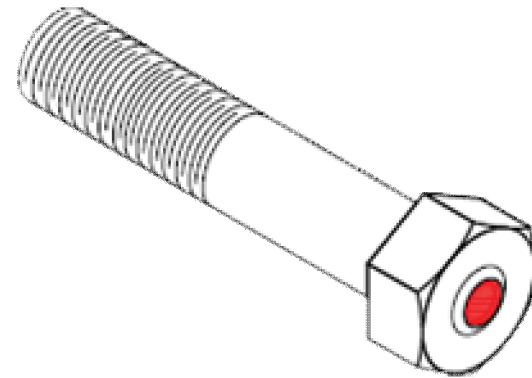
Visual indication is safer and it saves time and money.





SmartBolts are currently in use in the following industries and applications:

- “ **Electrical Distribution**
- “ **Industrial Machinery**
- “ **Critical Structural**
- “ **Materials Processing**
- “ **Heavy Equipment**
- “ **Mining**
- “ **Radar Towers**
- “ **Press Dies**
- “ **Machining Fixtures**
- “ **Amusement Rides**







DTI SmartBolts have become **the premier option** to secure busway joints for busway manufacturers globally, including General Electric, Eaton, Siemens, and Square-D (a subsidiary of Schneider Electric).

A **visual, no-touch inspection** is simple with the color indication of DTI SmartBolts.





Bay Shore Systems, Inc. currently uses SmartBolts in its LōDril series of excavator drilling attachments.

SmartBolts have been **standard on all LōDril units** since 2008.

These augers can weigh more than one ton and must be installed in the field by end-user personnel, who have benefited from SmartBolts' **safer operational procedures.**



# Heavy Equipment

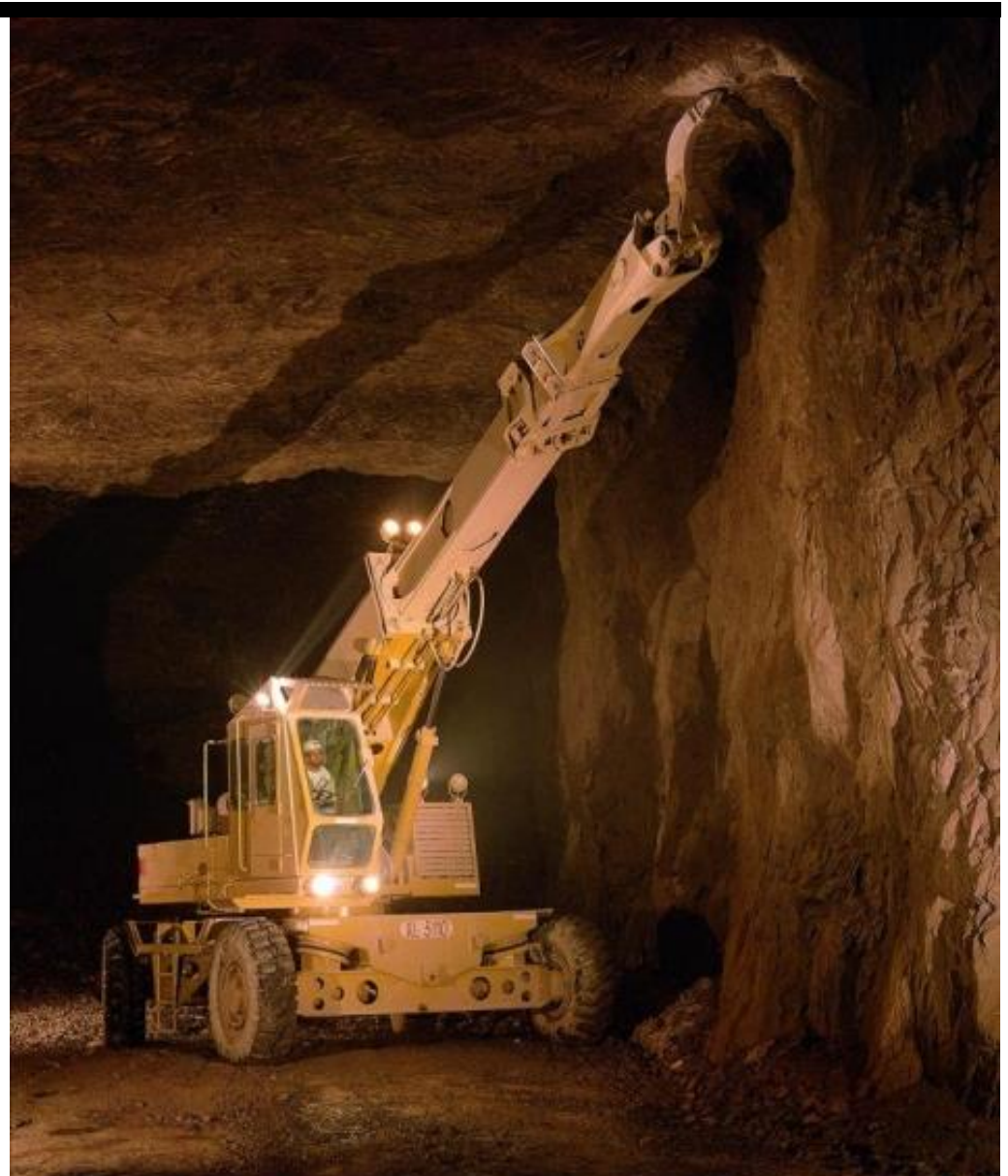


Operations at the Sifto Mine in Ontario, Canada – one of the largest salt mines in the world - requires excavating salt from the walls of the mine with scalers.

The cab and arm of this equipment is secured to the wheeled base with an array of 40 critical bolts.

Windsor Salt installed SmartBolts in these critical locations to **ensure proper preload at installation.**

Required weekly maintenance is now efficiently completed with a simple **visual inspection.**





# Press Dies



US Farathane is a leading supplier of engineered injection molded parts to the automobile industry.

Die setters for injection mold must bolt heavy dies in place to withstand **hundreds of tons of pressure** during the molding process.

When a die slips, it results production runs of poor quality. Certainty of correct bolt preload has been a constant challenge for USF for years.

SmartBolts were chosen to solve this ongoing problem and are now used to **ensure proper die bolt tension** during daily changeovers.





# Heavy Equipment

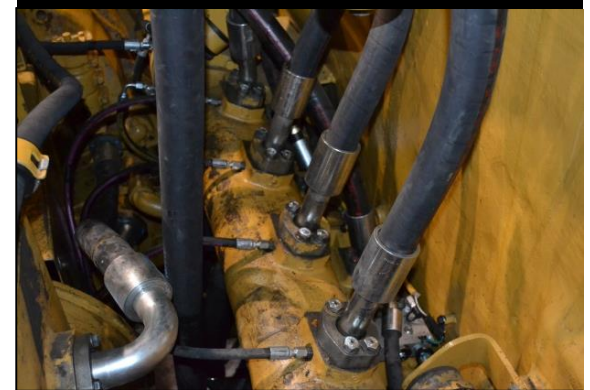


Suncor Energy operates fifty-five CAT 797 Mining Trucks in the Oil Sands mining operations in northern Canada.

Suncor had experienced an outbreak of engine fires on these trucks, which created an ongoing safety and operational risk.

The root cause of the engine fires was discovered to be improper tension on split flange bolts which caused fuel to leak onto the engine and ignite.

SmartBolts were chosen to **solve this problem**. Forty-eight SmartBolts per mining truck are used, and as a result, have **prevented any further leaks or engine fires**.

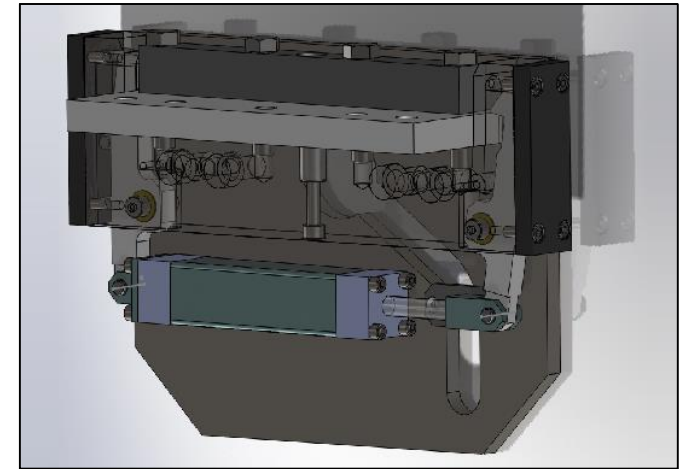




## ENGINEERED AUTOMATION SYSTEMS INC

Engineered Automation Systems, Inc. (EASI) is a designer and builder of custom production automation systems.

EASI developed a tool retainer system for a Fortune 100 manufacturer, many of which must be bolted on to 3,000 lb. machinery for use in production lines.



**TOOL RETAINER**

The customer experienced difficulty properly securing the tool retainer, which caused unsafe conditions, operational problems and maintenance concerns. The tool rotates and becomes inverted during operation which adds to safety concerns.

EASI chose to incorporate SmartBolts in its design, which allowed end users to **easily apply proper preload** by using the **intuitive color indicator** in the bolt head as a guide.



NASA's Marshall Space Flight Center in Huntsville, Alabama uses 1 x 8" SmartBolts.

SmartBolts are installed at **all four corners** of the Large Structure Assembly, a platform 80 feet on each side that travels up and down on four columns.

The bolts play a role in positioning the platform at any level, keeping it **secure** and **properly aligned**.





Rockwell Collins uses SmartBolts in its series of full motion flight simulators, designed for military and commercial flight training.

M24 DTI SmartBolts with a design tension of 36 kilopounds **secure the structure** to its foundation.





# Radar Towers



The U.S. National Weather Service utilizes SmartBolts in its Nextrad radar towers in 159 locations around the country.

A radar antenna with a 15 ft. diameter rotates rapidly within the dome.

SmartBolts were implemented to ensure **proper pre-load** and **ease inspection**.

As a result, we have reduced the centrifugal movement that would affect antenna alignment.





Freeport-McMoRan Copper & Gold, Inc. is a leading international mining company and North America's largest producer of copper.

1-¼" SmartBolts with a design tension of 58 kilopounds-force are in use at the Morenci copper mine in southeast Arizona – one of the largest open-pit mines in the world.



The bolts **assure proper tension** set-up during operations with the company's Crush and Convey system, a rotating drum for copper ore processing that weighs 88 tons when empty.



Engineered Mine Solutions utilizes SmartBolts as tensioned roof bolts that provide support and **instant, visual feedback** to operators.



SmartBolt with  
insufficient tension



SmartBolt within  
designed tension limits





ARM Rides, an amusement ride manufacturer in Ohio, deploys SmartBolts on its Super Shot product.

The Super Shot is designed to be transported in sections and assembled on site.

It accelerates riders from the top of the structure to the bottom at high speeds before gliding to a halt.

Concerns about the **proper tensioning of critical structural bolts** in the field led to the use of SmartBolts, ensuring construction and operation procedures are **safer and easier than ever** before.





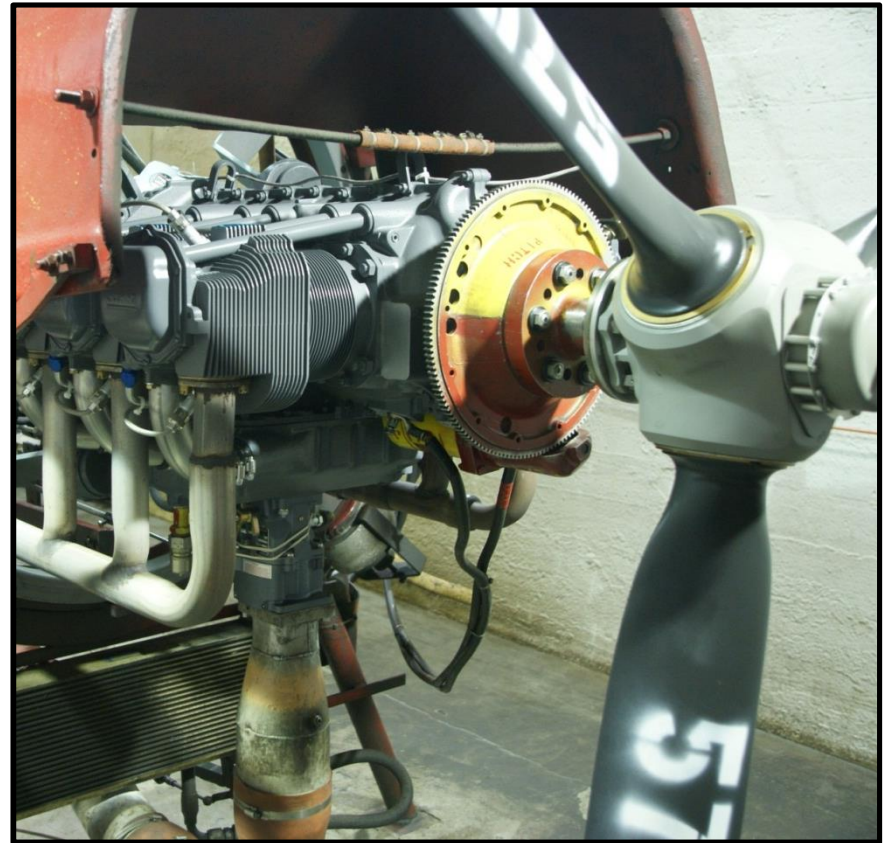


## ***LYCOMING***

Lycoming engines are run on a test rig for two hours with a stubby prop bolted in place.

An employee must attend to the engine while in use – occasionally the prop would fly off the engine hub and burrow through the wall!

Using ½" DTI SmartBolts with a design tension of 6 kilo pounds, Lycoming **secured** the prop to its hub for all subsequent engine tests.





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