

HYTORC

Georgia

Eliminating Hot Torquing: HYTORC Nut vs. Belleville Washers

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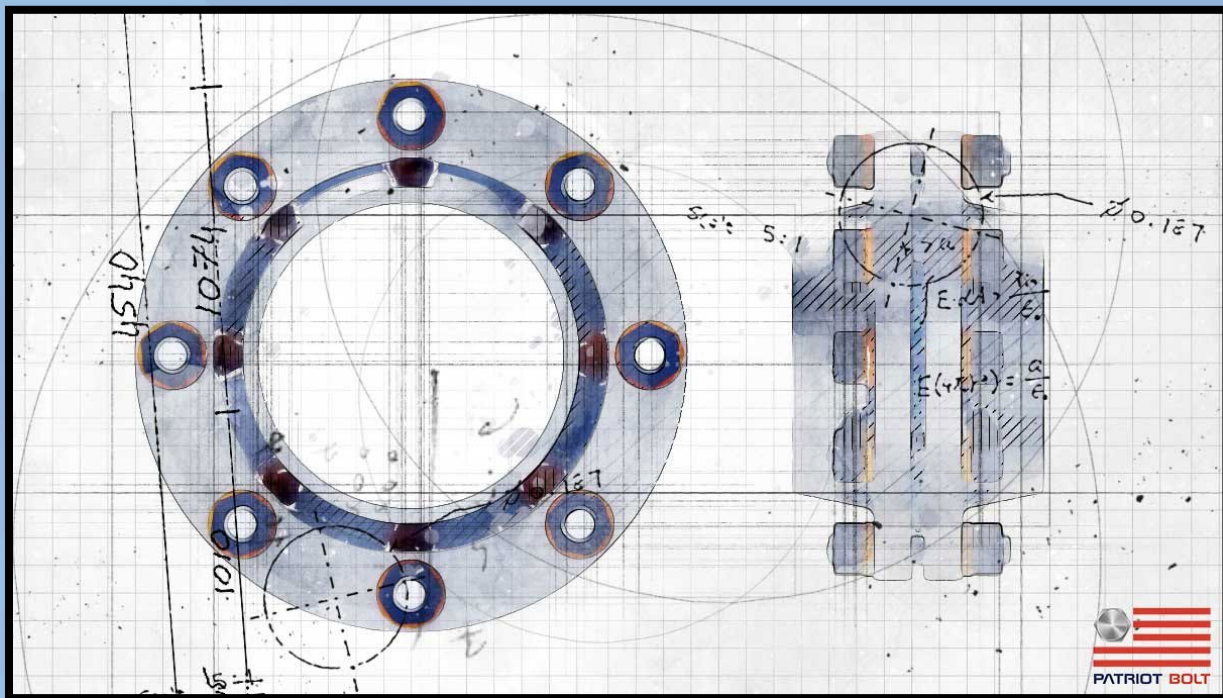
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LITHIUM SERIES II ELECTRIC TORQUE TOOL

Why hot torquing exists:

In high-temperature systems (e.g., steam, exhaust, turbine casings, high-pressure flanges), **Belleville washers** are often used to maintain bolt tension as the joint expands and contracts during heat-up and cooldown. After initial assembly, the joint is “hot torqued” — re-tightened after thermal growth — to compensate for relaxation and embedment losses.



Problems with this method:

- Requires shutdown and manual re-torquing at elevated temperature (safety hazard).
- Belleville washers lose elasticity over cycles and provide inconsistent load.
- Torque scatter increases due to friction and oxidation.
- Significant downtime and manpower costs.



The HYTORC Nut Solution

The **HYTORC Nut** eliminates the need for hot torquing or Belleville washers by **mechanically controlling the preload with pure tension**, not torque.

1. Design Overview

The HYTORC Nut is a **three-piece tensioning fastener**:

Body (Sleeve): Replaces the standard nut and is threaded onto the stud.

Washer: A hardened washer beneath the nut that interfaces with the tool.

Reaction Washer (Piston): HYTORC's tool engages here to apply hydraulic pressure directly, stretching the bolt axially rather than turning it under friction.



Chemical Style Limited Radius Nut
With a thicker outer sleeve to reduce stress, this nut is perfect for handling high loads at elevated temperatures. The through-bolt design is made for applications where stud protrusions are long, helping you maintain secure connections even in tough environments.



Hytorc Nut Highlights:

*A HYTORC Nut sits atop a bolt,
ready to be installed*

No Galling

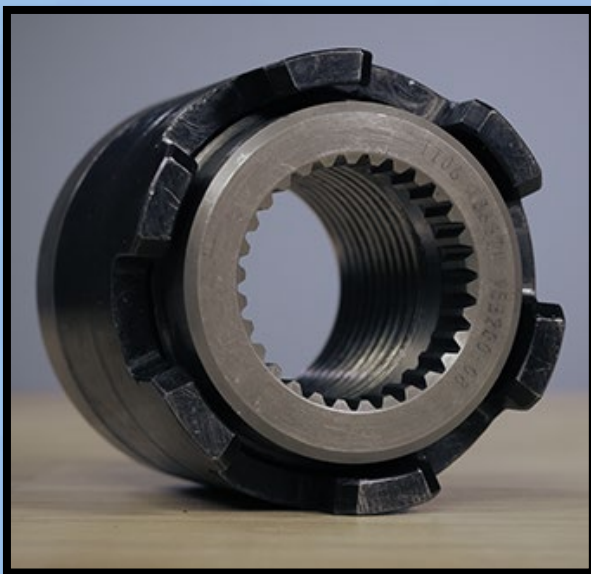
100% elimination of bolt galling.



*The LION GUN Electric
Torque Tool with the
HYTORC Nut Driver,
shown overtop a
HYTORC Nut
showcasing that there is
no need for a reaction
arm*

Improved Safety

No pinch points to worry about.



*A view of the top and
interior threads of a
HYTORC Nut*

Pure Tensile Loads

Made to withstand high
tension and shear load.



2. How It Works

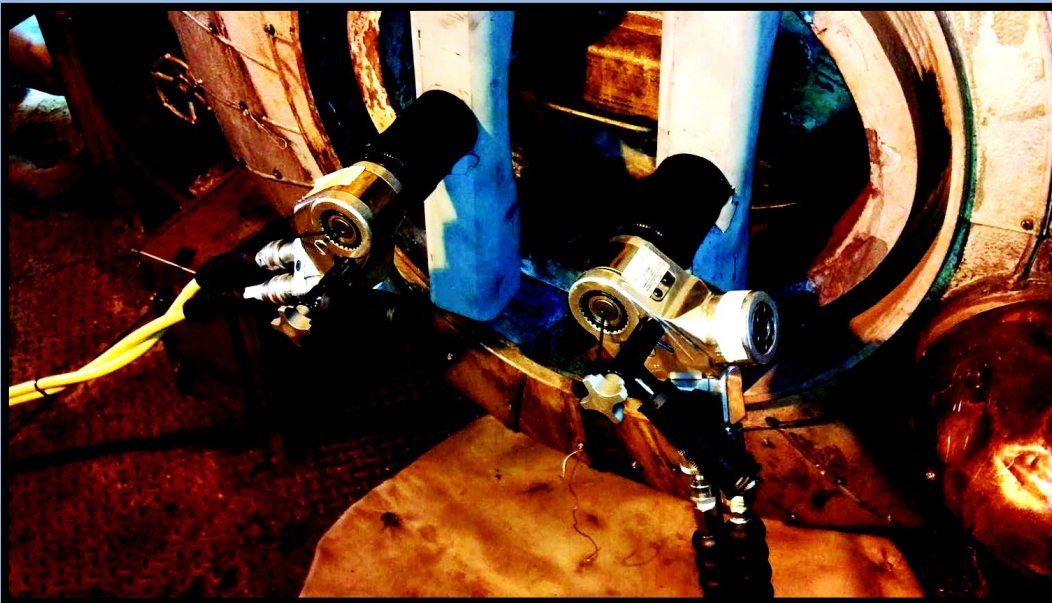
The HYTORC hydraulic tool applies **axial pressure** on the reaction washer.

The pressure elongates the bolt to the desired preload.

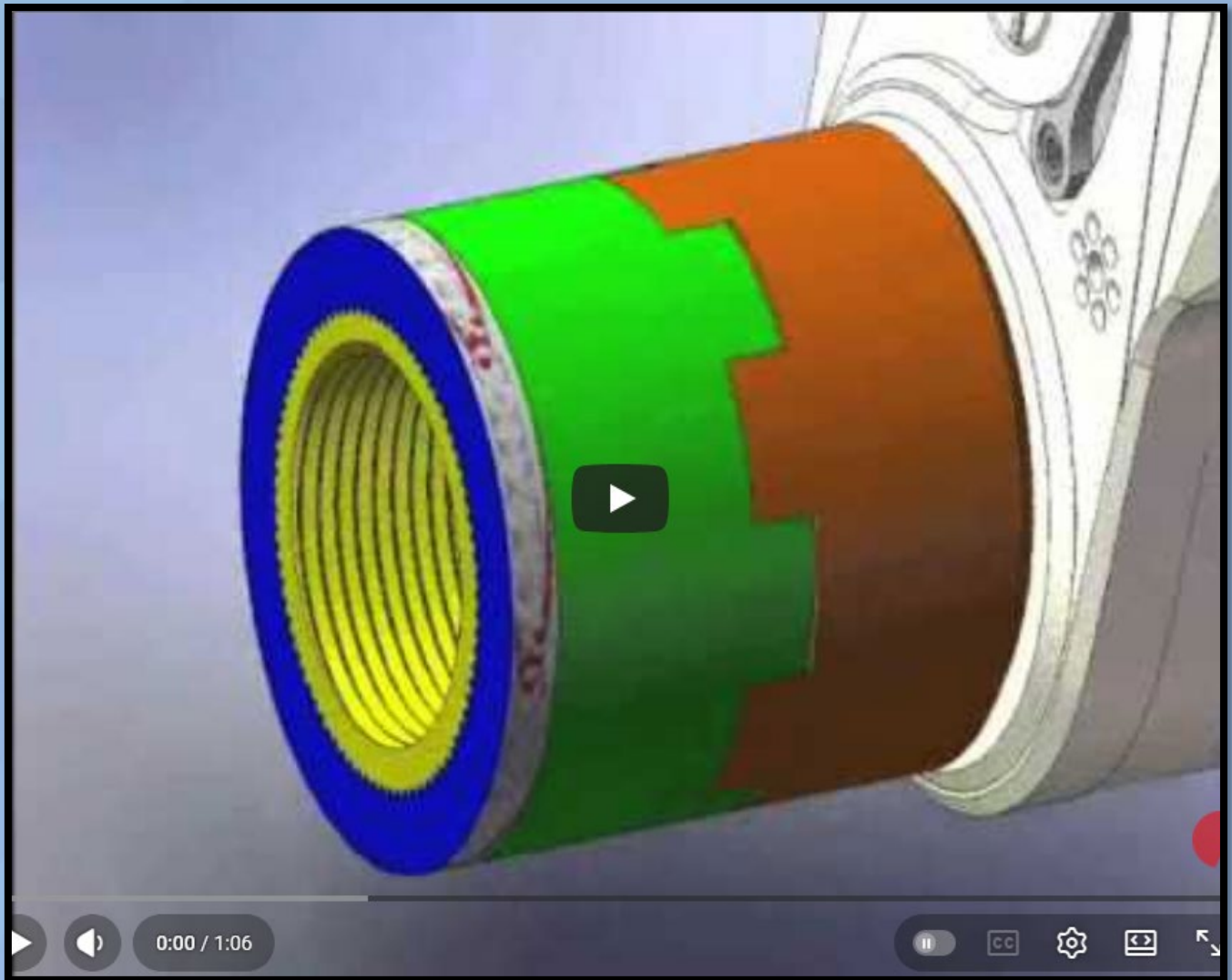
The main nut body is then rotated down **by hand or with a light wrench** to “capture” the load.

When pressure is released, the joint retains precise tension — **no frictional losses.**

Because the preload is generated purely in tension, **thermal expansion/contraction is absorbed elastically**, eliminating the need for Belleville washers or re-torque.



The HYTØRC Nut - Bolt Tensioning System



HYTØRC
— Georgia —

Technical & Reliability Advantages

The HYTORC Nut provides controlled, calibrated preload via **pure tension**, reducing reliance on friction and deformation of washers.

- It works across high-temperature applications (HYTORC's product literature indicates temperature ratings up to ~320 °C (≈ 600 °F) depending on series).
- It eliminates or significantly reduces the need for **hot re-torquing** (thus reducing safety risk and labor during thermal cycling).
- It creates a reliable audit-trail (calibration, documented preload) which supports maintenance records and compliance.
- It minimizes total downtime and can improve maintenance throughput (fewer revisit torque jobs, faster joint assembly/disassembly). For example: HYTORC's petro-chemical catalog shows large time savings when converting from conventional methods.

Safety & Maintenance Cost Advantages

- Eliminates repeated hot torquing operations—reducing risk exposure of personnel working on hot equipment, in confined spaces, or with chemical exposure.
- Fewer joint failures due to loosening or preload loss → fewer leaks, fewer unplanned shutdowns. This is especially critical for chemical plants like Symrise where a failure might lead to process upset or safety event.
- Improves uptime and asset reliability → aligns with Symrise's process-safety and production continuity goals.
- Documentation and traceability of bolting strengthen the maintenance management system and auditing readiness.

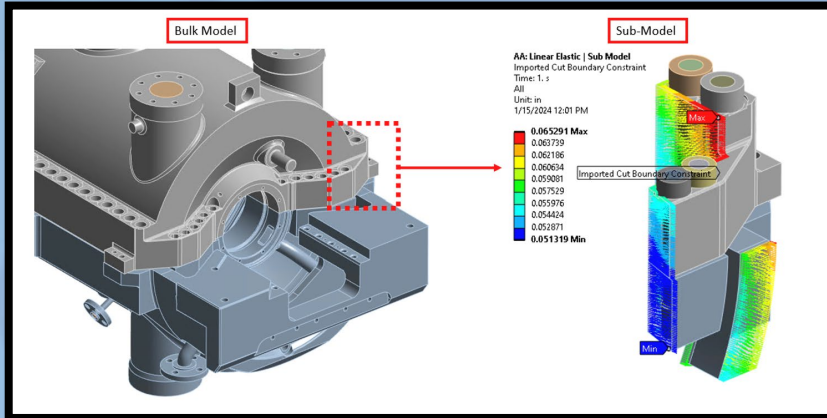




Advantages Over Belleville Washers

Issue	Belleville Washer System	HYTORC Nut System
Load Control	Indirect; dependent on spring rate and washer stack	Direct, calibrated hydraulic tension
Heat Cycles	Loses elasticity; requires re-torque	Load maintained through bolt elasticity
Friction Loss	High and inconsistent	Minimal (pure tension)
Safety	Requires hot torquing (risk)	No hot work required
Accuracy	±30% typical	±10% or better
Maintenance	Requires replacement after cycles	Reusable for decades with inspection

Example Applications

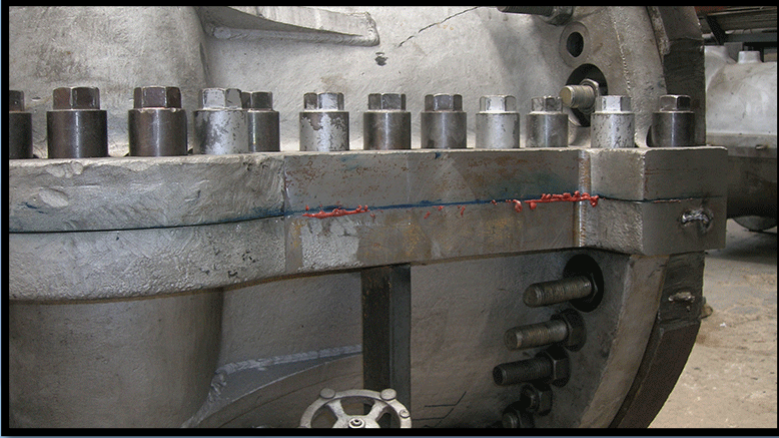


- Steam turbine casing joints (replacing hot torque procedures)



- Reactor and heat-exchanger flanges

Example Applications



- Gas turbine horizontal joint casings



- High-temperature pipeline flanges

⚙ Example Applications



- Pressure-vessel heads in refineries or power plants

The World's Most Trusted Industrial Bolting Systems

HYTORC NUT - CASE STUDY

Combined Cycle Power Plant HRSG Manway Door Solution Cycle

Safer, Faster, Higher Productivity

- Tools lock onto fasteners for hands-free operation
- Remote operation keeps personnel out of danger
- Assures even and accurate bolt load for a perfect seal
- Creates pure tensile bolt loads with no stud torsion
- Guaranteed to eliminate galling, allowing infinite stud reusability
- Cuts bolting time in half over alternative methods
- Inline reaction improves safety by eliminating pinch points
- Works with a simple adapter for your HYTORC tools



24 Hour SERVICE

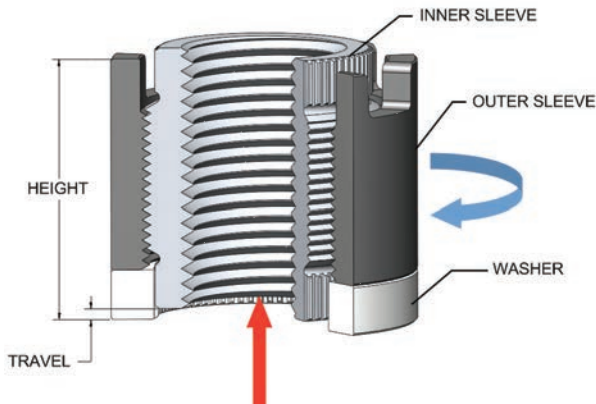
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HYTORC®
Since 1968

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The HYTORC Nut is a three piece fastener that will directly replace any type of industrial fastener.



- The HYTORC Nut is composed of three parts: outer sleeve, inner sleeve, and washer. As the outer sleeve turns (blue arrow), the inner sleeve moves upward (red arrow.)
- The washer is spline-connected to the inner sleeve to prevent it from turning while providing a solid reaction point for turning the outer sleeve.
- This results in the inner sleeve (and the bolt) being pulled upward by a torsion-free, purely axial force applying pre-calibrated tension to the bolt.
- The hardened washer remains stationary during the entire operation eliminating facial galling.
- Simply install The HYTORC Nut, set the pump pressure according to the load desired, position the tool and push a button on the remote control to achieve unprecedented bolt load accuracy.





Implementation Tips

- Select **HYTORC Nut size** matching your stud diameter and material (e.g., B7, Inconel).
- Use **certified load-calibration charts** to correlate pressure (PSI) to tension (kN).
- Lubricate threads per HYTORC procedure for consistent load.
- If retrofitting, ensure **stud protrusion** allows full nut sleeve engagement.
- Optional: Pair with **HYTORC Washer** for simplified reaction-free torquing where space is limited.



Summary

The HYTORC Nut replaces the Belleville washer and hot torquing process by tensioning the stud precisely and maintaining that preload automatically through controlled elasticity. It improves safety, repeatability, and uptime — while meeting the same functional need (thermal load compensation) in a simpler, more reliable way.

- HYTORC Nut is at least as safe (and typically safer) than Belleville washers + hot torquing.
- It improves reliability of critical bolted joints in harsh, high-temp, high-vibration chemical plants.
- It supports Symrise's priorities: safety, uptime, traceability, cost effectiveness.
- The risk of making the change is low—with pilot demonstration—and the reward (reduced downtime, improved joint integrity) is high.



LITHIUM SERIES II ELECTRIC TORQUE TOOL

The most advanced electric torque tool in the market will improve your bolting experience with its intuitive interface, unparalleled functionality, durability, and ease of use. The go-to solution for the toughest bolting jobs, making them easier with real-time documentation via the HYTORC Connect App* or USB**. This powerful yet lightweight tool allows you to bolt almost anywhere, offering strength and versatility.

Model	Drive	Weight (lbs)	Torque Range (ft-lbs)
LST-3000	1"	17.70	500-3000

HYTORC

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