

# Industrial Bolting Techniques Mining Equipment

Jim Thornton  
PEG – Corporate Account Manager

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Please Post any Questions in the Q & A

HYTORC

- *Invented Hydraulic Torque Tools Over 50 Years Ago*
- *Continuously Innovating to Make Bolting Safer and Easier*
- *Headquartered in Mahwah, NJ*
- *Over 500 Dedicated Sales Representatives Worldwide*
- *Mobile Van Technicians with Repair and Calibration Capabilities around the World*
- *Tooling can be Purchased or Rented*
- *Rent to Own Options can Reduce Risk and can Lower the Cost of Ownership*



HYTORC

**HYTORC®**  
Bolting Optimization

# On-Site Tool Management Repair – Calibration – Rental - Training



HYTORC MISSION STATEMENT

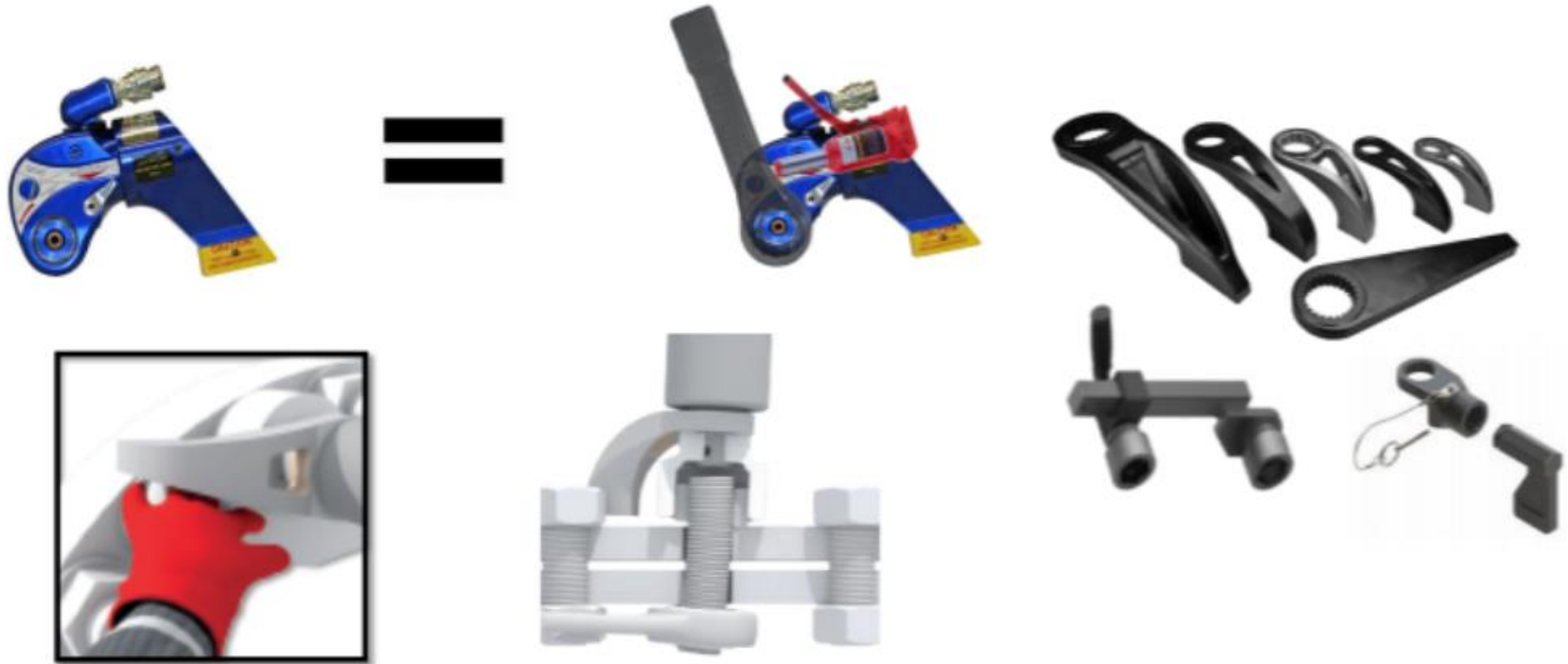
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Optimize safety, quality, and schedule in industrial bolting through innovative solutions and an unyielding commitment to world class customer service.



HYTORC REACTION ARMS

*Square Drive Tools – Side Load & Reaction Arms*



HYTORC WASHER SYSTEM ADVANTAGES OVER REACTION ARMS

# ***HYTORC Washer Functionality***

***Removes Reaction Arms, Side Load And Backup Wrenches***



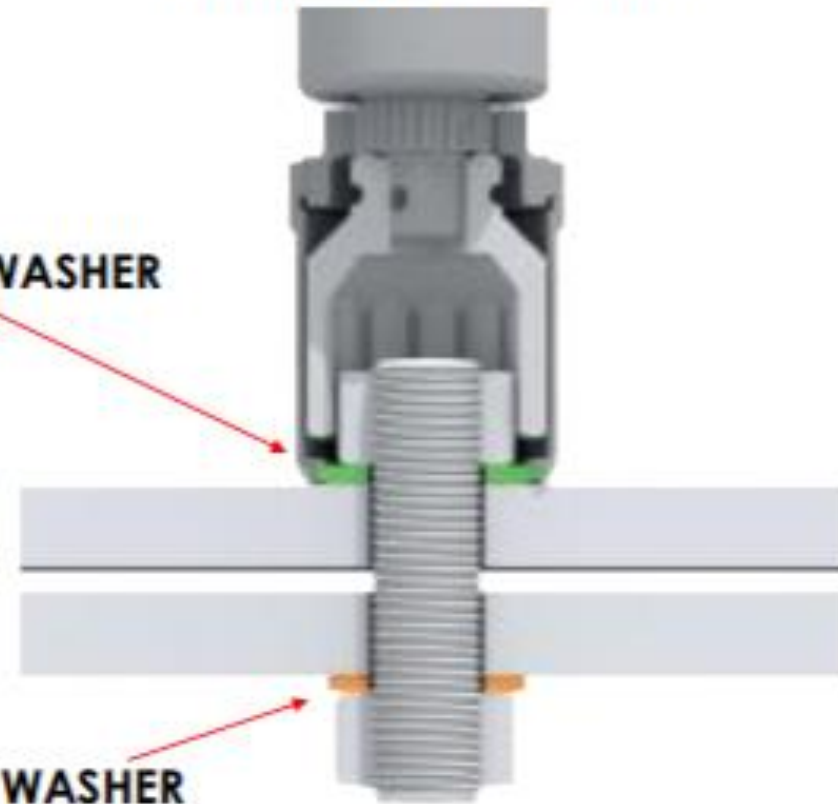
Conventional SETUP



HYTORC WASHER SETUP

HYTORC WASHER

BACKUP WASHER



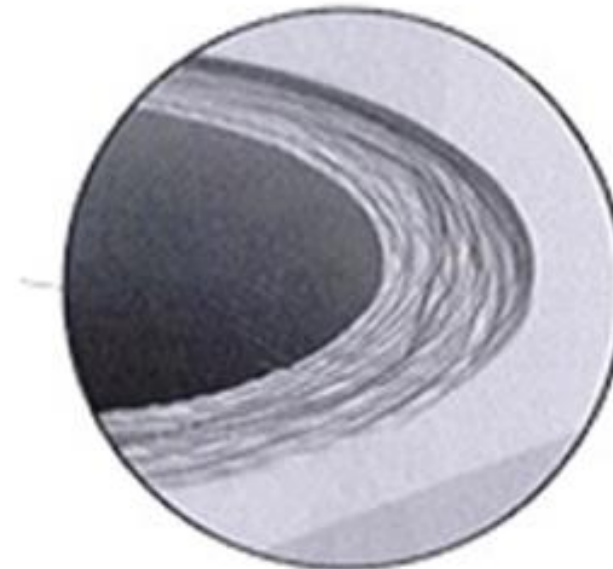
## Side Load - Galling Damage

Applying torque with conventional reaction arms can result in serious side-load damage, leading to costly maintenance issues later.



### Potential Thread Galling

The side-load forces cause bolt to bend slightly, can result in galling of the threads, threads are no longer usable, creates a stress concentration and potential failure point in the joint.



### Flange surface may be damaged

In addition to damage caused by a nut turning directly (without a washer) against a flange, additional wear can result from the side load. This results in damage requiring resurfacing or replacing the equipment, significantly increasing maintenance costs, keeps equipment out of service longer during repairs.

HYTORC WASHER SYSTEM SPECIFICATIONS

# HYTORC Washer Material Spec

Specification	Details
Material	Steel AISI 4140 (UNS G41400) Through Hardened and Tempered 4140 alloy steel is a medium carbon, chromium-molybdenum, through-hardening alloy steel that has a good hardenability with high strength and toughness as well as good fatigue and impact resistance after heat treating.
Sizes	Washers for 1/2" to 3" stud diameters, M14 to M80
Properties	ASTM F436 Type 1 Specification covers the chemical, mechanical, and dimensional requirements for hardened steel washers for use with fasteners
Hardness	38 to 45 HRC
Service Temperature	ASTM A829 (4140) (540C) Single Use to 1,000 F (750C) Reuse to 750F (399C)
Surface Finish	Black Oxide or Galvanized ASTM B695 Specification Class 55 (0.0022" dia)
Markings	HYTORC, Stamped to indicate manufacturer Inch and metric stud size
Certification	EN 1024 2.2 or 3.1 certificate for chemistry and hardness
Compatibility	Bolts Conforming to; ASTM A325, A490, A449, A193, A320 and F15534
Service Environment	ASME PCC-1-2013 Type 4

HYTORC Washers Comply with all ASME, ASTM and API standards for dimensions, hardness and thickness

Black Oxide Finish

Galvanized Finish





HYTORC WASHER SYSTEMS

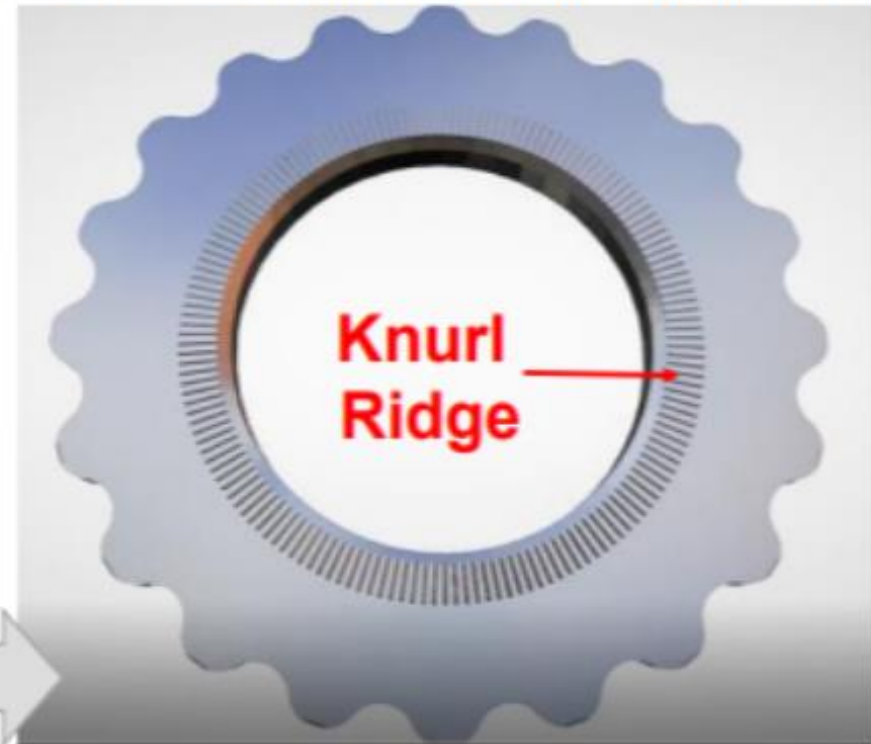
The new HYTORC J-Washer takes the HYTORC Reaction Washer to an entirely new level by adding a locking feature that minimizes loosening, keeping bolts tight under dynamic loads.

Standard HYTORC Reaction Washer

New J-Washer



- Side A Exactly the Same as Current HYTORC Washer
- Side B Adds Knurl Ridge to Previously Smooth Surface



All the benefits of the HYTORC Reaction Washer Plus Locking!

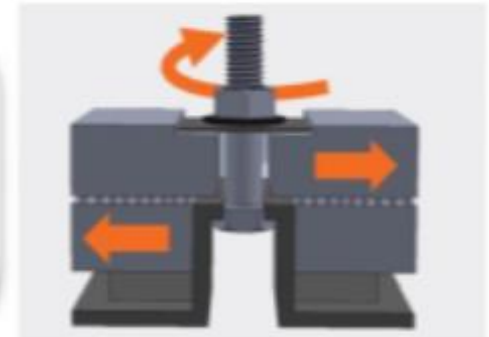
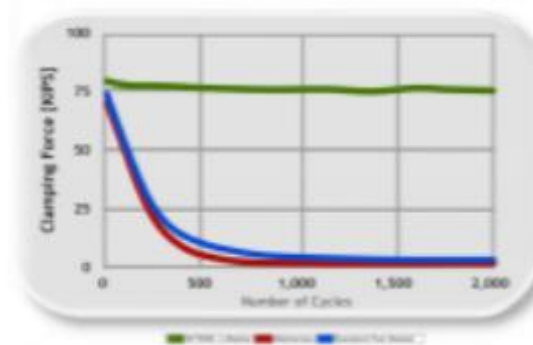
# New Product - J-Washer HYTORC Locking Washer



## J-Washer Benefits

- All of the Benefits of a HYTORC Reaction Washer
- Reduce Chances of Loosening Under Transverse Load
- Pass the Junker Vibration Test
- Will be Stocked in Sizes from ½" to 2.25" or M14 to M56
- For Applications where Anti-Loosening is a Desirable Benefit

Junker Test



## HYTORC J-WASHER SIZES

NOMINAL LOCKING WASHER DIMENSIONS (IMPERIAL)

BOLT SIZE	PART NUMBER	ID	OD	T
1/2"	JRW-008	0.531	1.118	0.123
9/16"	JRW-009	0.625	1.219	0.123
5/8"	JRW-010	0.688	1.432	0.130
3/4"	JRW-012	0.813	1.600	0.152
7/8"	JRW-014	0.938	1.865	0.152
1"	JRW-100	1.063	2.057	0.158
1-1/8"	JRW-102	1.241	2.307	0.190
1-1/4"	JRW-104	1.346	2.492	0.190
1-3/8"	JRW-106	1.497	2.742	0.190
1-1/2"	JRW-108	1.592	2.928	0.190
1-5/8"	JRW-110	1.703	3.179	0.245
1-3/4"	JRW-112	1.823	3.355	0.245
1-7/8"	JRW-114	1.977	3.617	0.245
2"	JRW-200	2.135	3.787	0.245
2-1/4"	JRW-204	2.341	4.280	0.298

Dimensions for reference only.

NOMINAL LOCKING WASHER DIMENSIONS (METRIC)

BOLT SIZE	PART NUMBER	ID	OD	T
M14	JRW-M14	15.00	28.40	3.10
M16	JRW-M16	17.00	30.96	3.10
M18	JRW-M18	19.00	36.37	3.30
M20	JRW-M20	21.00	37.01	3.30
M22	JRW-M22	23.00	40.64	3.30
M24	JRW-M24	25.00	47.37	4.10
M27	JRW-M27	28.00	52.25	4.10
M30	JRW-M30	31.00	58.60	4.80
M33	JRW-M33	34.00	63.30	4.80
M36	JRW-M36	37.00	69.65	4.80
M39	JRW-M39	40.00	74.37	4.80
M42	JRW-M42	43.00	80.75	6.40
M45	JRW-M45	46.00	85.22	6.40
M48	JRW-M48	50.00	91.87	6.40
M52	JRW-M52	54.00	96.19	6.40
M56	JRW-M56	58.00	108.71	7.60

Dimensions for reference only.

## HYTORC J-WASHER MATERIALS

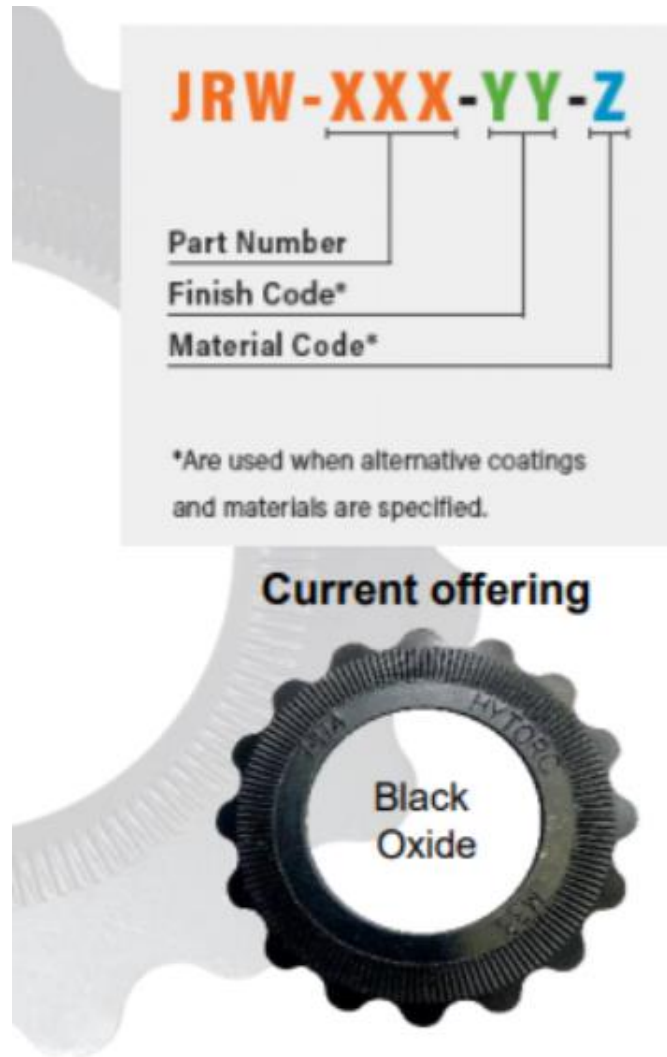
**JRW-XXX-YY-Z**

Part Number  
Finish Code\*  
Material Code\*

\*Are used when alternative coatings and materials are specified.

**Current offering**

Black Oxide

A diagram showing the breakdown of a part number 'JRW-XXX-YY-Z'. 'JRW' is the Part Number, 'XXX' is the Finish Code, and 'YY-Z' is the Material Code. Below this, a 'Current offering' is shown as a black oxide coated J-washer.

XYLAN 1424

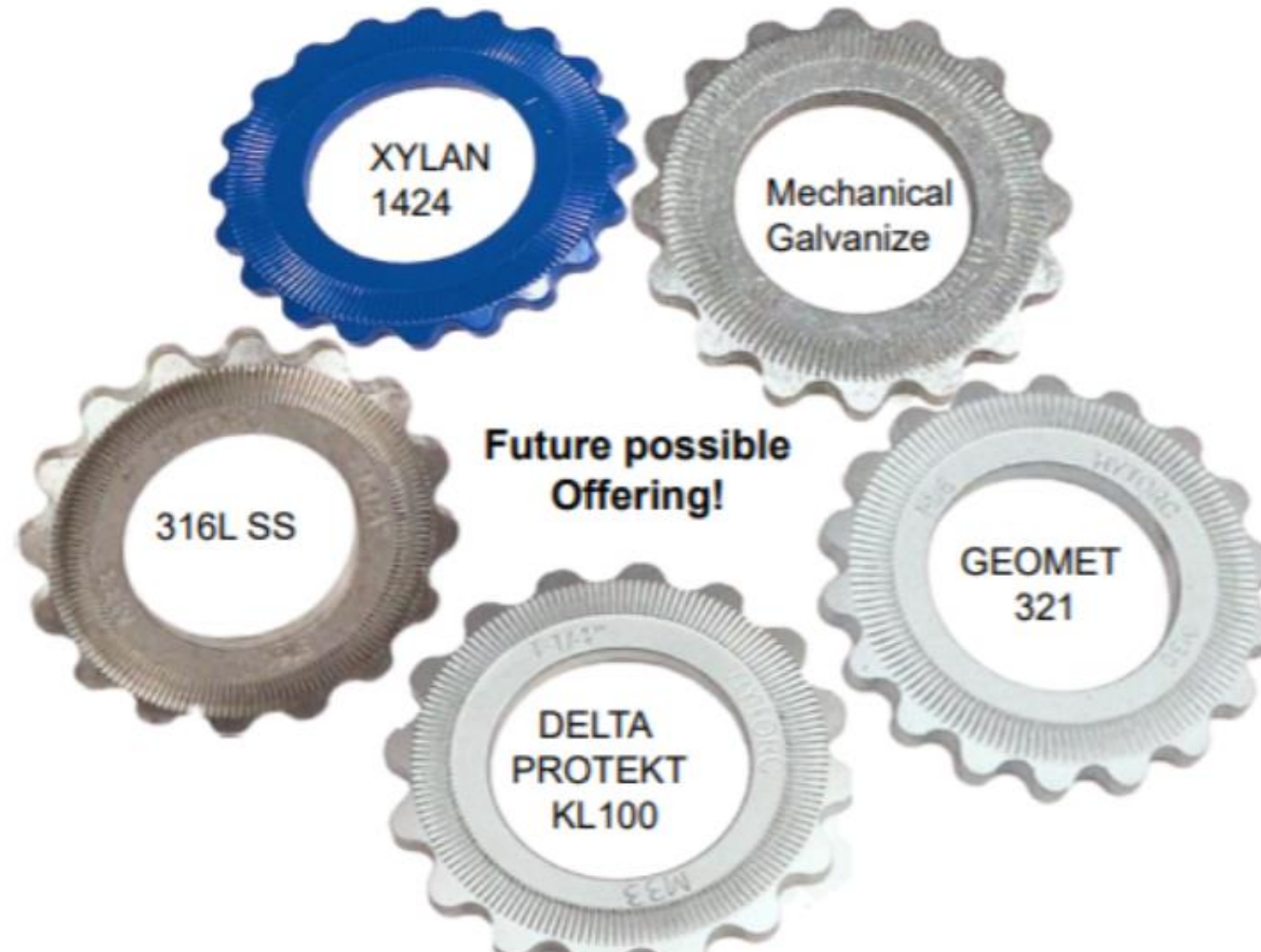
Mechanical Galvanize

316L SS

Future possible Offering!

DELTA PROTEKT KL100

GEOMET 321

Five J-washer washers are displayed with different finishes and materials: a blue Xylan 1424, a silver Mechanical Galvanize, a stainless steel 316L SS, a silver Delta Protekt KL100, and a silver Geomet 321. A label 'Future possible Offering!' is placed between the 316L SS and the Delta Protekt KL100 washers.

## **HYTORC WASHER MATERIAL**

- **STANDARD MATERIALS MEET REQUIREMENTS OF ASTM F436**
- **SPECIAL WASHERS CAN BE MANUFACTURED TO CUSTOMER DEFINED MATERIAL AND GEOMETRY SPECIFICATIONS**
- **COMPLETE MATERIAL TRACEABILITY AND CERTIFICATION AVAILABLE**
- **HYTORC STOCKS STAINLESS STEEL AND GALVANIZED WASHERS**
- **STANDARD GEOMETRIES ARE AVAILABLE FOR HEX HEAD BOLTS, HEX NUTS AND SHCS ARRANGMENTS**



## HYTORC J-WASHER JUNKERS TEST



### Junker's Test Parameters

- Bolt Head Fixed
- Lubrication – MoS<sub>2</sub>
- Frequency – 12.5 Hz
- Displacement – ± 0.082
- Cycles - 2,000 (>2 min)
- Test Runs - 12 tests

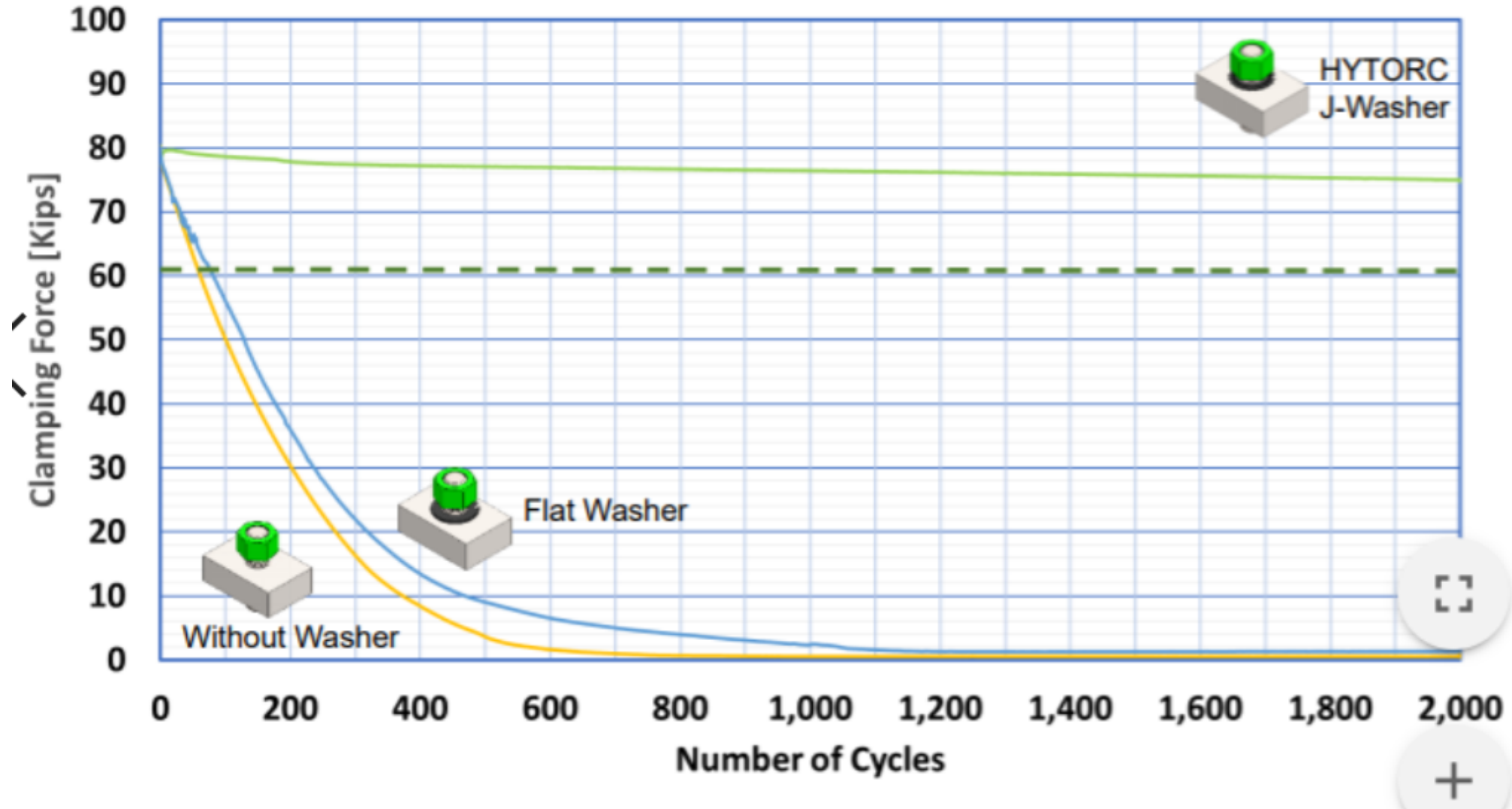


No Washer



w/ J-WASHER  
& lubrication

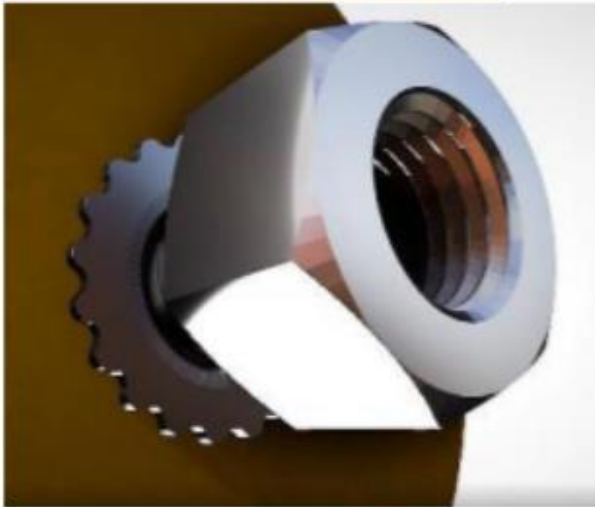
## HYTORC J-WASHER JUNKER TEST



## HYTORC J-WASHER SYSTEM



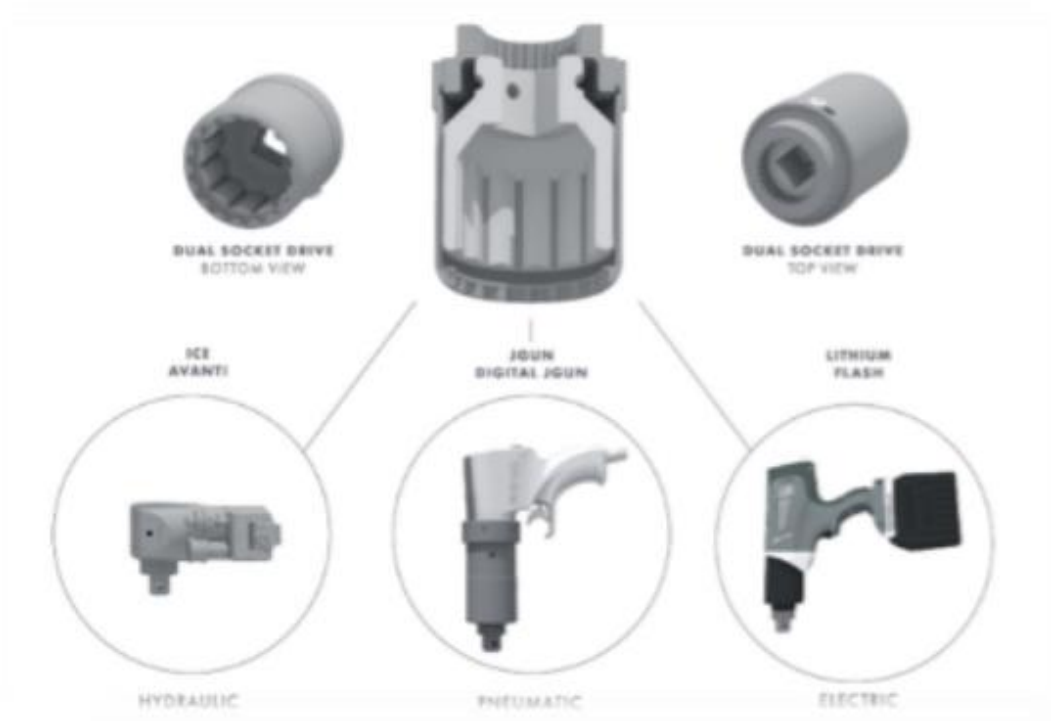
- Must be oriented correctly
- Outer knurled ridge (Side A) facing the flange
- Inner knurled ridge (Side B) facing the nut
- Lubricate bolt and nut surface
- Install nut
- Tighten with matching washer driver



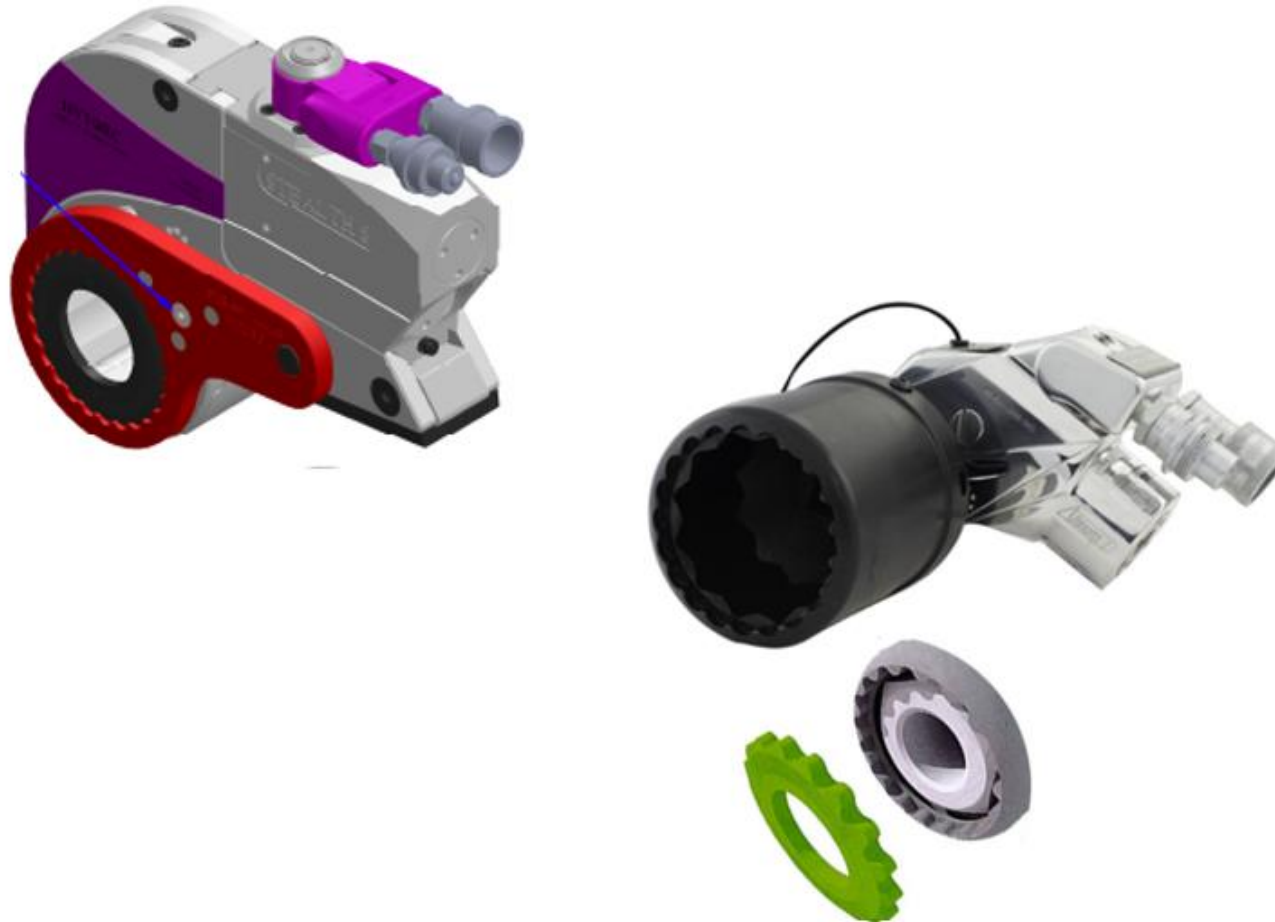


# SLEEVED SOCKET ASSEMBLY

*Eliminates Pinch Points*



## Washer Accessories



HYTORC WASHER SYSTEM CUSTOM ACCESSORIES



HYTORC WASHER SYSTEM APPLICATIONS

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HYTORC WASHER SYSTEM APPLICATIONS



## HYTORC TOOLS

### HYDRAULIC TORQUE TOOLS

- **ICE** Hydraulic Torque Wrench
- **AVANTI** Hydraulic Torque Wrench
- **STEALTH** Hydraulic Torque Wrench



### PNEUMATIC TORQUE TOOLS

- **JGUN** Pneumatic Torque Tool
- **JGUN DUAL SPEED** Pneumatic Torque Tool
- **jGUN DIGITAL** Pneumatic Torque Tool



### ELECTRIC TORQUE TOOLS

- **LITHIUM SERIES®** Electric Torque Tool
- **LITHIUM SERIES® II** Electric Torque Tool
- **LION GUN** Electric Torque Tool



HYTORC TOOLS



HYTORC TOOLS



## HYTORC VECTOR PUMPS

- VECTOR - A Family of Pumps
- Global Ready
- A Modular Pump
- Familiarization and Setup
- Manual, Full Automatic, Full Automatic with Documentation
- VECTOR Future
  - SCANNER
  - VECTOR T&A
  - Bluetooth, WIFI, Open Protocol
- VECTOR CASE
- VECTOR Resources



## HYTORC VECTOR PUMPS

VOLTAGES	TORQUE UNITS	PRESSURE UNITS	TEMPERATURE UNITS	LANGUAGES
115V	Ft/LBS.	PSI	FAHRENHEIT (F)	GERMAN
230V	NM	BAR	CELSIUS (C)	ENGLISH
400V	KPM		KELVIN (K)	FRENCH
				SPANISH
				DUTCH
				PORTUGUESE
				ITALIAN
				RUSSIAN
				TURKISH



The first time the pump is commissioned the user is prompted to enter setup information (language, date, time, torque units and units).

## HYTORC VECTOR PUMPS

Base Model	4 Port Manual	1 Port Fully Automatic	4 Port Fully Automatic	Documentation (add software)	Bluetooth*	Torque & Angle*
1 Port Manual VECTOR-T1	✓ VECTOR-T4	✓ VECTOR-FA1	✓ VECTOR-FA4	✓ VECTOR-FA1-DOC VECTOR-FA4-DOC	✓ VECTOR-FA1-DOC-BLU VECTOR-FA4-DOC-BLU	✓ VECTOR-FA1-TA
4 Port Manual VECTOR-T4		✓ VECTOR-FA1	✓ VECTOR-FA4	✓ VECTOR-FA4-DOC	✓ VECTOR-FA4-DOC-BLU	
1 Port Fully Automatic VECTOR-FA1			✓ VECTOR-FA4	✓ VECTOR-FA4-DOC	✓ VECTOR-FA1-DOC-BLU VECTOR-FA4-DOC-BLU	✓ VECTOR-FA1-TA
4 Port Fully Automatic VECTOR-FA4				✓ VECTOR-FA4-DOC	✓ VECTOR-FA4-DOC-BLU	



**\*FUTURE  
UPGRADES**



HYTORC VECTOR PUMPS



Kit Requires Installation

Coming Soon!!!

## VECTOR SCANNER

### Works With:

- VECTOR FA DOC Pump
- VECTOR MINI FA DOC Pump

### Sale:

- New VECTOR pump orders
- Current VECTOR pump owners



HYTORC VECTOR PUMPS



Coming Soon!!!

## VECTOR Torque & Angle

Current- Field Trials US & Europe

### Works With:

- VECTOR FA Pump (Single Port)
- VECTOR MINI FA Pump

### Sale:

- New VECTOR pump orders
- Current VECTOR pump owners



HYTORC VECTOR PUMPS

VECTOR Bluetooth



**Current-** Bluetooth  
Tablet Smart Torque System  
**Future-** Bluetooth BLE

VECTOR Open Protocol



**Current-** RJ45 Network Plug  
**Future-** WIFI Network  
- Torque & Angle



HYTORC VECTOR PUMP QUESTIONS

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- Basic functionality available
- When sold – customer specific – taylor made application
  - Information required from customer:
    - what Psets (commands) shall be used
    - process description how the Psets are to be progressed
    - what feedback does the server expect
    - what connectivity is used

# Q & A

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Please post any questions in the Q & A

# THANK YOU

[sales@hytorc.com](mailto:sales@hytorc.com)

[info@hytorc.com](mailto:info@hytorc.com)

[www.hytorc.com](http://www.hytorc.com)

Jim Thornton  
PEG Corporate Account Manager

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CELL 201-466-2228  
jthornton@hytorc.com

**HYTORC**  
The World's Most Trusted Industrial Bolting Systems