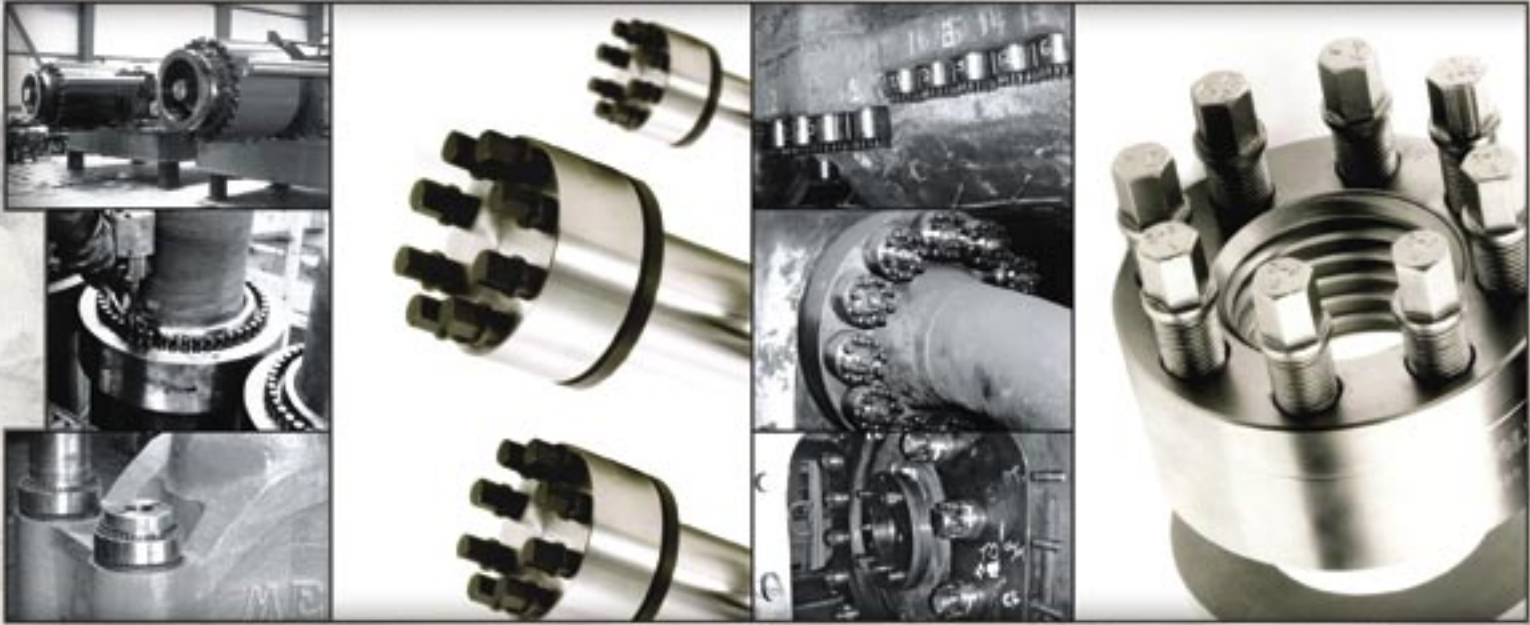


THE SOLUTION TO BOLTING PROBLEMS



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SUPERBOLT[®]

INNOVATION. QUALITY. EXPERIENCE.



2,500 Ton Structural Foam Injection Molding Press. Installation was accomplished in 2 hours using hand tools!



High pressure steam turbine inlet flange.



Superbolt Tensioners on a 1,000 Ton Diecast Machine.



Final torque values on heat exchanger verified with hand held torque wrench.



16-1/2" split nut on forging press columns.

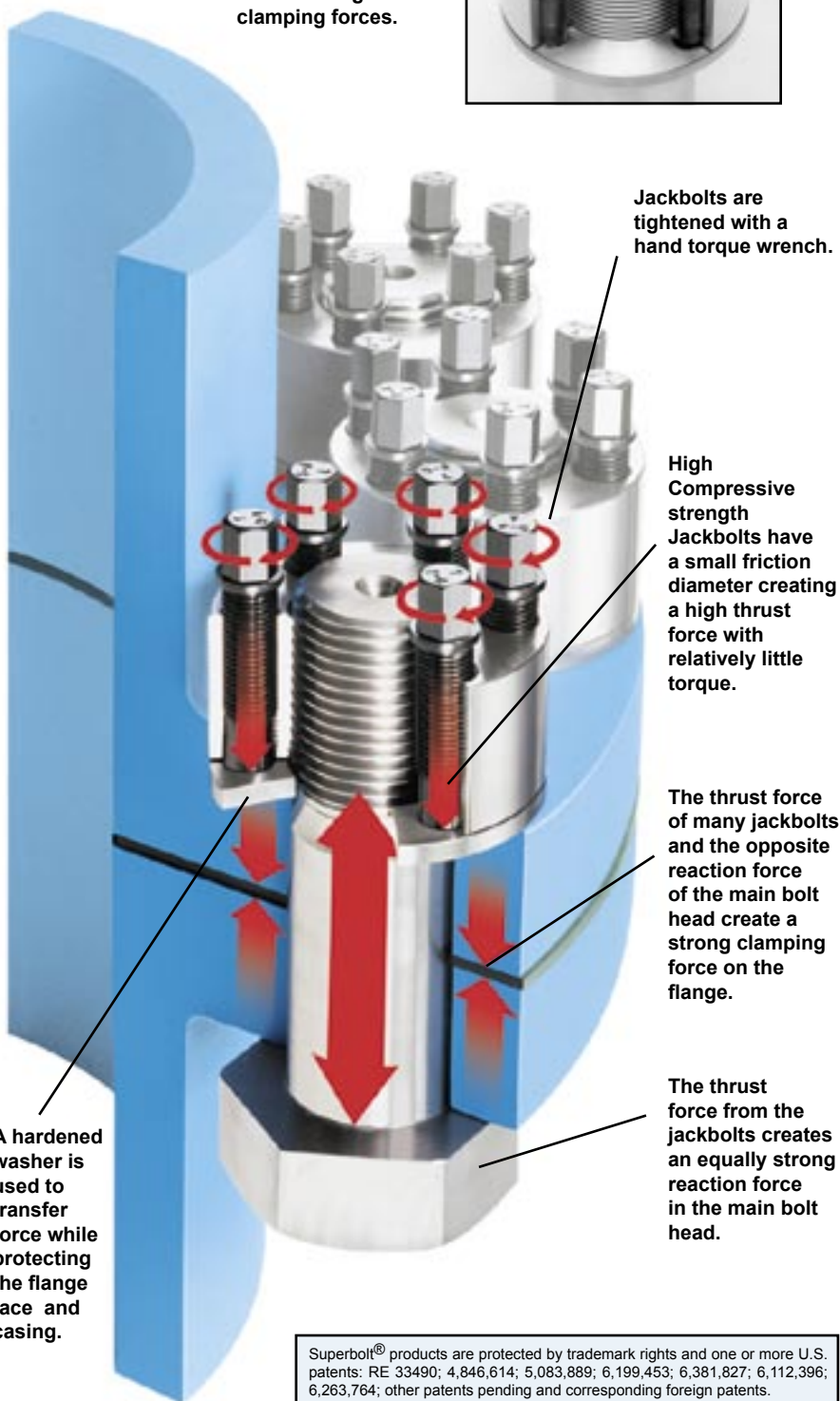


This flexible disc coupling took 2 men 2-1/2 hours to install, saving this company 19 man hours!

Bolting Technology Takes A Step Forward

Tighten any size stud with a hand torque wrench!

Supernut® Multi-Jackbolt Stud Tensioners utilize jackbolts threaded through the main body of the nut to create large clamping forces.



Supernut® products are protected by trademark rights and one or more U.S. patents: RE 33490; 4,846,614; 5,083,889; 6,199,453; 6,381,827; 6,112,396; 6,263,764; other patents pending and corresponding foreign patents.

Why Superbolt Tensioners?

An Old Problem:

The strength of a screw fastener increases with the square of its diameter. The torque required increases with the third power. Bolts with a diameter greater than 1 inch cannot be effectively torqued to capacity with hand tools. To achieve high preload levels requires some form of high energy equipment. Slugging wrenches and crane wrenches are dangerous and thermal tightening can be time consuming. Hydraulic wrenching can be expensive, time consuming, inaccurate and it often leads to thread galling problems. Hydraulic tensioning also shares some of these problems and adds problems with field retrofit.

The Simple Solution:

Superbolt Tensioners are designed as direct replacements for standard bolting. They can be threaded onto a new or existing bolt, stud, threaded rod or shaft. With Superbolt Tensioners, bolting is fast, safe, easy and accurate.

Torque Comparison: Superbolt vs. Hydraulic Wrench			
Thread Size [Inch]	Bolt Load [lbs]	Hydraulic wrench torque for standard Nut [lb•ft]	Supernut® jackbolt torque (MTX series) [lb•ft]
1	48,600	716	14
1-1/2	98,400	2,173	25
2	175,200	5,160	57
3	428,400	18,925	114
4	806,400	47,497	114
5	1,008,000	74,214	189
6	1,209,600	106,868	189

One would need 18,925 ft•lb of torque to stress a 3" stud to 428,400 lbs using a hex nut. With a 3" MTX Supernut®, only 114 ft•lbs on each of the jackbolts is needed to produce the same bolt load.

Replace Old Tightening Methods

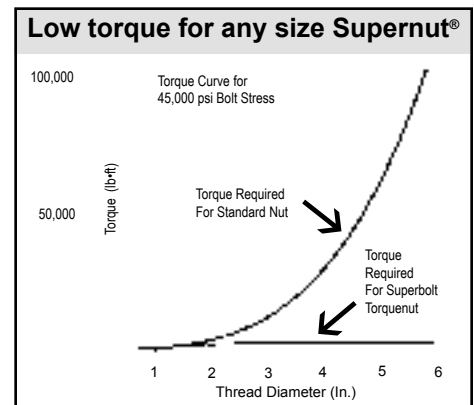
Sledgehammer

Thermal Tightening

Hydraulic Tensioning

Crane Wrench

Hydraulic Wrench



Benefits:

Only Hand Tools Required

Standard torque wrenches can generate higher bolt tensions than any other bolting method available.

Time and Labor Savings

The number of jackbolts has proven not to be a concern. Vast time savings during installation/removal have been realized. Multiple workers and air tools can be used for even faster installation/removal.

Holding Power

Properly torqued, Superbolt products will not loosen. Prestressed tensioners on bolts or studs remain tight on vibrating, pulsating, or reciprocating equipment, eliminating downtime due to bolting.

Safe To Use

Superbolt Tensioners eliminate many common injuries associated with other bolting methods. They have been used in awkward locations such as overhead bolts, on top of large equipment, and also in hazardous environments such as nuclear power plants.

Accurate Preload

Superbolt products provide precise tightening control, which is critical for sensitive applications such as gasketed flanges. Multi-jackbolt Tensioners provide consistent tension from stud to stud.

Fits In Restricted Areas

Most applications can utilize standard Superbolt products. However, specials can be designed to fit a wide variety of limited space applications.

Flexing - Adds Elasticity

Superbolt Tensioners add elasticity to any bolted joint (see page 22). The joint becomes more resistant to thermal or dynamic cycles.

Flexing Can Eliminate bolt breakage

When the jackbolts are tightened, the nut body flexes slightly (see page 22), removing stress concentrations in the first few threads. Precise load control and reduced thread stress can eliminate bolt breakage problems.

Tightens In Pure Tension
















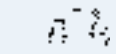






Thread galling and stud seizure is eliminated due to tightening in pure tension. This prevents the difficulties associated with removing frozen studs.

Economical / Reusable

Superbolt products are simple mechanical devices which cost comparatively less than other bolting methods.

Table of Contents

The Principle of Multi-Jackbolt Tensioners	2	How To Order Superbolt Products	6
The Advantages of Multi-Jackbolt Tensioners	3	Introduction to High Temperature Bolting	22
Installation and Removal Procedure	27, 28		

Type	Description	Applications	Body Matl.	Size Range	Temp.	Page
MT 	Standard Torquenut	For machinery applications. Replaces standard hex nuts.	4140 HT	Std. 3/4" to 6" Special: No limit	-50°F to 500°F	7
CY 	High strength Torquenut	CY tensioners can be used on grade 8 bolts and studs with high preload	4340 HT	Std. 3/4" to 6" Special: No limit	-150°F to 500°F*	8
MTSX 	Ultra high strength Torquenut	For extra high loads.	4140 HT	Std. 4-1/4" to 6" Special: No limit	-50°F to 500°F	9
SJX 	Compact Jamnut	Where limited headroom is available.	4140 HT	Std. 3/4" to 6" Special: No limit	-50°F to 500°F	10
SMX 	Mill Motor Nut	For coupling and brake wheels on 600 and 800 series Mill Motors	4140 HT	Std. 3/4" to 4" Special: No limit	-50°F to 500°F	10
NI 	Bearing Locknut	For direct replacement of std. AN series bearing locknuts	4140 HT	AN6 to AN950 Also metric	-50°F to 500°F	11
MTA 	Armored Torquenut	For applications where jackbolts need to be protected from damage	4140 HT	Std. 3/4" to 6" Special: No limit	-50°F to 500°F	12
STUDS 	Studs	OEM quality studs from all materials. Rolled threads to 6" dia.	As required	All sizes	-423°F to 1400°F*	13
CN 	Crosshead Jamnuts	For reciprocating compressor crosshead connection.	4140 HT	Std. 1" to 6" Special: No limit	-50°F to 500°F	14
SP 	Piston Endnuts	Low torque method to tighten piston to piston rods on all types of cylinders	To suit application	Special design No limits	To suit materials	15
MLC	Mechanical Load Cell	Monitors bolt load with a rotating gauge ring	To suit application	Special Design No limits	To suit materials	15
SB8 	Standard Torquebolts	Std. bolt type tensioner used mostly in Grade 5 and B7 applications	4140 HT	Std. 3/4" to 6" Special: No limit	-50°F to 500°F	16
SB12 	High strength Torquebolts	High strength bolt type tensioner used in demanding applications (Grade 8)	4340 HT 4140 HT	Std. 3/4" to 6" Special: No limit	-150°F to 500°F	17
SBU 	High Strength Ultrabolts	The worlds strongest bolts made from exotic materials	To suit application	Special design No limits	To suit materials	17
SSJX 	Torquebolts with set screws	Bolt type tensioners that fit in a std. counterbore of socket head cap screws	4140 HT	Std. 3/4" to 6" Special: No limit	-50°F to 500°F	18
SX8 	Flexnuts	These nuts relieve the stress concentration on high strength bolts	4140HT	Std. 3/4" to 6" Special: No limit	-50°F to 500°F	19
SX12 	High strength Flexnuts	Designed for use at very high stress levels	4340HT	St. 3/4" to 6" Special: No limit	-150°F to 500°F*	19
H650 	Med. temp. Torquenut	Can be used on most B7 bolts or studs without modifications	A193-B7	Std. 3/4" to 5" Special: No limit	-50°F to 650°F	20
H650X 	Med. temp. Torquenut with Moly jackbolt lube	For bolts or studs at medium temperature. Features less jackbolts	A193-B7	Std. 1-1/4" to 4" Special: No limit	-50°F to 650°F	20
H650T, H650TX 	Med. temp. Torquenut	For ambient and medium high temp. applications where space is limited	A193-B7	Std. 1" to 6" Special: No limit	-50°F to 650°F	21
H1215 	High temp. Torquenut Corrosion resistant	For high temp. applications where limited space is available	A193-B8M or to suit	Std. 5/8" to 4" Special: No limit	-423°F to 1200°F*	23
H1216 	High temp. Torquenut Corrosion resistant	For high temp. applications where adequate space is available	A193-B8M or to suit	Std. 1" to 6" Special: No limit	-423°F to 1200°F*	23
H1218 	Stainless Steel Torquenut Corrosion resistant	For food, corrosion, nonmagnetic applications and high temperatures	A193-B8M or to suit	Std. 5/8" to 4" Special: No limit	-423°F to 1200°F*	23

* FOR LOW TEMPERATURE SERVICE, ADDITIONAL MATERIAL TESTING AND CERTIFICATION MAY BE REQUIRED.

High Temperature Bolting System	Reduced diameter inconel studs at high prestress	Valves, steam flanges, steam turbines	Inconel 718, B16, A286 and to suit	All sizes	to 1,200°F	24
Nuclear Series	Approved nuclear materials	Valves, pumps, heaters, flanges, manways	SA194-GR7 and to suit	All sizes	to 650°F	25
Monel Series	Approved marine and navy materials	Various naval and salt water applications	Monel & K-monel	All sizes		25
Corrosion Protection	Optional coatings and materials	wet applications or chemical service	Various	All sizes	to suit materials	25
EB	Radial Expansion Bolts	To replace fitted bolts for large machines such as turbine couplings	As required	All sizes	To suit materials	26
Tools	Commercial and custom sockets	Custom sockets for higher torque values	N/A	All sizes	N/A	29
Lube	JL-G (Graphite Lube) JL-M (Moly Lube)	For std. and high temp lube. For low torque on large jackbolts.	N/A	N/A	to 1,200°F to 650°F	29
Caps	Plastic Caps Metal Caps	Low cost plastic, avail. for most sizes. Metal caps designed and made to order.	To suit	All sizes		N/A
Application Photos						30 31

Specials

Superbolt manufactures its products in special sizes, threads, configurations, materials and ratings. Our engineers encourage discussion of special problem applications. Where drawings are available, a comprehensive review will determine

requirements, identify restrictions and develop solutions to specific problems. From 1" special mill motor nuts to 12" tensioners to 40" thrust collars, the Superbolt design team is ready to help.



3"-8 tpi covered Supernut®. Used on pressure vessel hydrotest and final assembly.



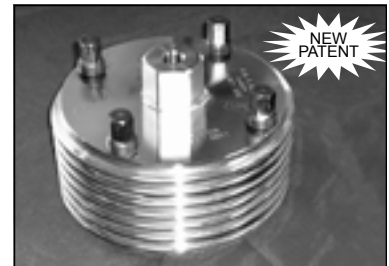
Actual photograph of large custom designed 22" thread Tensioner.



18" split nut used on aluminum extrusion press tie rods.



19" special design for a hydraulic press.



External thread Compression screw. Patent pending. Retrofit setscrew / jamscrew, any size.

Thrust Collars



The thrust collar is positioned close to the bearing, then a split ring is inserted behind the collar so that as the jackbolts are tightened, the collar is thrust against the split ring to preload the bearing.

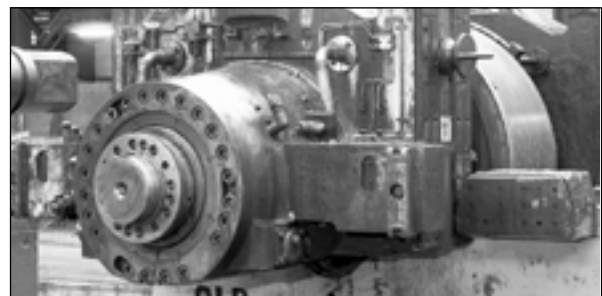
Due to the massive size of the rolls and associated equipment, thrust collars have proven to be advantageous for worker safety

Superbolt® thrust collars consist of unthreaded rings with jackbolts which are used primarily on the bearings on large steel mill

and injury reduction. Previously, the large bearing locknut arrangements were difficult to tighten and to keep tight. Sledge hammers, large pry bars, and overhead crane rigging were utilized, with back, hand and muscle injuries very common. Superbolt thrust collars are usually installed with air power wrenches, followed by a standard torque wrench to verify the final target jackbolt torque.

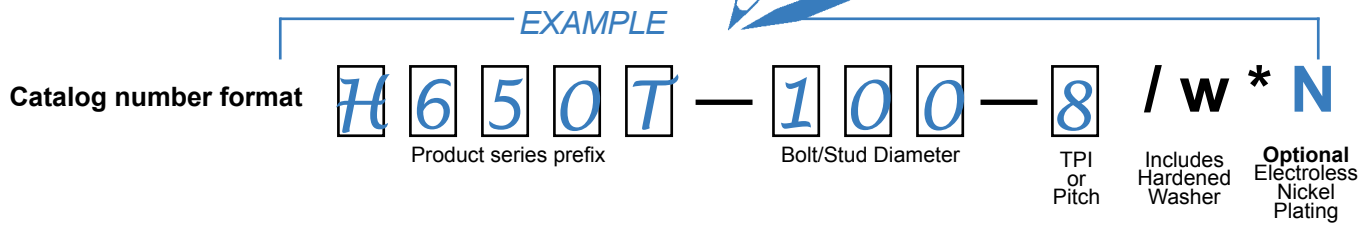
Thrust collars have been shipped in sizes up to 40"

inside diameter, capable of creating 4,500,000 lbs of bearing preload. Typical inside diameters range from 5" to 30", but virtually any size can be designed and produced.



257 mm Thrust collars on sheet mill backup roll.

How to order SUPERBOLT® products



All standard products have a catalog number which conforms to the format above. Determine the diameter of your bolt or stud and the thread pitch as described below, and choose the product series that matches your size, temperature and material requirements. When ordering Torquebolts the length under the head must also be specified. Please account for washer thickness.

To place an order, please review variables for product selection and call or e-mail us. Our sales engineers will be happy to discuss the details of your application.

Basic variables for product selection:

- Required bolt load or nut torque
- Temperature
- Space restrictions?
- Corrosion protection needed?
- Materials of mating components

Examples:

For 2-3/4" 8 tpi A193-B7 stud up to 650°F
 For 1-3/8" 6 tpi high strength stud
 For 56 mm, 5.5 mm pitch high strength stud
 Nut for a 3-1/4" 4 tpi stud in corrosive atmosphere (with optional electroless Nickel plating)
 Torquebolt for a 2-1/2" 4 tpi for 450°F service, 8" long under the head.

Order Part No.

H650-275-8/w
 MT-137-6/w
 MT-M56-5.5/w
 MT-325-4/w*N
 SB8-250-4x8.00/w

How to measure and determine thread pitch.

Ordering Superbolt products requires correct determination of the thread pitch. This is the most common reason for ordering errors. The table at the right lists common Thread Per Inch counts for various diameters. If your count is not shown, recheck, then contact Superbolt for assistance (412-279-1149).

Diameter Inches	NC TPI	NF TPI	Other TPI	Diameter Inches	NC TPI	Other TPI	Diameter mm	Coarse Pitch mm	Other Pitch mm
5/8	11	18		2-3/4	4	6, 8, 10, 12	M20	2.5	1,1.5,2
3/4	10	16		3	4	6, 8, 10, 12	M24	3	1,1.5,2
7/8	9	14		3-1/4	4	6, 8, 12	M27	3	1,1.5,2
1	8	12	14	3-1/2	4	6, 8, 12	M30	3.5	1,1.5,2
1-1/8	7	12	8	3-3/4	4	6, 8, 12	M33	3.5	1.5,2,3,4
1-1/4	7	12	8	4	4	6, 8, 12	M36	4	1.5,2,3,4
1-3/8	6	12	8	4-1/4		4, 6, 8, 12	M39	4	1.5,2,3,4
1-1/2	6	12	8	4-1/2		4, 6, 8, 12	M42	4.5	1.5,2,3,4
1-5/8			5.5, 6, 8, 12	4-3/4		4, 6, 8, 12	M45	4.5	1.5,2,3,4
1-3/4	5	12	6, 8, 10	5		4, 6, 8, 12	M48	5	1.5,2,3,4
1-7/8			5,6,8,10,12	5-1/4		4, 6, 8, 12	M52	5	1.5,2,3,4
2	4-1/2	12	6, 8, 10	5-1/2		4, 6, 8, 12	M56	5.5	1.5,2,3,4
2-1/8			6, 8, 12	5-3/4		4, 6, 8, 12	M60	5.5	1.5,2,3,4
2-1/4	4-1/2	12	6, 8, 10	6		3,4,6,8,12	M64	6	1.5,2,3,4
2-1/2	4	12	6, 8, 10				M72	6	1.5,2,3,4
							M80	6	1.5,2,3,4
							M90	6	2,3,4,8
							M100	6	2,3,4,8
							M110	6	2,3,4,8

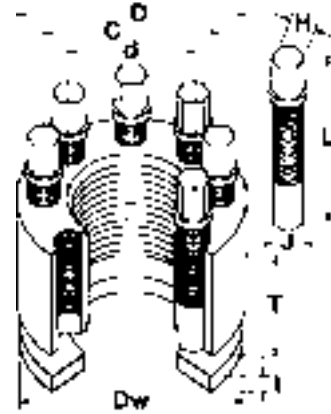
Notes for applications engineering with Superbolt products.

The torque and preload (bolt load) values given in the catalog tables are the "standard" values for common uses. If your application requires a higher or lower load, usually the standard product torque can be increased or decreased proportionally. However, you should check with a Superbolt engineer prior to significant increases beyond rated bolt load.

The values listed in this catalog were obtained by factory tests. They are valid for new products as shipped. Repeated use, exposure to extreme heat, washing in solvents, or field lubrication can cause variations in values. Designers should use the same safety factors as for standard fasteners.

Operating Temperature: -50°F to 500°F

Bolt stress at maximum preload:
Small sizes: 80,000 to 100,000 psi
Large sizes: 70,000 to 80,000 psi



MT tensioners are used on general mechanical applications. They can be used on high or medium strength bolts and studs and will fit in the same area as a heavy hex nut. The MT series features hex-head jackbolts.

APPLICATIONS: General machinery, mining equipment, anchorbolts, gear boxes, pinion stands, tables, crushers, engines, compressors, presses etc.

NOTE: FOR PERMANENT BOLTING APPLICATIONS, PRELOAD CAN BE SAFELY INCREASED 30% BY INCREASING SPECIFIED TORQUE 30%.

WHEN ORDERING: Replace the three dots (...) with the threads per inch (TPI) or the metric pitch required. Please watch for unusual thread forms. See also "HOW TO ORDER" on page 6.

**CONTACT
SUPERBOLT FOR
PRODUCT DETAILS**

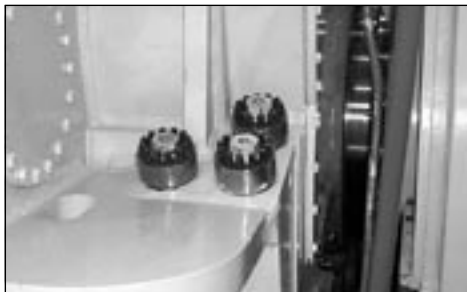
Part No	Nominal Thread d In	O.D. D In	Body Thick T In	B.C. C In	OAL L In	Jackbolts			Washer		Standard		Wt. Lb
						No Jb n	Size J In	Hex H In	O.D. Dw In	Thick t In	Pre-Load Lb	Torq Lbft	
MT-075-.../w	3/4	1.47									20400	14	.3
MT-087-.../w	7/8	1.60									30600	14	.3
MT-100-.../w	1	1.90									48600	27	.6
MT-112-.../w	1-1/8	2.08									48600	27	.7
MT-125-.../w	1-1/4	2.25									64800	27	.8
MT-137-.../w	1-3/8	2.46									73800	49	1.3
MT-150-.../w	1-1/2	2.70									98400	49	1.5
MT-162-.../w	1-5/8	2.96									98400	49	1.8
MT-175-.../w	1-3/4	3.08									129600	75	2.3
MT-187-.../w	1-7/8	3.59									175200	114	3.6
MT-200-.../w	2	3.59									175200	114	3.5
MT-225-.../w	2-1/4	3.95									175200	114	4.1
* MT-250-.../w	2-1/2	4.45									285600	233	6.9
* MT-275-.../w	2-3/4	4.70									285600	233	7.4
* MT-300-.../w	3	5.20									428400	233	9
* MT-325-.../w	3-1/4	5.45									428400	233	10
* MT-350-.../w	3-1/2	5.70									571200	233	13
* MT-375-.../w	3-3/4	6.20									571200	233	14
* MT-400-.../w	4	6.45									642600	233	16
* MT-425-.../w	4-1/4	6.95									806400	390	22
* MT-450-.../w	4-1/2	7.20									806400	390	23
* MT-475-.../w	4-3/4	7.45									907200	390	25
* MT-500-.../w	5	7.70									1008000	390	27
* MT-525-.../w	5-1/4	8.45									1108800	390	38
* MT-550-.../w	5-1/2	8.45									1108800	390	36
* MT-575-.../w	5-3/4	8.95									1209600	390	45
* MT-600-.../w	6	8.95									1209600	390	42

Metric	mm	mm
MT-M20-.../w	M20	37
MT-M24-.../w	M24	43
MT-M27-.../w	M27	50
MT-M30-.../w	M30	53
MT-M33-.../w	M33	58
MT-M36-.../w	M36	66
MT-M39-.../w	M39	69
MT-M42-.../w	M42	75
MT-M45-.../w	M45	81
MT-M48-.../w	M48	85
MT-M52-.../w	M52	94
MT-M56-.../w	M56	100
MT-M60-.../w	M60	107
* MT-M64-.../w	M64	113
* MT-M72-.../w	M72	119
* MT-M80-.../w	M80	132
* MT-M90-.../w	M90	145
* MT-M100-.../w	M100	164
* MT-M110-.../w	M110	177
* MT-M120-.../w	M120	189
* MT-M140-.../w	M140	215
* MT-M160-.../w	M160	234

Lb	Lbft	Lb
24300	11	.3
32400	11	.3
48600	27	.6
48600	27	.7
64800	27	.9
77400	53	1.5
103200	53	1.6
103200	53	1.9
157200	98	2.7
157200	98	2.9
157200	98	3.6
157200	98	4.1
196500	98	4.6
285600	233	7.1
285600	233	8
428400	233	10
571200	233	12
571200	233	16
709920	479	23
946560	479	26
1183200	479	38
1419840	479	48

* NOTE: THE MTX SERIES IS RECOMMENDED WHEN THE MT SERIES JACKBOLT TORQUE REQUIREMENT EXCEEDS 200 FT-LBS. MTX SERIES FEATURES JL-M MOLY LUBRICATED JACKBOLTS WHICH WILL REDUCE REQUIRED JACKBOLT TORQUE BY APPROXIMATELY HALF. ALL DIMENSIONS ARE THE SAME AS THE ABOVE MT SERIES. CONTACT SUPERBOLT FOR FURTHER INFORMATION.

Application Examples:



Nuclear plant turbine generator bearing housing. (6) MT-300-8/w Supernuts®.



3" tensioners used for the bearing housing on this "mud" pump.



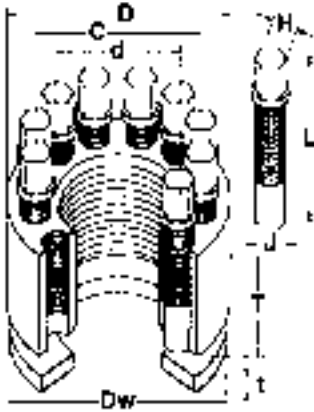
Top view of many bolted sections Cable Tensile Testing Machine.



Side view of frame bolting on Cable Tensile Testing Machine.

Operating Temperature: -150°F to 500°F*
Bolt stress at standard preload: 60,000 to 130,000 psi

* FOR LOW TEMPERATURE SERVICE, ADDITIONAL MATERIAL TESTING AND CERTIFICATION MAY BE REQUIRED.



CY series tensioners are used for higher bolt loads on general machinery applications. They fit in the same area as a heavy hex nut.

APPLICATIONS: Semi-cryogenic bolting, compressors, pumps, high pressure flanges, pinion stands, gear reducers, gear boxes, split gears, crushing equipment, presses, and military equipment.

NOTE: FOR PERMANENT BOLTING APPLICATIONS, PRELOAD CAN BE SAFELY INCREASED 30% BY INCREASING SPECIFIED TORQUE 30%.

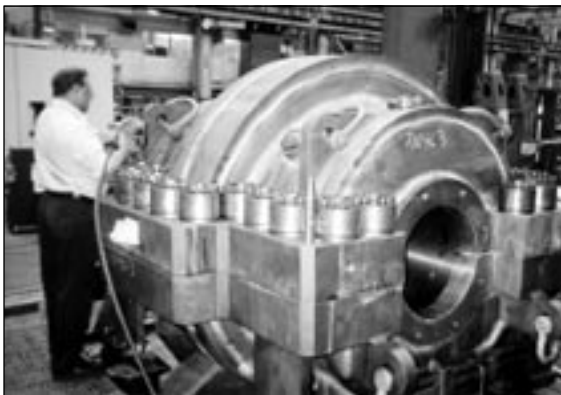
WHEN ORDERING: Replace the three dots (...) with the threads per inch (TPI) or the metric pitch required. Please note unusual thread forms. See also "HOW TO ORDER" on page 6.

Part No	Nominal Thread d In	O.D. D In	Body Thick T In	B.C. C In	Jackbolts				Washer		Standard		
					OAL L In	No Jb n	Size J In	Hex H In	O.D. Dw In	Thick t In	Pre-Load Lb	Torq Lbft	Wt. Lb
CY-075-.../w	3/4	1.47									30600	14	.3
CY-087-.../w	7/8	1.70									40800	14	.4
CY-100-.../w	1	1.90									48600	27	.6
CY-112-.../w	1-1/8	2.08									64800	27	.7
CY-125-.../w	1-1/4	2.32									73800	49	1.2
CY-137-.../w	1-3/8	2.46									98400	49	1.3
CY-150-.../w	1-1/2	2.80									129600	75	2.0
CY-162-.../w	1-5/8	2.96									129600	75	2.1
CY-175-.../w	1-3/4	3.20									194400	75	2.5
CY-187-.../w	1-7/8	3.59									175200	114	3.6
CY-200-.../w	2	3.70									262800	114	3.8
CY-225-.../w	2-1/4	3.95									262800	114	4.1
* CY-250-.../w	2-1/2	4.45									428400	233	7.5
* CY-275-.../w	2-3/4	4.70									428400	233	8
* CY-300-.../w	3	5.20									571200	233	10
* CY-325-.../w	3-1/4	5.45									571200	233	11
* CY-350-.../w	3-1/2	5.70									642600	233	12
* CY-375-.../w	3-3/4	5.95									642600	233	12
* CY-400-.../w	4	6.20									714000	233	14
* CY-425-.../w	4-1/4	6.95									907200	390	22
* CY-450-.../w	4-1/2	7.20									907200	390	23
* CY-475-.../w	4-3/4	7.45									1008000	390	25
* CY-500-.../w	5	7.70									1008000	390	27
* CY-525-.../w	5-1/4	7.95									1108800	390	31
* CY-550-.../w	5-1/2	7.95									1108800	390	29
* CY-575-.../w	5-3/4	8.45									1209600	390	37
* CY-600-.../w	6	8.45									1209600	390	34

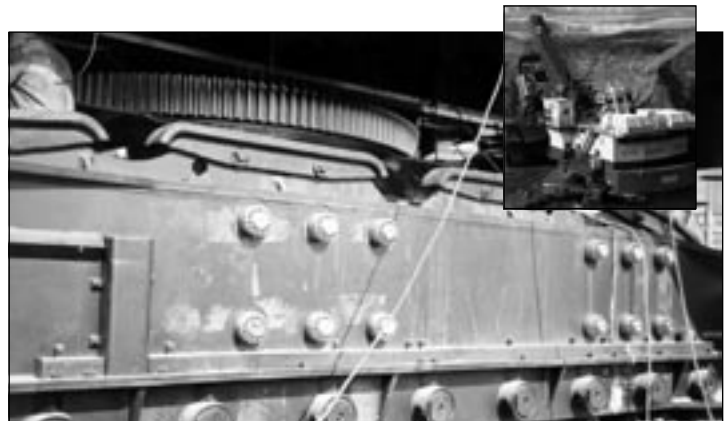
CONTACT SUPERBOLT FOR PRODUCT DETAILS

Metric	mm		Lb		
	mm	mm	Lb	Lbft	Lb
CY-M20-.../w	M20	37	32400	11	.3
CY-M24-.../w	M24	47	48600	27	.6
CY-M27-.../w	M27	50	64800	27	.7
CY-M30-.../w	M30	53	64800	27	.7
CY-M33-.../w	M33	62	77400	53	1.2
CY-M36-.../w	M36	66	103200	53	1.5
CY-M39-.../w	M39	71	129000	53	1.7
CY-M42-.../w	M42	75	154620	53	1.9
CY-M45-.../w	M45	81	157200	98	2.7
CY-M48-.../w	M48	85	196500	98	2.9
CY-M52-.../w	M52	94	235800	98	3.6
CY-M56-.../w	M56	97	235800	98	3.7
* CY-M60-.../w	M60	107	276000	233	7.0
* CY-M64-.../w	M64	113	357000	233	7.8
* CY-M72-.../w	M72	119	428400	233	8
* CY-M80-.../w	M80	132	571200	233	10
* CY-M90-.../w	M90	145	571200	233	12
* CY-M100-.../w	M100	157	571200	233	14
* CY-M110-.../w	M110	177	714000	233	18
* CY-M120-.../w	M120	189	1064880	479	26
* CY-M140-.../w	M140	215	1301520	479	38
* CY-M160-.../w	M160	226	1419840	479	43

* NOTE: THE CYX SERIES IS RECOMMENDED WHEN THE CY SERIES JACKBOLT TORQUE REQUIREMENT EXCEEDS 200 FT-LBS. CYX SERIES FEATURES JL-M MOLY LUBRICATED JACKBOLTS WHICH WILL REDUCE REQUIRED JACKBOLT TORQUE BY APPROXIMATELY HALF. ALL DIMENSIONS ARE THE SAME AS THE ABOVE CY SERIES. CONTACT SUPERBOLT FOR FURTHER INFORMATION.



High pressure centrifugal compressor.



Power shovel side frames.

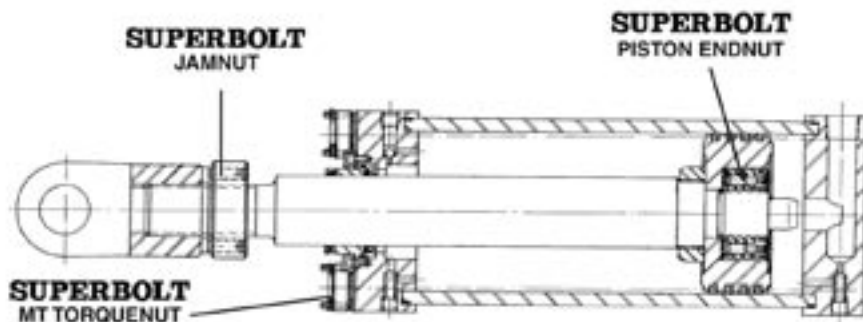


Part No	Nominal Thread d In	O.D. D In	Body Thick T In	B.C. C In	OAL L In	Jackbolts No Jb n	Jackbolts Size J In	Hex H In	Washer O.D. Dw In	Washer Thick t In	Standard Pre-Load Lb	Torq Lbft	Wt. Lb
MTSX-425-.../w	4-1/4	7.45									1008000	189	29
MTSX-450-.../w	4-1/2	7.95									1193400	288	36
MTSX-475-.../w	4-3/4	8.20									1326000	288	42
MTSX-500-.../w	5	8.45									1326000	288	44
MTSX-525-.../w	5-1/4	8.95									1568700	435	52
MTSX-550-.../w	5-1/2	9.45									1743000	435	58
MTSX-575-.../w	5-3/4	9.95									2035800	623	77
MTSX-600-.../w	6	9.95									2035800	623	74
Metric	mm	mm									Lb	Lbft	Lb
MTSX-M110-.../w	M110	189									1064880	189	27
MTSX-M120-.../w	M120	202									1183200	230	36
MTSX-M140-.../w	M140	240									1638000	390	60
MTSX-M160-.../w	M160	264									2136000	563	84

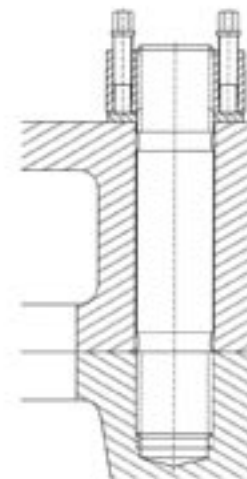
**CONTACT
SUPERBOLT FOR
PRODUCT DETAILS**

MTSX Torquenuts provide extremely high preloads on large bolts or studs. Relatively little jackbolt torque is required by using JL-M MOLY paste lubrication.

Application Examples



Example of Superbolt Tensioners used on a hydraulic cylinder.



Example of MT Series SUPERBOLT Torquenut on long studs designed to hold large machinery together.

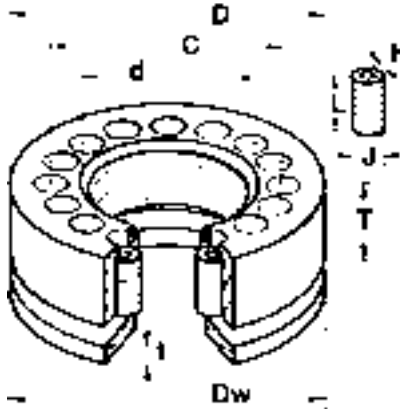


Kaplan Turbine Coupling, (18) 6-3/16" studs. The previous method required 150-250 man hours utilizing a 150 lb. "dead man", a 50 ton hydraulic ram, and a 250 lb. wrench. Supernuts® were installed in 2-1/2 hours using 1/2" air impacts and hand torque wrenches.



MT Supernuts® used as a closure tool. The shell had to be bolted up without the rotor assembly for measurements. The tensioners were used to speed up the maintenance schedule thus saving valuable outage time. Supernuts® are reusable for repairs on other turbines within this utility.

Operating Temperature: -50°F to 500°F



SJX Jamnuts are used for applications where limited thread headroom and/or limited thread engagement are required. On request Jamnuts are available with Superbolt's patented captive set screws.

APPLICATIONS: Hydraulic cylinders, shaft mounts, pipe flanges, and inaccessible places.

WHEN ORDERING: Replace the three dots (...) with the threads per inch (TPI) or the metric pitch required. Please watch for unusual thread forms. See also "HOW TO ORDER" on page 6.

Part No	Nominal Thread d In	O.D. D In	Body Thick T In	B.C. C In	OAL L In	Jackbolts No Jb	Size J In	Hex H In	Washer O.D. Dw In	Thick t In	Standard Pre-Load Moly Lb	Jb Torq Lbft	Wt. Lb
SJX-075-.../w	3/4	1.70									18120	7.7	.4
SJX-087-.../w	7/8	1.84									25140	7.2	.5
SJX-100-.../w	1	2.10									33060	7.1	.6
SJX-112-.../w	1-1/8	2.34									43680	14	.9
SJX-125-.../w	1-1/4	2.47									55740	14	1.1
SJX-137-.../w	1-3/8	2.72									69300	14	1.3
SJX-150-.../w	1-1/2	3.20									84000	27	2.3
SJX-162-.../w	1-5/8	3.45									100800	33	2.7
SJX-175-.../w	1-3/4	3.59									118800	31	2.8
SJX-187-.../w	1-7/8	3.72									138000	30	3.2
SJX-200-.../w	2	4.20									159000	64	4.9
SJX-225-.../w	2-1/4	4.70									205200	66	6.1
SJX-250-.../w	2-1/2	4.95									257400	69	7.1
SJX-275-.../w	2-3/4	5.70									315600	107	11
SJX-300-.../w	3	6.20									379200	137	15
SJX-325-.../w	3-1/4	6.70									449400	162	17
SJX-350-.../w	3-1/2	6.95									511875	185	19
SJX-375-.../w	3-3/4	7.20									606600	188	22
SJX-400-.../w	4	7.45									694200	289	29
SJX-425-.../w	4-1/4	7.95									787200	281	33
SJX-450-.../w	4-1/2	8.20									775950	277	34
SJX-475-.../w	4-3/4	8.45									903375	282	37
SJX-500-.../w	5	8.45									904500	282	39
SJX-525-.../w	5-1/4	8.70									883050	275	41
SJX-550-.../w	5-1/2	8.95									996150	276	43
SJX-575-.../w	5-3/4	9.45									1010625	280	48
SJX-600-.../w	6	9.45									1005000	279	47

CONTACT SUPERBOLT FOR PRODUCT DETAILS

Metric	mm	mm	Lb	Lbft	Lb
SJX-M20-.../w	M20	43	20160	8.8	.4
SJX-M24-.../w	M24	50	29100	8.4	.5
SJX-M27-.../w	M27	56	38280	8.3	.6
SJX-M30-.../w	M30	63	46800	14	1.1
SJX-M33-.../w	M33	69	58440	14	1.3
SJX-M36-.../w	M36	75	68640	25	2.0
SJX-M39-.../w	M39	81	82680	24	2.3
SJX-M42-.../w	M42	88	94080	27	2.7
SJX-M45-.../w	M45	91	111120	27	2.9
SJX-M48-.../w	M48	100	124920	56	4.4
SJX-M52-.../w	M52	107	150180	54	4.9
SJX-M56-.../w	M56	113	173220	62	5.5
SJX-M60-.../w	M60	119	197520	71	6.7
SJX-M64-.../w	M64	126	229440	69	7.4
SJX-M72-.../w	M72	151	299640	114	12
SJX-M80-.../w	M80	157	379140	144	14
SJX-M90-.../w	M90	177	491700	220	22
SJX-M100-.../w	M100	183	618600	238	26
SJX-M110-.../w	M110	202	741195	249	33
SJX-M120-.../w	M120	208	744413	250	34
SJX-M140-.../w	M140	221	833490	249	41
SJX-M160-.../w	M160	240	932190	251	47

Operating Temperature: -50°F to 500°F



SMX Mill Motor Nuts are used to replace standard mill motor armature nuts supplied by electric motor manufacturers. SMX tensioners are available for most standard motor frame sizes. For sizes not listed, including 400

series frames, contact Superbolt for further information. Preload matches the hub stress capacity of brake wheels and pulleys.

*See bottom of page 11 for installation examples.

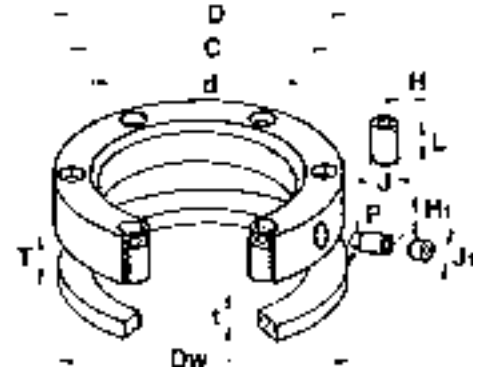
Part No	Nominal Thread d In	Thrd per Inch	O.D. D In	Body Thick T In	B.C. C In	OAL L In	Setscrews No Jb	Size J in	Hex H In	Washer O.D. Dw In	Thick t In	Standard Pre-Load Moly Lb	Jb Torq Lbft	Wt. Lb
"SUPERBOLT" Standard Mill Motor Nuts														
SMX-802/w	1	8	2.3									22000	12	1
SMX-803/w	1-1/4	8	2.7									33000	12	1
SMX-806/w	1-1/2	8	3.5									37000	26	3
SMX-808/w	2	8	3.7									56000	26	3
SMX-810/w	2-1/4	8	4.4									66000	58	5
SMX-812/w	2-1/2	8	4.7									99000	58	6
SMX-814/w	3	8	5.4									132000	58	9
SMX-816/w	3-1/4	8	5.9									132000	58	10
SMX-818/w	3-1/2	8	6.4									132000	58	12
SMX-820/w	4	8	7.2									198000	58	18
SMX-824/w	4	8	7.7									198000	58	20
Other Standard Sizes														
SMX-050-20/w	1/2	20	1.9									7500	3.5	.3
SMX-062-18/w	5/8	18	1.9									9000	4.2	.3
SMX-075-10/w	3/4	10	2.0									11000	6	.6
SMX-075-14/w	3/4	14	2.0									11000	6	.6
SMX-087-12/w	7/8	12	2.2									14500	8	.6
SMX-100-12/w	1	12	2.3									24000	13	.9
SMX-100-14/w	1	14	2.3									24000	13	.9
SMX-175-8/w	1-3/4	8	3.7									56000	26	2
SMX-175-12/w	1-3/4	12	3.7									56000	26	2
SMX-275-8/w	2-3/4	8	5.9									92000	40	8
SMX-300-8/w	3	8	6.4									132000	58	10
Other Inch Sizes and Metric Sizes available. Call Superbolt Inc. for Details.														

CONTACT SUPERBOLT FOR PRODUCT DETAILS

Operating Temperature: -50°F to 500°F

Part No.	Thread Diameter & TPI In	O.D. D In	Body			Setscrews			Side Screw			Allowable		Washer		Wt Lb
			B.C. C In	Thck T In	OAL L In	No. Jb n	Size J In	Hex H In	Size J1 In	Hex H1 In	Tip P In	Pre-Load Lb	Moly Torq Lbft	O.D. Dw In	Thick t In	
NI-06	1.173-18	1.95										12750	3	1.95	.19	.3
Special	1.299-18	2.07										12750	3	2.07	.19	.3
NI-07	1.376-18	2.15										12750	3	2.15	.19	.4
NI-08	1.563-18	2.80										20800	6	2.80	.19	.8
NI-09	1.767-18	2.97										20800	6	2.97	.19	.9
NI-10	1.967-18	3.09										20800	6	3.09	.19	.9
NI-11	2.157-18	3.30										20800	6	3.30	.19	.9
NI-12	2.360-18	3.55										20800	6	3.55	.19	1.1
NI-13	2.548-18	3.70										20800	6	3.70	.19	1.1
NI-14	2.751-18	3.95										20800	6	3.95	.19	1.2
NI-15	2.933-12	4.09										20800	6	4.09	.19	1.8
NI-16	3.137-12	4.30										36200	12	4.30	.19	1.8
NI-17	3.340-12	4.50										36200	12	4.50	.19	1.8
NI-18	3.527-12	4.70										36200	12	4.70	.19	2.0
NI-19	3.730-12	4.95										48250	12	4.95	.19	2.2
NI-20	3.918-12	5.15										48250	12	5.15	.19	2.4
NI-21	4.122-12	5.45										48250	12	5.45	.25	3.0
NI-22	4.325-12	5.90										68000	22	5.90	.25	4.0
NI-24	4.716-12	6.22										68000	22	6.22	.25	4.3
NI-26	5.106-12	6.72										92600	20	6.72	.25	5.2
NI-28	5.497-12	7.15										92600	20	7.15	.25	5.4
NI-30	5.888-12	7.47										92600	20	7.47	.25	5.9
NI-32	6.284-8	8.35										100700	44	8.35	.31	9.4
NI-34	6.659-8	8.72										100700	44	8.72	.31	9.8
NI-36	7.066-8	9.20										100700	44	9.20	.31	11
NI-38	7.472-8	9.60										151000	44	9.60	.31	12
NI-40	7.847-8	9.95										151000	44	9.95	.31	13
NI-44	8.628-8	10.70										151000	44	10.70	.31	14
NI-48	9.442-6	11.75										201300	44	11.75	.31	18
NI-52	10.192-6	12.50										201300	44	12.50	.31	19
NI-56	11.004-6	13.30										201300	44	13.30	.31	20
NI-60	11.785-6	14.10										201300	44	14.10	.31	22
NI-64	12.562-6	14.90										201300	44	14.90	.31	24

**CONTACT
SUPERBOLT FOR
PRODUCT DETAILS**

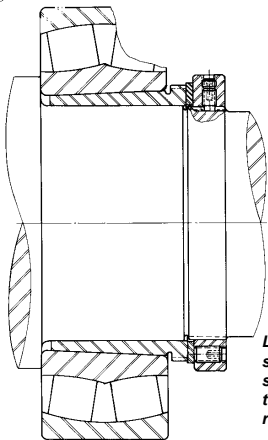


(Bearing locknuts are designed to match their respective size bearing loads). NI bearing locknuts are directly interchangeable with standard AN and N series locknuts. Bearing locknuts are ideal for jacking bearings into place. They can also clamp entire shaft assemblies.

Larger sizes (NI-68 through NI-950) are also available. Contact Superbolt for your bearing locknut needs.

APPLICATIONS: Common bearings.

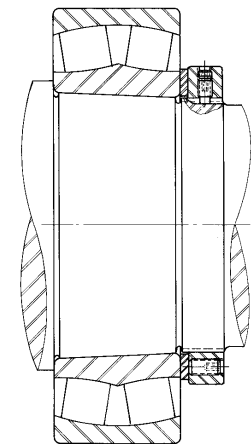
Design Examples of Superbolt Bearing Locknuts



Locknut with standard tapered sleeve is easily tightened or easily removed.



Bearing lock nut.



Locknut on tapered seat.

Design Examples of Superbolt Mill Motor Nuts.



Mill Motor Nut on brake wheel.

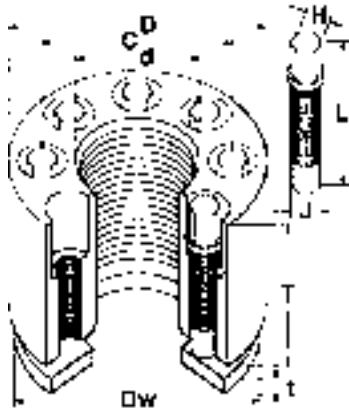


Mill Motor Nut on brake wheel.



Mill Motor Nut with V-Belt pulley.

Operating Temperature: -50°F to 500°F



Superbolt Armored Torquenuts are used primarily for rough service environments. The jackbolts are recessed in the nut or bolt body protecting them from flying debris or rotating parts. Armored Torquebolts are also available, see below.

APPLICATIONS: Mining equipment, anchorbolts, gear boxes, pinion stands, tables, crushers, engines, compressors, presses, etc.

NOTE: FOR PERMANENT BOLTING APPLICATIONS, PRELOAD CAN BE SAFELY INCREASED BY 30% BY INCREASING SPECIFIED TORQUE BY 30%.

WHEN ORDERING: Replace the three dots (...) with the threads per inch (TPI) or the metric pitch required. Please watch for unusual thread forms. See also "HOW TO ORDER" on page 6.

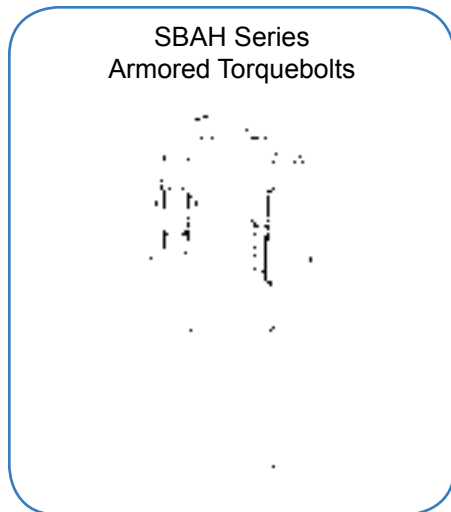
Part No	Nominal Thread d In	O.D. D In	Body Thick T In	B.C. C In	No Jb n	Jackbolts		Washer		Standard		
						Size J In	Hex H In	O.D. Dw In	Thick t In	Pre-Load Lb	Torq Lbft	Wt. Lb
MTA-075-.../w	3/4	1.97								20400	14	.9
MTA-087-.../w	7/8	2.09								30600	14	1.0
MTA-100-.../w	1	2.47								42120	23	1.8
MTA-112-.../w	1-1/8	2.59								48600	27	2.0
MTA-125-.../w	1-1/4	2.70								64800	27	2.1
MTA-137-.../w	1-3/8	3.20								73800	49	3.6
MTA-150-.../w	1-1/2	3.32								98400	49	3.8
MTA-162-.../w	1-5/8	3.45								98400	49	4.0
MTA-175-.../w	1-3/4	3.70								129600	75	5.6
MTA-187-.../w	1-7/8	3.97								175200	114	6.7
MTA-200-.../w	2	4.20								175200	114	7.5
MTA-225-.../w	2-1/4	4.45								219000	114	8.1
MTA-250-.../w	2-1/2	5.45								285600	233	16
MTA-275-.../w	2-3/4	5.70								357000	233	17
MTA-300-.../w	3	5.95								357000	233	18
MTA-325-.../w	3-1/4	6.20								428400	233	19
MTA-350-.../w	3-1/2	6.45								428400	233	20
MTA-375-.../w	3-3/4	6.70								428400	233	22
MTA-400-.../w	4	7.20								499800	233	25
MTA-425-.../w	4-1/4	7.45								604800	390	32
MTA-450-.../w	4-1/2	7.90								604800	390	36
MTA-475-.../w	4-3/4	8.20								705600	390	38
MTA-500-.../w	5	8.40								705600	390	40
MTA-525-.../w	5-1/4	8.60								705600	390	40
MTA-550-.../w	5-1/2	8.90								806400	390	42
MTA-575-.../w	5-3/4	9.20								806400	390	44
MTA-600-.../w	6	9.45								806400	390	46

CONTACT SUPERBOLT FOR PRODUCT DETAILS

Metric	mm	mm
MTA-M20-.../w	M20	50
MTA-M24-.../w	M24	63
MTA-M27-.../w	M27	66
MTA-M30-.../w	M30	69
MTA-M33-.../w	M33	81
MTA-M36-.../w	M36	84
MTA-M39-.../w	M39	88
MTA-M42-.../w	M42	91
MTA-M45-.../w	M45	100
MTA-M48-.../w	M48	100
MTA-M52-.../w	M52	104
MTA-M56-.../w	M56	107
MTA-M64-.../w	M64	138
MTA-M72-.../w	M72	145
MTA-M80-.../w	M80	151
MTA-M90-.../w	M90	164
MTA-M100-.../w	M100	177
MTA-M110-.../w	M110	201
MTA-M120-.../w	M120	208
MTA-M140-.../w	M140	234
MTA-M160-.../w	M160	253

Lb	Lbft	Lb
24300	11	.9
32400	27	1.9
48600	27	2.0
48600	27	2.2
77400	53	3.7
77400	53	3.9
103200	53	4.2
103200	53	4.5
117900	98	6.9
157200	98	6.8
157200	98	7.1
196500	98	7.3
285600	233	17
357000	233	18
428400	233	18
428400	233	21
499800	233	24
709200	479	38
709200	479	40
945600	479	49
945600	479	54

Bolt Style Superbolt Armored Tensioner



Armored Torquebolts used to secure blades on this hydro turbine.



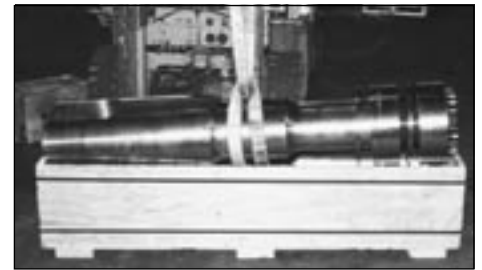
Armored Torquenut on large machinery. Recessed jackbolts can be helpful when there is flying debris or when more thread engagement is needed.



Superbolt also manufactures high quality studs in all configurations. We can currently roll threads up to 6" in diameter.

Common materials include:

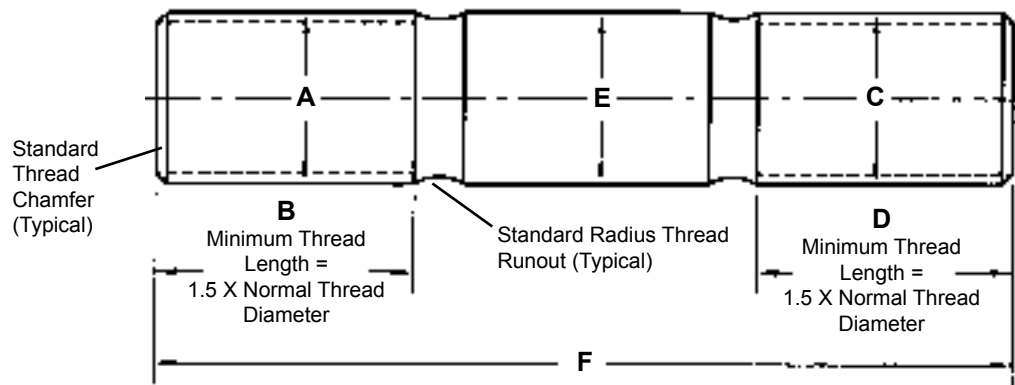
4140 H.T.	4340 H.T.
A193-B7	A193-B16
Inconel 718	Custom 450®
ULTRATUFF®	ETD 150
AERMET 100®	Many More!



Superbolt custom manufactured 8" diameter load pins for Naval cranes used for nuclear refueling (Shown with 8" Torquenuts and Mechanical Load Cells).

FOR A QUOTE:

Copy this page and fax to Superbolt or send existing drawing

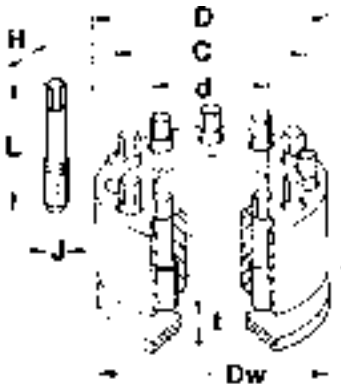


DETAIL	SIZE	DESCRIPTION
A		NOM. THRD. DIA.
B		MIN. THRD. LENGTH (±0.125")
C		NOM. THRD. DIA.
D		MIN. THRD. LENGTH (±0.125")
E		NOM. SHAFT DIA. (+0/-0.020")
F		OVERALL LENGTH (±0.125")
MATERIAL		
ADDITIONAL REQUIREMENTS:		

Optional Installation / Removal hex on one end:

YES NO

Operating Temperature: -50°F to 500°F
 Rod stress at normal preload: Approximately 30,000 psi



CN Crosshead Jamnuts are safe and easy to install/remove on compressor crossheads. They were designed in conjunction with a major compressor manufacturer. Crosshead Jamnuts have Superbolt patented "captive" machinery type jackbolts as an

added safety feature. The bolt circle is larger than on standard torquenuts to allow wrench clearance from the piston rod.

Customer Application Worksheet is available for non-standard applications.

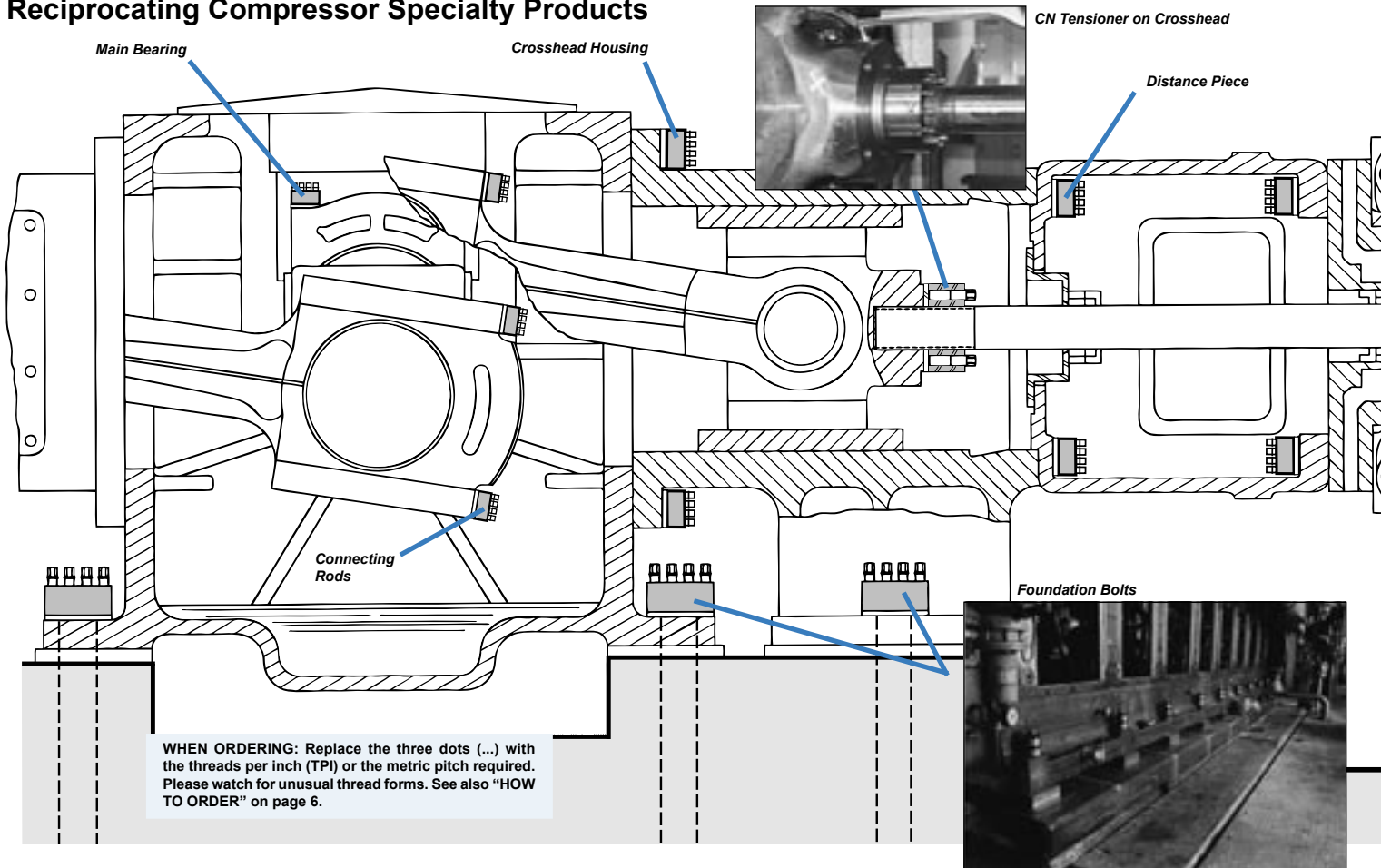
Part No	Nominal Thread d In	O.D. D In	Body Thick T In	B.C. C In	OAL L In	Jackbolts No Jb n	Size J In	Hex H In	Washer O.D. Dw In	Thick t In	Standard		Wt. incl. Wash Lb
											Pre-Load Lb	Torq Lbft	
CN-100-.../w	1	2.75									18000		1.8
CN-112-.../w	1-1/8	2.88									24000		2.1
CN-125-.../w	1-1/4	3.00									31000		2.2
CN-137-.../w	1-3/8	3.13									38000		2.3
CN-150-.../w	1-1/2	3.75									46000		4.7
CN-162-.../w	1-5/8	3.75									55000	S	4.6
CN-175-.../w	1-3/4	4.00									65000	E	5.2
CN-187-.../w	1-7/8	4.00									76000	E	5.0
CN-200-.../w	2	4.20									87000		5.4
CN-225-.../w	2-1/4	4.45									112000	S	6.7
CN-250-.../w	2-1/2	4.90									142000	P	8.1
CN-275-.../w	2-3/4	5.40									173000	E	14
CN-300-.../w	3	5.90									210000	C	17
CN-325-.../w	3-1/4	5.90									250000	I	16
CN-350-.../w	3-1/2	6.40									290000	A	18
CN-362-.../w	3-5/8	6.53									310000	L	19
CN-375-.../w	3-3/4	6.90									333000		21
CN-400-.../w	4	6.90									375000		20
CN-425-.../w	4-1/4	7.40									433000	N	30
CN-450-.../w	4-1/2	7.90									475000	O	34
CN-475-.../w	4-3/4	7.90									544000	T	32
CN-500-.../w	5	8.40									600000	E	37
CN-525-.../w	5-1/4	8.65									650000		39
CN-550-.../w	5-1/2	9.15									720000		44
CN-575-.../w	5-3/4	9.40									808000		45
CN-600-.../w	6	9.90									891000		51

CONTACT SUPERBOLT FOR PRODUCT DETAILS

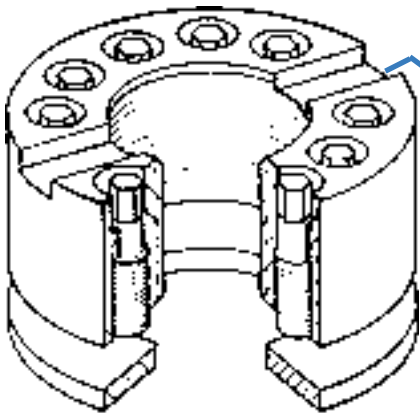
SPECIAL NOTE ON CN JACKBOLT TORQUES: JACKBOLT TORQUES DEPENDENT ON LUBRICANT. OLDER JAMNUTS WERE LUBRICATED WITH OIL WHILE NEW PRODUCTION SPECIFIES A MOLY BASED LUBRICANT. STILL OTHERS SUPPLIED ON OEM BASIS MAY BE LUBRICATED WITH DOW CORNING GN PASTE. PROPER TORQUE VALUES ARE STAMPED ON THE JAMNUT BODY AND ARE SUPPLIED WITH INSTALLATION INSTRUCTIONS.

CN Crosshead Jamnuts are also available in metric thread sizes - Contact Superbolt for further information.

Reciprocating Compressor Specialty Products



WHEN ORDERING: Replace the three dots (...) with the threads per inch (TPI) or the metric pitch required. Please watch for unusual thread forms. See also "HOW TO ORDER" on page 6.



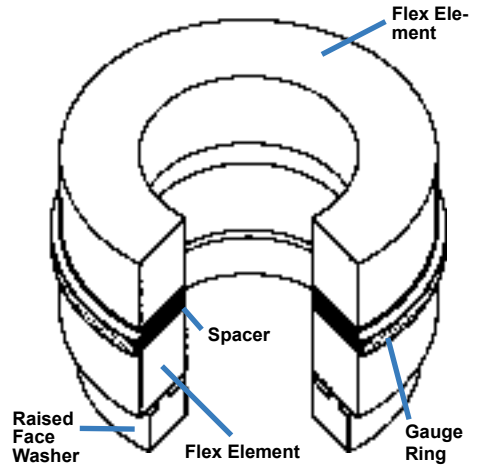
Spanner wrench groove optional as shown

End Nuts. Because almost every compressor piston is custom designed to accommodate different gases at different temperatures, the Piston End Nuts that attach the pistons to the rods also vary. The space available for Piston End Nuts varies. Nut material may also vary due to corrosion resistance requirements. Superbolt has an extensive data base of previously designed and installed Piston End Nuts. New applications can usually be designed by modifying an existing design. Most Piston End Nuts have Superbolt patented "captive" machinery type jackbolts as an added safety feature. Contact Superbolt for Customer Application Worksheet.

Piston End Nut Applications:

Superbolt offers the SP series in custom designed Piston End Nuts. These nuts are "Torquenut" type multi-jackbolt tensioners designed to properly attach compressor pistons to the piston rod. There is no need to clamp the piston rod when installing or removing Superbolt Piston

OTHER APPLICATIONS: Hydraulic Pistons



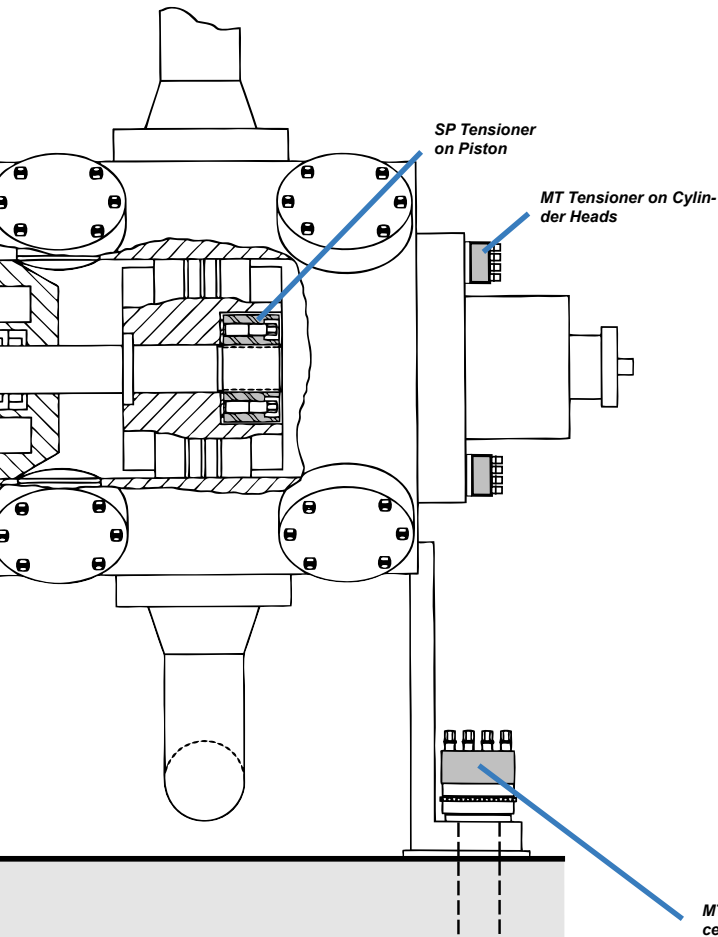
Flex Element
Spacer
Gauge Ring
Flex Element
Raised Face Washer

Mechanical Load Cells can mechanically measure the load on a bolt independently of all other factors such as nut friction, joint elasticity, bent or misaligned bolts, stud length, lubrication, etc. The MLC consists of two flex elements and gauge ring with the approximate dimensions of a hex nut. The flex elements bend under load and will pinch the gauge ring. When the ring can be rotated by hand the pre-load is too low and the torquenut needs to be tightened more. When the ring stops moving the bolt or stud is tightened to the calibrated load of the MLC.

When used in conjunction with Superbolt Tensioners, the MLC can confirm the proper preload on a bolt or stud as the result of jackbolt tightening.

MLC's have proven particularly useful in monitoring the tightness of compressor foundation bolts. Using tensioner jackbolts, it is easy to retighten the foundation bolts while the compressor is running.

Models without a gauge ring are available which can use a feeler gauge to measure varying loads. Contact Superbolt for details.



SP Tensioner on Piston

MT Tensioner on Cylinder Heads



SP Tensioner on Piston



Connecting Rod

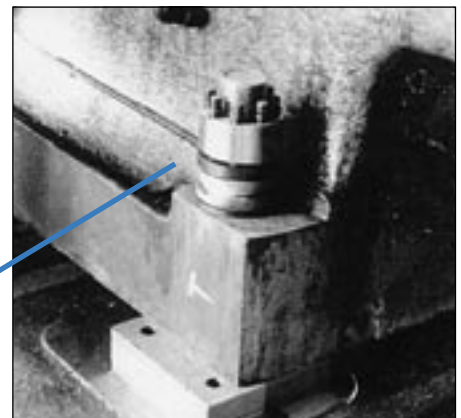


Distance Piece



Cylinder Head

MT Tensioner with load cell on foundation bolts



SB8 Torquebolt Series

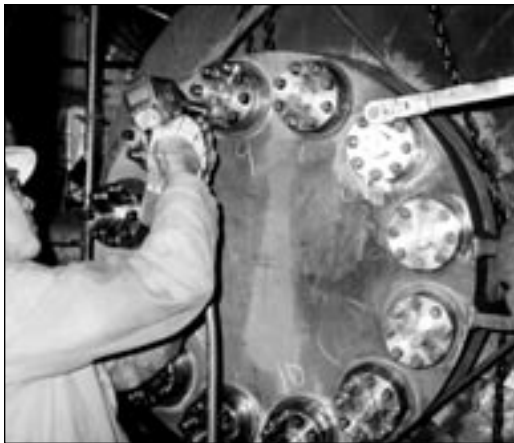
Operating Temperature: -50°F to 500°F
Bolt stress at standard preload: varies with size



Torquebolts are most often used for applications with tapped holes. Additionally, the diameter of the torquebolt head is smaller than a nut type tensioner, allowing torquebolts to fit tighter areas.

ORDERING INFORMATION: To the part numbers in the table, add your threads per inch (or pitch) requirement and the length required under the head (please account for washer thickness).
Example: for a 2", 8TPI bolt 9" long, order SB8-200-8 x 9.00/w (The /w specifies the standard hardened washer).

NOTE: FOR PERMANENT BOLTING APPLICATIONS, PRELOAD CAN BE SAFELY INCREASED 30% BY INCREASING SPECIFIED TORQUE 30%.



Torquebolts are also available for high temperature service and can be made from a variety of materials. Optional external installation hex's on bolt heads were used.

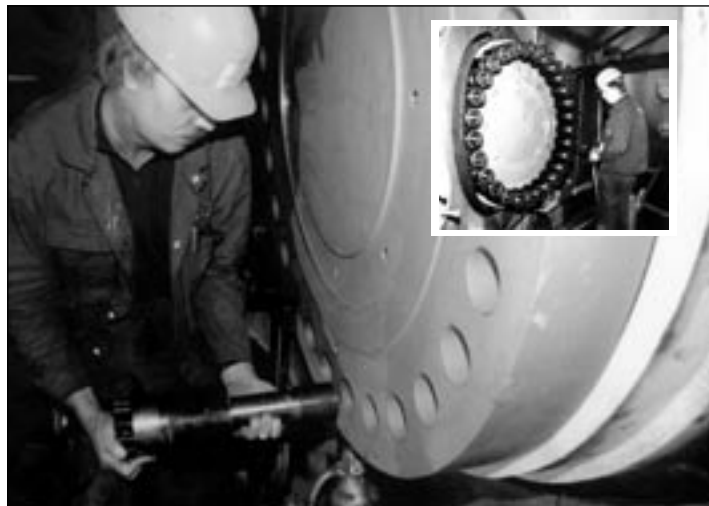


Original bolt (left) and replacement Torquebolt (right).

Part No	Nominal Thread d In	Head Dimensions				Nom. Thrd		Jackbolts				Washer		Standard		Wt. Lb
		O.D. D In	Thick T In	B.C. C In	Lgth X In	Lgth B In	OAL L In	No Jb n	Size J In	Hex H In	O.D. Dw In	Thick t In	Pre-Load Lb	Torq Lbft		
SB8-062-...x.../w	5/8	1.21												20400	11	.5
SB8-075-...x.../w	3/4	1.35												20400	14	.7
SB8-087-...x.../w	7/8	1.48												30600	14	.9
SB8-100-...x.../w	1	1.59												40800	14	1.3
SB8-112-...x.../w	1-1/8	1.83												48600	27	1.9
SB8-125-...x.../w	1-1/4	1.98												64800	27	2.6
SB8-137-...x.../w	1-3/8	2.23												73800	49	3.9
SB8-150-...x.../w	1-1/2	2.35												98400	49	4.6
SB8-162-...x.../w	1-5/8	2.47												123000	49	5.3
SB8-175-...x.../w	1-3/4	2.73												129600	75	6.7
SB8-187-...x.../w	1-7/8	2.98												175200	114	7.9
SB8-200-...x.../w	2	3.20												175200	114	11
SB8-225-...x.../w	2-1/4	3.45												219000	114	13
SB8-250-...x.../w	2-1/2	3.94												285600	233	18
SB8-275-...x.../w	2-3/4	4.20												357000	233	25
SB8-300-...x.../w	3	4.47												428400	233	33
SB8-325-...x.../w	3-1/4	4.70												499800	233	41
SB8-350-...x.../w	3-1/2	4.95												571200	233	47
SB8-375-...x.../w	3-3/4	5.44												705600	390	65
SB8-400-...x.../w	4	5.70												806400	390	73
SB8-425-...x.../w	4-1/4	5.94												806400	390	82
SB8-450-...x.../w	4-1/2	6.22												907200	390	105
SB8-475-...x.../w	4-3/4	6.44												907200	390	123
SB8-500-...x.../w	5	6.70												1008000	390	147
SB8-525-...x.../w	5-1/4	6.94												1008000	390	186
SB8-550-...x.../w	5-1/2	7.20												1008000	390	203
SB8-575-...x.../w	5-3/4	7.44												1008000	390	221
SB8-600-...x.../w	6	7.69												1008000	390	240

**CONTACT
SUPERBOLT FOR
PRODUCT DETAILS**

Metric	mm	mm	Lb	Lbft	Lb
SB8-M16-...x.../w	M16	31	16200	11	.5
SB8-M20-...x.../w	M20	34	24300	11	.7
SB8-M24-...x.../w	M24	40	32400	11	1.2
SB8-M27-...x.../w	M27	45	48600	27	1.7
SB8-M30-...x.../w	M30	50	48600	27	2.4
SB8-M33-...x.../w	M33	57	77310	53	3.6
SB8-M36-...x.../w	M36	59	77310	53	4.2
SB8-M39-...x.../w	M39	63	103080	53	4.9
SB8-M42-...x.../w	M42	66	103080	53	5.5
SB8-M45-...x.../w	M45	74	157200	98	7.3
SB8-M48-...x.../w	M48	75	157200	98	9.6
SB8-M52-...x.../w	M52	81	196500	98	11
SB8-M56-...x.../w	M56	85	196500	98	13
SB8-M60-...x.../w	M60	90	235800	98	15
SB8-M64-...x.../w	M64	100	285600	233	21
SB8-M72-...x.../w	M72	111	357000	233	27
SB8-M80-...x.../w	M80	119	428400	233	39
SB8-M90-...x.../w	M90	126	571200	233	48
SB8-M100-...x.../w	M100	145	709200	479	72
SB8-M110-...x.../w	M110	158	827400	479	99
SB8-M120-...x.../w	M120	170	945600	479	119
SB8-M140-...x.../w	M140	188	1182000	479	206
SB8-M160-...x.../w	M160	208	1182000	479	266



1200 MW Hydro Plant Nozzles on Pelton Turbines. Engineers were able to decrease the size of the nozzles with close spacing of the torquebolts. Shown is the test plate being installed for hydro testing. Each 400 MW unit has five nozzles.

Operating Temperature: -150°F to 500°F*

Bolt stress at standard preload: varies with size

* FOR LOW TEMPERATURE SERVICE, ADDITIONAL MATERIAL TESTING AND CERTIFICATION MAY BE REQUIRED.



SB12 Torquebolts offer higher strength and are more suitable for low temperatures. Other features are the same as SB8 Torquebolts.

APPLICATIONS: Gear boxes, BOF applications, mining equipment, pinion stands, clamp type flange connections, and wind tunnels.

ORDERING INFORMATION: To the part numbers in the table, add threads per inch (or pitch) requirement and the length you require under the head (please account for washer thickness).

EXAMPLE: For a 2", 8TPI bolt 9" long, order - SB12-200-8 x 9.00/w (the /w specifies the standard hardened washer).

NOTE: FOR PERMANENT BOLTING APPLICATIONS, PRELOAD CAN BE SAFELY INCREASED 30% BY INCREASING SPECIFIED TORQUE 30%.

Part No	Jack bolt Lube	Nominal Thread d In	Head Dimensions				Nom. Thrd		Jackbolts				Washer		Standard		Wt. Lb
			O.D. D In	Thick T In	B.C. C In	Lgth X In	Lgth B In	OAL L In	No Jb n	Size J In	Hex H In	O.D. Dw In	Thck t In	Pre-Load Lb	Torq Lbft		
SB12-075-...x.../w	JL-G	3/4	1.35												27180	12	.7
SB12-087-...x.../w	JL-G	7/8	1.48												37710	13	.9
SB12-100-...x.../w	JL-G	1	1.73												49590	28	1.6
SB12-112-...x.../w	JL-G	1-1/8	1.85												65520	27	1.9
SB12-125-...x.../w	JL-G	1-1/4	1.98												83610	23	2.7
SB12-137-...x.../w	JL-G	1-3/8	2.23												103950	41	3.9
SB12-150-...x.../w	JL-G	1-1/2	2.35												126000	42	4.6
SB12-162-...x.../w	JL-G	1-5/8	2.47												151200	50	5.3
SB12-175-...x.../w	JL-G	1-3/4	2.73												178200	69	6.7
SB12-187-...x.../w	JL-G	1-7/8	2.98												207000	108	7.9
SB12-200-...x.../w	JL-G	2	3.20												238500	103	11
SB12-225-...x.../w	JL-G	2-1/4	3.45												256500	111	14
SB12-250-...x.../w	JL-G	2-1/2	3.95												321750	210	18
SB12-275-...x.../w	JL-G	2-3/4	4.20												394500	214	27
SB12-300-...x.../w	JL-G	3	4.45												474000	220	35
SB12X-325-...x.../w	JL-M	3-1/4	4.95												561750	176	43
SB12X-350-...x.../w	JL-M	3-1/2	5.20												656250	176	49
SB12X-375-...x.../w	JL-M	3-3/4	5.70												758250	276	69
SB12X-400-...x.../w	JL-M	4	5.90												867750	270	78
SB12X-425-...x.../w	JL-M	4-1/4	6.45												984000	410	94
SB12X-450-...x.../w	JL-M	4-1/2	6.70												1108500	396	118
SB12X-475-...x.../w	JL-M	4-3/4	6.95												1237500	442	130
SB12X-500-...x.../w	JL-M	5	7.45												1350000	624	168
SB12X-525-...x.../w	JL-M	5-1/4	7.70												1522500	603	208
SB12X-550-...x.../w	JL-M	5-1/2	7.95												1459875	578	227
SB12X-575-...x.../w	JL-M	5-3/4	8.20												1561875	619	246
SB12X-600-...x.../w	JL-M	6	8.45												1708500	592	266

CONTACT SUPERBOLT FOR PRODUCT DETAILS

Metric		mm	mm
SB12-M20-...x.../w	JL-G	M20	34
SB12-M24-...x.../w	JL-G	M24	43
SB12-M27-...x.../w	JL-G	M27	47
SB12-M30-...x.../w	JL-G	M30	50
SB12-M33-...x.../w	JL-G	M33	57
SB12-M36-...x.../w	JL-G	M36	59
SB12-M39-...x.../w	JL-G	M39	63
SB12-M42-...x.../w	JL-G	M42	66
SB12-M45-...x.../w	JL-G	M45	74
SB12-M48-...x.../w	JL-G	M48	75
SB12-M52-...x.../w	JL-G	M52	81
SB12-M56-...x.../w	JL-G	M56	85
SB12-M60-...x.../w	JL-G	M60	90
SB12-M64-...x.../w	JL-G	M64	100
SB12-M72-...x.../w	JL-G	M72	111
SB12-M80-...x.../w	JL-G	M80	119
SB12X-M90-...x.../w	JL-M	M90	138
SB12X-M100-...x.../w	JL-M	M100	145
SB12X-M110-...x.../w	JL-M	M110	164
SB12X-M120-...x.../w	JL-M	M120	177
SB12X-M140-...x.../w	JL-M	M140	201
SB12X-M160-...x.../w	JL-M	M160	221

Lb	Lbft	Lb
30240	10	.7
43650	24	1.5
57420	24	1.8
70200	23	2.5
87660	45	3.6
102960	43	4.2
124020	43	4.9
141120	49	5.5
166680	83	7.3
187380	93	9.6
187725	78	11
216525	90	13
246900	87	15
286800	187	21
374550	203	28
473925	220	39
614625	199	51
773250	214	74
950250	373	109
1145250	385	129
1311975	490	227
1722525	562	291

Ultrabolts are the strongest fasteners available, when applied correctly (usually with Flexnuts). Ultrabolts are custom designed, utilizing special and/or exotic materials. Bolt stress up to 120,000 psi is normal. Some Ultrabolts are capable of withstanding 300,000 psi tensile stress with 250,000 psi yield strength. Preloading repeatedly to 250,000 psi, with only the jackbolts, has been successfully accomplished without damage. For those applications requiring a nut with the Ultrabolt, SXU Flexnuts are recommended (grade 8 nuts are not strong enough for Ultrabolts). Contact Superbolt for your high strength and extra high strength requirements.



Operating temperature: -50°F to 500°F
Bolt stress at standard preload: varies with size



Internal Hex for ease of Installation

SSJX Torquebolts offer Multi-Jackbolt features in the same countersink head cap screws. They feature Moly lubricated setscrews.

APPLICATIONS: Gear boxes, BOF applications, mining equipment, pinion stands, clamp type flange connections, wind tunnels, machine tools, presses.

ORDERING INFORMATION: For part numbers in the table, add threads per inch (or pitch) requirement and the length you require under the head (please account for washer thickness).
EXAMPLE: For a 2", 8TPI bolt 9" long, order - SSJX-200-8 x 9.00/w (The /w specifies the standard hardened washer).

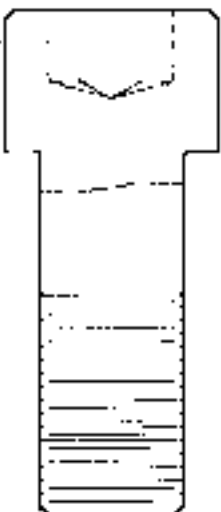
Part No	Nominal Thread d In	Head O.D. D In	Dimensions			Nom. Thrd		Jackbolts				Washer		Standard		Wt. Lb
			Thick T In	B.C. C In	Lgth X In	Lgth B In	OAL L In	No Jb n	Size J In	Hex H In	O.D. Dw In	Thick t In	Pre-Load Lb	Torq Lbft		
SSJX-062-...x.../w	5/8	.98												15453	4	.4
SSJX-075-...x.../w	3/4	1.17												22440	5	.6
SSJX-087-...x.../w	7/8	1.35												31365	5	.8
SSJX-100-...x.../w	1	1.49												39780	5	1.3
SSJX-112-...x.../w	1-1/8	1.70												52650	9	1.8
SSJX-125-...x.../w	1-1/4	1.85												63180	9	2.5
SSJX-137-...x.../w	1-3/8	2.10												79950	16	3.7
SSJX-150-...x.../w	1-1/2	2.22												95940	16	4.3
SSJX-162-...x.../w	1-5/8	2.43												95940	16	5.1
SSJX-175-...x.../w	1-3/4	2.60												111930	16	5.9
SSJX-187-...x.../w	1-7/8	2.80												142350	37	7.7
SSJX-200-...x.../w	2	2.98												170820	37	11
SSJX-225-...x.../w	2-1/4	3.40												199290	37	14
SSJX-250-...x.../w	2-1/2	3.80												243360	74	18
SSJX-275-...x.../w	2-3/4	4.15												283920	74	26
SSJX-300-...x.../w	3	4.45												283920	74	34
SSJX-325-...x.../w	3-1/4	4.90												353340	123	43
SSJX-350-...x.../w	3-1/2	5.15												412230	123	49
SSJX-375-...x.../w	3-3/4	5.65												490230	187	71
SSJX-400-...x.../w	4	5.97												571935	187	80
SSJX-425-...x.../w	4-1/4	6.18												571935	187	89
SSJX-450-...x.../w	4-1/2	6.45												653640	187	113
SSJX-475-...x.../w	4-3/4	6.68												653640	187	125
SSJX-500-...x.../w	5	6.93												653640	187	149
SSJX-525-...x.../w	5-1/4	7.45												859560	283	192
SSJX-550-...x.../w	5-1/2	7.70												859560	283	209
SSJX-575-...x.../w	5-3/4	7.95												967005	283	228
SSJX-600-...x.../w	6	8.20												967005	283	247

CONTACT SUPERBOLT FOR PRODUCT DETAILS

Metric	mm	mm
SSJX-M16-...x.../w	M16	25
SSJX-M20-...x.../w	M20	31
SSJX-M24-...x.../w	M24	35
SSJX-M27-...x.../w	M27	41
SSJX-M30-...x.../w	M30	45
SSJX-M33-...x.../w	M33	50
SSJX-M36-...x.../w	M36	55
SSJX-M39-...x.../w	M39	59
SSJX-M42-...x.../w	M42	63
SSJX-M45-...x.../w	M45	69
SSJX-M48-...x.../w	M48	71
SSJX-M52-...x.../w	M52	76
SSJX-M56-...x.../w	M56	84
SSJX-M60-...x.../w	M60	88
SSJX-M64-...x.../w	M64	97
SSJX-M72-...x.../w	M72	108
SSJX-M80-...x.../w	M80	117
SSJX-M90-...x.../w	M90	134
SSJX-M100-...x.../w	M100	144
SSJX-M110-...x.../w	M110	154
SSJX-M120-...x.../w	M120	164
SSJX-M140-...x.../w	M140	184
SSJX-M160-...x.../w	M160	204

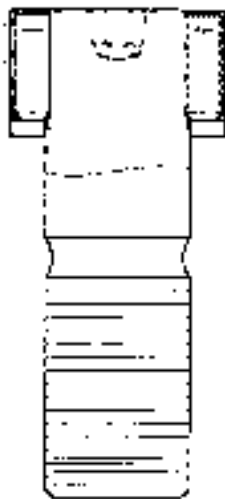
Lb	Lbft	Lb
15795	3.6	.4
25110	3.6	.7
31590	3.6	1.1
41340	9	1.6
51675	9	2.3
62010	9	3.1
74100	18	4.0
88920	18	4.6
88920	18	5.3
131040	32	6.6
131040	32	9.4
131040	32	11
131040	32	13
152918	32	14
250380	75	21
292110	75	27
336960	75	37
458640	149	54
458640	149	76
524160	149	104
589680	149	122
655200	149	205
720720	149	265

Before:



Normal socket head cap screw shown in a countersunk application.

After:



SSJX Torquebolt with the same countersink as the socket head cap screw shown at left.



Standard 2" SSJX Torquebolt.

Operating temperature: -50°F to 500°F
Bolt stress from 20,000 to 120,000 psi

Part No	Nominal Thread d In	O.D. D In	Flexnut Thick T In	Relief Angle Degree	Hex Dimensions			Washer		Max. Design Load		Wt. Lb
					O.D. O In	Flats F In	Length L In	O.D. Dw In	Thick t In	Stress psi	Minor Area Load Lb	
SX8-075-.../w	3/4	1.30								120000	36240	.2
SX8-087-.../w	7/8	1.52								120000	50280	.3
SX8-100-.../w	1	1.73								120000	66120	.4
SX8-112-.../w	1-1/8	1.95								120000	87360	.6
SX8-125-.../w	1-1/4	2.17								120000	111480	.8
SX8-137-.../w	1-3/8	2.38								120000	138600	1.1
SX8-150-.../w	1-1/2	2.60								120000	168000	1.4
SX8-162-.../w	1-5/8	2.81								120000	201600	1.7
SX8-175-.../w	1-3/4	3.03								120000	237600	2.1
SX8-187-.../w	1-7/8	3.25								120000	276000	2.6
SX8-200-.../w	2	3.46								120000	318000	3.2
SX8-225-.../w	2-1/4	3.90								100000	342000	4.5
SX8-250-.../w	2-1/2	4.33								100000	429000	6.1
SX8-275-.../w	2-3/4	4.76								100000	526000	8
SX8-300-.../w	3	5.20								100000	632000	10
SX8-325-.../w	3-1/4	5.63								100000	749000	13
SX8-350-.../w	3-1/2	6.06								100000	875000	17
SX8-375-.../w	3-3/4	6.50								100000	1011000	20
SX8-400-.../w	4	6.93								100000	1157000	25
SX8-425-.../w	4-1/4	7.36								100000	1312000	29
SX8-450-.../w	4-1/2	7.79								100000	1478000	35
SX8-475-.../w	4-3/4	8.23								100000	1650000	41
SX8-500-.../w	5	8.66								100000	1800000	48
SX8-525-.../w	5-1/4	9.09								100000	2030000	55
SX8-550-.../w	5-1/2	9.53								100000	2290000	62
SX8-575-.../w	5-3/4	9.96								100000	2450000	72
SX8-600-.../w	6	10.39								100000	2680000	82

**CONTACT
SUPERBOLT FOR
PRODUCT DETAILS**

Metric	mm	mm	psi	Lb	Lb
SX8-M20-.../w	M20	35	120000	40320	.2
SX8-M24-.../w	M24	42	120000	58200	.4
SX8-M27-.../w	M27	47	120000	76560	.5
SX8-M30-.../w	M30	52	120000	93600	.7
SX8-M33-.../w	M33	57	120000	116880	.9
SX8-M36-.../w	M36	62	120000	137280	1.2
SX8-M39-.../w	M39	66	120000	165360	1.4
SX8-M42-.../w	M42	73	120000	188160	1.9
SX8-M45-.../w	M45	77	120000	222240	2.2
SX8-M48-.../w	M48	83	120000	249840	2.8
SX8-M52-.../w	M52	88	120000	300360	3.3
SX8-M56-.../w	M56	97	120000	346440	4.4
SX8-M60-.../w	M60	105	100000	329200	5.6
SX8-M64-.../w	M64	111	100000	382400	6.6
SX8-M72-.../w	M72	125	100000	499400	9
SX8-M80-.../w	M80	139	100000	631900	13
SX8-M90-.../w	M90	156	100000	819500	18
SX8-M100-.../w	M100	173	100000	1031000	24
SX8-M110-.../w	M110	191	100000	1267000	32
SX8-M120-.../w	M120	208	100000	1527000	41
SX8-M140-.../w	M140	243	100000	2058000	66
SX8-M160-.../w	M160	277	100000	2702000	98



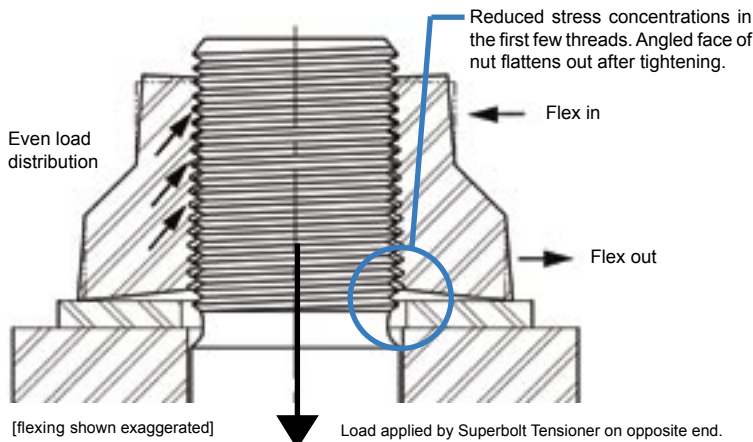
Patented SX8 series Flexnuts are designed to flex within the bolt stress range common for most torquebolts. They are ideal for reducing stress concentrations and also for adding flexibility to gasketed joints. They are suitable for SB8, SB12, and SSJX Torquebolts, and also in conjunction with through studs and Torquenuts.

APPLICATIONS: Test equipment, aircraft equipment, rocket and space, nuclear, mining, crushers, gasketed flanges, etc.

WHEN ORDERING: Replace the three dots (...) with the threads per inch (TPI) or the metric pitch required. Please watch for unusual thread forms. See also "HOW TO ORDER" on page 6.

How Flexnuts Work:

Flexnuts are used on through bolt applications on the opposite end of a Torquenut® or Torquebolt®. They are designed to flex out at the bottom and flex in toward the top of the nut. This distributes the bolt load along many threads, adds elasticity, and prevents stress concentrations in the first few threads.



Operating Temperature: 150°F to 500°F
Bolt stress from 120,000 to 200,000 psi

Patented SX12 Flexnuts are designed for use at very high stress levels. Call for more information.

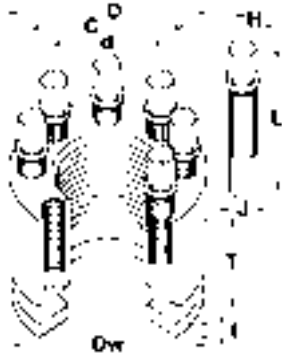


Split Gear segment on rotating kiln.

H650 Torquenuts

Medium Temperature
Graphite Lubricant (JL-G)

Operating Temperature: -50°F to 650°F
Bolt stress at standard preload: 45,000 psi



Tensioner Body Material:
ASTM-A193-B7

H650 tensioners are used for medium temperature, pressure vessel applications on A193-B7 bolts and studs. Material certification provided upon request.

Preload and torque values are based on 45,000 psi bolt stress, the value most commonly used by pressure vessel designers. Depending on operating temperature, jackbolt torque and preload may be increased.

Part No	Nominal Thread d In	O.D. D In	Body Thick T In	B.C. C In	OAL L In	Jackbolts No Jb n	Size J In	Hex H In	Washer O.D. Dw In	Thick t In	Standard @45k psi Stress		Wt. Lb
											Pre-Load Lb	Torq Lbft	
H650-075-.../w	3/4	1.47									13590	9	.3
H650-087-.../w	7/8	1.60									18855	8	.3
H650-100-.../w	1	1.90									24795	14	.6
H650-112-.../w	1-1/8	2.08									32760	18	.7
H650-125-.../w	1-1/4	2.25									41805	17	.8
H650-137-.../w	1-3/8	2.46									51975	34	1.3
H650-150-.../w	1-1/2	2.70									63000	31	1.5
H650-162-.../w	1-5/8	2.96									75600	37	1.8
H650-175-.../w	1-3/4	3.08									89100	52	2.3
H650-187-.../w	1-7/8	3.59									103500	67	3.4
H650-200-.../w	2	3.59									119250	78	3.5
H650-225-.../w	2-1/4	3.95									153900	100	4.1
H650-250-.../w	2-1/2	4.45									193050	157	6.9
H650-275-.../w	2-3/4	4.70									236700	193	7
H650-300-.../w	3	5.20									284400	154	9
H650-325-.../w	3-1/4	5.45									337050	183	10
H650-350-.../w	3-1/2	5.70									393750	160	11
H650-375-.../w	3-3/4	6.20									454959	185	14
H650-400-.../w	4	6.45									520650	188	16
H650-425-.../w	4-1/4	6.95									590400	286	22
H650-450-.../w	4-1/2	7.20									665100	322	23
H650-475-.../w	4-3/4	7.45									742500	319	25
H650-500-.../w	5	7.70									810000	313	27

CONTACT SUPERBOLT FOR PRODUCT DETAILS

Metric	mm	mm
H650-M20-.../w	M20	37
H650-M24-.../w	M24	43
H650-M27-.../w	M27	50
H650-M30-.../w	M30	53
H650-M33-.../w	M33	58
H650-M36-.../w	M36	66
H650-M39-.../w	M39	69
H650-M42-.../w	M42	75
H650-M45-.../w	M45	81
H650-M48-.../w	M48	85
H650-M52-.../w	M52	94
H650-M56-.../w	M56	100
H650-M60-.../w	M60	107
H650-M64-.../w	M64	113
H650-M72-.../w	M72	119
H650-M80-.../w	M80	132
H650-M90-.../w	M90	145
H650-M100-.../w	M100	164
H650-M110-.../w	M110	177
H650-M120-.../w	M120	189

Lb	Lbft	Lb
15120	7	.3
21825	7	.3
28710	16	.7
35100	20	.7
43830	18	.9
51480	35	1.5
62010	32	1.6
70560	36	1.9
83340	52	2.7
93690	58	2.9
112635	70	3.6
129915	81	4.1
148050	74	4.6
172080	140	7.1
224730	183	7.9
284355	154	9.5
368775	150	12
463950	189	16
570150	385	23
687150	348	26

H650X Torquenuts

Medium Temperature
Moly Lubricant (JL-M)

Operating Temperature: -50°F to 650°F
Bolt stress at standard preload: 45,000 psi

Tensioner Body Material:
ASTM-A193-B7

- Fewer jackbolts
- Bigger jackbolts
- Moly lubricant to reduce torque

APPLICATIONS: Boiler feed pumps, boiler circulating pumps, reactors, heat exchangers, etc.

Part No	Nominal Thread d In	O.D. D In	Body Thick T In	B.C. C In	OAL L In	Jackbolts No Jb n	Size J In	Hex H In	Washer O.D. Dw In	Thick t In	Standard @45k psi Stress		Wt. Lb
											Pre-Load Lb	Torq Lbft	
H650X-125-.../w	1-1/4	2.34									41805	14	1.0
H650X-137-.../w	1-3/8	2.59									51975	20	1.6
H650X-150-.../w	1-1/2	2.90									63000	27	2.0
H650X-162-.../w	1-5/8	3.05									75600	33	2.4
H650X-175-.../w	1-3/4	3.34									89100	45	3.0
H650X-187-.../w	1-7/8	3.70									103500	55	4.2
H650X-200-.../w	2	3.90									119250	63	4.6
H650X-225-.../w	2-1/4	4.15									153900	82	5.0
H650X-250-.../w	2-1/2	4.55									193050	121	7.7
H650X-275-.../w	2-3/4	4.92									236700	148	8.9
H650X-300-.../w	3	5.30									284400	133	10
H650X-325-.../w	3-1/4	5.30									337050	158	12
H650X-350-.../w	3-1/2	5.90									393750	148	15
H650X-375-.../w	3-3/4	6.15									454950	142	16
H650X-400-.../w	4	6.70									520650	163	20

CONTACT SUPERBOLT FOR PRODUCT DETAILS

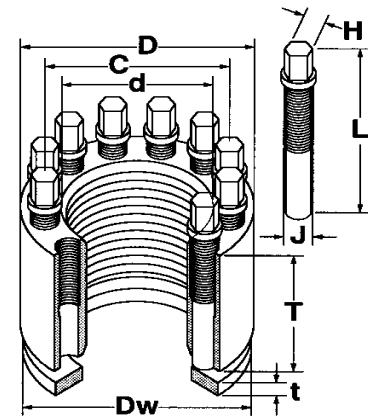
Metric	mm	mm
H650X-M30-.../w	M30	59
H650X-M33-.../w	M33	66
H650X-M36-.../w	M36	74
H650X-M39-.../w	M39	74
H650X-M42-.../w	M42	77
H650X-M45-.../w	M45	94
H650X-M48-.../w	M48	94
H650X-M52-.../w	M52	99
H650X-M56-.../w	M56	105
H650X-M60-.../w	M60	116
H650X-M64-.../w	M64	116
H650X-M72-.../w	M72	131
H650X-M80-.../w	M80	135
H650X-M90-.../w	M90	150
H650X-M100-.../w	M100	170

Lb	Lbft	Lb
35100	12	1.0
43830	15	1.3
51480	21	2.1
62010	26	2.0
70560	29	2.4
83340	45	4.3
93690	51	4.2
112635	61	4.5
129915	70	5.1
148140	112	8.1
172080	131	7.7
224730	128	9.9
284355	184	12.4
368775	179	15
463950	148	20

Torquenuts H650T

Medium Temperature
Tall Profile Series
Graphite Lubricant (JL-G)

Operating Temperature: -50°F to 650°F
Bolt stress at standard preload: 45,000 psi



Tensioner Body Material:
ASTM-A193-B7

H650T torquenuts replace "acorn" and "castle" nuts and are intended for use where space is limited. They are lubricated with JL-G graphite lubricant.

Part No	Jack Bolt Lube	Nominal Thread d In	O.D. D In	Torquenut				Jackbolts				Washer		Standard @45k psi Stress		Wt. Lb
				Thick T In	B.C. C In	OAL L In	No Jb n	Size J In	Hex H In	O.D. Dw In	Thick t In	Pre-Load Lb	Torq Lbft			
H650T-100.../w	JL-G	1	1.67											24795	8.6	.5
H650T-112.../w	JL-G	1-1/8	1.80											32760	11	.6
H650T-125.../w	JL-G	1-1/4	1.92											41805	9.6	.6
H650T-137.../w	JL-G	1-3/8	2.08											51975	10	.7
H650T-150.../w	JL-G	1-1/2	2.34											63000	22	1.3
H650T-162.../w	JL-G	1-5/8	2.47											75600	22	1.4
H650T-175.../w	JL-G	1-3/4	2.62											89100	22	1.5
H650T-187.../w	JL-G	1-7/8	2.79											103500	22	1.7
H650T-200.../w	JL-G	2	3.06											119250	39	2.5
H650T-225.../w	JL-G	2-1/4	3.37											153900	38	2.9
H650T-250.../w	JL-G	2-1/2	3.75											193050	55	4.1
H650T-275.../w	JL-G	2-3/4	4.13											236700	86	6
H650T-300.../w	JL-G	3	4.49											284400	91	7
H650T-325.../w	JL-G	3-1/4	4.87											337050	96	8
H650T-350.../w	JL-G	3-1/2	5.30											393750	182	12
H650T-375.../w	JL-G	3-3/4	5.62											454950	184	13
H650T-400.../w	JL-G	4	5.97											520650	187	15

CONTACT
SUPERBOLT FOR
PRODUCT DETAILS

Metric		mm	mm
H650T-M24.../w	JL-G	M24	41
H650T-M27.../w	JL-G	M27	43
H650T-M30.../w	JL-G	M30	46
H650T-M33.../w	JL-G	M33	49
H650T-M36.../w	JL-G	M36	53
H650T-M39.../w	JL-G	M39	61
H650T-M42.../w	JL-G	M42	64
H650T-M45.../w	JL-G	M45	67
H650T-M48.../w	JL-G	M48	72
H650T-M52.../w	JL-G	M52	79
H650T-M56.../w	JL-G	M56	84
H650T-M60.../w	JL-G	M60	90
H650T-M64.../w	JL-G	M64	96
H650T-M72.../w	JL-G	M72	106
H650T-M80.../w	JL-G	M80	118
H650T-M90.../w	JL-G	M90	135
H650T-M100.../w	JL-G	M100	149

Lb	Lbft	Lb
21825	7.1	.5
28710	7.4	.5
35100	7.6	.6
43830	8.1	.6
51480	8.3	.7
62010	21	1.4
70560	20	1.5
83340	20	1.6
93690	22	1.8
112590	39	2.7
129915	38	3.0
148140	38	3.5
172080	71	5.3
224730	70	6
284355	78	8
368775	171	13
463950	188	15

Part No	Jack Bolt Lube	Nominal Thread d In	O.D. D In	Torquenut				Jackbolts				Washer		Standard		Wt. Lb
				Thick T In	B.C. C In	OAL L In	No Jb n	Size J In	Hex Size In	O.D. Dw In	Thick t In	Pre-Load Lb	Torq Lbft			
H650TX-425.../w	JL-M	4-1/4	6.40											590400	158	22
H650TX-450.../w	JL-M	4-1/2	6.66											665100	156	23
H650TX-475.../w	JL-M	4-3/4	7.10											742500	155	27
H650TX-500.../w	JL-M	5	7.40											810000	152	29
H650TX-525.../w	JL-M	5-1/4	7.90											913500	156	33
H650TX-550.../w	JL-M	5-1/2	8.25											1030500	161	39
H650TX-575.../w	JL-M	5-3/4	8.80											1102500	159	46
H650TX-600.../w	JL-M	6	9.40											1206000	162	53

CONTACT
SUPERBOLT FOR
PRODUCT DETAILS

Metric		mm	mm
H650TX-M110.../w	JL-M	M110	166
H650TX-M120.../w	JL-M	M120	180
H650TX-M140.../w	JL-M	M140	198
H650TX-M160.../w	JL-M	M160	236

Lb	Lbft	Lb
570150	185	24
687150	191	28
926100	180	36
1215900	197	47

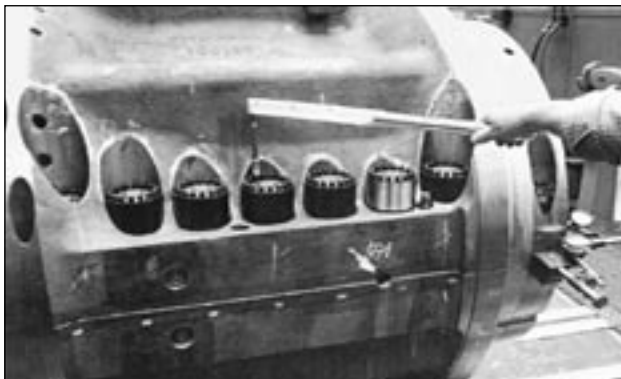
Medium Temperature
Tall Profile Series
Moly Lubricant (JL-M)

H650TX

Operating Temperature: -50°F to 650°F
Bolt stress at standard preload: 45,000 psi

Tensioner Body Material:
ASTM-A193-B7

H650TX torquenuts replace "acorn" and "castle" nuts and are intended for use where space is limited.



Low temperature steam turbine H650T series fits in counterbore locations.

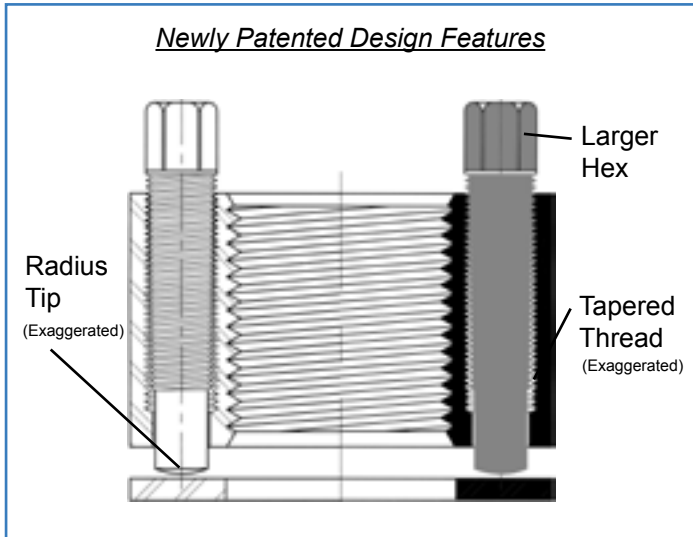


Ingersoll Rand boiler feed pump with 6" diameter studs (H650TX-600-8/w).
With air tools, tightening required only 2-1/2 hours.

High Temperature Products

NEW PATENTED TECHNOLOGY! High Temperature Multi-Jackbolt Tensioners

High temperature bolting applications still remain the most challenging for engineering and maintenance personnel. Using our years of bolting experience, Superbolt® has improved upon the original Multi-Jackbolt design. The result is, simply the best high temperature bolting method available.



Improvements on the Original Design:

- Tapered Jackbolt Thread reduces the friction factor by distributing the load more evenly over the threads. This reduces torque requirements and greatly reduces removal effort. Threads are precision rolled for improved toughness and hardness.
- The Rc 45 rolled jackbolt thread exhibits consistently easy breakaway performance when mated with the softer nut body thread, even after the lubricant has burnt off.
- Rounded jackbolt tip reduces friction and leaves only minor marking of the washer. This also results in reduced torque requirements and easier removal.
- Larger hex is cold worked and cold formed. The larger hex and lower torque requirements, eliminate socket breaking.

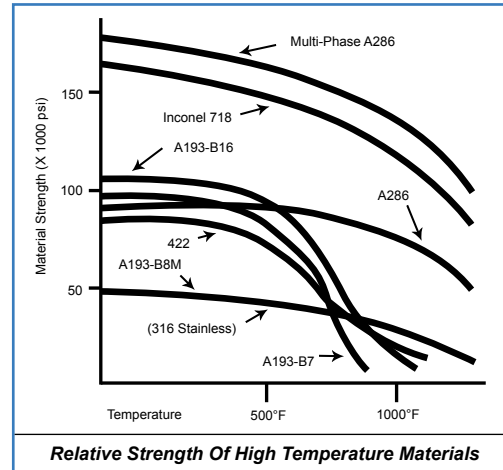


Chart for reference only. Do not use for design data.



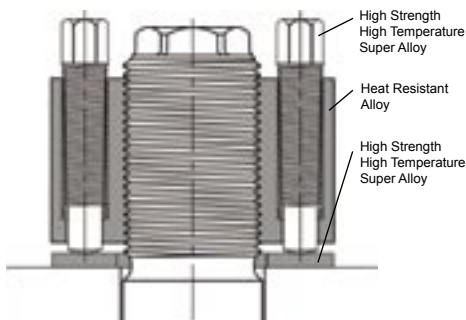
Available in both nut and bolt style.

High Flexibility for Tighter and More Permanent Joints

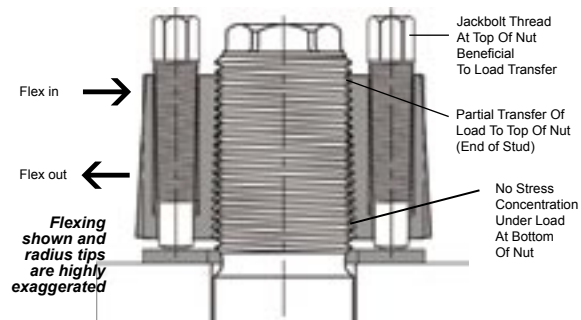
The increased elasticity of Multi-Jackbolt tensioners on high temperature flange and joint applications is critical to permanent sealing under operating conditions. Increasing bolting elasticity can compensate for flange and joint instability caused by temperature changes, changes in internal pressure and joint movement.

The flexing action in SUPERBOLT nut type tensioners is also beneficial in reducing stress concentrations on the male thread. When the jackbolts are tightened, the nut body flexes in slightly at the top (clamping the threads tighter) and flexes out at the bottom. This nut body flexing removes stress concentrations from the first few threads and distributes the stresses more evenly along the entire length of the threaded area, significantly improving load capacity and fatigue resistance.

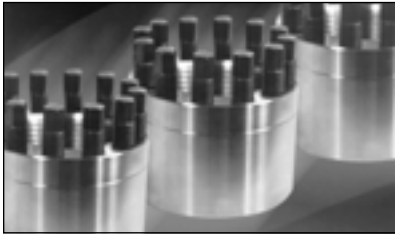
Turbine Torquenut Before Tightening



Turbine Torquenut After Tightening



High Temperature Products



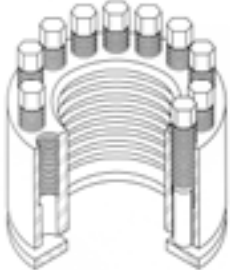
Torquenuts (650°F - 1200°F*)

Materials: Various material combinations are available including ASTM A193 Grade B16, 300 and 400 series stainless, nitrogen strengthened austenitic, and other various superalloys such as A286 and Inconels. Besides use for high temperature applications over 650°F, these products are also suitable for food, corrosion, and non magnetic applications down to -423°F (For low temperature service, additional material testing and certification may be required).

**Note: The temperature at the nut location is often lower than the process temperature. If the nut temperature is below 650°F, the medium temperature series on pages 20 and 21 can also be used.*

H1215

Body OD / Stud Dia = 1.5 (approx.)



Ex: 2-1/4" stud size
(16) 10mm jackbolts

H1215 Supernuts® have the smallest spotface design and will retrofit even the tightest nut spacing.

- Replaces "castle" and "acorn" nuts
- Smallest nut O.D., approx. 1.5x stud dia.
- Most number of jackbolts
- Smallest diameter jackbolts
- Lowest jackbolt torque
- For stud sizes up to 6" diameter and over

Prestress: Usually limited to 45,000 psi bolt stress.



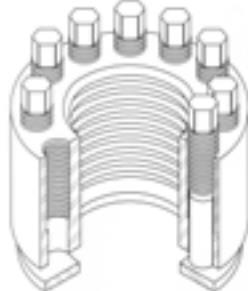
Turbine Control Valve



HP Turbine and valve

H1216

Body OD / Stud Dia = 1.6 (approx.)



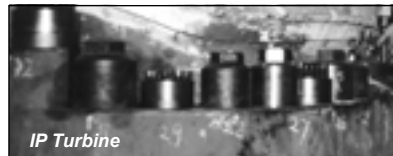
Ex: 2-1/4" stud size
(12) 12mm jackbolts

H1216 Supernuts® feature a slightly larger spotface than the H1215 Series. The H1216 is preferred to the H1215 if flange spotface room exists.

- Replaces many "acorn" & "castle" nuts.*
- Intermediate series, approx. 1.6x stud dia.
- Usually fewer jackbolts than 1215 series
- Some sizes have the same number of jackbolts as H1215 but of a larger dia.
- Some sizes can achieve higher preloads than the H1215 series
- For stud sizes up to 4" diameter

Prestress: 45,000 psi - 60,000 psi bolt stress.

**Usually the H1216 has a slightly larger OD than the original acorn or castle nut, but it can be used as long as spot face room is available on the flange.*



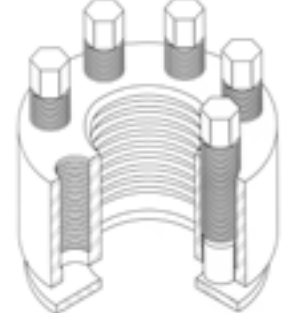
IP Turbine



Turbine Stop Valve

H1218

Body OD / Stud Dia = 1.8 (approx.)



Ex: 2-1/4" stud size
(8) 16mm jackbolts

H1218 Supernut® Tensioners have the largest diameter of the three series.

The larger diameter nut body permits larger diameter jackbolts, resulting in fewer jackbolts. This allows the H1218 to be installed and removed in the shortest time.

- Typically replace heavy hex nuts. Can also replace "acorn" and "castle" nuts if flange spotface room exists
- Largest nut O.D., approx. 1.8x stud dia.
- Least number of jackbolts
- Largest diameter jackbolts
- For stud sizes up to 2-3/4" diameter

Prestress: 45,000 psi - 60,000 psi. Higher prestress available with custom design.



Turbine Control Valve



High Pressure steam flange

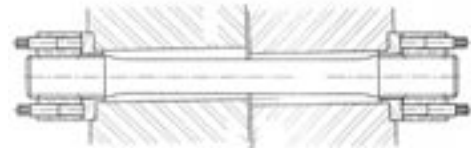
PROBLEM: The strength of ASTM A193 Grade B16 material falls away rapidly approaching 1,000° F (See chart on page 22) When used for studs above 950° F, leaks can occur if the joint is not engineered properly to withstand the high temperature creep of the studs. 12% chrome material (422 SS) can sometimes improve the situation as it's creep strength is slightly better (See page 22). However, 422 SS has a very different expansion coefficient than typical CrMoV housings. This can cause leakage problems for equipment that operates through frequent temperature cycles.

SOLUTION: A smaller diameter Inconel stud tensioned to a higher stress level. Inconel can easily hold higher stress levels (80-90ksi) at 1,000° F+ service and it has an expansion coefficient compatible with the CrMov housing. A Superbolt Tensioner is used to achieve this high bolt stress level where traditional tightening methods cannot. With a smaller stud and the same nut O.D., larger jackbolts can be used making the high powered Supernut highly stable at 1,000° F+. The system has many benefits which work together to improve integrity of the joint.

Applications: Steam Inlet flanges, stop valves, control valves, turbines, high temperature vessels, and more.



High pressure steam lead with rotational misalignment of bolt holes. Solved leakage and history of bolt failures.



Smaller diameter Inconel studs can be inserted with rotational misalignment of bolt holes. Jackbolts compensate for non-perpendicular surface.

Benefits:

Increased clamping load on the joint at elevated temperature - Inconel 718 studs are highly stable at temperatures up to 1000° F and maintain preload throughout operation.

Lower contact stress to housing - Utilizing the original bolt pattern, the smaller O.D. studs result in lower contact stress to the housing material.

Improved bolt elasticity - The tensioner body expands at the base and contracts at the top very slightly. This "flexing" action introduces a stored energy to the bolt. Bolts also have added elasticity due to the smaller diameter and their higher operating stresses. The result is an improved elasticity. The joint is more forgiving and will maintain the clamping load even through harsh, thermal cycling.

Improved preload accuracy - Even precision torquing of standard nuts yields substantial scatter in bolt preload. Accuracy of SB Tensioners is 5-10%.

Eliminates galling - Stud preload is achieved in pure tension (no torsional stress component). Since the main thread does not slide under load, galling of the main thread will not occur. Additionally, studs are easily extracted

from the housing even after long-term service.

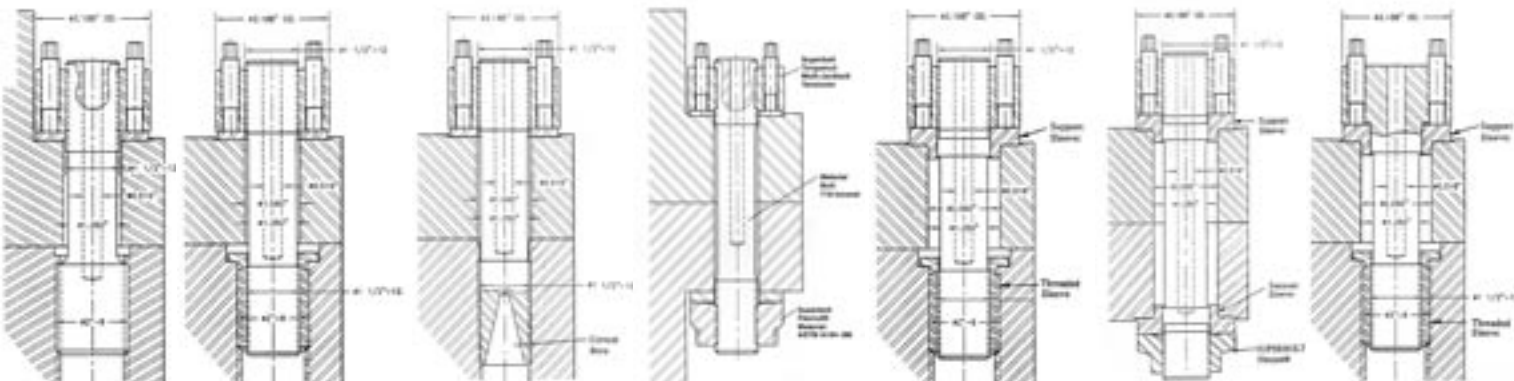
Reduce man hours and downtime - Most tensioners can be installed or removed in only a few minutes.

For new designs, reduce the size of the flange or housing - Due to the small space requirements of Superbolt systems, our tensioners can be positioned to the point of nearly touching, saving you space and materials in your design.

Lower initial cost - Less expensive than utilizing full size Inconel 718 studs.

THE RESULT

Solves leakage problems on difficult joints! Even designs prone to leakage can often be sealed permanently.



New unit design with stepped stud.

New unit design with threaded sleeves.

New unit alternative design with conical bore stud.

New unit design for through bolts.

Retrofit with threaded sleeve.

Retrofit of through-bolt design.

Retrofit for hex bolts. (Bolt style tensioner)



Steam inlet flange, control valve and stop valves on 960 MW turbine.



24" check valve.

Supernuts® are ideal for nuclear plant critical and high radiation applications. Significant savings in worker exposure and outage time are realized.

Applications: valves, heaters, manways, pumps, turbines

Manufactured from approved ASME materials.



Pressurizer main steam safety valve.



Check valve.



PORV - Pressurizer relief valve.



Excess let-down heat exchanger.

Monel Series MN

Corrosion Resistant Hull Integrity Stud/Bolt Tensioners

Monel Multi-Jackbolt Tensioners are designed as an alternative to Mil-N-25027/1 Heavy Hex Monel Self-Locking nuts. They are shock qualified and salt water proof, ideally suited for commercial marine, Navy, and offshore applications. They are especially useful where space limitations exist.



Superbolt tensioners passing shock qualifications at hull integrity levels at the HiTest Laboratories facility, Arvon, VA.

Corrosion Protection Options



Black oxide coated tensioner.



Xylan coated torquebolt.



Bright zinc plating tensioner.



Electroless nickel plated tensioner.



Xylan body with Dacromet® jackbolts.



Cadmium plated tensioner.



Stainless steel tensioner.

Superbolt manufactures tensioners from various materials for all types of corrosive applications. We also offer various coatings and platings for our standard carbon alloy steel tensioners. A Superbolt sales associate will be able to discuss with you the various material and plating options.

Materials: including various martensitic, austenitic, and precipitation hardening stainless steels, Inconels and Monels.

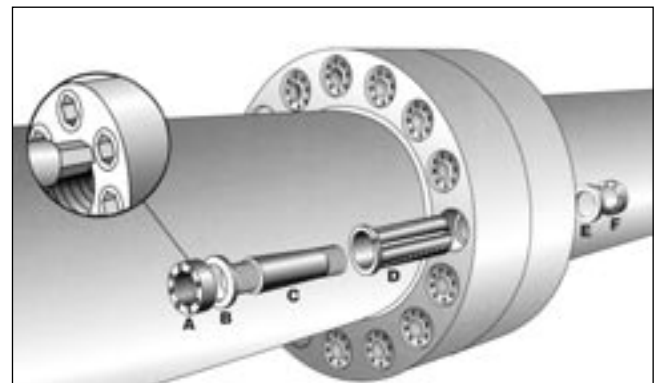
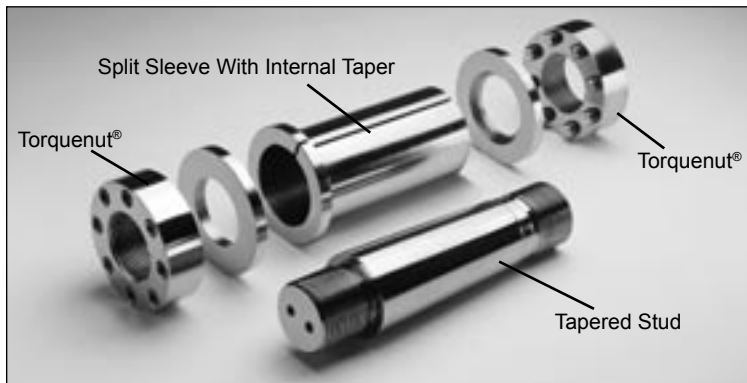
For large machinery couplings and other large fitted bolt applications

Problems:

Couplings such as those found on turbines present unique bolting problems. Alignment of shafts is a primary concern. Current practice requires the use of fitted bolts to assure proper alignment. Fitted bolts require precision machining, and installation and removal is often difficult.

Solutions:

Superbolt has developed a custom bolting system for machines requiring large fitted bolts, such as steam turbines, generators, marine equipment and steel mill machinery. The bolting system consists of a tapered stud with threads on both ends. This stud slides into a sleeve with an internal taper. The sleeve has a slot which allows it to expand as the tapers are drawn together. Typically, sleeves are designed .005" - .010" loose in the hole.



HOW EXPANSION BOLTS WORK

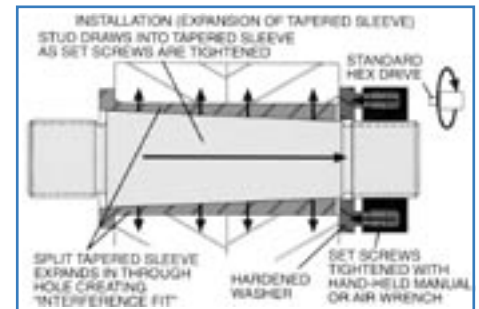
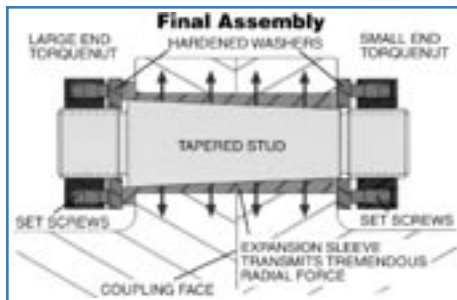
Superbolt Expansion Bolts utilize a six piece system (shown above). The small end Torquenut® supplies the large force required to draw the tapered stud into the expandable tapered sleeve. As the tapered sleeve expands, a large, radial force is exerted uniformly against the mating through-holes. The large end Torquenut creates additional

clamping force on the joint and is also used for easy removal of the tapered stud. Once the tapered stud is extracted, the sleeve collapses, allowing easy removal.

Expansion Bolts are specially designed and are available in all types of standard and exotic bolting materials.

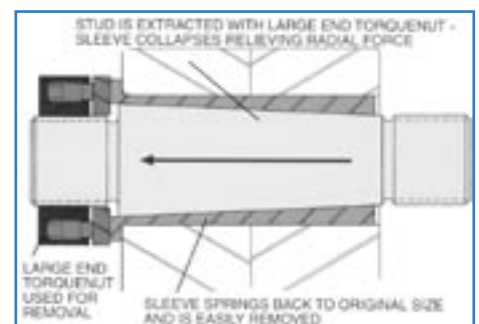
Installation:

1. Insert expandable tapered sleeve (D) into through-hole
2. Insert tapered stud (C) into tapered sleeve
3. Slip washer (E) over threaded small end of tapered stud
4. Thread Torquenut (F) onto small end of tapered stud
5. Tighten set screws on Torquenut (F) to prescribed torque
6. Install washer (B), Torquenut (A), and tighten set screws



Removal:

1. Removing Torquenut® (F)
2. Extracting the stud with Torquenut® (A). Once the tapered stud is extracted, the sleeve collapses, allowing easy removal.



Large turbine/generator coupling.
Installation 4 hours, removal 1 hour.

Benefits:

- Fast Installation and Removal
- Provides a Strong Rigid Connection
- Eliminates High Powered Tools, Bolt Heating, Drilling out Seized Studs
- Honing of Holes Not Required
- The Loose Fit Sleeves Tolerate Variations in Diameters

Installation Procedure

(excludes piston end, crosshead, mill motor & bearing lock nuts)

BEFORE TIGHTENING

Determine the target jackbolt torque from the installation sheet shipped with the product, or by calling Superbolt.

Note: *The jackbolt torque value stamped on the tensioner is a standard value for that part and may not be correct for your application.*

If using air impacts: Select a tool with output of about 100% - 110% of the target torque. See "Air Impact Tool Selection" on back.

Preparation: **1)** Confirm jackbolts are lubricated with correct Superbolt lubricant (JL-G or JL-M). New product is pre-lubricated at the factory. **2)** Make sure the jackbolt tips are flush (or recessed) with bottom of nut body. **3)** Lubricate thread of main stud. **4)** Slide hardened washer onto the stud, **5)** Lubricate the washer face or jackbolt tips with correct Superbolt lubricant (JL-G or JL-M).

For flanges: To speed up installation, use two workers at 180° apart, following the OEM pattern for tightening.

TIGHTENING SEQUENCE

STEP 1: Spin the tensioner onto the main thread until it seats against the washer. You may want to back off the tensioner slightly as mentioned in Helpful Tip #3.

STEP 2: Tighten (4) jackbolts at 90° apart (12:00, 6:00, 9:00, and 3:00) on all studs with a partial torque (30 - 70%). This serves to seat the flange. If using an impact, use a reduced setting or lightly pulse the trigger at the full setting.

STEP 3: At 100% target torque, tighten the same (4) jackbolts on all studs.

STEP 4: At 100% target torque, tighten all jackbolts in a circular pattern. Do this for all studs (1 round only). See Helpful Tip #7 about using up to 120% torque.

STEP 5: Repeat "STEP 4" until all jackbolts are "stabilized" (less than 10° rotation). This usually requires 2-4 additional passes. If using air tools, switch to a torque wrench when socket rotation is small. Use the torque wrench to stabilize at the target torque.

Note: *Product with 4 or 6 jackbolts- use a star pattern for all steps.*

Removal Procedure

Note: For stubborn removal, please call for alternate procedure

CAUTION! Removal requires strict procedures! Jackbolts must be unloaded gradually. If some jackbolts are fully unloaded prematurely, the remaining jackbolts will carry the entire load and may be hard to turn. With extreme abuse, a jackbolt tip can deform making removal difficult.

SERVICE UNDER 250°F

Preparation: Spray jackbolts with penetrating oil or hydraulic oil prior to start (especially if product is in corrosive environment).

STEP 1: Loosen each jackbolt 1/8 turn following a circular pattern around the tensioner (1 round only). As you move around and get back to the 1st jackbolt, it will be tight again. Do this for all studs on the joint prior to the next step.

STEP 2: Repeat a 2nd round as above for all studs, loosening each jackbolt 1/4 turn in a circular pattern.

STEP 3: Continue loosening 1/4 turn for 3rd and successive rounds until all jackbolts are loose.

Note: *Usually after the 3rd or 4th round, an impact can be used to completely extract the jackbolts, one by one. For long bolts or tie rods, additional rounds may be required before removing the jackbolts with an impact tool.*

STEP 4: Remove, clean, and relubricate the jackbolts prior to next use with correct Superbolt lubricant (JL-G or JL-M).

SERVICE OVER 250°F

Preparation: Above 300°F the petroleum base of the lubricant burns off. Oil per "STEP 1" below to reduce the removal torque.

STEP 1: As the equipment is cooling down (around 300°F), apply hydraulic oil to the jackbolts and washer and let sit for several hours. Thoroughly "wet-down" all components and re-apply during equipment cool down period. If the tensioner is inverted, squirt oil in the gap between the nut body and the washer. Synthetic oil can be used for oiling above 300°F.

STEP 2: Wait for tensioners to cool below 200°F. Using a circular pattern, "crack" each jackbolt only enough to ensure movement. Do not turn beyond the break loose point. Do this for all studs.

STEP 3: Now begin with "STEP 1" of the procedure for service under 250°F.

Note: *Heating Rods can be used to reduce the removal torque required.*

Main Stud: Any standard anti-seize lubricant can be used.

Jackbolts are pre-lubricated from the factory with either moly (JL-M) or graphite (JL-G) lubricant. JL-M product is stamped with “JL-M”. For reuse after temperature service, remove, clean, and re-lubricate the jackbolts with the correct Superbolt lubricant. For best results, also lubricate the female jackbolt threads.

Washers: Apply JL-M or JL-G lubricant to the washer face (or jackbolt tips). Again, it is important to use the correct Superbolt lubricant.

(Call Superbolt for additional help with tool selection)

AIR IMPACT TOOL SELECTION 90 psi air pressure

Note: The jackbolt torque actually achieved by an air impact wrench is usually only 30 - 50% of its rated output. For minimum hand work, use an impact with an output of 110% - 120% target torque. For maximum power, use the largest air line and fitting.

Up to 70 ft-lbs: For 15 - 35 ft-lbs use a right angle ratchet or light duty 3/8” impact. For 35 - 70 ft-lbs use a heavy duty 3/8” impact.

70 - 100 ft-lbs: Use a light duty 1/2” impact at a reduced pressure or setting. (Be careful not to overtighten! Calibrate the impact before starting)

100 - 170 ft-lbs: For 100 - 130 ft-lbs use a light duty 1/2” impact. For 130 - 170 ft-lbs use a heavy duty 1/2” impact.

170 - 200 ft-lbs: Use a light duty 3/4” impact on low setting. Some heavy duty 1/2” impacts will also reach this range.

Over 200 ft-lbs: For 200 - 300 ft-lbs, use a light to medium duty 3/4” impact. Over 300 ft-lbs, use a heavy duty 3/4” impact.

Calibrating an air impact wrench: Tighten one jackbolt until the socket rotation stops and check the jackbolt with a torque wrench. The torque required to move the jackbolt further is the output of the impact as measured on Superbolt tensioners.

HELPFUL TIPS

PRIOR TO TIGHTENING:

1) Check threads of main stud: If possible, verify that the tensioners spin on prior to the installation date. If a tensioner is tight or will not thread on, try using lapping compound on the main thread and work the tensioner in a back and forth motion making small advances when the thread loosens up. If necessary, chase the studs with a die.

2) Use of spacers: Tensioners should be positioned at the ends of the studs to minimize exposed threads and facilitate easy access to the jackbolts. A spacer (or stacked washers) can be used beneath the special hardened washer to accomplish this. A spacer will also “step over” a damaged area on a stud where years of bolting have deformed the first few threads.

3) Back the tensioner off before tightening to provide 1/16” to 1/8” gap: The additional jackbolt extension provides easy access for oiling the jackbolt tips prior to removal. This is especially beneficial for oiling when the tensioners are inverted. Note: There may be insufficient jackbolt stroke to allow this step when tensioning exceptionally long bolts or tie rods, or when closing a gap between flanges.

4) Sockets: High hex stresses require the use of quality six-point sockets. Have several spares handy for each job and replace them at the first sign of wear. Special Superbolt sockets are required when using a 3/4” impact or torque wrench due to close jackbolt spacing.

5) For spinning the tensioner on and off the stud: Custom “sockets” which grip the tensioner are available. Also, two deep well sockets inserted over two jackbolt hex’s at 180° apart can serve as “handles” for spinning the tensioners on and off the studs.

FOR TIGHTENING:

6) To improve efficiency when using impacts: Don’t wait for the socket to stall completely on a specific jackbolt before advancing to the next jackbolt. It is faster, overall, to move quickly between jackbolts.

7) Overshooting the target torque: You may want to use 110 - 120% of the target torque for “Step 3”, “Step 4”, and for 1-2 rounds of “Step 5”. This may eliminate a tightening round. Be careful not to stabilize all of the jackbolts at this torque however. For long bolts or tie rods, you may want to experiment using even higher torque values. Call Superbolt before using more than 120% target torque.

8) For gasketed joints: During gasket compression, the load is transferred to the jackbolts (i.e. stud) being tightened. Don’t be concerned if some jackbolts (or tensioners) become loose during the procedure. Continue following the procedure. Don’t spin down tensioners that become loose during gasket compression.

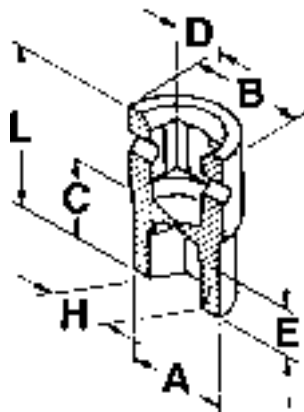
FOR REMOVAL:

9) 1/4 turn or less!: Removing the jackbolts more than a 1/4 turn will increase the removal torque of the remaining jackbolts and you may get stuck. If this happens, you will have to retighten and start again.

10) Stuck Jackbolt Removal: If a jackbolt will not turn, remove, relube, and retighten a neighboring jackbolt and then try to turn it.

Superbolt® offers a line of extra strong socket tools designed to torque external hex jackbolts. For the classic ST series, as well as those products which have setscrews for jackbolts, a collection of Allen type hex bits is available. As a service, Superbolt, Inc. can provide various torquing devices in all common drive sizes.

Special tools, including wrench units which encompass the jackbolts are also available.



www.superbolt.com

Our web-site offers extensive application examples, basic bolting information, and features an online help section for installation and removal. Also, if you don't have it already, you can request our "Solution To Bolting Problems" DVD, and our "Installing and Removing Superbolt Tensioners" CD-Rom online.

Lubricants

The torque-preload relationship of Superbolt tensioners depends on the tensioner body and jackbolt materials, heat treatment, plating, lubricants, and other factors. Superbolt engineers have performed extensive tests to determine the best lubricants for the various materials utilized by Superbolt, Inc. In an emergency, a number of commercially available graphite or nickel based lubricant compounds can be used for jackbolt re-lubrication in the field, however, obtained preload may not be accurate.

Copper bearing compounds have not performed well as jackbolt lubricants.

Two custom lubricants, JL-G and JL-M are RECOMMENDED by Superbolt. Both compounds have a higher solids content than commercially available compounds. They have performed better as jackbolt lubricants, particularly in high temperature applications. JL-G and JL-M are available in various container sizes and can be ordered directly from Superbolt.

Proper Lubricant should be applied to the tips of the Jackbolts prior to installation.

JL-G is a lubricant paste made from selected flaky graphite and pure mineral oil. It has a relatively uniform friction factor of 0.130 under widely varying conditions.

JL-G is used in the assembly of most Superbolt products. Tests show that as long as the lubricant is intact, the torque-preload relationship does not change appreciably in subsequent tightenings. Re-lubrication of jackbolts after lengthy or high temperature service restores Superbolt products to their original performance.

JL-M is a lubricant paste with a high concentration of Molybdenum Disulfide power. Recent advances in formulation have made this lubricant stable with a friction factor of approximately 0.055 even on the first tightening rounds.

In addition to being used on several product lines, this lubricant is used on products with larger jackbolts (roughly 5/8" and up) enabling high bolt preload capacities with a low torque input (approximately 1/2 the torque of JL-G). This also helps reduce wear on sockets and adds the possibility of using smaller wrenches. JL-M should not be used on applications above 650° F.

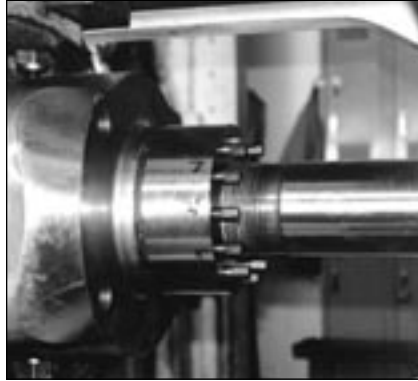
As with all lubricants, it is important to apply some to the jackbolts prior to installation.



Gas Compression



Reciprocating compressor, distance piece.



Crosshead nut.



Compressor connecting rod nuts.

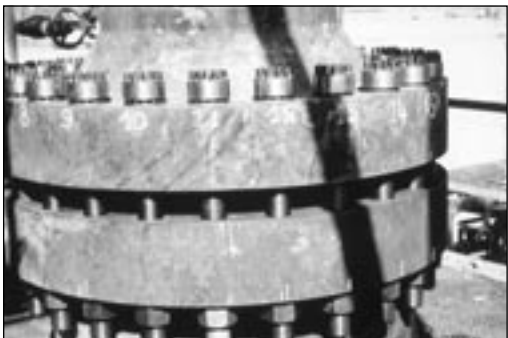


Anchor bolts.



Piston end nut.

Petrochemical



Installation and removal requires only 1-2 hours for this reactor cover.



Steam turbine easily installed despite inverted position.



Severe temperature swings previously caused this flange to leak. Superbolt tensioners eliminated this problem. Also, because only hand tools are required, the worker can safely climb to this elevated worksite.

These heat exchangers used to require extensive destructive removal of nuts and studs. With Superbolt, galling is eliminated.



Large methanol reactor with 11" studs. Six hours with Superbolt vs. two days with Hydraulic Tensioners.

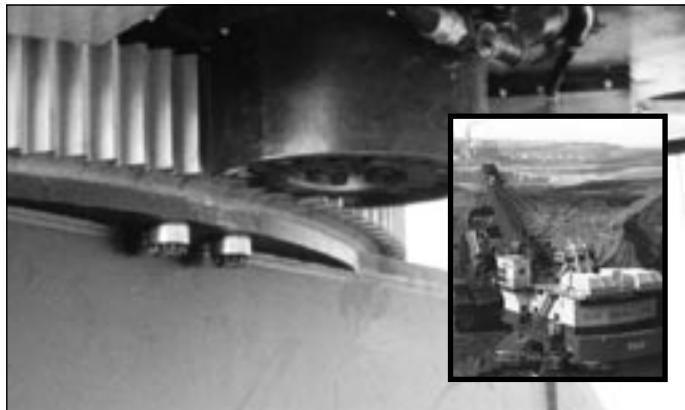


Hydrotest for new reactor ebulating pump.

Mining



Gyratory crusher.



Ring gear installation on large dragline. Shear pins and small bolts were replaced with 3" bolts and Supernuts™. Movement of the joint has been eliminated.



Boom point.



Hoist and drag drums.

Application Examples

Presses



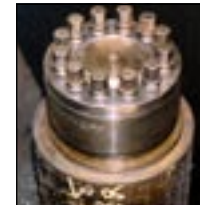
Press Platen repaired with tie bolts and Supernuts.



Stamping Press.



20" diameter Supernut™ Tensioners on a 5,000 Ton Forging Press.



Press Anchorbolt on 2,000 Ton Hydraulic Press.

(Left) 8 Superbolt column nuts required only 12 man hours vs. 2-1/2 full days for heating of columns.

Steam Power



Two workers needed only 1 hour and 21 minutes to tighten these 5" tensioners.



High pressure feedwater heater.



Outage time was reduced on this turbine stop valve.



Superbolt tensioners make fast work for boiler circulating pump bolting.



Steam turbine inlet flange. 30 minutes to install, 15 minutes to remove.



Low torque is easy for tight spaces on this control valve.



Stainless bolts used for blade rings and inner turbine shell.

Hydro Power



Kaplan turbine bolting.



Piston Nut



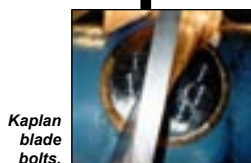
Linkage Bolts



Radial expansion bolts used for generator rotor to shaft connection.



Overhead work is simplified with the low torque requirement on this Turbine Wheel to Shaft bolting. Galling and seizure is eliminated.



Kaplan blade bolts.



Coupling Bolts



Small wicket gate friction device.



Split joint on new manufacture ball valve.



Large hydro turbine wicket gate servo motor.



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6,263,764; other patents pending and corresponding foreign patents.



SPECIALTY APPLICATIONS: (LEFT) Study by Defense Department confirmed substantial time savings and lighter tooling to transport. (ABOVE) 9" MT Tensioner used as a tool to push this rudder up a taper. (RIGHT) Superbolt Tensioners used to secure Canadarm 2 during space launch.

Superior Bolting Technology

...becoming the bolting standard for end users and OEM's alike.

Common Applications include:

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Bolts • Couplings • Engines • Off-Shore Applications • Oil-Field Equipment
- Steam Power** Turbines-Split Case • Boiler Feed Pumps • Boiler Circulating Pumps
Stop Valves • Control Valves • Couplings • Pipe Flanges • Pulverizers
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- Steel & Industrial** Gear Boxes • Mill Stands • Pinion Stands • Anchor Bolts • Mill Motors
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