



OFFSHORE APPLICATIONS



SUPERBOLT[®]

THE SOLUTION TO BOLTING PROBLEMS

Tough environments demand innovative solutions...



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, some form of high energy equipment is required. 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 - only hand tools are required!

Superbolt® vs. Hydraulic Wrench: With a hydraulic wrench one would need 18,925 lb•ft of torque to stress a 3" stud to 428,400 lbs using a hex nut. With a 3" MTX Supernut™, only 114 lb•ft on each of the jackbolts is needed to produce the same bolt load!

Torque vs. Preload Comparison Chart			
Thread Diameter	2"	3"	6"
Equivalent Hex Nut Torque	5,160 lb•ft	18,925 lb•ft	106,868 lb•ft
Preload (lbs)	175,200 lbs	428,400 lbs	1,209,600 lbs
Superbolt® Jackbolt Torque	57 lb•ft	114 lb•ft	189 lb•ft

How They Work:

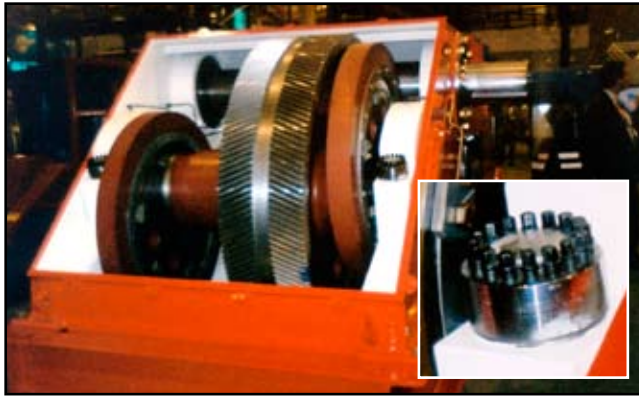
The hardened washer is installed first to protect the joint surface. The Torquenut™ is spun on hand tight, for positioning. Easy turn jackbolts "push" the nut body up, tightening the existing bolt or stud in pure tension.



Superbolt® has been proven again and again in the field, solving thousands of bolting problems and improving your bottom line. The following pages detail a few of the applications in your industry.



Mud Pumps:



Both manufacturers and end users have found that replacing the bearing cap bolts on the Mud Pump with Superbolt® Torquebolts® increases maintainability by limiting required tooling to that which is readily available. One manufacturer has used a Superbolt® developed special part on the “Fluid End” of the pump. Similar applications are possible on High Pressure Well Service Pumps.

Blow Out Preventer:



Superbolt® Tensioners are now being used on OEM NOV/Schaffer’s Blow Out Preventers. 1310 LXF.

Custom Applications:



Our state-of-the-art machine shop features extensive capabilities and quick turnaround times, even on custom jobs. We can develop unique bolting solutions for your specific application needs. This particular product (left) was developed for a riser collar application.

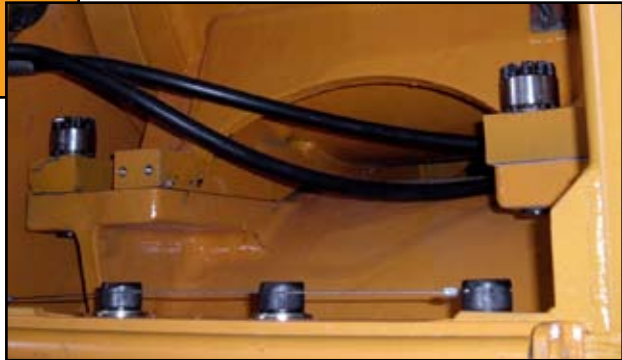
Another example is the Superbolt® “Super Screw” developed for the “fluid” end of a mud pump. The same approach can be used for high pressure well service pumps.

Partial List of Offshore Applications:

Company	Application
Oil States Industries, Houma, Louisiana	Offshore Cranes Slewing Rings
FMC Technologies, Houston, TX	Support structure for offshore refinery
Timerberland Equip., Woodstock, ONT	Anchor chain hydraulic pullers
LEWCO, Houston, TX	Various size Mud Pumps
Ellis Williams, Magnolia, TX	Various size Mud Pumps
Gardner Denver, Houston, TX	Various size Mud Pumps
Parker Hanifin, Eugene, OR	Hydraulic Cylinders
Exxon - Hondo Platform, Goleta, CA	Positive Displacement Pumps, Compressors
Hermosa Platform, Oxnard, CA	Compressors
Gulf of Mexico platforms, including Exxon	Compressors
Dresser-Rand, Painted Post, NY	Many reciprocating compressors
Aker Kvaerner, Tambar platform	Pump Cover
Aker Kvaerner Subsea, various platforms	Riser locking.
Scana Offshore, Sevan Marine platform	Deck Machinery
Seadrill, Gullfaks B platform	Foundation
Seadrill - Wireline, various platforms	BOP
Seadrill, vesslefrikk	BOP clamp
Smedvig Offshore, Gullfaks B platform	Foundation
KCA Deutag Drilling, Kvitebjorn platform	BOP
Scana Offshore, Sevine Marine platform	Deck Machinery
Schlumberger, various platforms	Christmas Tree
Vetco Gray, onshore	Pressure testing
LeTourneau, Houston	Top Drive, North Sea



Top Drive:



Solution: Superbolt® Multi-Jackbolt Tensioners are easy to install and remove with only hand/air tools. The Torquebolts® used on this application dropped the required installation torque to values easily obtained with a small hand held torque wrench. This eliminated the need for a special design torque multiplier, or a re-design of the equipment to allow for a larger tool. Additionally, service in the field has been greatly simplified.

Problem: During design, it was realized that not enough space was available for a torque multiplier, and that if a “special” torque multiplier was used, it would probably not be available in the field.

Offshore Special:



This Multi-Jackbolt tensioner was developed for the unique needs of the Off Shore industry. It incorporates three additional features: 1) The washer is captive to the nut body to prevent loss of the washer. 2) It features corrosion protection to address the harsh conditions. 3) Incorporates flats on the nut to assist with installation/removal on studs with potentially damaged threads.

Riser Clamp:



We have solved many difficult bolting applications for the offshore industry, as well as many other industries:



Compressors Applications (Split-Case and Reciprocating Compressors shown).



Petrochemical Applications.



Power Applications.



Pressure Vessels.



SUPERBOLT®

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6,199,453; 6,381,827; 6,112,396; 6,263,764; 7,637,706; 7,775,559;
other patents pending and corresponding foreign patents.*