NUCLEAR POWER PLANT BOLTING OPTIMIZATION USING THE HYTORC NUT

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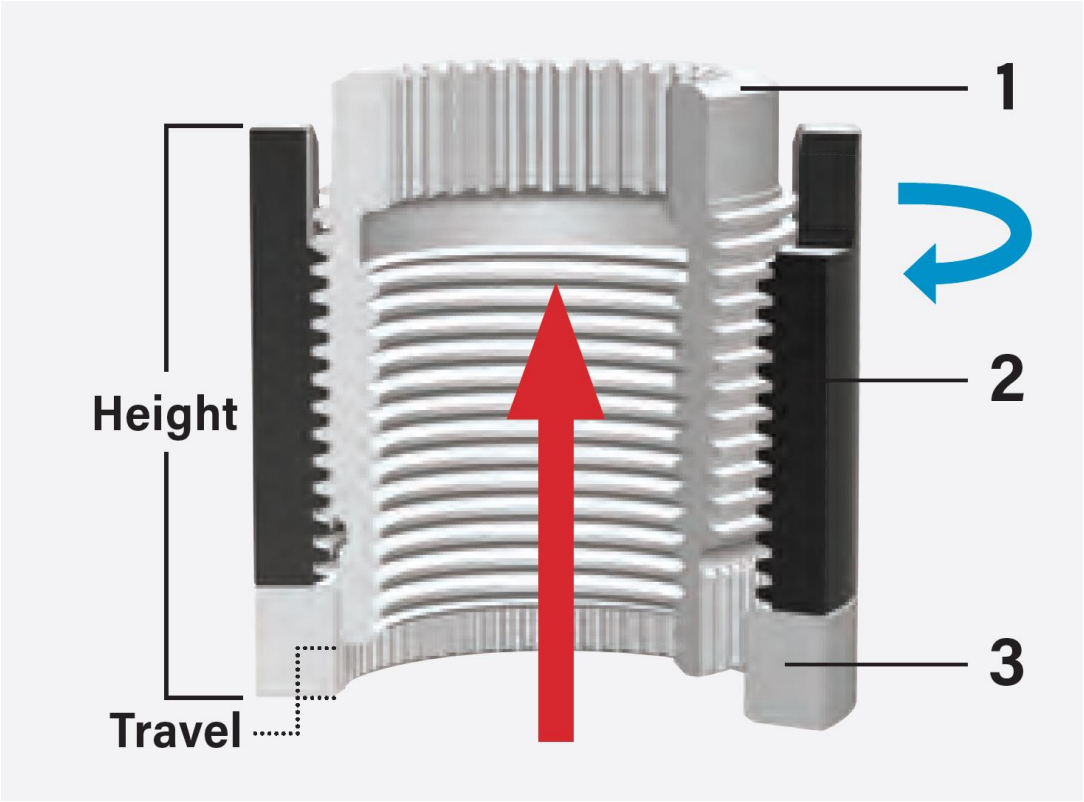
HYTORC

The World's Most Trusted Industrial Bolting Systems

THE HYTORC NUT

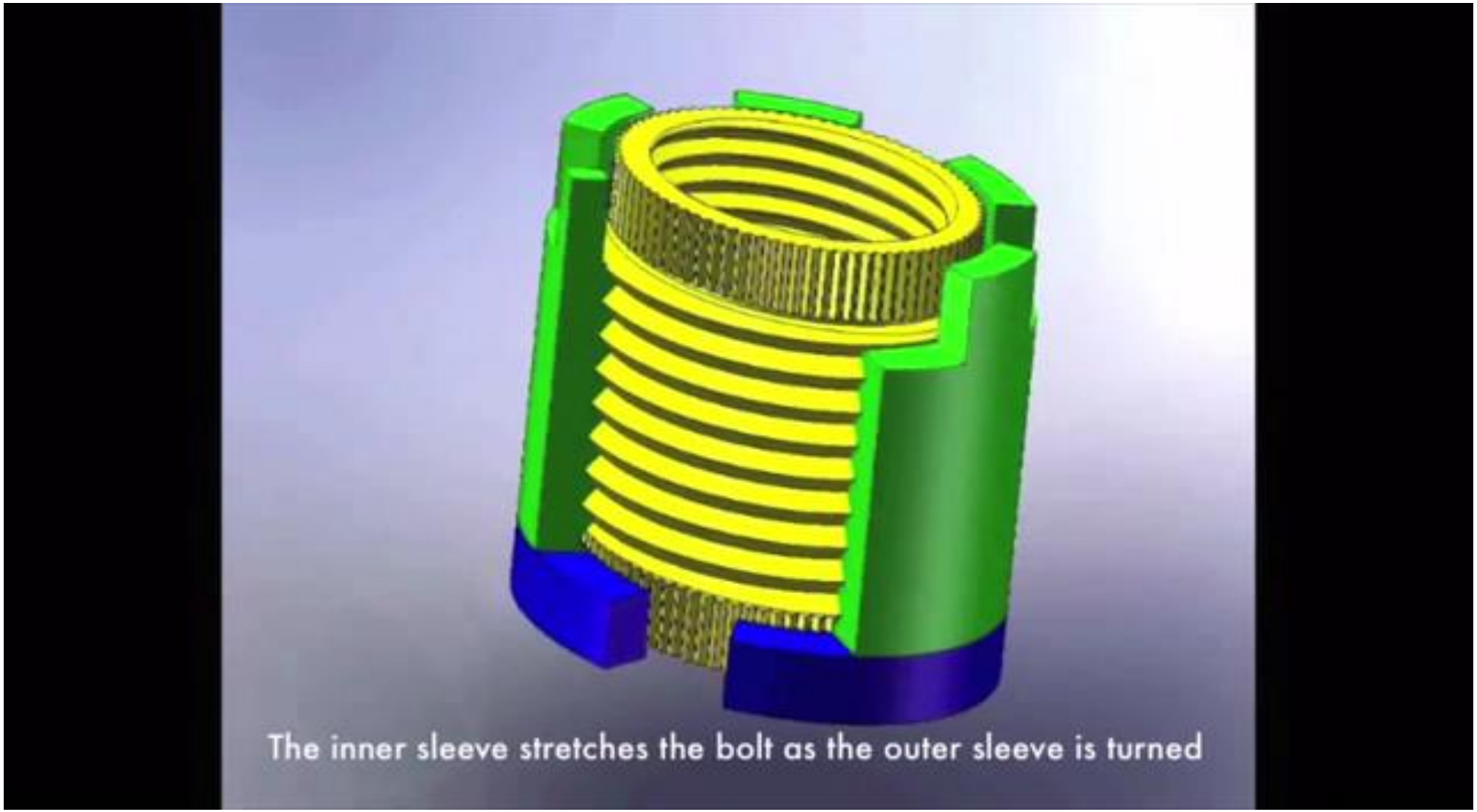
For critical applications requiring the highest level of bolt load control, the patented **HYTORC Nut system** provides industry-leading joint integrity. This three-piece fastener applies pure tension to the bolt to prevent thread damage and ensure bolt load accuracy. The HYTORC Nut is available in a variety of materials to suit all applications, from extreme temperatures to harsh climates.

HOW THE HYTORC NUT WORKS

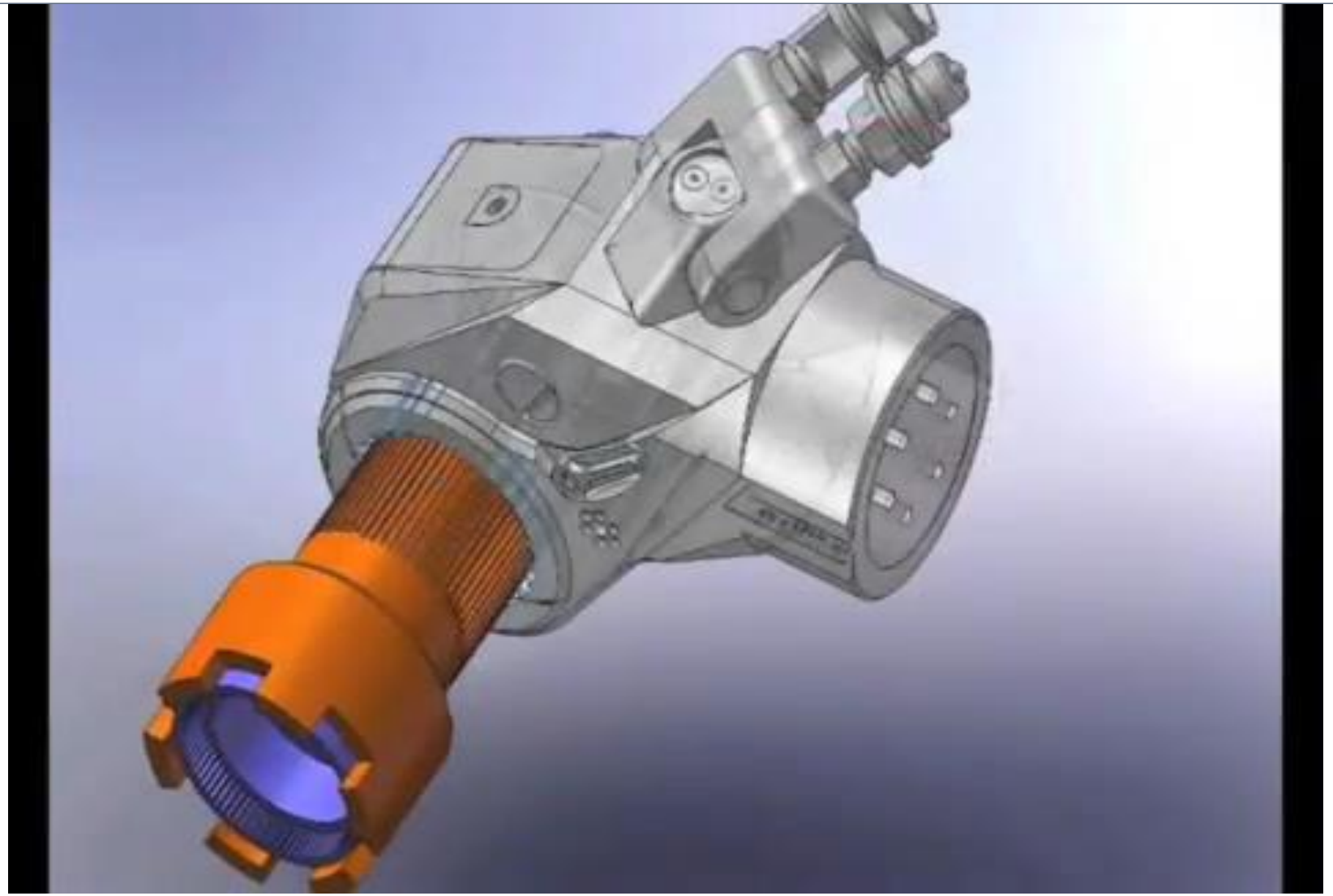


The HYTORC Nut is composed of an inner sleeve (1), outer sleeve (2), and washer (3). As the outer sleeve turns (blue arrow), the inner sleeve moves upwards (red arrow). The washer spline rotationally couples the inner sleeve with the washer preventing the inner sleeve from turning while providing a solid reaction point for turning the outer sleeve.

THREE PIECE MECHANICAL TENSIONER



HYTORC TOOL AND DRIVER



SYSTEM COMPARISON

TORQUE WRENCH USED WITH BACKUP WRENCH

Torque wrench and backup wrench rotate in same direction.

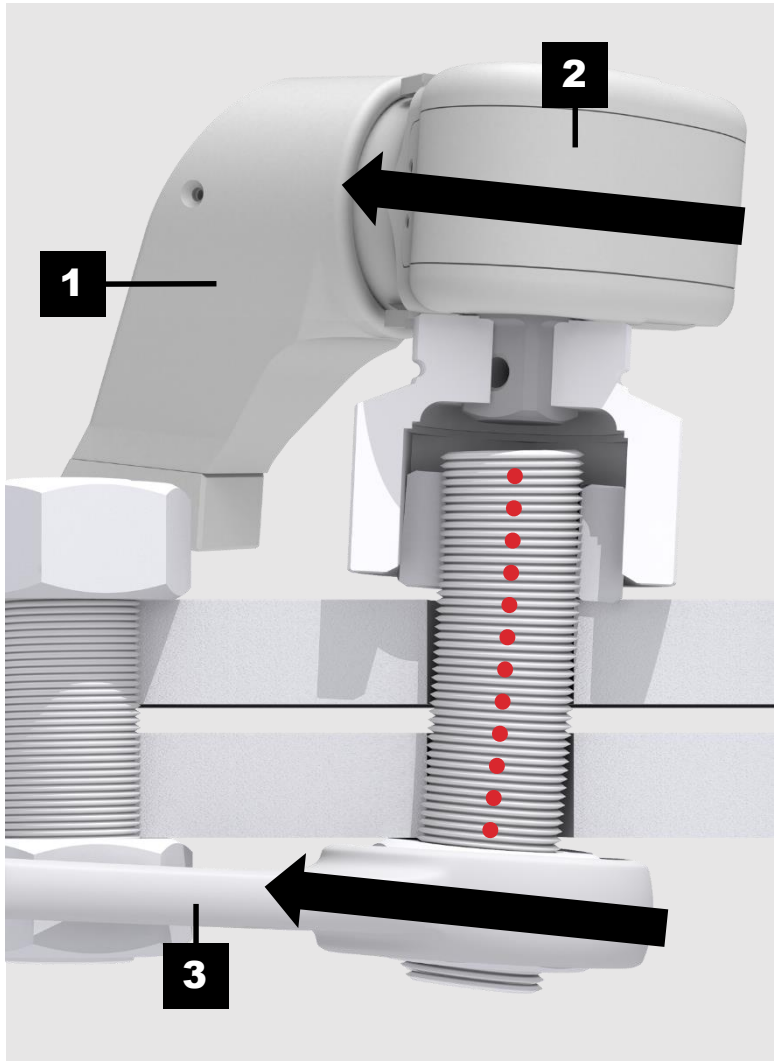
1) Reaction fixture

2) Torque wrench

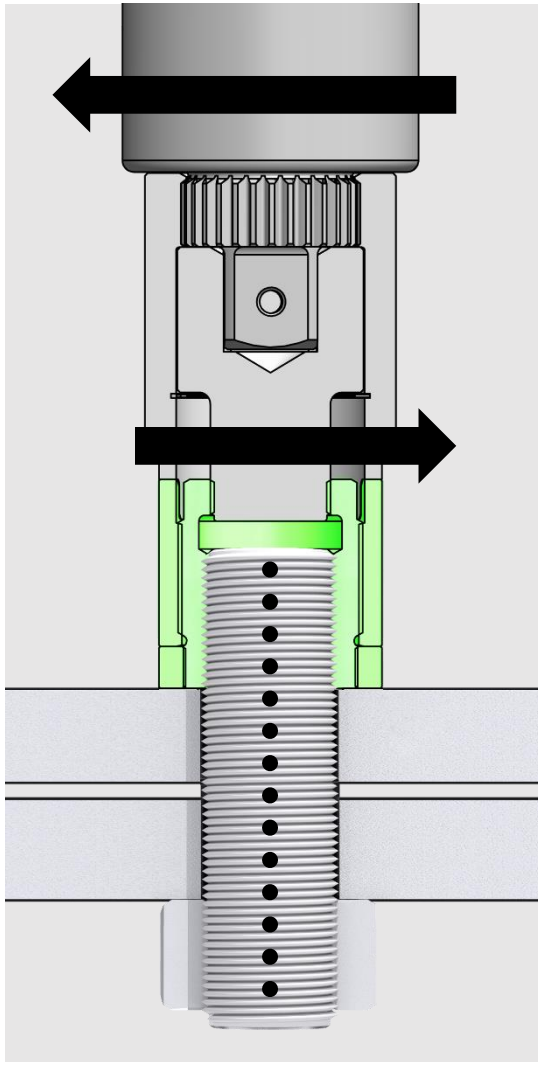
3) Backup wrench

⬅ Same incorrect angle and direction of rotation of torque wrench and backup wrench

⋮ Yielded bolt center axis



HYTORC NUT



The HYTORC Nut ensures a level bolting operation.

4) Torque wrench

5) HYTORC Nut driver

6) HYTORC Nut

⬅ Direction of rotation of torque wrench

➡ Direction of rotation of nut driver

⋮ Uncompromised bolt center axis

PCC-1 LEGACY/STAR PATTERN VS PARALLEL JOINT CLOSURE

Fig. F-1 Legacy Pattern Numbering System

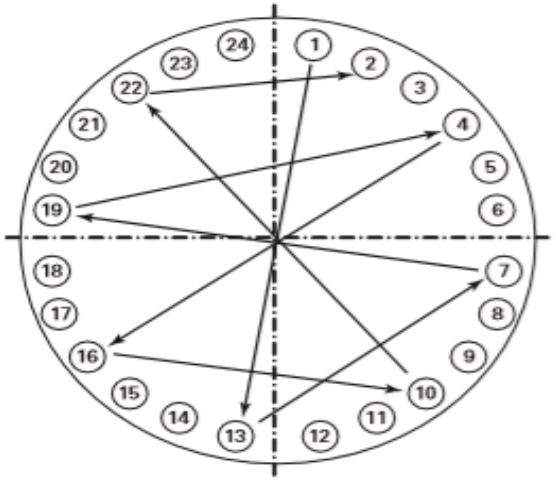
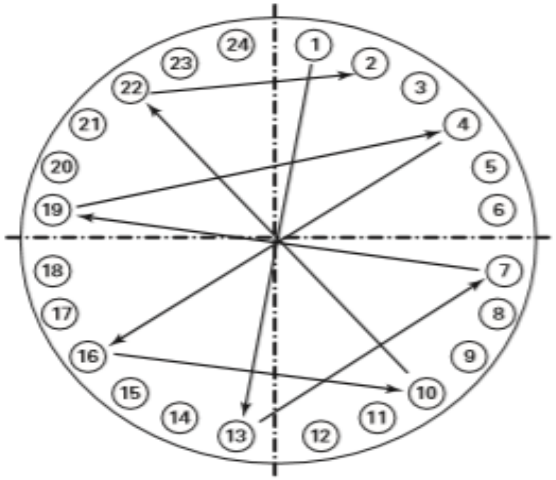
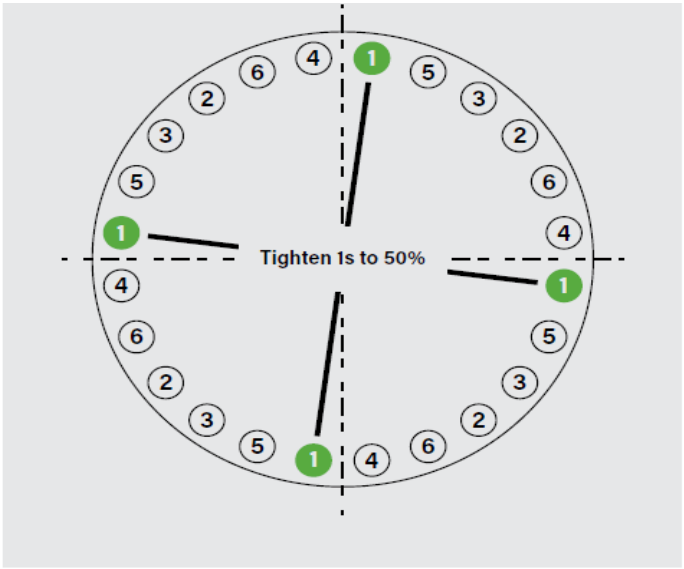
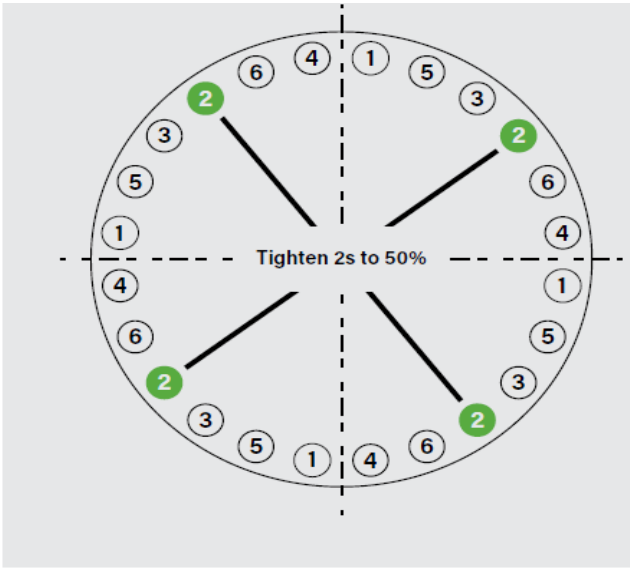


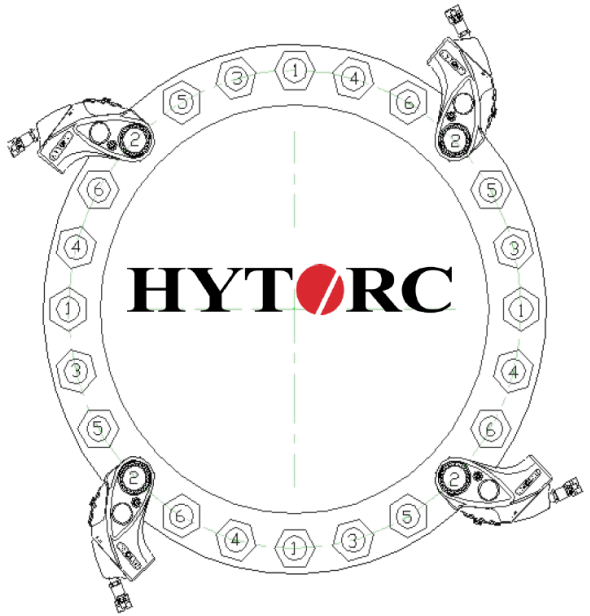
Fig. F-2 Alternative Assembly Pattern #1
(Modified Legacy Pattern)







SAMPLE VALVE PROCEDURE



FLANGE PREPARATION

1) INSTALL (4) NUTS SET UP TO 600 PSI AND GENTLY CLOSE THE COUPLING GAP ALTERNATING BETWEEN THE (4) NUTS UNTIL GAP IS FULLY SEATED.
2) INSTALL ALL HYTORC TENSION NUTS ON BOLTS HAND TIGHT, FLUSH TO FLANGE ASSURE THERE ARE NO GAPS BETWEEN BOTTOM OF THE CLAMP & FLANGE.
3) MAKE SURE TOP OF HYTORC TENSION NUT ARE ALIGNED PROPERLY, NOTE THAT TOP OF OUTER CASTLE SHOULD BE LEVELED WITH INNER SLEEVE BEVEL.
4) LABEL FLANGE WITH BOLT NUMBERS ACCORDING TO CHART.
5) SET PUMP PRESSURE FOR STEP #1.
6) APPLY TOOLS ONTO HYTORC TENSION NUTS TO BOLT #1
7) PROCEED TO STEP 1 TENSIONING BELOW.

BOLTING SEQUENCE

STEPS	PUMP PRESSURE PSI	BOLT SEQUENCE	APPLIED POUND FORCE	LOW CLEARANCE TOOL
STEP 1	1500	1,2	94,194	
STEP 2	3600	3,4,5,6,1,2	157,543	
STEP 3	3600	3,4,5,6,1,2	157,543	

CONTINUE CHECK PASS UNTIL NO MOVEMENT

BOLTING MATERIALS

	FASTNERS		HYTORC NUT
QTY 24	STUD DIA 2"	NUT SIZE 0	
QTY 24	HYTORC NUT 24		
QTY 0	BACK UP WASHER 0		

GASKET TYPE
N/A

LUBRICATION
P37

HYTORC EQUIPMENT

QUANTITY	TOOL
4	AVANTI 5
	DRIVER TYPE
4	HYTORC 2" NUT DRIVER
	PUMPS
1	HYTORC 4 PORT PUMP
	15' HOSES
4	P/N 090172S

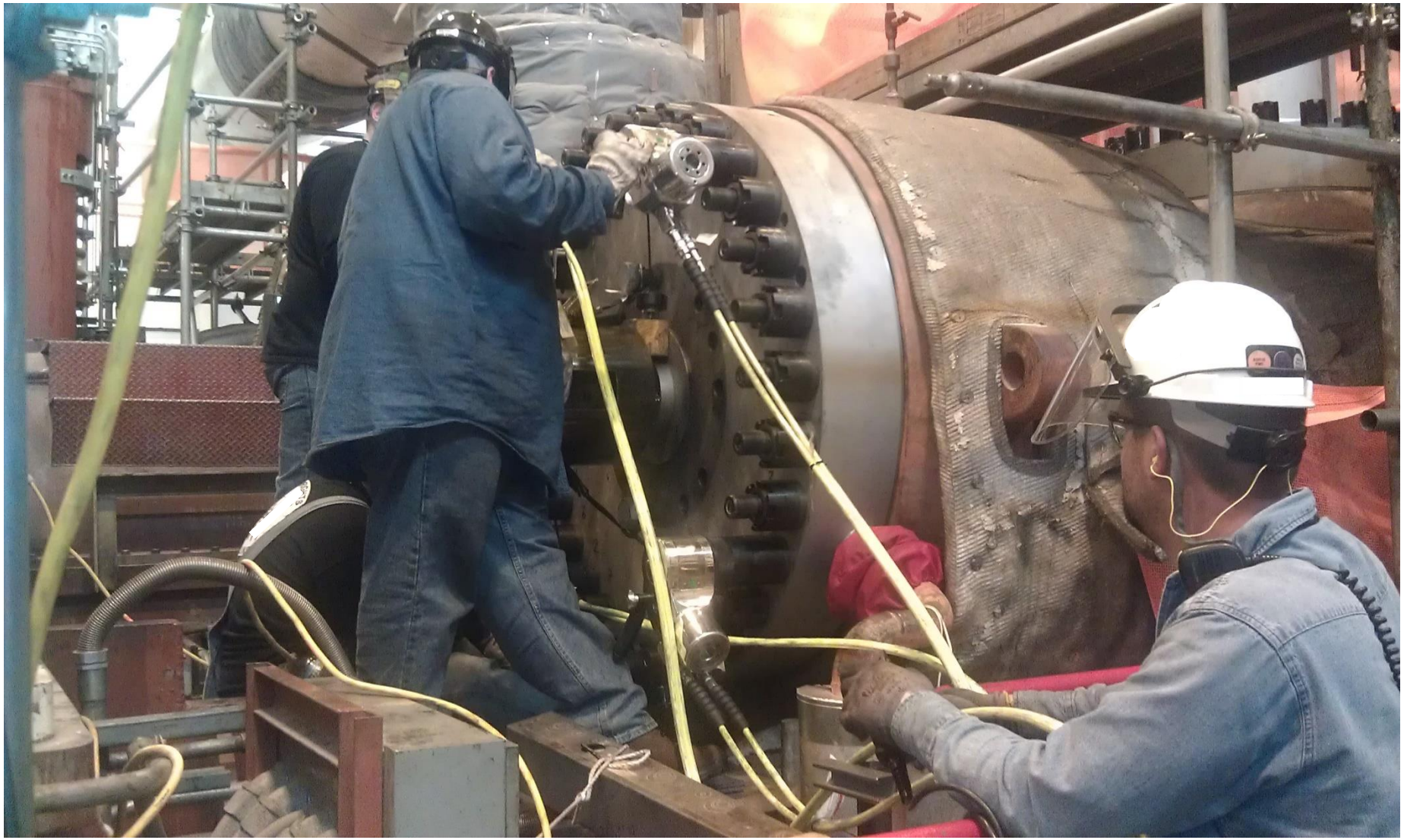
NOTES :
1)
2)
3)
4)
5)
6)
7)

QA OVERSIGHT: **DATE :**

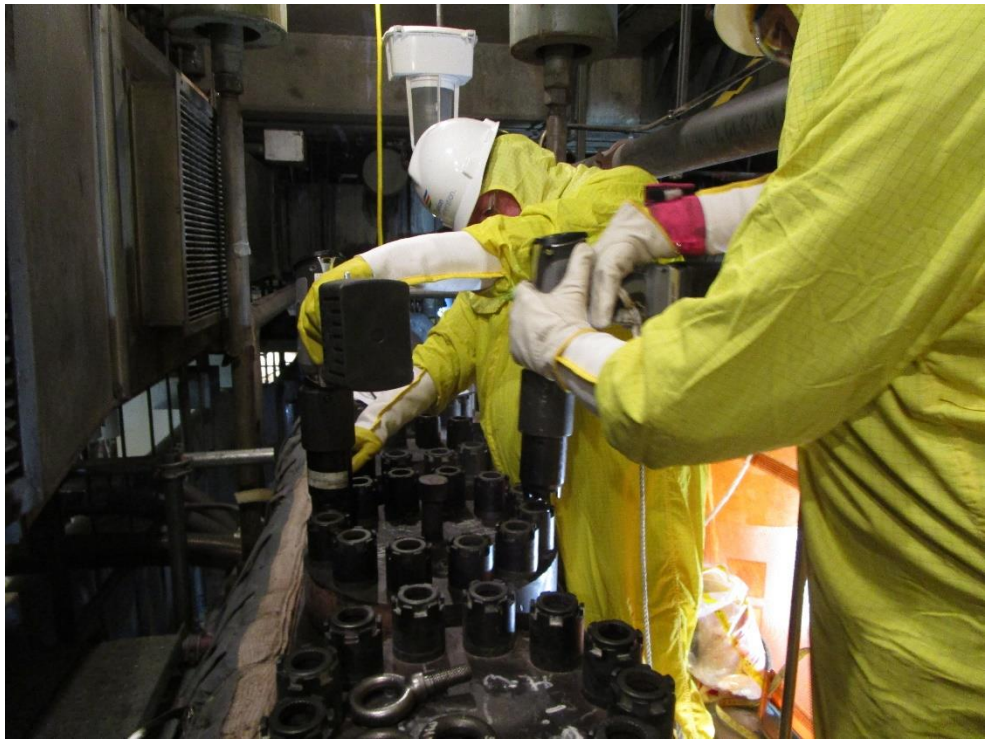
OUTAGE CONTRACTOR : **DATE:**

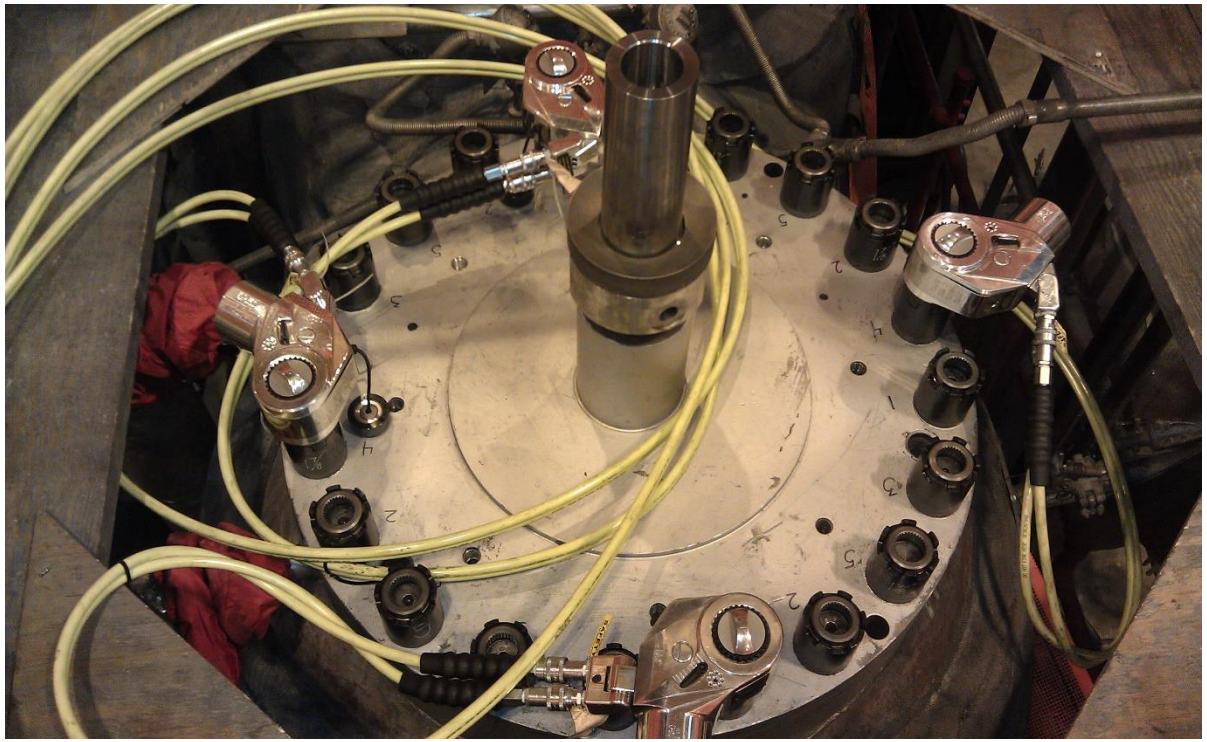
DOCUMENT NUMBER : *SAMPLE1234*

32 BOLT FLANGE USING FOUR AVANTI TOOLS



BATTERY TOOLS AND HYDRAULIC TOOLS





NOTES FROM BWR OUTAGE

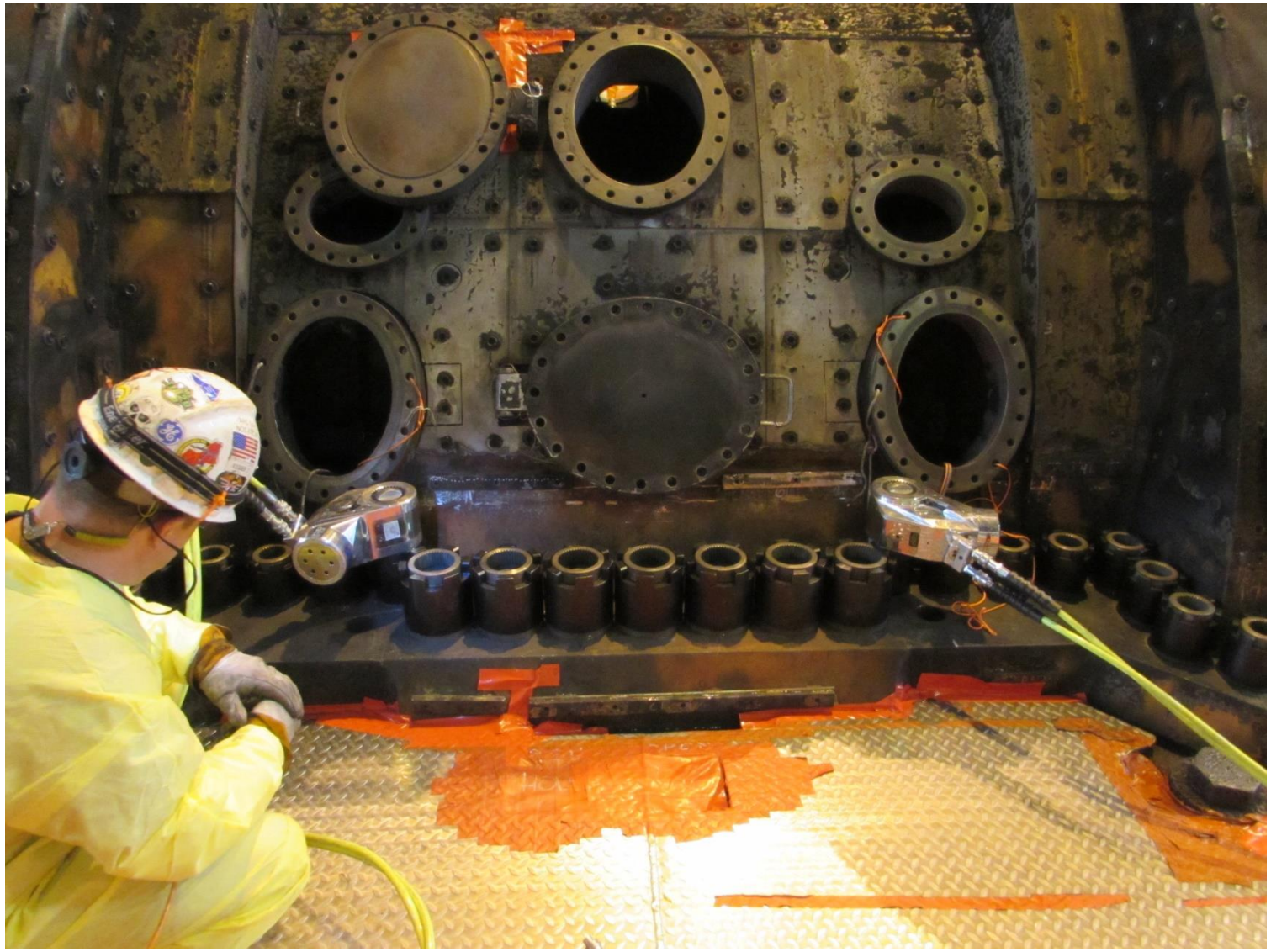
TURBINE SHELLS

LP B Inner Shell

Stud:

While loosening "B" LP inner casing bolting five studs had to be cut (#'s 645,647,673,696, & 698) and fourteen nuts/studs (#'s 605,619,623,625,627,629,651,653,655,657,659,665,667, & 669) had to be heated to loosen or cut off the nuts. One of the cut studs was removed by millwrights and machinists were mobilized to site drill out the other four studs. Engineered inserts (2) were ordered for the right side, stud numbers 696 and 698 and plant machinists machined the internal threads and machinists drilled out the casing stud holes to accomadate the inserts. The inserts were threaded in and staked in place. A four inch stud on the right side (stud number 642) was found to have excessive thread damage and was replaced. New studs and nuts were ordered and installed to replace the damaged ones. All studs were ultrasonic inspected with no discrepancies noted.

HANDS FREE



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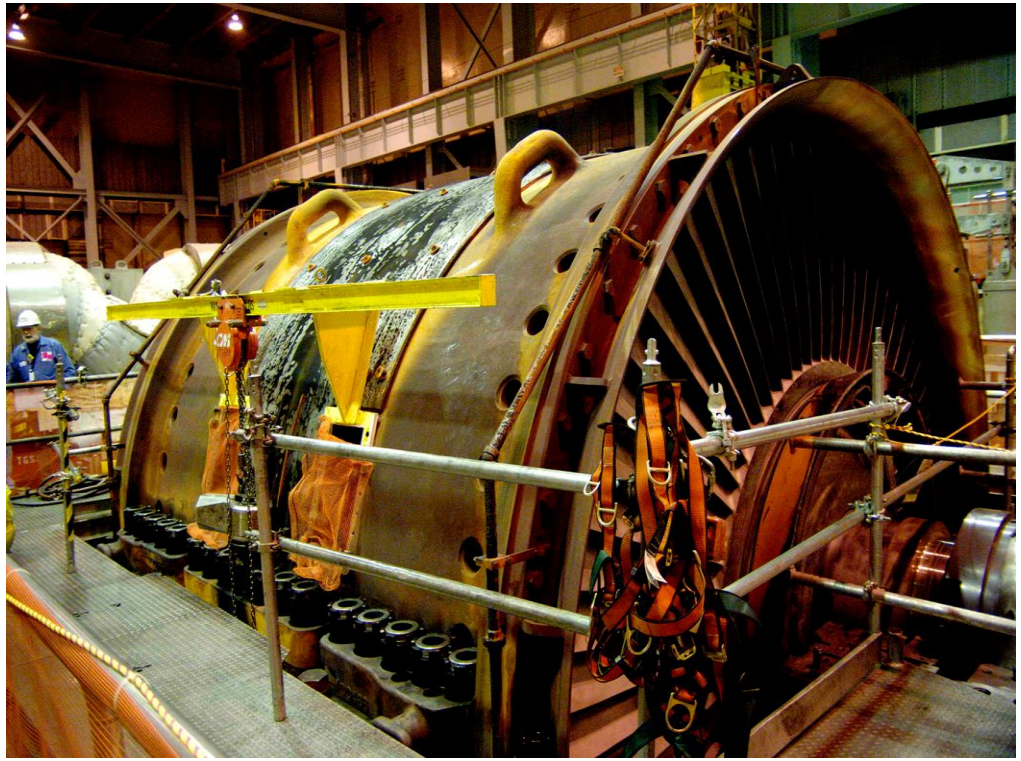


82 Internal and external bolts: • Previous method: 21 hours, 50 minutes • HYTORC method: 3 hours • Time savings: Nearly 20 hours

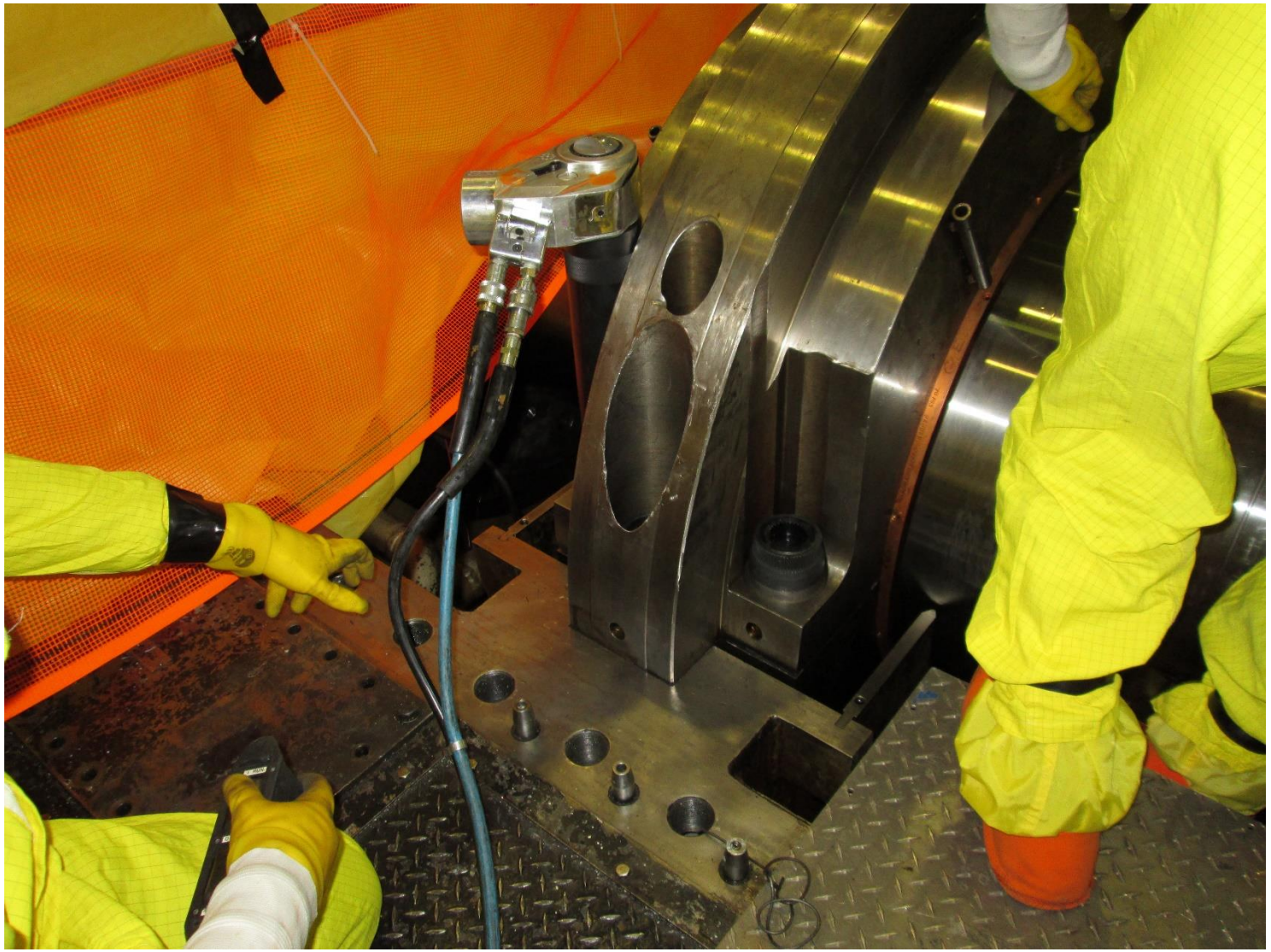
Safe Bolting: Hands-free remote operation on horizontal, vertical and inverted applications.

BLADE RING OR DIAPHRAGM BOLTING

LOW CLEARANCE NUT

FOR APPLICATIONS WITH LOW OVERHEAD CLEARANCE

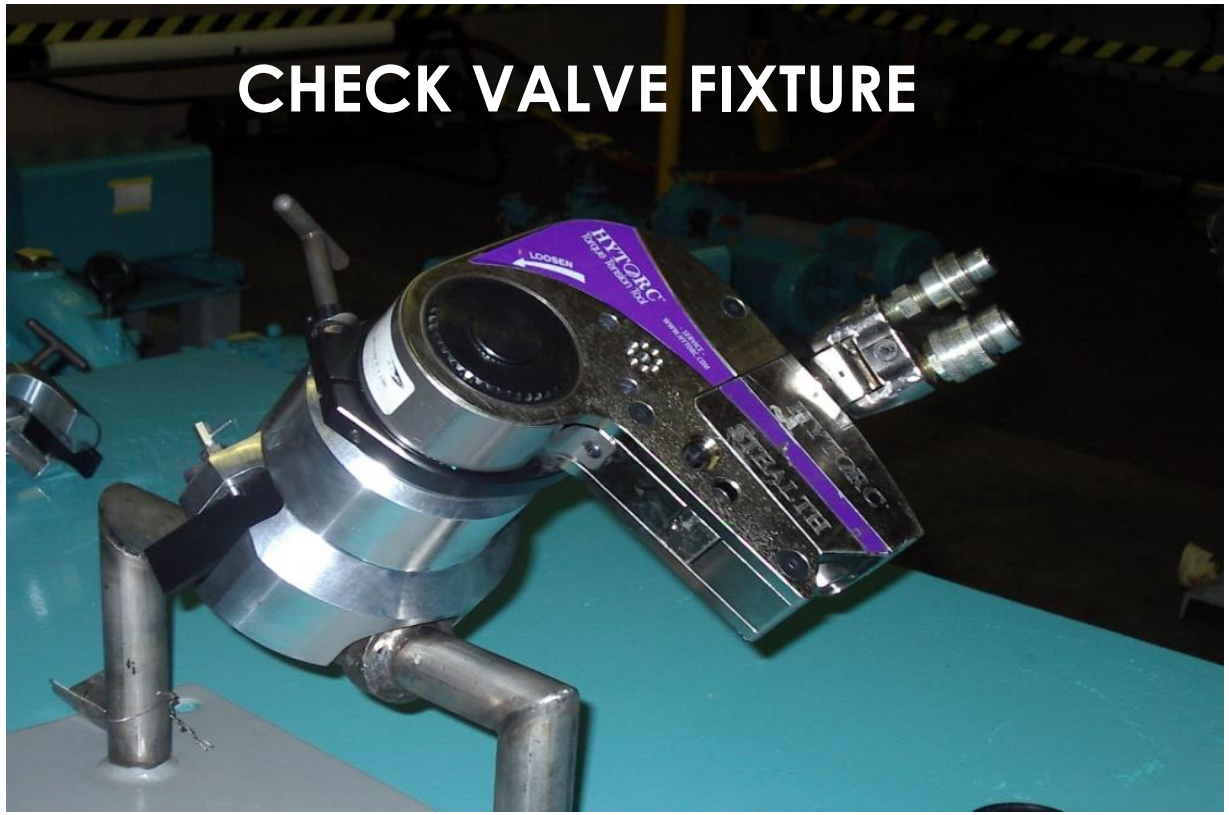
BEARING BOLTING MADE EASY




TORCGUN


HYTORC

LARGE AND SMALL VALVES – 50% DOSE SAVINGS



"We were given a dose goal of 45 Mrem in 3 hours. This dose estimate was given with the thought that we would be using the old wrench equipment that we have used in the past. When it came to do the job we were able to perform the job in just under 2 hours and at 22 Mrem. All this savings can be attributed to the training and use of the new equipment. The fact that setup time was cut and the need to have 1 man on the valve was a big dose saver"

Thank you

HYTORC

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CLICK TO GIVE THIS A SUBTITLE

PARALLEL JOINT CLOSURE