



# **POWER GENERATION**

**HYTORC®**  
*Since 1968*

**Ma'Aref TECHNOLOGIE (Pvt) Ltd.**

House # 8, Street # 6  
Fizaia Housing Scheme  
Airport Road, Rawalpindi - Pakistan  
TeleFax: +9251 447 0034  
Mobiles: 0336 666 0316, 0336 666 0317  
+92 336 666 0314, +1(973)-786-1576

E-mail: [MaAref@MaArefTech.com](mailto:MaAref@MaArefTech.com); [HYTORC\\_Pakistan@MaArefTech.com](mailto:HYTORC_Pakistan@MaArefTech.com)

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





COVANTA POWER MAUBAN, PHILIPPINES



**ABOVE PICS:** GE 460MW coal fired Steam Turbine, AVANTI-50 used to break out the 4-1/4" nuts on the A & B stage Turbine Coupling bolts.

**PAGE 2 (below):** GE 460MW coal fired Steam Turbine, Qty x 4 AVANTI-10 SIMULTORC system used to torque up the Interceptor Valve bolts to ensure a **ZERO-LEAKAGE START-UP!**

**Bolting Applications Booklet - Worldwide**

**COVANTA POWER  
MAUBAN, PHILIPPINES**

**LEAKAGE ZERO**™  
A RESULT-DRIVEN ALLIANCE

**HYTORC**®  
Since 1968



**The ONLY PROFESSIONALIZED BOLTING COMPANY IN PAKISTAN**

# GAS TURBINE INSTALLATIONS

## Mitsubishi



**HYTORC**<sup>®</sup>  
Since 1968

# STEAM TURBINE INSTALLATIONS

## Mitsubishi



## 2- TURBINES



**HYTORC**<sup>®</sup>  
Since 1968

The **ONLY** PROFESSIONALIZED BOLTING COMPANY IN PAKISTAN

## Bolting Applications Booklet - Worldwide



**HYTORC**  
Since 1968

**LEAKAGE ZERO**<sup>TM</sup>  
A RESULT-DRIVEN ALLIANCE

The **ONLY PROFESSIONALIZED BOLTING COMPANY IN PAKISTAN**

# Bolting Applications Booklet - Worldwide



**MITSUBISHI HEAVY INDUSTRIES, LTD.  
POWER SYSTEMS HEADQUARTERS  
TAKASAGO MACHINERY WORKS**

**Certificate for Authorization and Registration**

To Messrs. Hytorc Division Unex Corporation

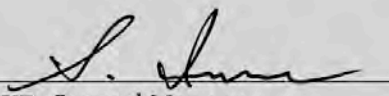
This is to certify and notify that Messrs. Hytorc Division Unex Corporation have successfully passed the evaluation on their quality assurance ability performed by Mitsubishi Heavy Industries, Ltd. Takasago Machinery Works (MHI) on the basis of MHI's quality assurance requirements and have been approved by MHI to satisfactorily possess the ability of the required quality assurance and been registered as such.

Address : 333 Route 17 North, Mahwah, New Jersey 07430 USA

Scope : CLAMP NUTS

Date of Validity : From 14 October 2008 to 31 October 2011

Date of Authorization : 14 April 2009

Authorized by :   
SINOUE General Manager,  
Quality Assurance Department  
Takasago Machinery Works  
Power Systems Headquarters  
Mitsubishi Heavy Industries, Ltd.

# Shell Chemicals in Rotterdam Application: Elliot Steam Turbine

Page-1







**CLAMPS HIGH TEMP** (Up to 500 Degree in Celsius) 2-1/2" 22 pieces

**TOOLING:** 25XLCT to remove Old nuts, T-400 to tighten with the Clamp

**MATERIAL:** 422 Stainless Steel Outer Sleeve, B16 Inner Sleeve and Washer with Nitride Finish

**REASON TO SWITCH TO THE CLAMP:** Galling of old nuts (refer to 1)

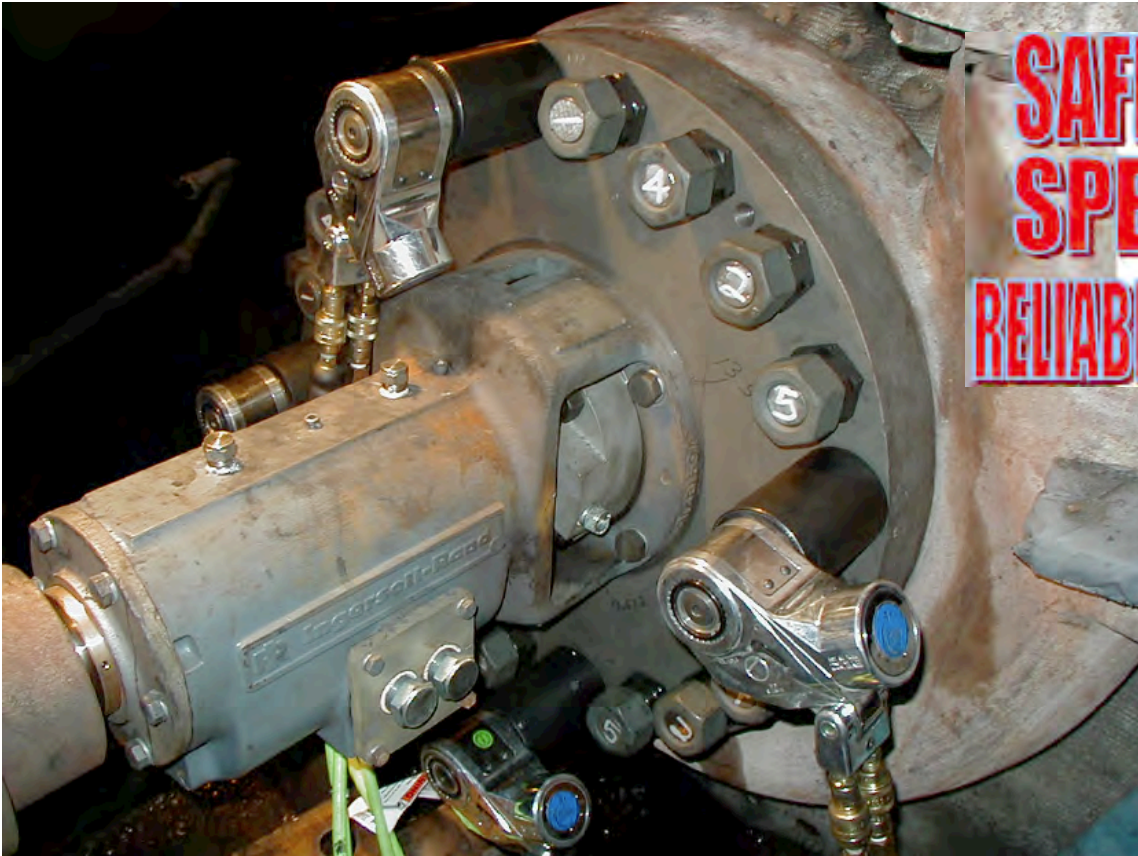
- 1) Unexpected problems forced Shell to open and close this machine in 8-9 days.
- 2) Used an HY-25 full force (and a torch on 2 bolts) January 2004

## Bolting Applications Booklet - Worldwide



### Forced Boiler Circulatory Pump

"Trash to Cash" Power Plant - USA



The **ONLY** PROFESSIONALIZED BOLTING COMPANY IN PAKISTAN

**JETYD**  
CORPORATION

**FOSSIL - FUELS**

**STEAM**



**GAS**

## Bolting Applications Booklet - Worldwide

**HYTORC**  
Since 1968

**LEAKAGE ZERO**<sup>TM</sup>  
A RESULT-DRIVEN ALLIANCE

# FOSSIL - FUELS



### GAS MAIN -INLET FLANGES

NEW METHOD: LOADISC/COLD STRETCH

(24) 2-1/2" BOLTS - NEW TIME: 55 MINUTES

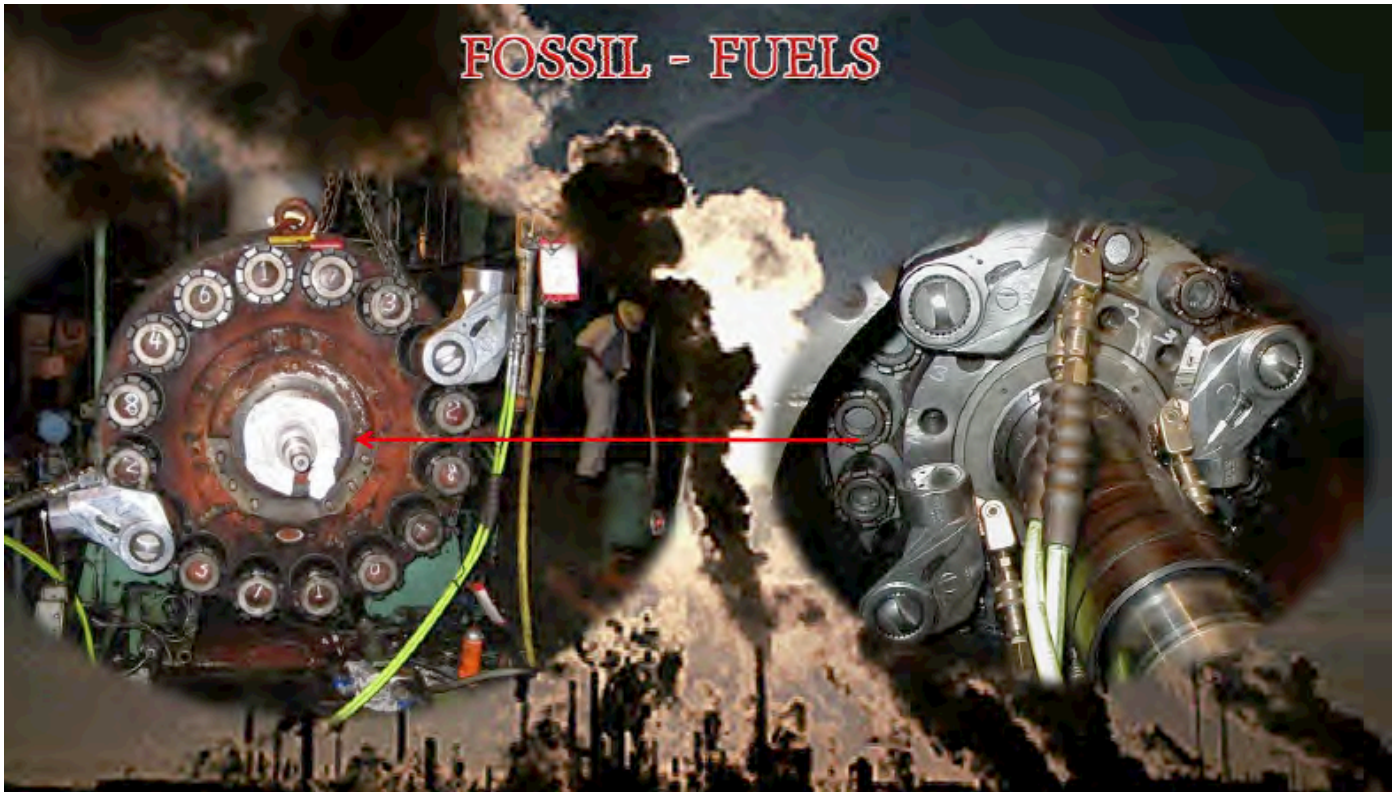
OLD METHOD-PREVIOUS TIME: 3 HOURS 45 MINUTES

The **ONLY** PROFESSIONALIZED BOLTING COMPANY IN PAKISTAN

# Bolting Applications Booklet - Worldwide



## FOSSIL - FUELS

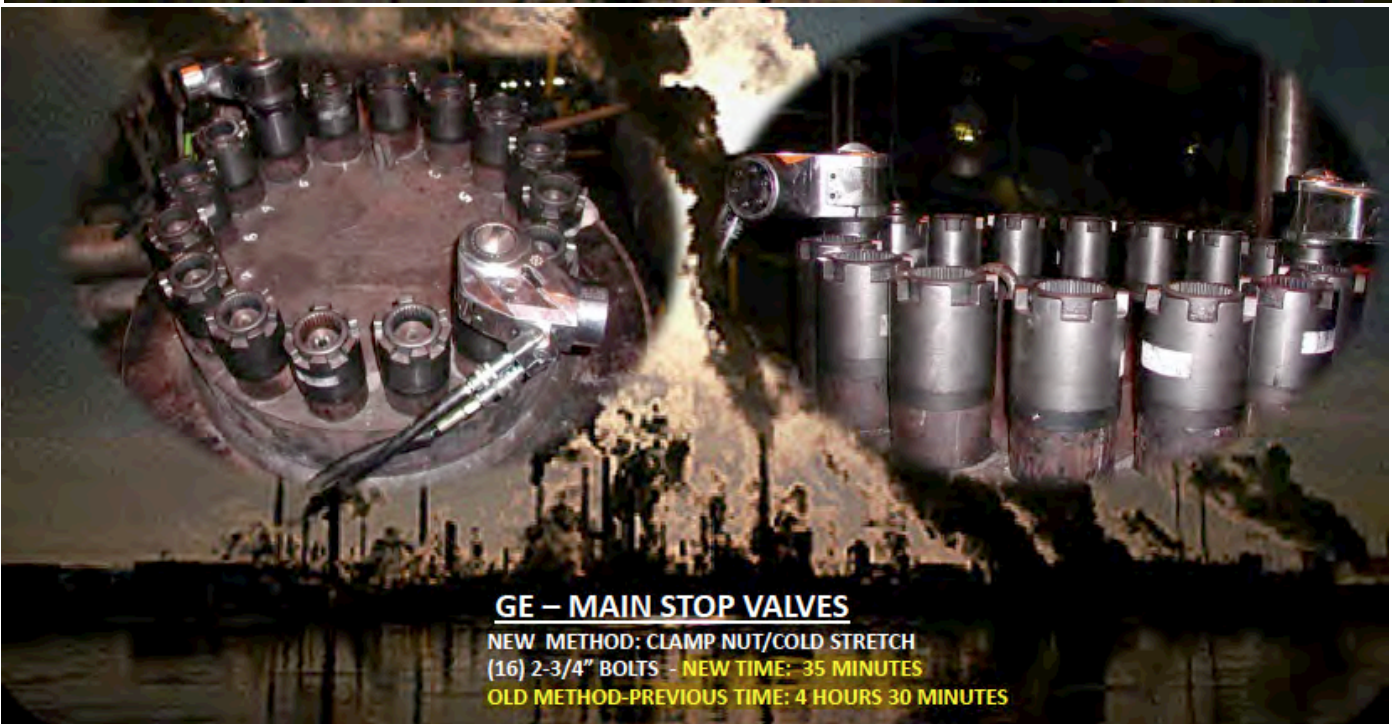


### BOILER FEED PUMP-MAIN HEAD

NEW METHOD: CLAMP-NUT/COLD STRETCH  
(16) 2-1/2" BOLTS - NEW TIME: 1 HOUR 20 MINUTES  
OLD METHOD-PREVIOUS TIME: 8 HOURS 10 MINUTES

### BOILER FEED PUMP -STUFFING BOX

NEW METHOD: CLAMP-NUT/COLD STRETCH  
(16) 1-1/2" BOLTS -NEW TIME: 1 HOUR  
OLD METHOD-PREVIOUS TIME: 6 HOURS 15 MINUTES



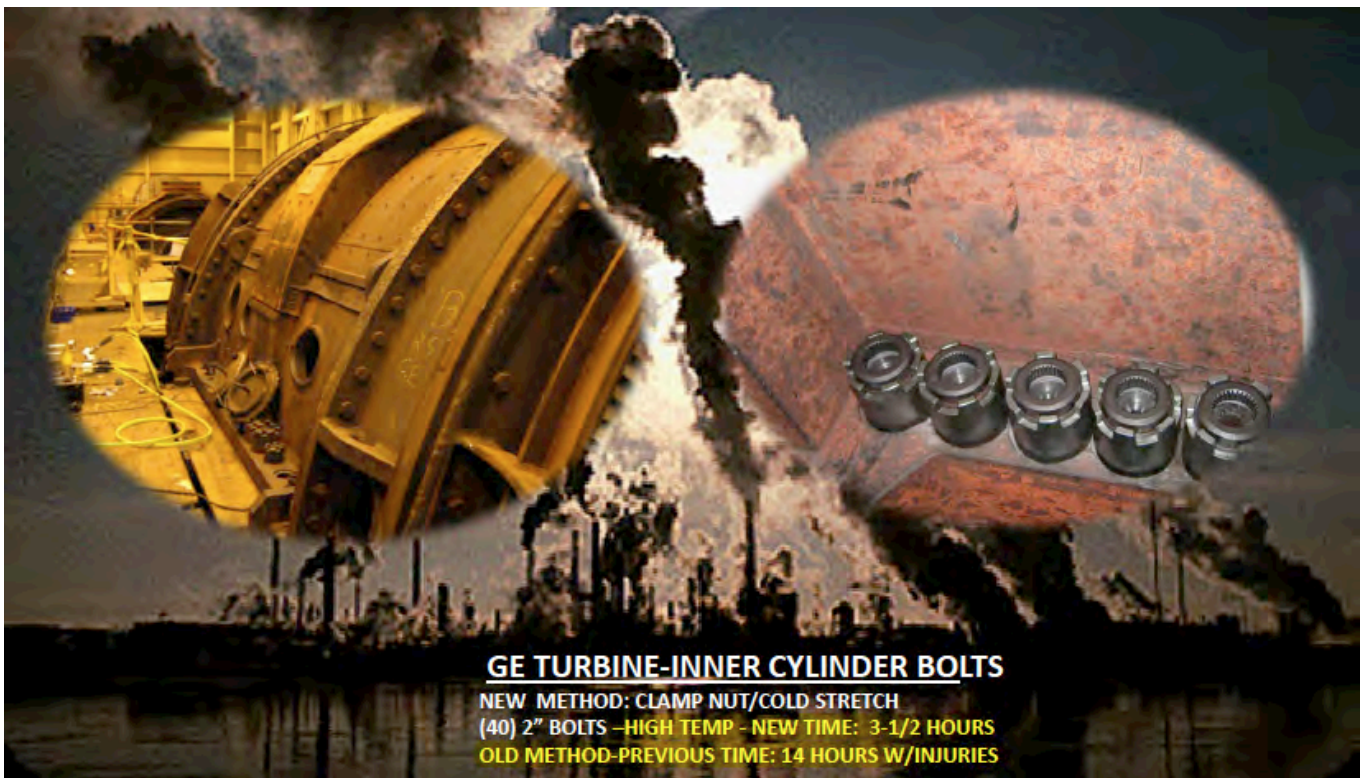
### GE – MAIN STOP VALVES

NEW METHOD: CLAMP NUT/COLD STRETCH  
(16) 2-3/4" BOLTS - NEW TIME: 35 MINUTES  
OLD METHOD-PREVIOUS TIME: 4 HOURS 30 MINUTES

# Bolting Applications Booklet - Worldwide

**HYTORC**  
Since 1968

## FOSSIL - FUELS



The **ONLY** PROFESSIONALIZED BOLTING COMPANY IN PAKISTAN

# Bolting Applications Booklet - Worldwide

**HYTORC**  
Since 1968

## FOSSIL - FUELS

### CROSS-OVER FLANGES

NEW METHOD: CLAMP NUT/COLD STRETCH  
(60) 2" BOLTS – NEW TIME: 2 HOURS 15 MINUTES  
OLD METHOD-PREVIOUS TIME: 5 HOURS

### GE – LOAD COUPLING

NEW METHOD: CLAMP NUT/COLD STRETCH  
(20) 2-1/4" BOLTS – NEW TIME: 55 MINUTES  
OLD METHOD-PREVIOUS TIME: 4 HOURS 20 MINUTES

The **ONLY** PROFESSIONALIZED BOLTING COMPANY IN PAKISTAN

## Bolting Applications Booklet - Worldwide

### FOSSIL - FUELS

#### GE – CONTROL VALVES

NEW METHOD: SIMULTORC

(8) 2-3/4" BOLTS – NEW TIME: 35 MINUTES

OLD METHOD-PREVIOUS TIME: 4 HOURS 10 MINUTES

#### GE – SHAFT COUPLINGS

NEW METHOD: SIMULTORC

(12) 2-3/4" BOLTS – NEW TIME: 35 MINUTES

OLD METHOD-PREVIOUS TIME: 8 HOURS 10 MINUTES



## Bolting Applications Booklet - Worldwide

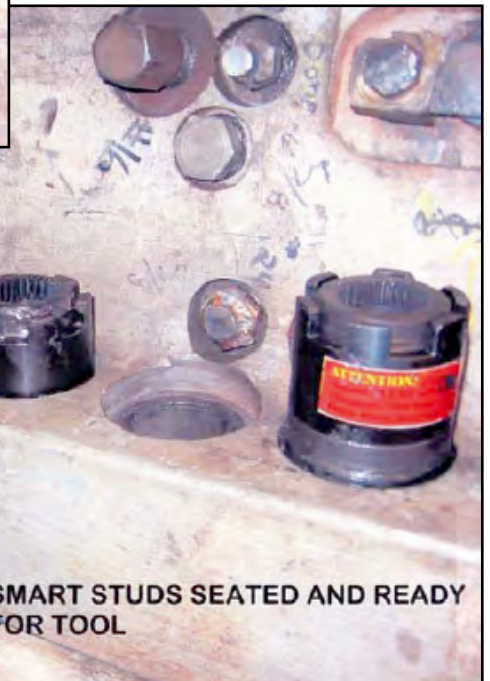
**HYTORC**<sup>®</sup>  
Since 1968



The **ONLY** PROFESSIONALIZED BOLTING COMPANY IN PAKISTAN

# Bolting Applications Booklet - Worldwide

**HYTORC**  
Since 1968

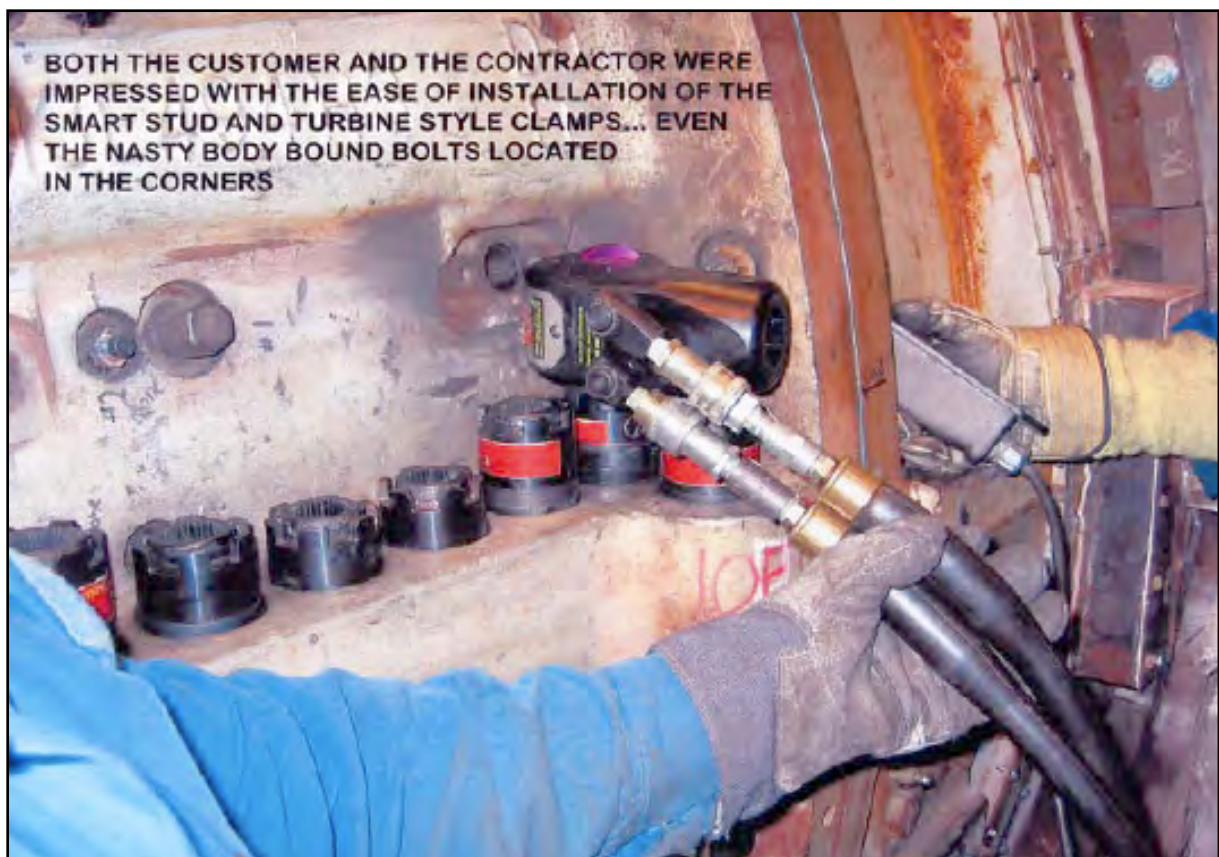
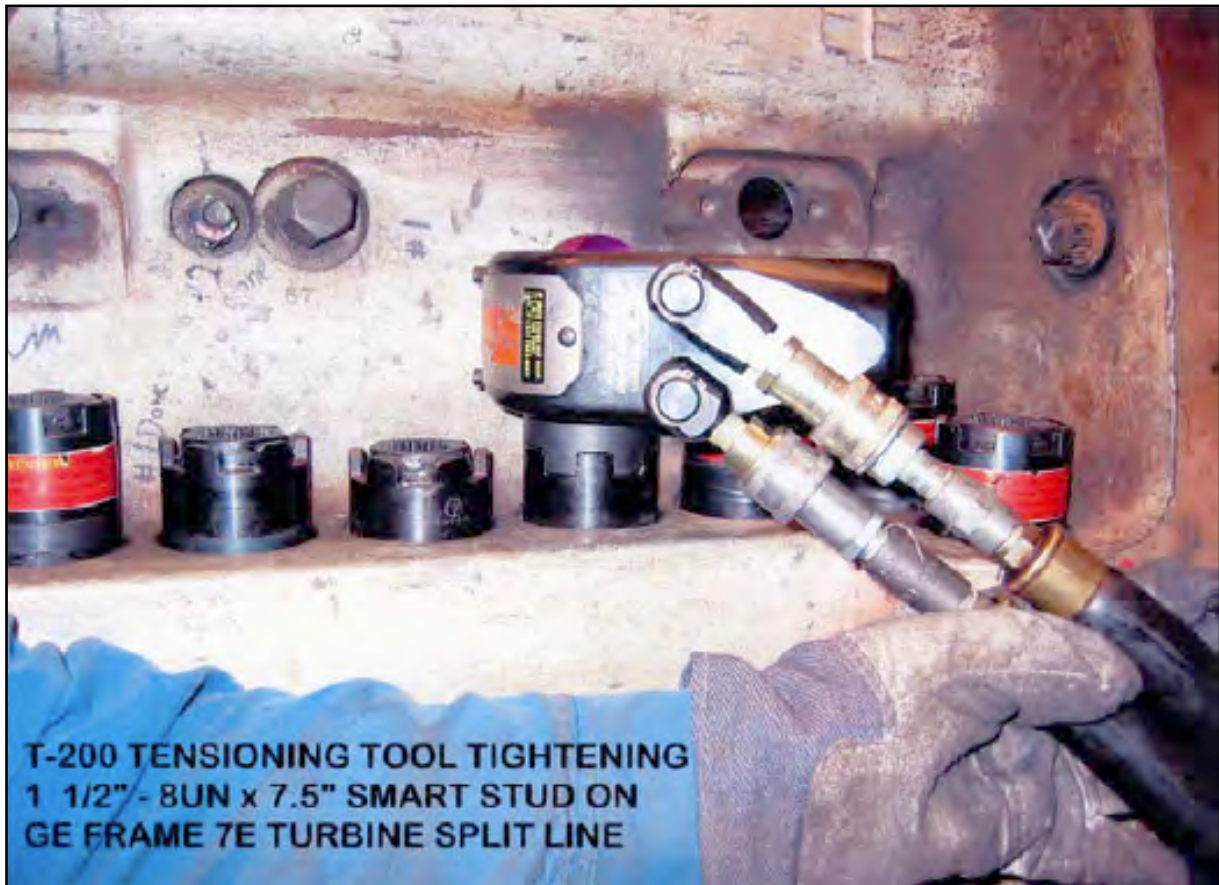


**GE FRAME 7E**

The **ONLY** PROFE

**GE FRAME 7E**

**HYTORC®**  
Since 1968



## Bolting Applications Booklet - Worldwide

**HYTORC**<sup>®</sup>  
Since 1968



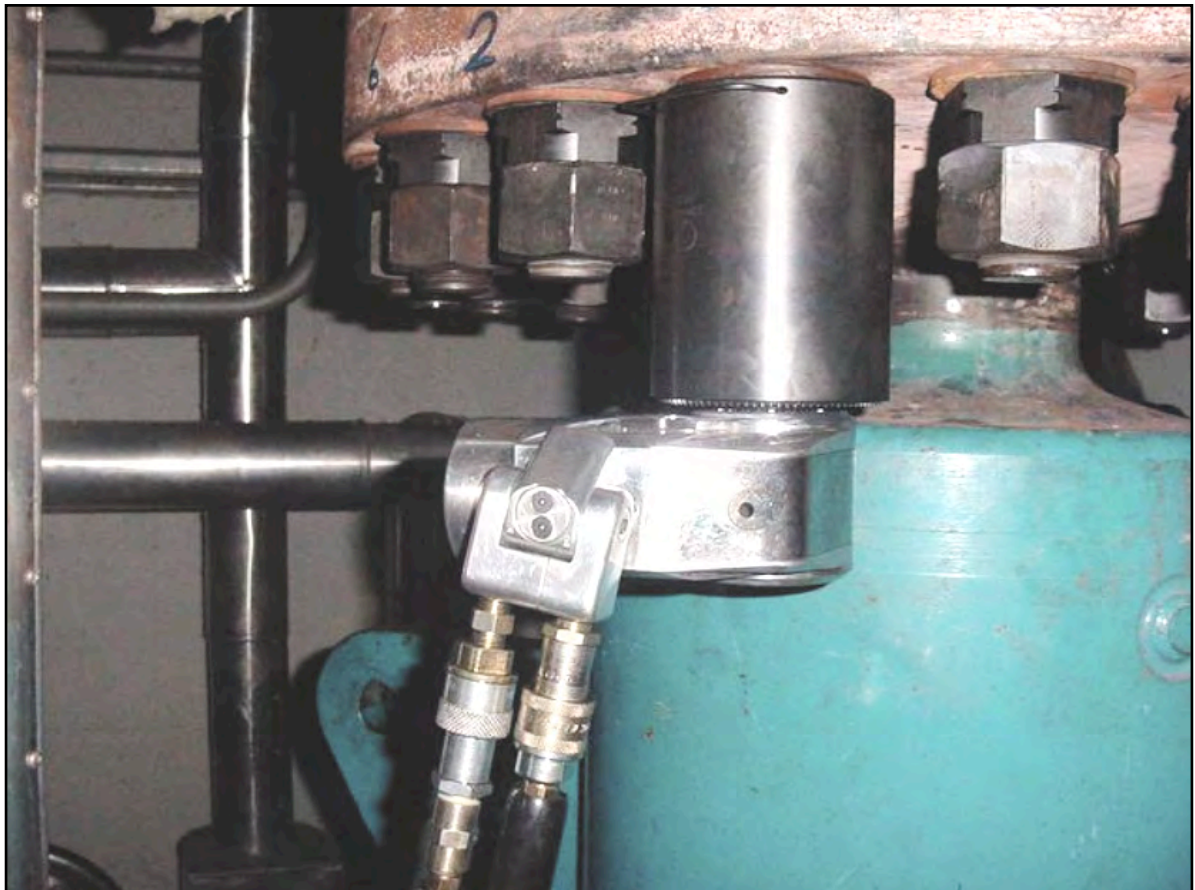
**GE FRAME 7E**

The **ONLY** PROFESSIONALIZED BOLTING COMPANY IN PAKISTAN

## Bolting Applications Booklet - Worldwide



### CIRCULATION PUMPS CUSTOMER: RELIANT

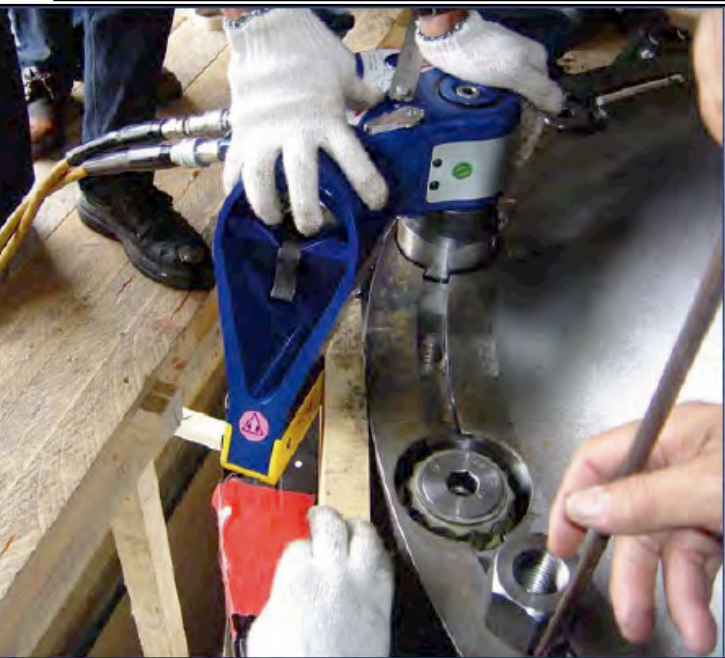


**Avanti-3 locked on the Hytorc Disc: Hands-free tool operation  
(even on inverted applications).**

# Bolting Applications Booklet - Worldwide

**HYTORC**  
Since 1968

**GE FRAME 7E GAS  
TURBINE OVERHAUL**



**Note the Hex bar used to  
stop the stud from turning !**



The **ONLY** PROFESSIONALIZED BOLTING COMPANY IN PAKISTAN

# Bolting Applications Booklet - Worldwide

**HYTORC**  
Since 1968



**GE FRAME 7E GAS  
TURBINE OVERHAUL**

**MXT™ 10MXT ON GAS TURBINE  
BLADE RING MARRIAGE BOLTS**

*A very happy Hytorc customer using Stealth*



บริษัท ผลิตไฟฟ้าราชบุรี จำกัด  
Ratchaburi Electricity Generating Co.,Ltd.

**Ratchaburi Combined Cycle Power Plant in Thailand. A ST-14 CLAMP NUT DRIVER being used on a GE OEM application for 2-5/8"-16 load coupling bolts, on a GE Frame 9F Gas Turbine.**

**STEALTH & CLAMP NUT™**

**For Extreme Side-Clearance Limitations**

**UPGRADE BOLTING & JOIN THE REVOLUTION !  
Raise Your Productivity, Efficiency & Safety !**



# Bolting Applications Booklet - Worldwide

**HYTORC**  
Since 1968

**For Extreme Side-Clearance  
Limitations**



- ✓ NO FLOGGING SPANNERS
- ✓ NO BOLTING ACCIDENTS
- ✓ NO JOINT FAILURES



The **ONLY** PROFESSIONALIZED BOLTING COMPANY IN PAKISTAN

## Bolting Applications Booklet - Worldwide

**HYTORC**  
Since 1968

**LEAKAGE ZERO**<sup>TM</sup>  
A RESULT-DRIVEN ALLIANCE

### Quezon Power (Phils.) Limited, Co. Barangay Cagsiay-1, Mauban, Quezon Province, Philippines

#### Application: CCI Recirculation

**Application Details:** Bolt size: M30 stud x 50mm hex • Tool / size: Avanti-1 x 2 pcs & QAS-230 • Pressure Applied: 5000 psi • Bolting time: 30 mins. Loosening & tightening



The **ONLY** PROFESSIONALIZED BOLTING COMPANY IN PAKISTAN

# Bolting Applications Booklet - Worldwide

**HYTORC**  
Since 1968

**Quezon Power (Phils.) Limited, Co.**  
Barangay Cagsiay-1, Mauban, Quezon Province, Philippines

## **Application: Condensate Pump**

**Application Details:** Bolt size: M33 stud x 50mm hex • Tool / size: 2XLCT x 2 pcs with 50mm link & QAS-230 • Torque Applied: 862 ft. lbs. @ 5000 psi • Bolting time: 40 mins. Loosening & tightening



The **ONLY** PROFESSIONALIZED BOLTING COMPANY IN PAKISTAN

# Bolting Applications Booklet - Worldwide

**HYTORC**  
Since 1968



**HY-25XLT™** HY-25XLT with 115mm Socket @ 16059 ft lbs being used by the Turbine Maintenance section

**AVANTI-5 with 65mm Skt**



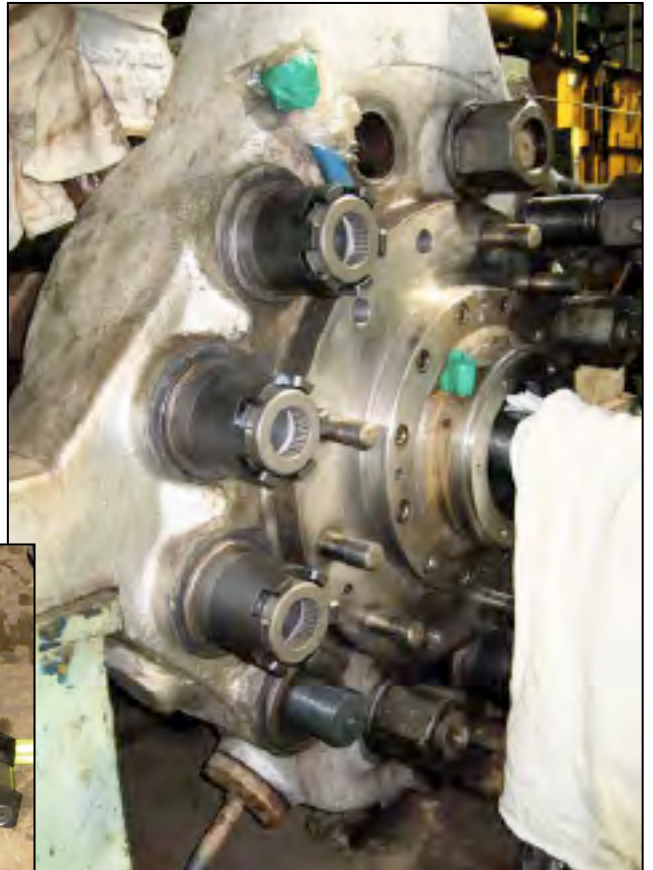
**Problem-Free Joints in no Time!**

The **ONLY** PROFESSIONALIZED BOLTING COMPANY IN PAKISTAN

# Bolting Applications Booklet - Worldwide

**HYTORC**  
Since 1968

**KOMIPO**



**Boryeong Power Site Division of KOMIPO, [www.komipo.co.kr](http://www.komipo.co.kr), Boiler Feed Pump ST-14 w/ TS Driver, QAS230 Pump & M65-11 TS Clamp Nuts x Qty 24**

**The ONLY PROFESSIONALIZED BOLTING COMPANY IN PAKISTAN**

# Bolting Applications Booklet - Worldwide

**HYTORC**  
Since 1968

## Gas Engines 6.3 HP

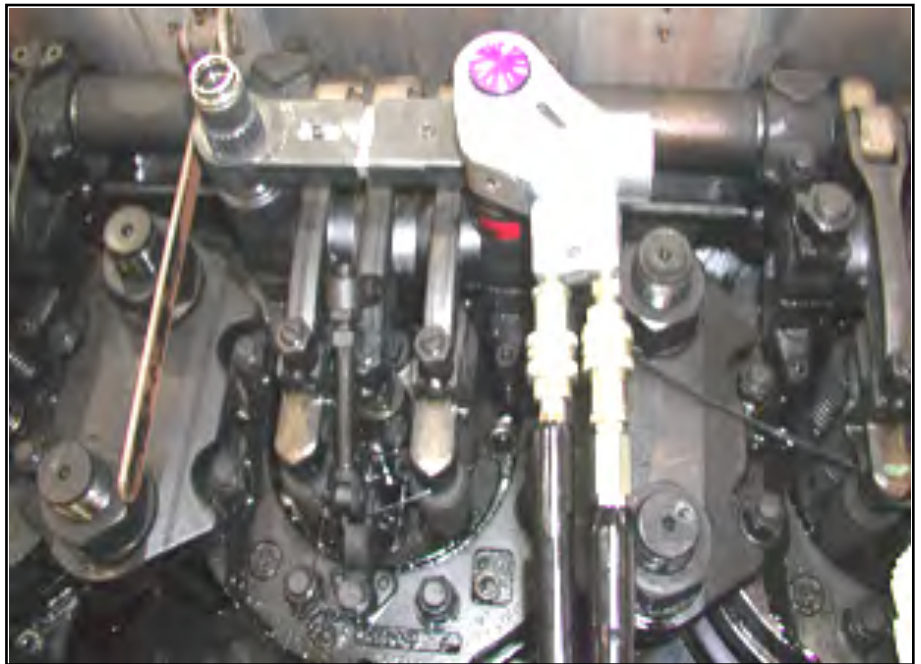


The **ONLY** PROFESSIONALIZED BOLTING COMPANY IN PAKISTAN

**ROCKER ARM - 300 FT-LB**

**HYTORC**  
Since 1968

**CSX Transportation**  
Huntington  
West Virginia



**CRAB NUT - TORQUE 2400 FT-LB**



**Locomotive Diesel  
Engine Rebuild**

Avanti 1 & 4XLCT  
Dual Reaction Fixtures  
QAS in portable tool cart  
20/21 Seconds Per Bolt

**Benefits to Customer:**

No pinch point  
Weight reduction  
Calibration traceability  
Guaranteed  $\pm 3\%$  accuracy

**THE HYTORC LoaDISC  
UNDER EACH HEX NUT**





# Bolting Applications Booklet - Worldwide



## Description of Application

Centrifugal pump with our **Clamp-nuts 2" 8UN**  
**51 Clamp-nuts 2" 8UN**, **52 Protective Covers (Plastic)**, **1 AVANTI-5 per pump**.

## Problem: Difficult access nuts

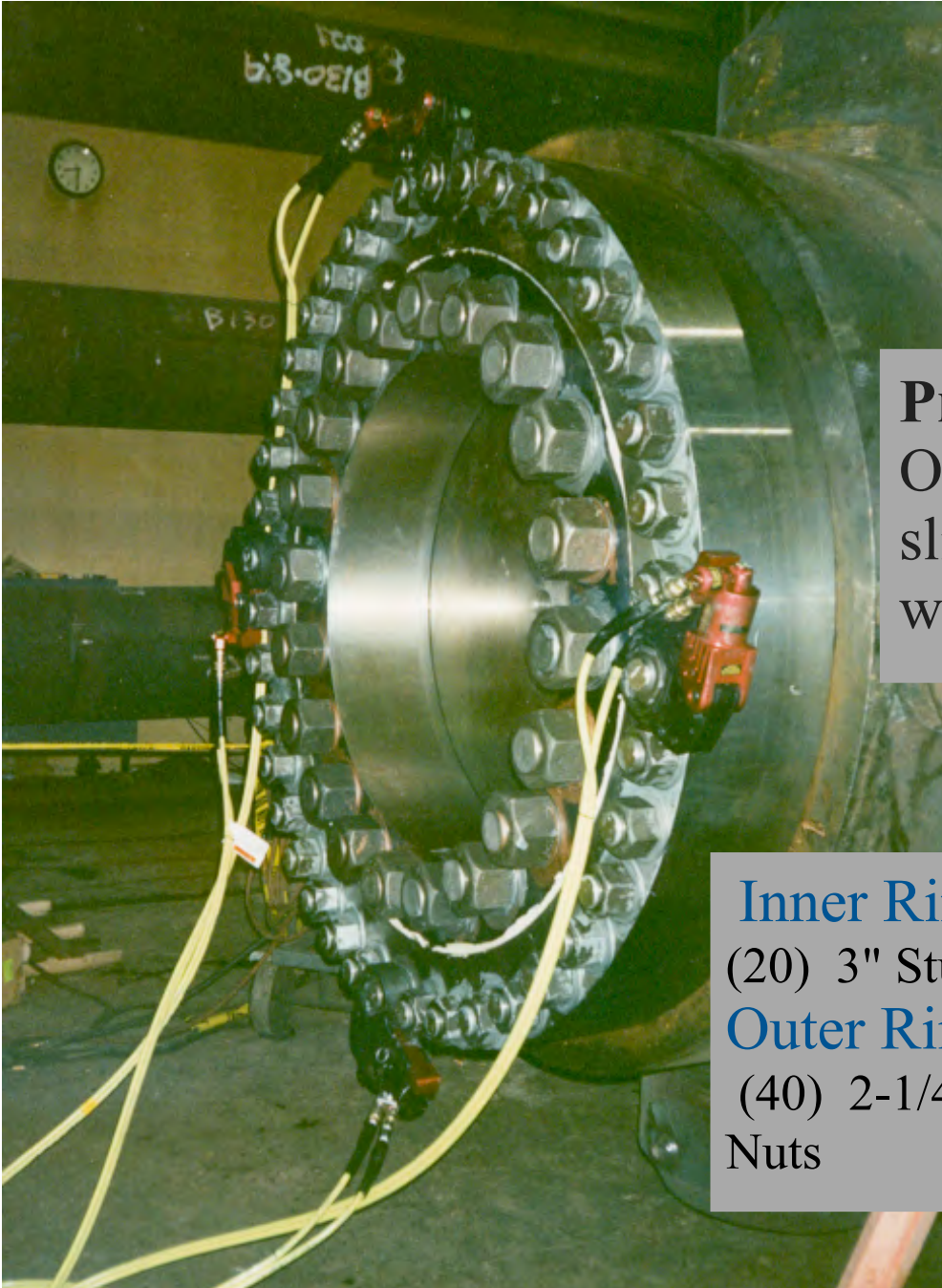
The company had problems tightening the nuts with the torque method used on the bolts. Studs were threaded to the housing and then it was difficult to remove the bolts.

## Benefit To Customer

With the **Clamp-nuts** installation on the **Centrifugal Pump** the reaction points were eliminated. **40% Time reduction!**



# FEEDWATER HEATER



**Previous Method:**  
Overhead Crane  
slinged to hammer  
wrenches

**Inner Ring:**  
(20) 3" Studs with 4-5/8" Nuts  
**Outer Ring:**  
(40) 2-1/4" Studs with 3-1/2"  
Nuts

**HYTORC Bolting System: 4 hours**  
**Time Savings over six flanges: 12 hours**

# THROTTLE VALVE



**Previous Method:** Sledge Hammer Wrenches

Previous Method: 8 hours per flange

HYTORC Bolting System: 35 minutes per flange

Time Savings over six flanges: 44.5 hours

## **Special Note:**

*Notice the **HYTORC** Bolting System is a hands-free operation. This is a **HYTORC** exclusive benefit.*

## SUPERHEAT BY-PASS VALVE



**Previous Method:** 1 HY-10XLT HYTORC

Previous Method: 3 hours per flange

HYTORC Bolting System: 35 minutes per flange

Time Savings over EIGHT flanges: 19.3 hours

### **Special Note:**

This was a critical path job, which shortened the outage by 2 shifts .

## STEAM INLET FLANGE



### **Previous Method:**

Sledge hammers and Heater Rods

Previous Method: 10 hours per flange

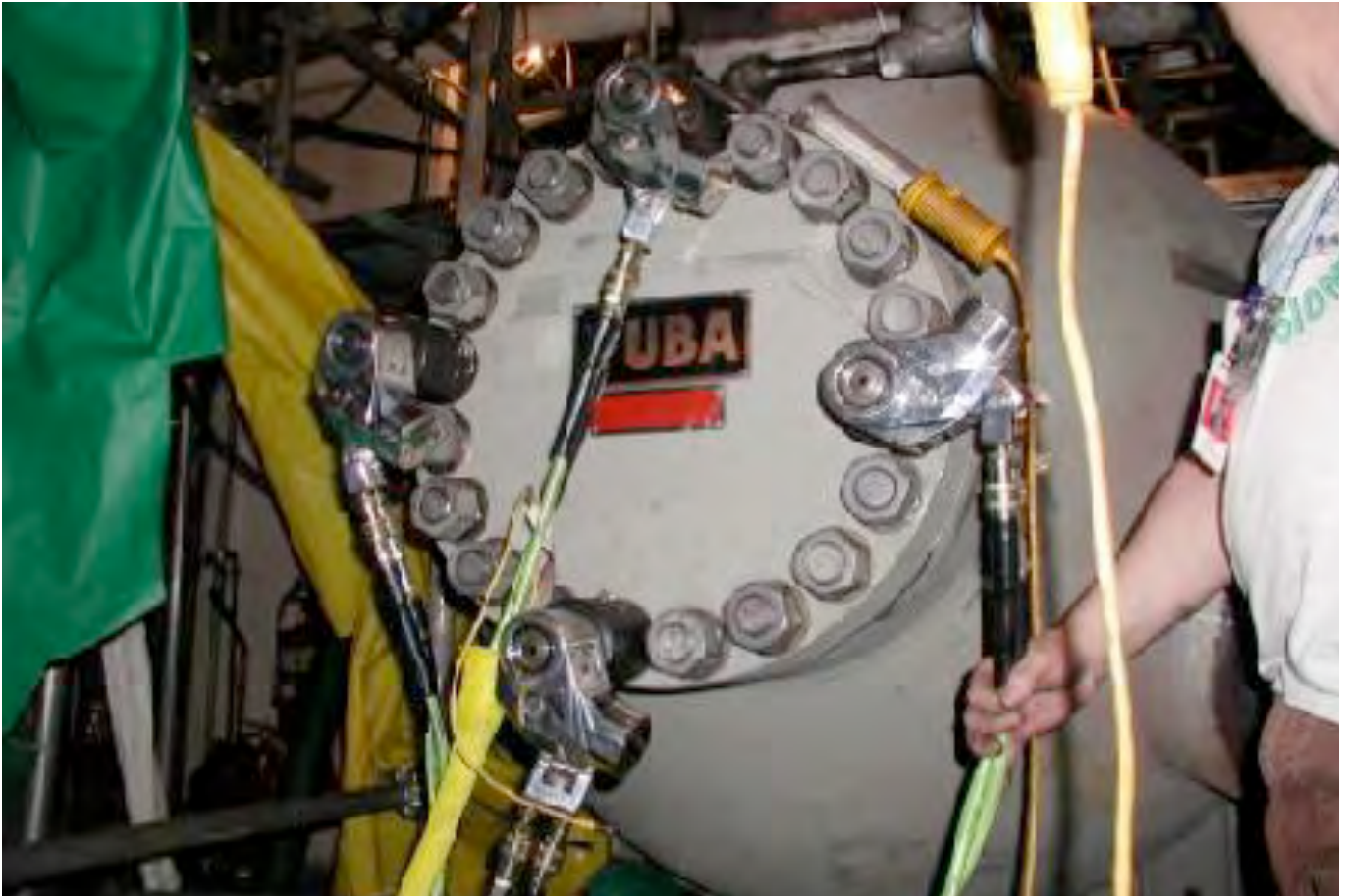
HYTORC Bolting System: 35 minutes per flange

Time Savings over EIGHT flanges: 56.5 hours

### **Special Note:**

This was a critical path job, which shortened the outage by 2 shifts .

## Bolting Applications Booklet - Worldwide



### YUBA Feed Water Heaters Manway Cover Valve Installation

Installation completed in 17 minutes, well within nuclear regulatory specifications. 20 of 1-5/8"-8UN bolts with a gasket. Two passes with 4 tool Simul-torc reduced bolting time. Use of **LoadDISCs** eliminated bolt and nut surface galling problems.

Equipment Used: 4 x HYTORC Avanti-3 and **LoadDISCs**

**LOADDISC™**

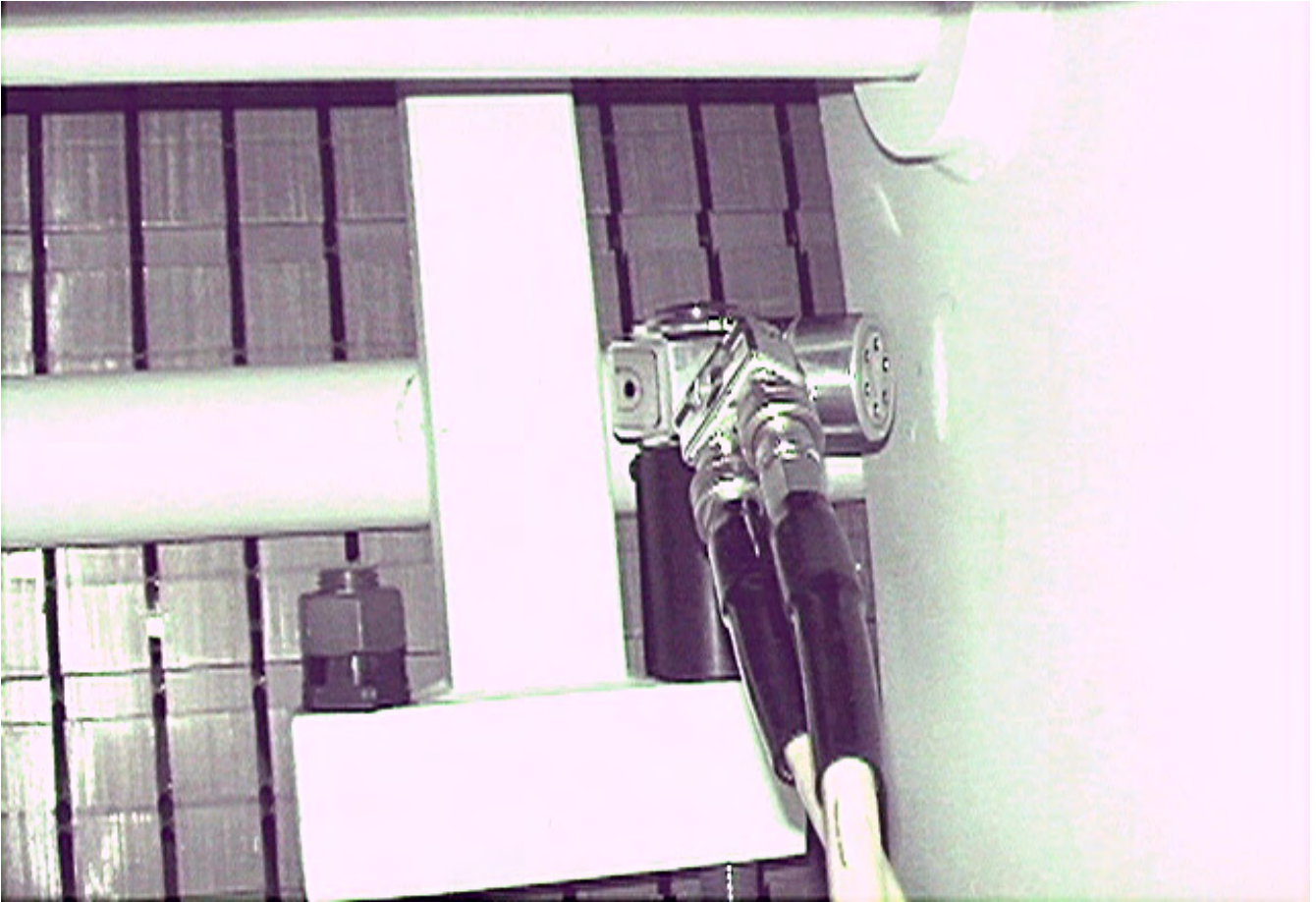


**STRETCH-TO-LOAD**

**LEAKAGE ZERO™**  
A RESULT-DRIVEN ALLIANCE

The **ONLY PROFESSIONALIZED BOLTING COMPANY IN PAKISTAN**

## Bolting Applications Booklet - Worldwide



### GENERAL ELECTRIC Generator Internal Bands Application

With high performance light weight HYTORC Avanti, 1-5/8" Internal Band bolts in confined area were bolted together with no problem. Hand-Holding and Reaction Arm-Free bolting was completed in just 90 minutes. (Previously 13 hours) Bolt relaxation and bending were eliminated. HYTORC's calibrated tracability is an additional benefit.

Equipment Used: 2 x HYTORC Avanti-1 and LoadDISCs

**LOADDISC™**



**STRETCH-TO-LOAD**

**LEAKAGE ZERO™**  
A RESULT-DRIVEN ALLIANCE

The **ONLY PROFESSIONALIZED BOLTING COMPANY IN PAKISTAN**

## Bolting Applications Booklet - Worldwide

**HYTORC**  
Since 1968

**LEAKAGE ZERO**<sup>TM</sup>  
A RESULT-DRIVEN ALLIANCE



### Norwegian Sea Offshore Application:

Offshore Floating Oil Refinery (one and a half hour ride on helicopter out in the ocean). Equipment is required to have 100% reliable due to an isolated environment. 20 of 3 inch bolts were stretched within  $\pm 0.1\text{mm}$  (.0039") accuracy thanks to HYTORC's STRETCH-TO-LOAD Technology. Safety is enhanced due to Hands free bolting even in inverted applications.

Equipment Used: 4 x HYTORC Avanti-20 and **LoaDISCs**

**LOADISC**<sup>TM</sup>



**STRETCH-TO-LOAD**

**LEAKAGE ZERO**<sup>TM</sup>  
A RESULT-DRIVEN ALLIANCE

The **ONLY PROFESSIONALIZED BOLTING COMPANY IN PAKISTAN**



# Bolting Applications Booklet - Worldwide



THE CUSTOMER LIKES THE IDEA OF USING SMART STUDS ON THE STRUT LEG BOLTS AND THE COMPRESSOR FLANGE DISCHARGE BOLTS

STRUT LEG BOLT

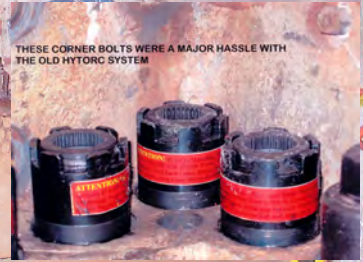
STRUT LEG BOLT

COMPRESSOR FLANGE DISCHARGE BOLTS --

T-200 TENSIONING TOOL AND 1 1/2" - 8UN TURBINE STYLE HYTORC CLAMP



THESE CORNER BOLTS WERE A MAJOR HASSLE WITH THE OLD HYTORC SYSTEM



1 1/2" - 8UN x 7.5" SMART STUD HYTORC-CLAMP ON GE FRAME 7E TURBINE SPLIT LINE PREPARED FOR INSTALL

1 1/2" - 8UN TURBINE STYLE HYTORC-CLAMP ON EITHER SIDE



SMART STUDS SEATED AND READY FOR TOOL

CLAMP™



1 1/2" - 8UN x 7.5" SMART STUD HYTORC-CLAMP USED ON GE FRAME 7E TURBINE SPLIT LINE

PRECISION TENSION

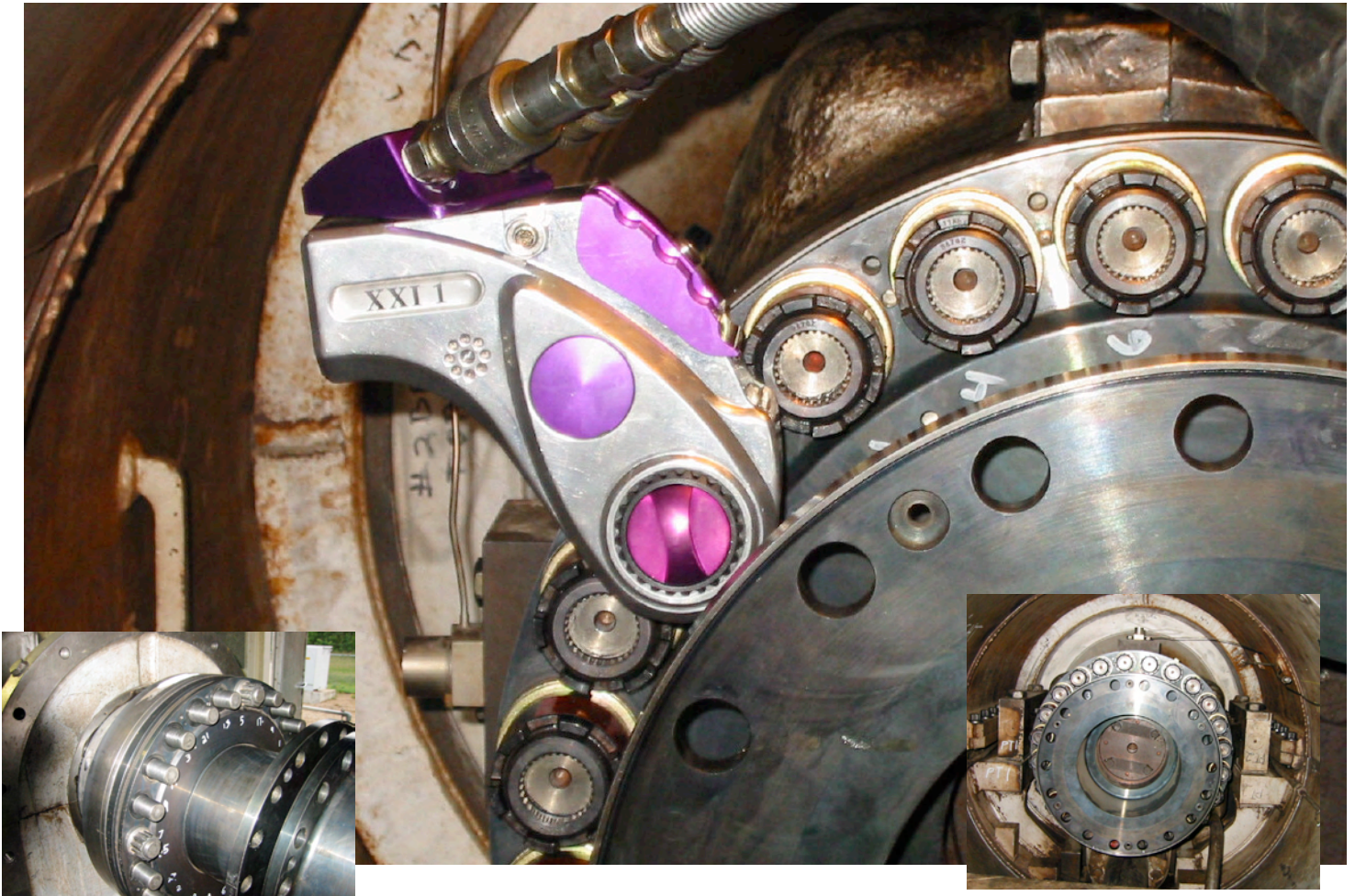
Dow Chemical Canada GE Frame 7E Application

# LEAKAGE ZERO™

A RESULT-DRIVEN ALLIANCE

The ONLY PROFESSIONALIZED BOLTING COMPANY IN PAKISTAN

## Bolting Applications Booklet - Worldwide



### Sask Power Low Pressure Turbine Flange Assembly

Previously 12 point nuts were used to tighten this circular flange. With High Speed Continuous Rotation XXI tool in conjunction with the turbine style **Clamp-nuts**, bolt load accuracy of +/-5% was guaranteed to tighten flange with Even Bolt-load to stop any leakage.

Equipment Used: HYTORC XXI-1 and M52 Turbine Style Clamp-nuts

**CLAMP**



**PRECISION TENSION**

# LEAKAGE ZERO<sup>TM</sup>

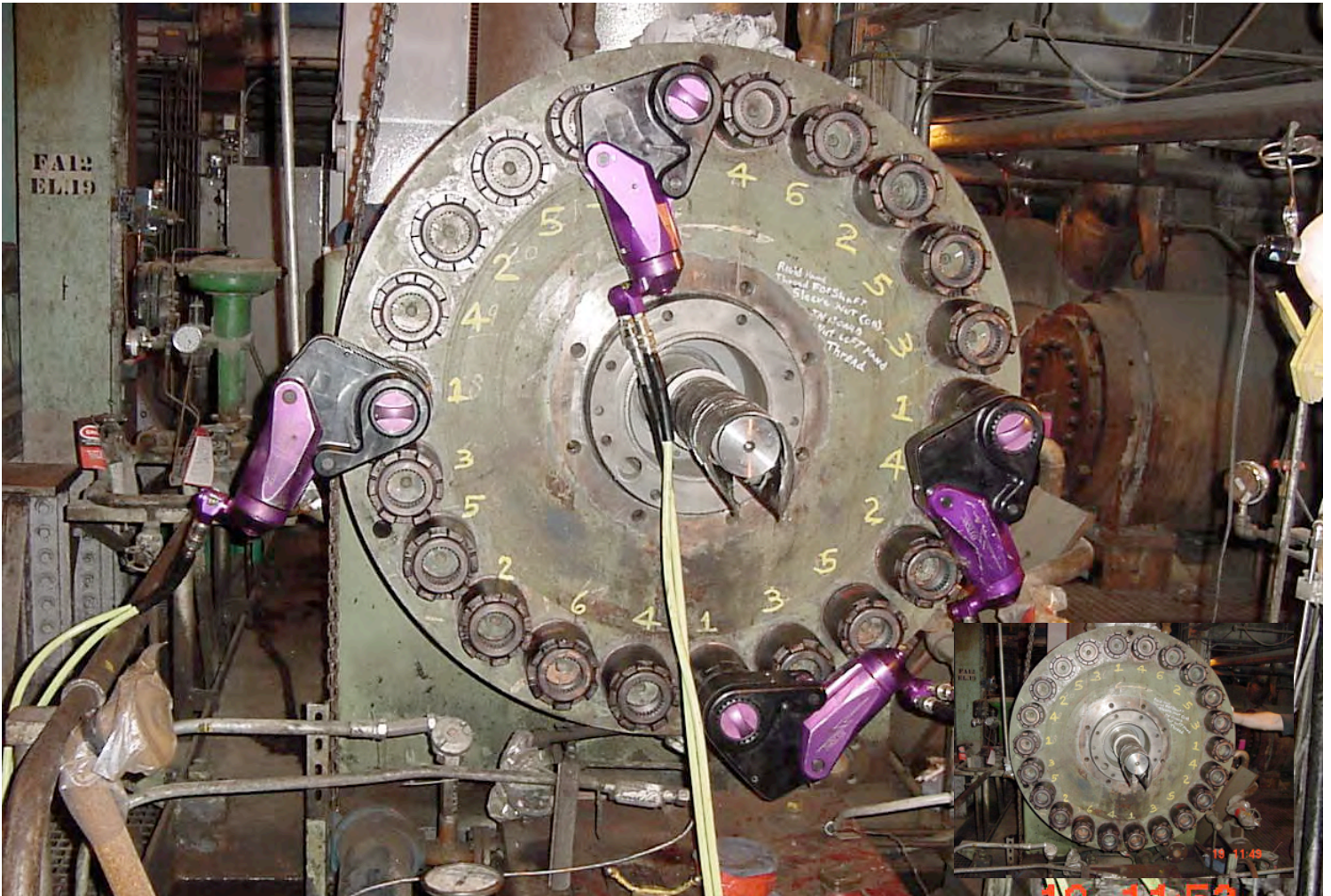
A RESULT-DRIVEN ALLIANCE

The **ONLY PROFESSIONALIZED BOLTING COMPANY IN PAKISTAN**

## Bolting Applications Booklet - Worldwide

**HYTORC**  
Since 1968

**LEAKAGE ZERO**<sup>TM</sup>  
A RESULT-DRIVEN ALLIANCE



### Wisconsin Electric Flange Assembly

With HYTORC Simul-torc System, the flange was zipped together to just in 2 passes. Time saving using HYTORC System was from 3 hours & 20 minutes to 55 minutes. HYTORC Clamp, Precision Mechanical Tensioner protect bolts from over stretching and guarantees Side-Load-free and Hands-free parallel joint closure.

Equipment Used: HYTORC Blitz-8 and 2-3/8 Turbine Style Clamp-nuts

**CLAMP**<sup>TM</sup>



**PRECISION TENSION**

**LEAKAGE ZERO**<sup>TM</sup>  
A RESULT-DRIVEN ALLIANCE

The **ONLY PROFESSIONALIZED BOLTING COMPANY IN PAKISTAN**