

HYTORC



**COP28
UAE**



Reducing Fugitive Emissions in the Energy Transition Era

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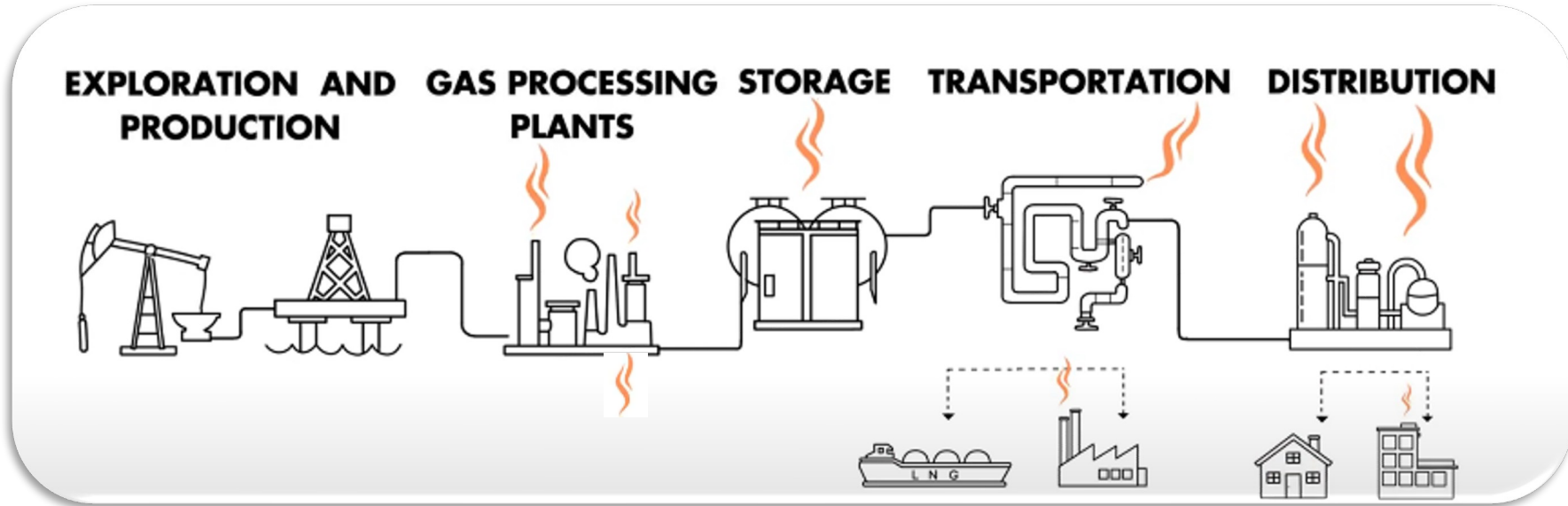
COP28 / EXPO Dubai, UAE

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AGENDA

- **Fugitive emissions in hydrocarbon industry**
- **Bolted joints focus**
- **Lead Detection and Repair (LDAR)**
- **HYTORC Environmental Leak Protection**
- **Case study**
- **Observations and Conclusions**

FUGITIVE EMISSIONS IN HYDROCARBON INDUSTRY

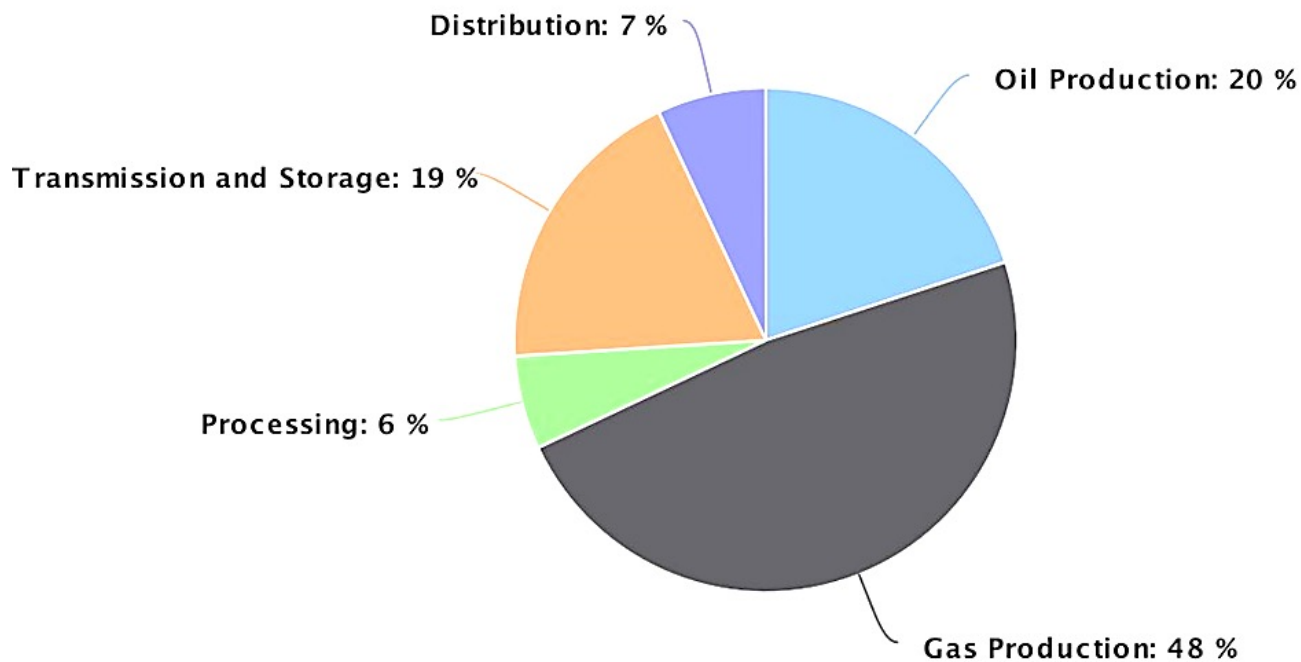


The hydrocarbon industry significantly contributes to fugitive methane emissions at all phases of its activities. During exploration, drilling, production, refining, and distribution processes.

The nature of fugitive emissions makes them difficult to assess but their level is significant - around **5% of global emissions**, and increasing

FUGITIVE EMISSIONS IN HYDROCARBON INDUSTRY

O&G Methane Emissions by Segment



Methane leaks are **25 times more impactful than CO2 on Global Warming.**

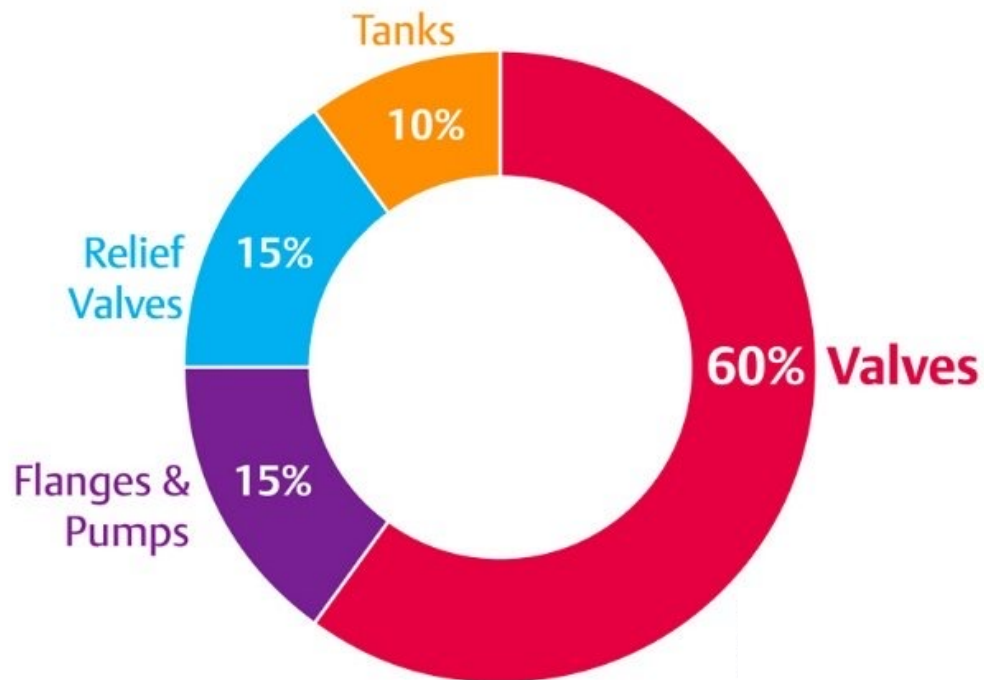
16MM metric tons of methane are released into the atmosphere every year due to Fugitive Emissions.

The cost of these emissions is **\$6.3MM per day or \$2.3B per year (USA).**

Because of the difficulties in measuring or quantifying emissions, fugitive emissions are sometimes **disregarded when establishing a GHG inventory.**

FUGITIVE EMISSIONS IN HYDROCARBON INDUSTRY

O&G Fugitive Emissions Sources



Methane (CH_4) emissions may be accidental or deliberate; emissions are **brought on by equipment leaks, faulty seals, or joints**. When natural gas cannot be used or retrieved economically, it may be purposefully expelled or burnt rather than sold.

Leakage or discharge of gases from pressure-containing equipment and components inside plants **such as valves, piping flanges, pumps, storage tanks, valves, compressors, etc.**

FUGITIVE EMISSIONS IN HYDROCARBON INDUSTRY

Heat exchanger



Reactor/Vessel



Pump



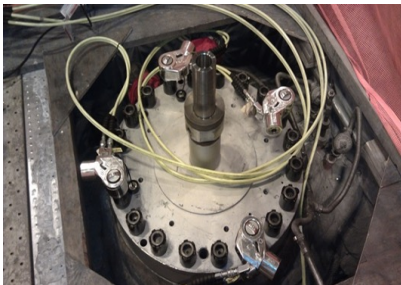
Generator



Flanges/BOP



Valve



Turbine/Compressor



Christmas tree

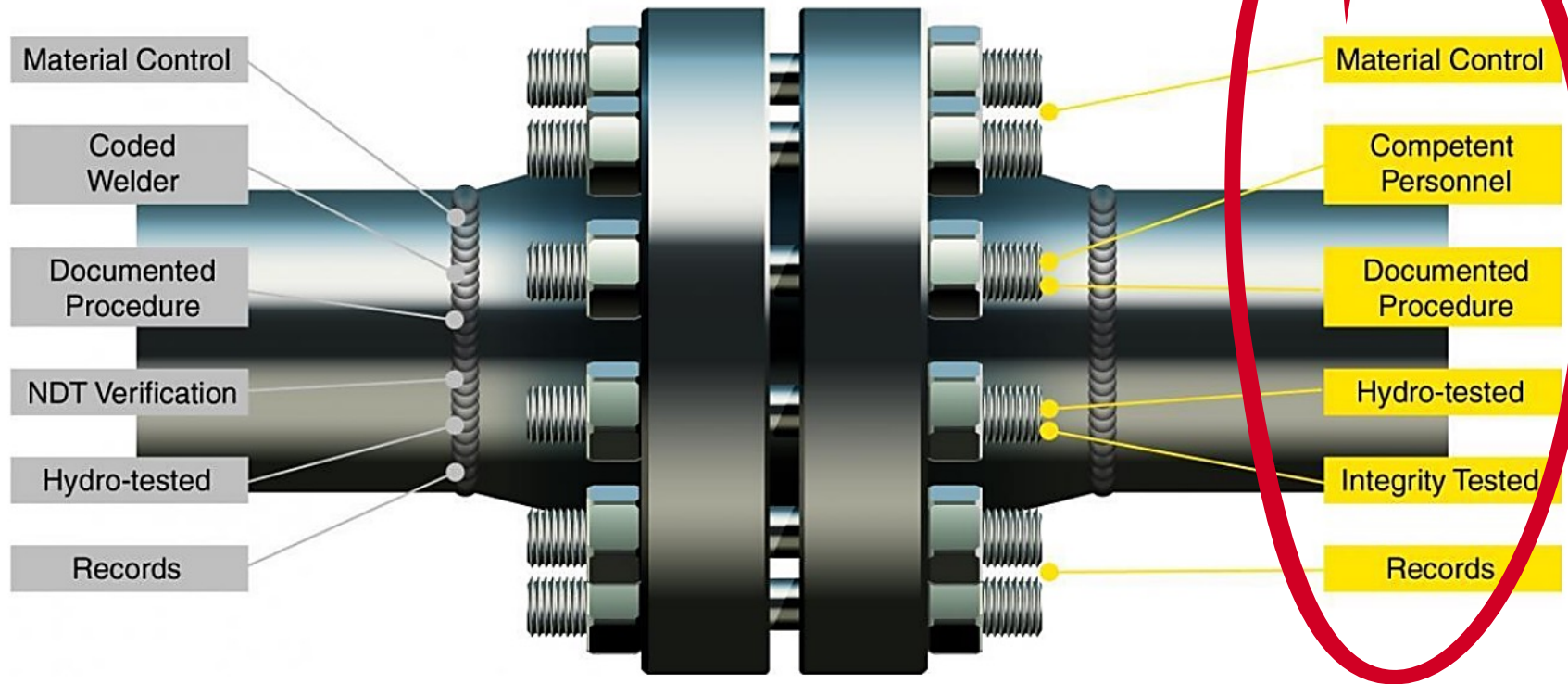


Manway



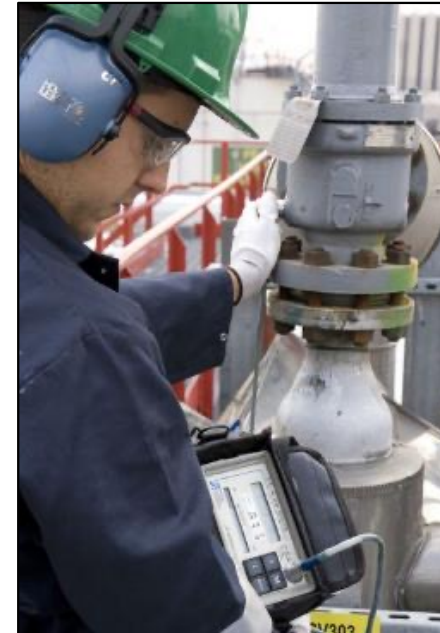
BOLTED JOINTS FOCUS

Welded Joint



An Oil & Gas processing plant can have 10,000 to over 100,000 bolted flanges

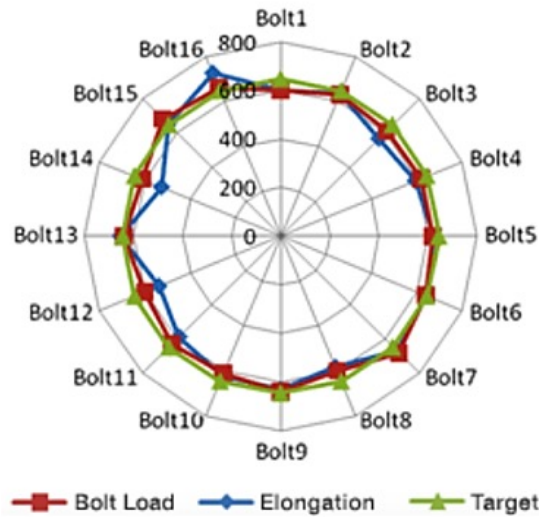
LEAK DETECTION AND REPAIR (LDAR)



A typical refinery or chemical plant can emit **600 to 700 tons per year of VOCs** from leaking equipment, such as valves, connectors, pumps, sampling connections, compressors, pressure-relief devices, and open-ended lines.

Industry emphasis on Leak Detection and Repair (LDAR)

**MEASUREMENT:
HYTORC Washer**



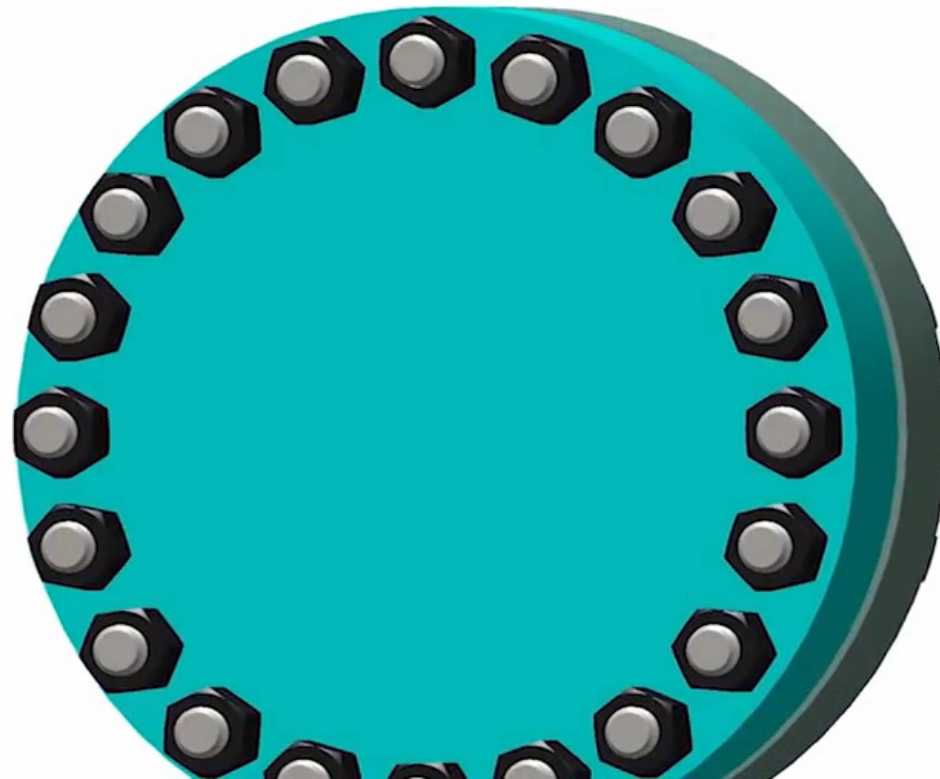
“Facilities can control emissions from equipment leaks by implementing a leak detection and repair (LDAR) program or by modifying/replacing leaking equipment with leak-free components”

- ✓ HYTORC is helping to reduce leaks all over the world.
- ✓ Identifying leaks using state of the art techniques.
- ✓ Solutions improve flange alignment, bolt load control and uniform sealing while reducing the time to repair.
- ✓ Solutions provide bolted joint integrity to prevent future leaks.



HYTORC REVOLUTIONARY SOLUTION TO ELIMINATE LEAKS

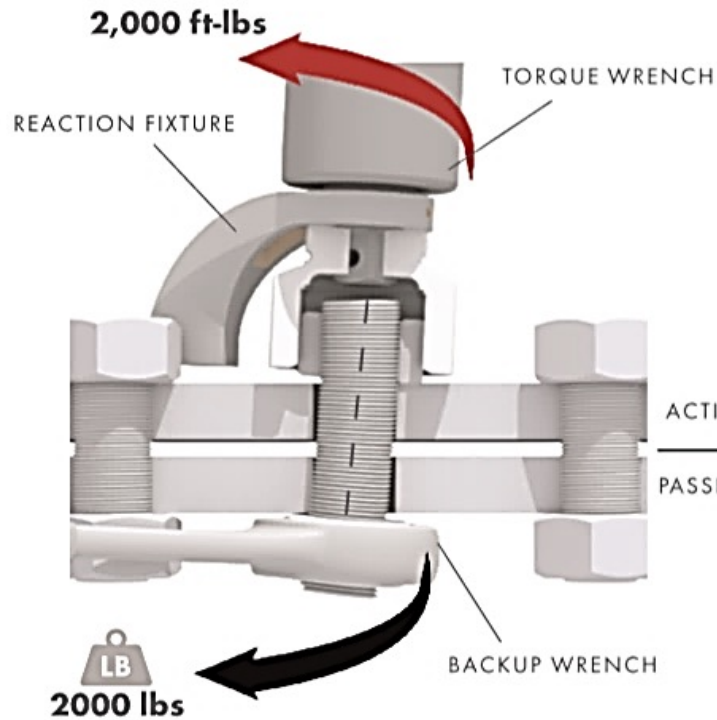
Conventional Bolting Risks



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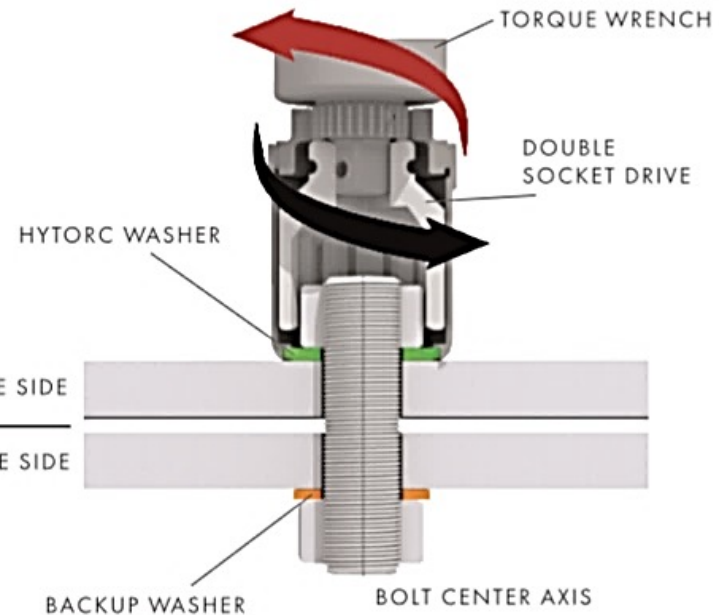
CONVENTIONAL VS NEW BOLTING METHOD (HYTORC WASHER)

USING A STANDARD REACTION FIXTURE



When the reaction fixture abuts away from the bolt's center axis, side loads and bending forces are applied to the bolt.

HYTORC WASHER WITH BACKUP WASHER

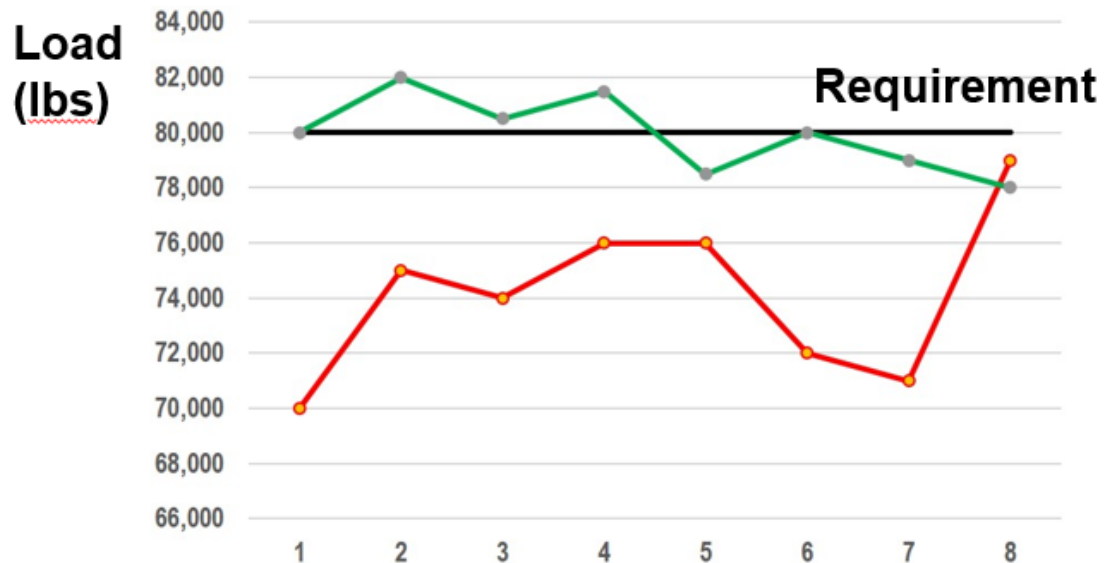


The HYTORC Washer enables coaxial bolting using a double drive socket. Action and reaction occur on the bolt's center axis.



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UNIFORM LOAD DISTRIBUTION ON FLANGES – LEAK FREE



Test: Apply torque to tighten eight new studs and nuts; record applied force on load cell.

Lubrication : Nickel Anti Seize

Stud Diameter : 1 - 1/2" x 8

Stud Material: B7

Target Load: = 80,000 lbs = 51% Yield

Torque: 1,100 ft-lbs

Pump Pressure : 3,600 psi

Tool: AVANTI 3

CONVENTIONAL REACTION ARM, NO WASHER

RANGE 9.0

AVERAGE 74.1

STD DEV 3.0

HYTORC WASHER SOLUTION

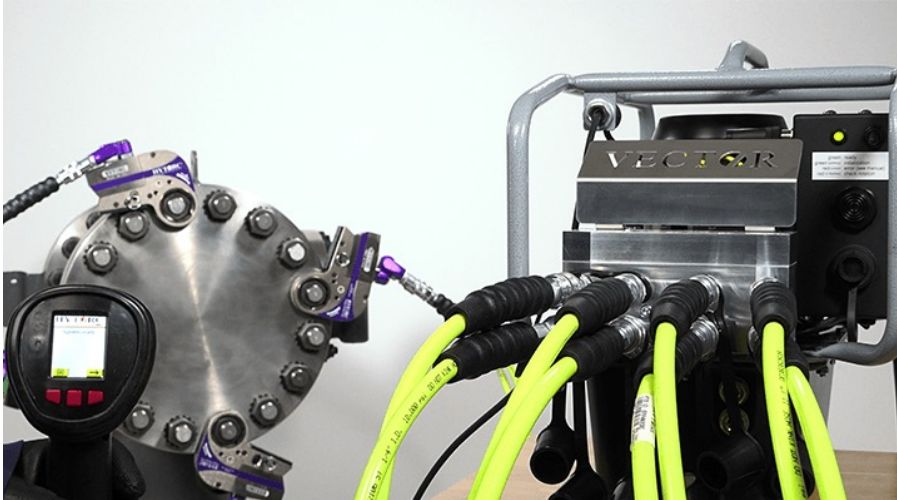
RANGE 4.0

AVERAGE 80.0

STD DEV 1.4

The HYTORC Washer System consistently meets target torque requirements and provides more uniform results (less scatter) from one bolt to the next – ultimately improves reliability.

PARALLEL JOINT CLOSURE – LEAK FREE



Parallel Joint Closure

To ensure overall joint reliability, parallel joint closure, and eliminate the possibility of leaks, the logical system for any flanged joint is our Simultorc system. The Simultorc system utilizes multiple HYTORC machines simultaneously on your flanged connections.

Best Practices

ASME PCC-1-2013 (Guidelines for Pressure Boundary Bolted Flange Joint Assembly) The use of the Simultorc™ type of bolting system is recognized by ASME as the preferred method for flanged joint assembly.

ASME PCC-1-2013 (page 33) states: "The simultaneous use of multiple tools spaced evenly around a flange has been shown to give equal or even superior tightening parity, and parallel closure, in less time than using a single tool in a cross-pattern.

INDUSTRY LEADING, HIGH-PRECISION TOOLS

Hydraulic Square Drive Torque Wrench



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Hydraulic Low Clearance Torque Wrench



Battery Operated Torque Wrench



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Pneumatic Torque Wrench



Smart Hydraulic Pumps



Data Capture Software



QC Traceability App



Bluetooth Wireless Technology

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CASE STUDY: REFINERY TURNAROUND



Situation before site survey:

- Leaks Detected with Thermal Imaging
- Measured with Sensor
- Over 50,000 PPM /YR Threshold

CASE STUDY: REFINERY TURNAROUND



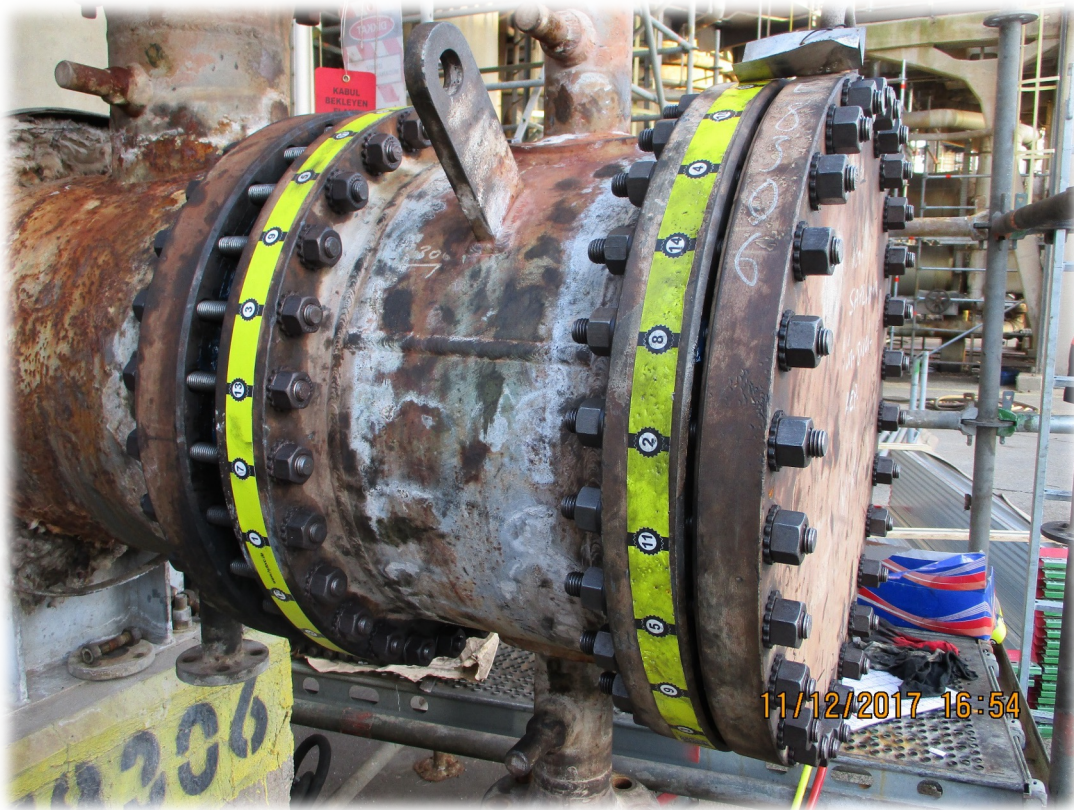
Detection

- Site Surveys
- Detecting and measuring leaks

Repair

- Trained workers to ASME Guidelines
- Upgraded to HYTORC Fasteners
- Proper Selection of Tools
- Customized Tightening Procedures
- Documentation & Quality Control

CASE STUDY: AFTER TURNAROUND



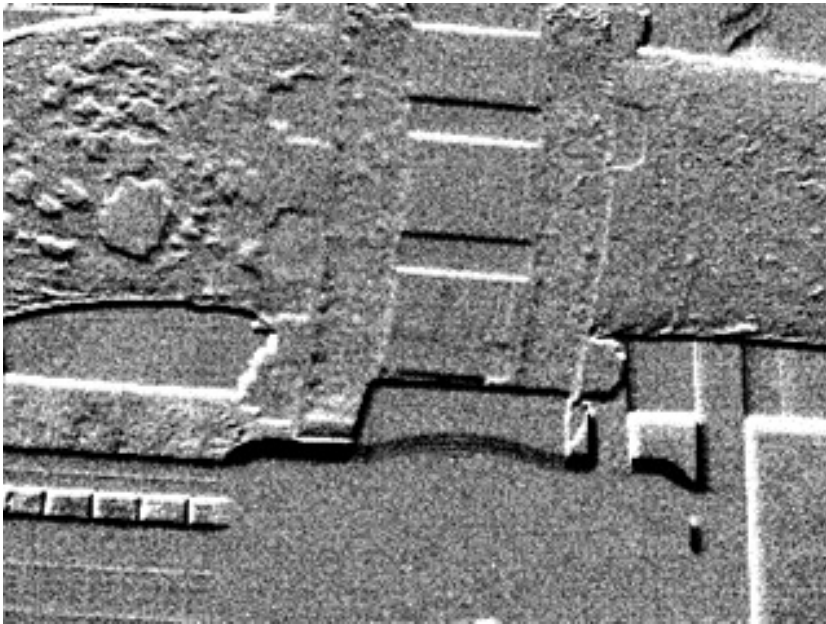
- ✓ No leakages observed
- ✓ 30 percent time saving
- ✓ Safe and easy
- ✓ Planning to standardize HYTORC Washer use in all relevant refinery applications

CASE STUDY: CONCLUSION ON H.E.L.P ADVANTAGES

Before:

- Infrared Camera Detection of emissions 50,000 PPM /Year
- 3,700kg/Year*

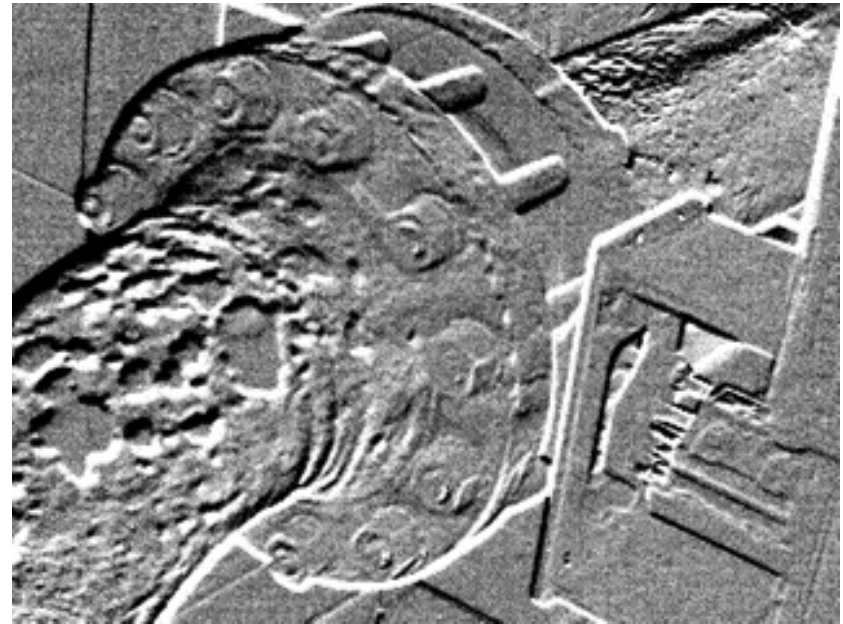
*100PPMV screening value is equal to 7.4kg/year of VOC



After HYTORC Environmental Leak Protection:

With HYTORC Washers installed and Parallel Joint Closure using Calibrated Tools

- ✓ No Leaks Detected on applications repaired
- ✓ 88Tons of VOC/year could potentially be reduced



EVERYTHING YOU NEED TO ELIMINATE FUGITIVE EMISSIONS

- **Quality tools and fasteners** solutions for every application
- **Award-winning software** and the capability to integrate tools with existing solutions
- **Unmatched** service, support, training and expertise



OBSERVATIONS & CONCLUSIONS

With enormous potential to reduce emissions and to support the decarbonisation of the Middle East . Innovative partnering between oil and gas, renewables, hydrogen, and carbon capture can accelerate energy transition – oil and gas infrastructure and capabilities can be leveraged for carbon capture and storage ('CCS'), and to support renewable energy production and hydrogen generation, transport and storage.

In addition to large capital-intensive decarbonisation projects, there are also smaller-scale abatement opportunities for upstream oil and gas operations. These cover a range of activities in several broad areas, including:

- Flaring – Improved measurement and control of flare combustion efficiency – Shortening duration of cold flaring episodes – Installation of vapour recovery units*
- Venting – Installation of vapour recovery units*
- Fugitives – Leakage detection and repair*
- Equipment – Upgrade to more energy efficient equipment for example fluid pumps.*

As Energy sector moves towards these greater goals, aligning with the improvements above such as Flaring, Venting, Fugitives and Equipment. There are detrimental effects from each application and execution from Cradle to Grave of the asset.

Huge gains from industry best practice bolting, Smart tooling and multiple tool execution to assure leak free joints, parallel joint closure to assure uniform loading of the gasket and limit localised stress, thus limiting loss of primary containment and emissions. Competency of personnel aligned to accredited standards. Creating ownership of each and every joint in a live database about to allow for a trend analysis and lessons learned towards continues improvements and Emission goals.



“THE WORLD NEEDS MAXIMUM ENERGY, MINIMUM EMISSIONS”

HE Dr. Sultan Al Jaber, Minister of Industry and Group CEO of ADNOC



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THANK YOU

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