

## INTRODUCTION TO HYDRAULIC BOLT TENSIONING

A hydraulic bolt tensioning tool provides a quick and easy method for tightening large diameter bolts to high and accurate pre-loads. Unlike conventional methods it does not use torque and does not require any forceful turning of the nut or bolt, like impact wrenches, flogging spanners or hydraulic torque wrenches. All of these methods have one common enemy FRICTION!

Overcoming thread friction between the nut and washer uses up over 80% of the torque energy applied to the nut or bolt, leaving less than 20% of the energy to produce useful tension in the shank of the bolt. Variations in this friction loss, from bolt to bolt causes non uniform tension in bolts that have been tightened to the same torque or impact wrench setting.

A hydraulic bolt tensioner is an annular jack which fits over the bolt and nut to be tightened. The jack pushes against the bolted joint and pulls on the end of the bolt which needs to be at least one diameter longer to accommodate the bolt tensioning tool.



Because the force produced by the jack is applied directly to the end of the bolt, a tension equal to the load generated by the jack is developed in the shank of the bolt. With the jack applying the tension, it is possible to turn the nut with zero torque until its tight.

The load applied by the jack is then relaxed and a high percentage, depending on the length of the bolt and its diameter is retained in the shank of the bolt.



- 1 Hydraulic oil flows into load cell
- 2 Load generated by load cell is transferred into the puller
- 3 Puller transfers the load directly into the bolt
- 4 The nut lifts clear of the flange surface due to bolt stretch
- 5 The socket is used to turn the nut down retaining the load

Bolt tensioning tools can be grouped together to enable multiple bolts to be tightened simultaneously to the same high and accurate pre-load. Flexible hoses with self sealing quick connect couplings are used to connect the bolt tensioning tools together to form a hydraulic ring main. The ring main and tensioning tools are normally pressurised using an air driven pump working from a compressed air supply.

This is particularly useful when compressing gaskets in pipeline or pressure vessel flanged connections. The high load developed by the multiple bolt tensioning tools is evenly distributed around the joint causing the gasket to flow into the surface irregularities of the flange giving a much better seal.