AN EXPLANATION OF TORQUE

What is Torque?
Torque is the application of a Force acting at a radial Distance and tending to cause rotation.

Torque is used to create tension.

How?
Referring to the diagram below, it can be seen that as the nut and bolt are tightened the two plates are clamped together. The thread converts the applied torque into tension in the bolt shank. The amount of tension created in the bolt is critical.

Why?
The tension in the bolt creates a "clamping" force between the two parts. If the clamping force is too low, the fasteners can work loose due to vibration or movement between the component parts. If a clamping force is too high, the fastener may permanently stretch and no longer apply the required clamping force. In severe cases the fastener may fail in assembly or during use when under load. Clamping force is generally referred to as the preload.
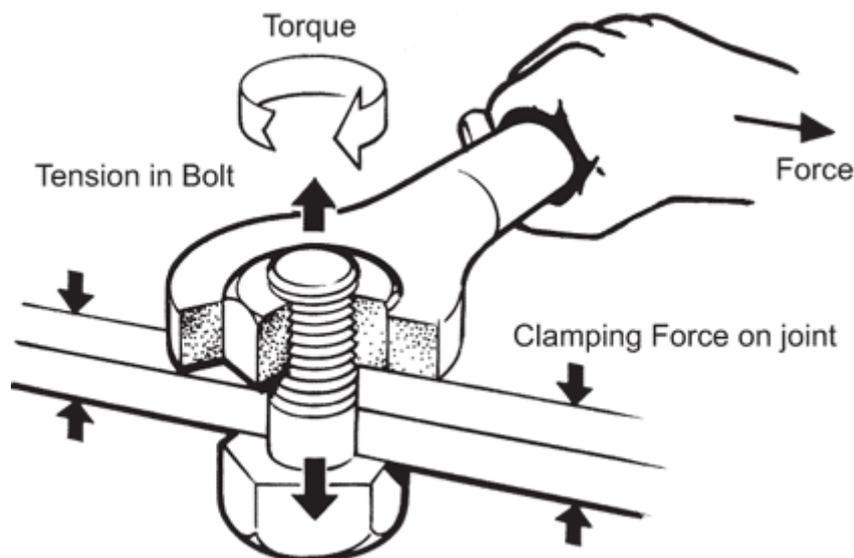

How is torque calculated?
Torque is the result of multiplying the value of Force applied by the Distance from the point of application.

Comparing the two examples it will be noted that the same resultant Torque can be achieved with a lower Force if the Distance from the nut/bolt is increased.

It should also be realised that some torque wrenches are "length dependant" which means that the actual torque applied to the fastener varies if the hand position on the wrench is varied - even with the wrench pre-set! This occurs if the pivot point of the wrench mechanism is not coincidental with the point of application of torque.

It should also be realised that some torque wrenches are "length dependant". This means the actual torque applied to the fastener is dependant on the position of the operator hand on the wrench. This occurs if the pivot point of the wrench mechanism does not coincide with the axis of the fastner.

Note: Most Torqueleader wrenches are not length dependent.
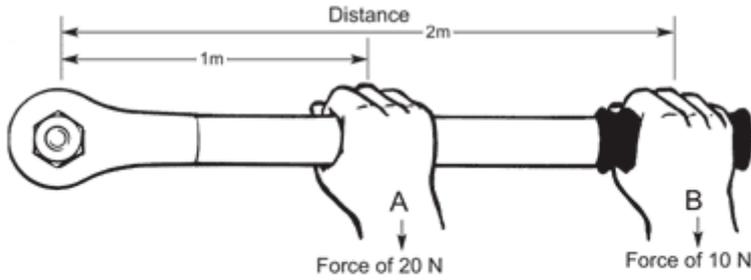
Let: T = Torque
        F = Force
        L = Length of Lever or Wrench

Then: $T = F \times L$

Example A
20 Newtons x 1 metre = 20 N.m (Newton metres)

Example B
10 Newtons x 2 metres = 20 N.m