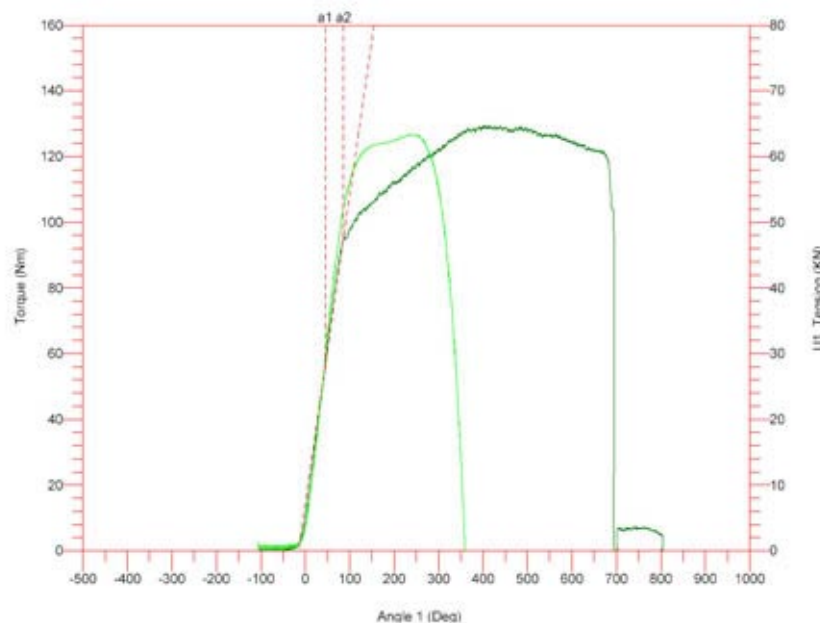


Torque/Tension/Angle Testing



The graph shown above is from a Torque/Tension/Angle Test. During this test, input torque, bolt tension, and angle of bolt rotation are dynamically measured throughout the rundown. The bolt tension is measured ultrasonically, which involves exciting a piezoelectric crystal mounted on the bolt head and measuring the time it takes the sound wave to travel back and forth through the bolt. By dynamically measuring torque and tension, the customer can easily select a

torque strategy that will provide sufficient clamp load to keep the joint together during service.

Torque/Tension/Angle Tests can be conducted to failure, however the ultrasonic clampload signal becomes erroneous past yield. The highest clamp load value we identify is the yield tension, which is represented by (a2) in this graph.