

EXPERIMENTS AND ANALYSIS OF LOOSENING OF CONE AND THREAD FITTINGS FOR HIGH PRESSURE HYDROGEN SYSTEMS

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ABSTRACT

Mechanisms of loss of sealing function in cone and thread (C/T) fittings were studied. A new test method was developed for measuring contact force at the sealing part during fastening, and under combination of external loading and misalignment between a fitting body and a tube. Also, changes in contact force and leakage of 90 MPa hydrogen gas from fastened joint under tensile loading were measured. The experiments revealed that relationship between the contact force and tightening torque depended on grease lubrication condition during fastening, the contact force changed by repeated tightening and loosening, and cyclic compression with larger amplitude and cyclic bending with higher bending moment caused decrease in the contact force. Measurement of surface topography showed that local step-like plastic deformation occurred at tapered sections of the fittings during fastening and during external loading. FEM stress analysis confirmed the occurrence of plastic deformation at the contact. It was concluded that the major cause of the loss of fastening force was the decrease in contact force at the sealing part by plastic deformation.

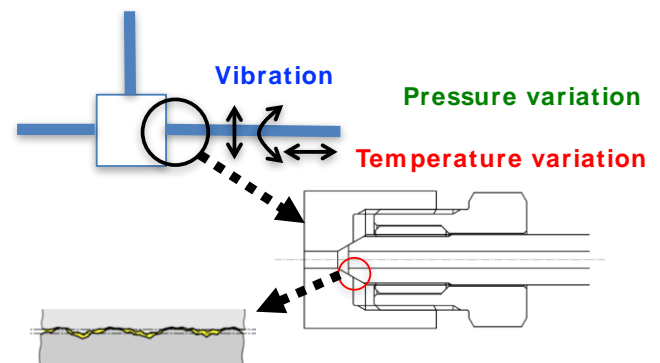


Fig.1 Forces applied to cone and thread fitting

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