The Hydraulic Joint Key to curved micro tunneling

This paper introduces the Hydraulic Joint, a pressure transfer ring for micro tunneling pipes, enabling the jacked pipes to pass curved alignments maintaining regular pipe lengths and high admissible jacking forces. A short introduction into pressure transfer for micro tunnel pipes is given, providing the basic knowledge to understand how different means and materials affect stresses and forces acting on the jacking pipes during construction. The Hydraulic Joint is explained in detail from design and structural point of view and as a large scale pressure sensor to determine the stress state in the jacking pipes during the advance. Introducing the real time structural monitoring system associated with the Hydraulic Joint, risk management aspects and risk reduction possibilities are presented and discussed. The paper concludes with a brief presentation of select drives that have been executed in different places around the world to give the reader an idea of the capabilities of today's micro tunneling technology.