

FIERF SPONSORED LABORATORY TESTING TO IDENTIFY PERMANENT PVD COATINGS TO MINIMIZE LUBRICANT USE DURING FORGING WEBINAR

A laboratory test that provides a quantitative measurement of the impact of a range of substrate conditions on the level of friction between a forged aluminum workpiece and an H13 steel forging die has been identified and validated. The test, called the ring Compression test, is easy to perform, and provides an excellent laboratory simulation of the metal deformation conditions present in commercial forging applications. A modified ring compression test apparatus has been designed and built that allows the examination of a range of substrate conditions on friction.

Several forging conditions have been examined at both room and elevated temperatures (100°C and 200°C), including lubricated and un-lubricated, un-coated, nitrided, and a number of PVD coatings (i-Kote, Super MoS₂, SiC, diamond-like carbon [DLC], TiCN and AlCrTiN). In the unlubricated condition, the lowest friction factors were obtained with two PVD coatings, i-Kote and Super MoS₂. These are nanocomposite, thin-film coatings containing lubricious particles such as graphite and/or molybdenum disulfide (MoS₂).

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