GLOSSARY OF TERMS—Lubrication Test Methods

Twist Compression Test Twist Compression Test The Twist Compression Test (TCT) simulates lubricant starvation conditions in a metal forming operation. It is designed to test boundary and extreme pressure lubrication regimes. It provides information on the coefficient of friction and the conditions under which the lubrication breaks down. The unit tests lubricants under different pressures. This test measures the coefficient of friction as a rotating cylinder applies torque under pressure onto a lubricated surface. The testing is best for comparative evaluations. There are several types of wear that this unit can produce. The wear can be adhesive (cold welding), abrasive (hard surfaces), fatigue (spalling), chemical (reaction products) and mixed (any combination of the other types).

Drawbead Simulator This device measures the coefficient of friction and the bending deformation for the given lubricant and metal in a die cavity situation. This simulator lets you compare different products under the same loads. There is fixed compression force (load) between the test sample and the die. The test is the stretchdraw forming on large panels. Different types of metal can be run in the testing. The testing can also be set up to cause the lubrication to break down.

Falex Block on Ring Test Machine This Falex test is called the Block on Ring Test Machine. This device measures the friction and wear characteristics of different lubricants. Like the Pin & V-Block, this method is tied to several ASTM methods (D2714, D2981, D3704, D2509 and G77). A block is put in place and a metallic ring spins on top of the block. There is variable load between the block and ring. The level of wear on the block is determined based on the scar. Again the scars for different lubricants are compared.

Falex Four-Ball Tester The Falex Four Ball Tester can measure wear and extreme pressure lubrication. The Four Ball can run at different speeds. Three balls are brought together in a clamped fashion. The fourth ball sits on top of the three balls and rotates for a fixed period of time. The load on the 4th ball can be varied. The purpose of this testing is to compare lubrication by measuring the scar on the fourth ball. Measuring the scar on the fourth ball determines if the lubrication is higher or lower compared to other lubricants. ASTM methods D2266, D2783, D2596, D4172 and D5183 apply to this tester.

Falex Pin & V-Block One of the standard tests is the Falex Pin & V-Block method. This method provides wear, average friction forces (measured in pounds) and extreme pressure properties of lubricants. This method is tied to many different ASTM methods (D2670, D2625, D3233 and D5620) as well as Chrysler (461-C-84-01, 461-C84-02 and 461-C-84-03) and Ford methods (FMC -BJ1-1). The unit is relatively easy to operate and collect data. This method lets the user compare one product to another. A steel journal is locked in place with a brass pin. Two V-blocks surround the journal while it rotates.
The blocks apply increased pressure over time. The wear on the blocks can be measured to determine how much of the block was worn away. There is also testing that is more specific for the extreme pressure testing (ASTM D3233). This test has two different methods to examine low, medium and high levels of extreme pressure testing. Most metalworking fluids fall into the boundary lubrication. Most metalworking fluids utilize the standard 1137 steel journals and steel blocks. Other blocks and journals are available. Blocks can be weighed before and after to see how much of the block was removed. This is one way to compare fluids.

Reciprocating Friction and Wear Test (RCP Tester) The RCP lubrication test method measures sliding friction (boundary lubrication) and average coefficient of friction (COF) forces under stress at a certain speed. Depending upon the material being tested, the average roughness can be detected from the surfaces. The testing is conducted with a 52100 steel ball under pressure on the flat surface with a small measured amount of lubricant. Different temperatures can be employed with the lubricants to simulate customer conditions under different loads.