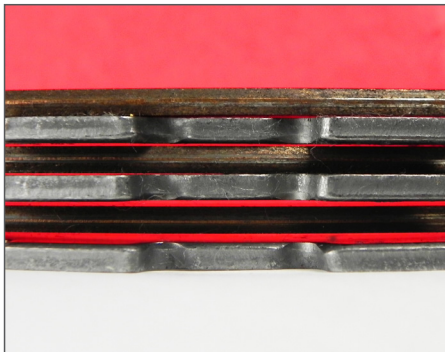


PAPER BASED MATERIAL VS. SINTERED METAL IN AUTOMOTIVE AUTOMATIC TRANSMISSIONS

Sintering metal is a manufacturing process that involves the compacting of a powdered metal material into a mold by means of pressure or heat. Sintered metal first appeared in automatic transmissions in the 1950's. There are applications where sintered metal is the preferred choice; however, in automotive automatic transmissions, compliance of paper based materials resulting in excellent load distribution and favorable friction characteristics make paper materials a much better and more durable choice. Sintered metal is much stiffer than paper based material and thereby poorly compensates geometry imperfections of clutch components; because of high stiffness it tends to produce hot spots and create substantially higher local surface

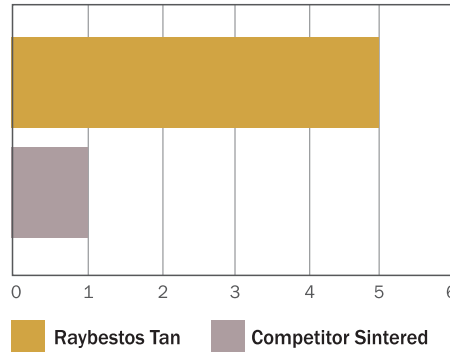
temperatures than a paper based material. This often results in coning, warping and fluid degradation which leads to premature clutch failure. Sintered metal typically has a lower friction coefficient than paper based materials with an endpoint friction coefficient that is typically higher than the midpoint causing harsh shifts. Sintered metal is aggressive towards mating steel which creates surface wear. As metal wears it produces hard debris that is harmful to other components and systems in the transmission and can lead to electronic failure. The use of sintered metal materials also necessitates more frequent transmission service to eliminate the debris and proves to be more costly overtime.

SAE J2487 - STEPPED POWER CONED SINTERED METAL PLATES



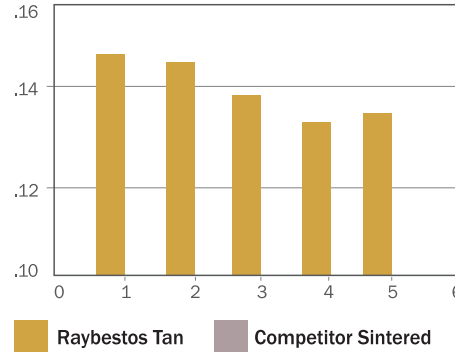
■ The red background light coming through the sintered plates indicates that the plates have severely coned resulting in failure.

SAE J2487 - STEPPED POWER TEST CYCLES SURVIVED



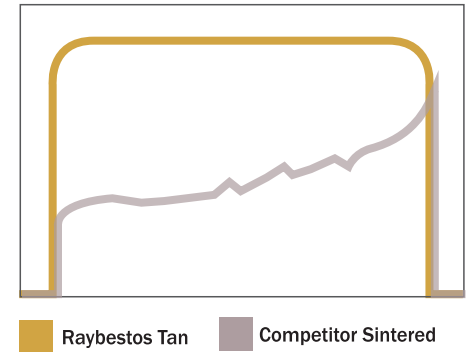
■ The sintered metal material coned and failed after just one test level while the Raybestos conventional tan material continued to perform.

SAE J2487 - STEPPED POWER COEFFICIENT OF FRICTION



■ This graph depicts the tan material's coefficient of friction through each test level. Sintered data could not be obtained due to such early failure.

SAE TEST 24571 E/M RATIOS



■ Tan material produces a smooth shift with an E/M Ratio close to 1 while the sintered material produces a harsh shift with a high endpoint.