Plans are under way to select an appropriate drilling machine to launch our program to provide drill tool life versus machining condition data for the tool economics analysis project.

PLAINTIFF'S EXHIBIT
FD-737

Personnel: Cowell, Stauffer

A04 VEHICLE SAFETY

Friction Materials (R-120 R)

1. 1975 Disc Brake Lining Development

One set of our experimental disc brake linings has been installed in a Ford Station Wagon for general durability testing at the MPG. The remaining samples of this formulation are to be used for dynamometer and vehicle testing to the FMVSS 105a schedule on a Mark IV as soon as equipment is available.

Bendix now has tested three combinations of linings and brakes which permit our heavier vehicles to pass the 105a tests. They performed over 1000 double-ended dynamometer simulations, in addition to numerous vehicle tests to develop these systems. The high cost of new friction material development and the need for development of complete brake systems to meet the new Federal Standards has led Johns Manville to discontinue all friction material manufacturing. Borg-Warner is considering a similar action regarding brake linings. Neither Johns Manville nor Borg-Warner are current brake lining suppliers to Ford.

A designed experiment is in progress to develop a four-wheel disc brake lining. The primary goal is to provide improved customer performance, in addition to meeting the 105a requirement. Initial results indicate that a means will have to be found to control Forsterite formation at high power densities and high disc temperatures.

Personnel: Anderson, Johnson
Weintraub (Chemical Engineering Department)

PRODUCED BY FORD
SCF-ALLF-04490

2. Support to Divisions

A. Pinto Drum Brake Pull Problem

A diagnostic investigation of brake pulls on some California Pinto drum brake cars was requested by the Brake Department. Lining surfaces were found to contain high concentration of iron and iron oxides. The chemistry of the iron fragments were found to match that of the drum. No lining irregularities were detected. It was concluded that the problem drums had not been adequately cleaned after shipment.

Personnel: Weintraub (Chemical Engineering Department)

B. Dry Clutch QC Procedure

Specification tests for dry clutch quality control are being revised. In support of this, we have aided in the development of new PGC and FADT specifications and have worked with Borg Warner and Raybestos in establishing appropriate vendor test capabilities.

Personnel: Weintraub (Chemical Engineering Department)

3. Automatic Transmission Clunk Investigation

Automatic transmissions sometimes produced a "clunk" upon engagement from neutral to drive or reverse. The amplitude and frequency of occurrence have increased substantially as a consequence of altered engine idle/torque characteristics with recent emission packages. At the request of the Transmission Division, we are investigating the friction material's contribution to the problem. Recent work has involved time and motion analysis of high speed (3500 frames/sec) motion pictures of clutch engagements. These studies indicate the time rate of change of torque and the peak torque at the end of the engagement both are significant in the excitation of noisy engagement.

Personnel: Anderson, Johnson

8003 0302

PRODUCED BY FORD

4. Ford of Europe Brake Pull Problem

Eight experimental cast iron FAST discs were prepared by Process Research in a program effort to determine the cause of brake pull with some Ford of Europe cars. FAST machine tests with Ferodo linings showed, after use, that all eight samples were similar to each other (and to Ford U. S. and Leamington cast iron) with respect to friction level (versus velocity and temperature) and both lining and cast iron wear rates.

Personnel: Anderson, Johnson
Warrick (Process Research Department)
Weintraub (Chemical Engineering Department)

TECHNICAL REPORTS

SR-73-21 W. A. Carey and A. M. Janotik, Test Procedure for Rolling Contact Fatigue Testing of Front Wheel Bearings.

SR-73-23 L. L. Ting and J. E. Mayer, Jr., Piston Ring Lubrication and Cylinder Bore Wear Analyses.

John E. Mayer, Jr., Manager
Mechanical Research Department

8003 0303

PRODUCED BY FORD