

PLAINTIFF'S
EXHIBIT
FD-493

EXAMPLE

ASBESTOS ELIMINATION FROM PRODUCT COMPONENTS PROGRAM

PART 1 - FRICTION MATERIALS

STATUS REPORT NO. 1

Vehicle Materials Development and Planning
June, 1980

8001 1794

SCF-FORD-1994

PRODUCED BY FORD

ASBESTOS ELIMINATION - EMISSION MATERIALS
SECTION 1 - GILSON, IERON

TRUCK ENGINE OFFICE 2	TRUCK DISC (DISC. PLATES)	TRUCK DISC (DISC. PLATES)	TRUCK DISC (DISC. PLATES)	TRUCK DISC (DISC. PLATES)
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1/ ALTHOUGH 70% MAY BE SHOWN "AVERAGE HARDWARE", SCI LAB (ANDERSON) IS CONTINUALLY
EVALUATING/DIAGNOSING SUPPLIER SUBMISSIONS.

2/ OFFICES NOT AFFECTED: - DEFE, ENGINE, CCD, EEO, FPD'S

ASBESTOS ELIMINATION - FRICTION MATERIALS CATEGORY

SECTION 2 - PRODUCT ENGINEERING REPORTS

Activities Review - Brakes

- Passenger Car Chassis - Asbestos free semi-met front disc brake pads were first used in the 1979 Mustang turbo option and Fairmont police package. Usage spread in 1980 models to all Mustang, V8 Fairmont and T-Bird. 1981 usage will increase again to all Fox vehicles and Granada. Bendix is the sole supplier. Semi-mets have proven the least expensive way to improve capacity. The trade off is generally greater rotor wear. All rear brakes are drum with asbestos containing lining.

A general asbestos-free lining development has been initiated by Car Chassis Brake Department with a letter to all the leading lining manufacturers. The letter invites manufacturers to demonstrate feasibility of asbestos free linings by comparing performance to current release over a single set of vehicle test parameters.

- Light Truck - All 1980 model light truck utilize semi-met front disc brake supplied by Bendix. Rears are all drum type with asbestos containing shoes. No non-asbestos substitutes are being investigated.
- Heavy Truck - The majority of Ford heavy trucks are equipped with drum brakes, front and rear, of conventional asbestos material. The very heavy class 16,000 to 20,000 pound capacity front axle trucks utilize disc brakes with semi-met pads. There are no plans to evaluate additional non-asbestos brake materials.

Statistics - 6/80

Number of End Item Brakes

PEO		Actual 1981 Model		Est. 1982 Model		Est. 1985 Model	
		Total	%Non-Abs	Total	%Non-Abs	Total	%Non-Abs
Car Chassis	Front						
	Rear						
Lt. Truck	Front						
	Rear						
Hvy. Truck	Front						
	Rear						

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ASBESTOS ELIMINATION - FRICTION MATERIALS CATEGORY

SECTION 2 - PRODUCT ENGINEERING REPORTS

Activities Review - Clutches

- Transmission and Axle - T&A incentive to develop asbestos substitutions has been largely policy. All wet operating internal transmission clutch plates and bands and locking differential clutch plates have been converted to non-asbestos facing as of ().

A non-asbestos (fiberglass) compound, developed for manual transmission clutches by Raybestos, was used in production of 1980 200 CID Fairmonts. The same material is currently released as an option to all conventional asbestos containing facings. Production of non-asbestos clutches however, will be limited by Raybestos production facilities until other sources are approved (Thermoid in process). Higher cost might also inhibit early release.

- Heavy Truck - clutch facings are being converted to ceramic materials as performance and costs become known. Conventional organics are not adequate.
- Light Truck - No non-asbestos substitutes have shown equivalent performance to date. Possible development for Yuma with Ashai (Japan). Current 90% supplier, Thermoid, assures he can meet EPA proposed exposure limit. All facings beginning 81 are seal coated for assembly safety.

Statistics

Number of End Product Clutches

PEO	Actual 1981 Model		Est. 1982 Model		Est. 1985 Model	
	Total	%Non-Abs	Total	%Non-Abs	Total	%Non-Abs
T&A						
Light Truck						
Heavy Truck						

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ASBESTOS ELIMINATION PROGRAM - FRICTION MATERIALS

SECTION 3 - BACKGROUND TO CURRENT DESIGN DIRECTION

Brakes and Heavy Duty Friction Applications

Asbestos has unique physical and chemical properties which are very difficult to reproduce in a substitute. These properties include a consistent natural lubricity, high temperature function, good permeability to heat generated gases, low cost. Furthermore, braking performance is judged against a highly developed (on asbestos) envelope of GPAS and FMVSS tests.

Three categories of non-asbestos compounds are currently being investigated.

- 1) Semi-metallics (Semi-met) - essentially sponge iron and steel wool plus graphite and borium sulfate held together in an organic matrix.

The graphite is required to prevent welding to the drum or rotor but has a very low coefficient of friction when wet - it effectively restricts passenger car use to power disc brakes; although they have been applied to heavy trucks.

Semi-met disc brake pads supplied by Bendix today for car and light truck are a composite sandwich of semi-met surface bonded to a reinforced organic backing in turn riveted to a conventional steel pad. The sandwich construction is used primarily because the semi-met material does not have the compressive strength for riveting.

- 2) Sintered metallics - mixtures of iron and copper, some in variable density, used in clutch discs, aircraft brakes. Not likely to become feasible for automotive brakes.
- 3) Non-asbestos organic (N.A.O.) - essentially the same as the current asbestos shoes/pads but with other fibers such as glass. These would seem the best prospect as a substitute involving least product development but N.A.O. materials are not strong structurally & delaminate in the high speed manufacturing process used for passenger car drum brakes. They are compatible with less automated process used in some large truck drum brakes.

Consensus among passenger car product engineers and suppliers is that an N.A.O. material would require a three to five year combined development of drums, shoes, and linings before release.

Regulation and General Corporate Policy

(TBD) tons of asbestos are released to the environment annually as a result of wear of friction material containing asbestos. There is a strong difference in professional opinion as to the hazard from wear debris. High temperatures and pulverizing during wear change asbestos into a different form. The disagreement is to the toxicity of the debris.

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Section 3
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Regulation and General Corporate Policy (continued)

There is no doubt, however, that asbestos mining and manufacture of asbestos containing products will be increasingly regulated. Regulations will be in the form of air-born exposure limits, and banning of more products containing asbestos in a free condition (as vs. a filler in gaskets and plastics). A ban on the use of asbestos containing friction material is not expected in the near future but regulation will make them more costly and reduce their availability. More information about regulations and the intentions of private sector leadership will be exposed at an EPA sponsored conference July 14, 1980 in Washington D.C. Mr. A. Anderson of the Scientific Lab will attend.

NAAO Car and Truck Policy on product usage of asbestos is defined in CEPL-10: - with certain exceptions, "Newly designed components should not contain asbestos".

EXAMPLE

1/ Bibliography item reference

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APPENDIX - ASBESTOS ELIMINATION PROGRAM, PART 1
Friction Material Suppliers

<u>Company and (Representative)</u>	<u>Products</u>	<u>Comments</u>
Bendix (Carl Calvin - 967-1660 (Ram Lampsa - 967-1500)	* Brake Pads and Linings	* Largest current Ford source for "semi-met" pads, passenger car and truck.
Raybestos (Jim Ellis - 352-1900)	* Clutch Facing - Manual Trans and Stake Lining	* Currently supplying non-asbestos manual trans clutch facings for passenger car.
Abex (John Brown)	* Brake Lining	* Heavy -development of N.A.O. Truck drum brake linings.
Thickol (Herb Beler - 725-6689)	* Brake Pads and Linings	
H.K. Porter -Thermoid Div. (Tom Derkin - 649-1606)	* Clutch Facings * Brake Linings	
Beral (French Co.)	. Clutch Facings	
Mintex	. Brake Lining	
Nuturn (Jim Mellowe - (615)367-9900)	. Brake Pads & Linings	
Carlyle ..	* Brake Lining - Heavy Truck	
Kelsey Hayes	* Auto Trans Clutch Facing * Clutch Face - Manual Trans.	
Borge Warner	* Auto Trans Clutch Face	

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EXHIBIT E
Uses: Avialar

Vehicle Materials Development and Planning
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Responses from PEO's - Asbestos

1. Climate Control Division
2. Body and Electrical
3. Engine Engineering
4. Ford Parts & Service Division
5. Transmission & Axle Engineering
6. Electrical & Electronics Division
7. Truck and Recreation
8. Truck Operations
9. Chassis Engineering

Supplier Survey Request and Purchasing Activity Responses - Asbestos

10. Climate Control Division
11. Casting Division
12. Electrical & Electronics Division
13. Glass Division

Responses from PEO's - Chromium and Benzene

June 6, 1980

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