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Inter Office

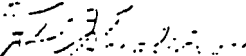
Engineering and Research Staff

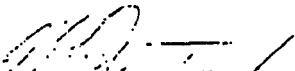
April 11, 1977

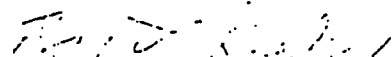
To: S. Gratch
M. Humenik, Jr.
S. S. Labana
J. E. Mayer, Jr.

Subject: Non-Asbestos Friction Materials

In view of the uncertainty of future regulations regarding asbestos in friction materials and the economics/availability of quality asbestos, we are proposing an expansion of our current friction material program (R6120) to include non-asbestos friction materials. A program proposal is attached, along with a copy of the Vehicle Materials Engineering Key Issue Report, Asbestos Usage -1.


A. E. Anderson


M. H. Weintraub


R. L. Gealer

jg
Attachments

004196

PQ

The sticky note shown below was written
by Barry Castleman and attached to the
page immediately following this one along
the right margin at the spot marked on the
next page with an **X**

*Research
asst.
replacement
in
brakes*

New Program Proposal

Non-Asbestos Frictional Materials

Objective

To develop and to evaluate non-asbestos friction material. To carry out tribological studies of non-asbestos brake linings on cast iron and aluminum drums and rotors.

Introduction

Asbestos is the major constituent in brake linings that are used for all of Ford's passenger vehicles. Airborne asbestos fibers can be generated in a work environment during the manufacturing and/or servicing of brakes. The allowable OSHA concentration for asbestos is presently 2 fibers/cc air and is expected to be 0.5 fibers/cc air in early 1978. There also has been suggestions by NIOSH that this limit be lowered to 0.1 fibers/cc air.

To reduce asbestos levels to 0.1 fibers/cc air or even to 0.5 fibers/cc air from the current levels (about 1.2 fibers/cc air), Ford's brake lining suppliers will be forced to redesign existing equipment and/or install new processing equipment which will demand a large capital investment. One of our suppliers indicates that a level of 0.8 fibers/cc air could be achieved by modifying current processing equipment. There will be a reluctance by some of our suppliers to commit the necessary capital to convert existing plants to meet new standards because of the uncertainty of future regulations and their ability to meet them. Also government regulations may force non-asbestos brake linings by restricting the servicing of brakes with asbestos brake lining materials. Thus, Ford's suppliers may be forced to abandon the current resin/asbestos composites in favor of an asbestos-free friction material. Unfortunately there are no asbestos-free brake linings currently available that will be satisfactory for normal customer usage. It is our understanding that both Inland and Delco-Moraine divisions of GM have developed, or are developing, asbestos-free brake linings. These materials appear to require different brake designs to provide optimal performance.

To help ensure that acceptable asbestos-free formulations are available, it is recommended that Research expand the friction material program to include the development of non-asbestos brake linings. This will enable Research Staff to gain the necessary expertise to assist in developing appropriate lining quality control tests, to determine failure modes, and to assist lining vendors when appropriate. Also this program would include studies of the best lining and brake geometries for use with the resultant non-asbestos linings.

Technical Approach

A. Survey Options

- Wet Brakes
- Full Metallic
- Resin-Bonded Metallic
- Resin-Fiber

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B. Evaluate Vendor Submissions

United States
Foreign

C. Selected Laboratory Studies

Carbon Fiber
Metal Wire Filled
Fiberglass Fiber
Titanate Fiber
Polymer Fiber

D. System Optimization

Lining Size and Shape
Vented on Solid Rotor
Rotor Material and Surface Finish

Project Requirements

The investigation will require the effort of 1 additional person in Polymer Science Department, 1 additional person in Machining and Wear Department, and 0.3 additional person in Technical Services.

004198

MEMO TO FILE

May 10, 1977

Subject: Asbestos Substitute Materials Meeting

Materials Strategy conducted a meeting May 6 with Engineering and Research Staff and NAAO Purchasing to clarify Ford plans for replacing asbestos if OSHA regulations reduce allowable airborne asbestos fibers in the work place to 0.5/cc.

Clutches

R. A. Majeske, Chassis and Powertrain Purchasing - surmised that H. K. Porter could meet 0.5/cc but at prices that would reflect additional processing costs. There is also a possibility that H. K. Porter may go out of the clutch facing business or that it would not invest additional money for capital equipment if OSHA regulations increase the complexity of working with asbestos materials.

John Skrbina, Engine Controls, Chassis Engineering - stated that H. K. Porter is working with Borg and Beck (a supplier of clutch assemblies) to develop non-asbestos clutch facings. Performance of the first samples presented to Ford was unacceptable. Additional evaluation samples are expected to be submitted late in 1977. If new clutch facing material were immediately available, required engineering changes would preclude use of them until the 1980 program.

J. D. Wells, Chassis Engineering and Clutch - stated that the Company does not have an alternative to asbestos clutch facing materials and that it would probably be three to five years before a viable substitute for asbestos could be developed.

Brakes

E. F. Clough, Brake Engineering - stated that almost no development work on non-asbestos brake linings is in process. Ford is relying heavily upon its suppliers to develop new products. Ford budgeted little or no funds for non-asbestos brake evaluation. He would appreciate budget support for non-asbestos evaluation.

If an acceptable substitute for asbestos brake linings were available, it would be the 1981 Model Year before it could be used on even a limited number of cars. The problem is more difficult with drum brakes where no known development is in process.

Each brake supplier has a different material composition which seems to work best for certain applications. Developing new materials is likely to be by trial and error.

Marvin Weintraub, Friction Materials, Engineering and Research Staff - reported that Thiokol recently submitted non-asbestos disc brake linings for evaluation. The prototype linings functioned satisfactorily at first but under extended testing developed unacceptable noise and wear.

Dealerships and brake repair shops may have problems with high levels of airborne particles as they work with asbestos linings. OSHA may propose additional rules to address this condition.

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May 10, 1977

Subj: Asbestos Substitute Materials Meeting

Automatic Transmissions

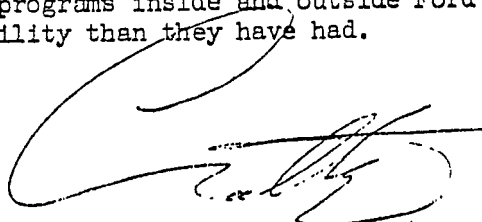
F. H. Abar, Transmission and Axle Engineering - knew of no substitutes for asbestos in automatic transmissions. It would require three years to develop acceptable substitutes. As many as 15 asbestos compositions used in transmissions would require an extended period to recertify replacements if they were available. It would be difficult to simplify compositions in transmissions.

Gaskets

E. J. Duda, Engine Materials - cited communications from Raybestos-Manhattan (attached) and Armstrong advising that both can meet existing and proposed OSHA asbestos regulations. Ford has initiated no effort to replace asbestos gaskets. It would require two or three years to develop substitutes.

Summary

A consensus was that suppliers do not have intensive programs to replace asbestos. They are looking to Ford for direction. There was also an agreement that problems with asbestos are urgent. Development programs inside and outside Ford should be pushed. They should have more visibility than they have had.



D. P. Cratty

j1
Attachment

011450

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Inter Office

Engineering and Research Staff

May 13; 1977

A. E. Anderson ✓	M. Humenik
W. D. Compton	S. Labana
R. L. Gealer	J. Mayer
S. Gratch	

Subject: Raybestos-Manhattan Asbestos Meeting

A presentation was made by Raybestos-Manhattan (RM) personnel, May 11, 1977, regarding their company's position on asbestos. It was stated that their overall development programs are directed towards elimination of asbestos in their friction materials (RM policy statement attached). The RM personnel also indicated that they commissioned R. F. Weston, Inc., to study the technical feasibility and economic impact on reducing the fiber count from the current level of 2 fibers/cc. The report, which RM indicated was presented to OSHA, stated that the proposed standard of 0.5 fibers/cc was not feasible for asbestos manufactured products. I have requested a copy of the report from RM. It also was stated that OSHA has commissioned Consad Research Corp. to re-examine the asbestos standards. We should determine if Consad personnel have contacted Ford, if not perhaps Ford personnel should contact the Consad group.

Comments made by RM personnel indicated the following.

- No known replacement for asbestos and at least 5 to 8 years to develop production non-asbestos brake linings. Semi-metallic linings are not as yet suitable for customer usage. (Design changes that may be necessary to utilize new materials was not addressed.)
- Replacing asbestos with glass fiber looks promising for manual transmission clutch facings.
- Reasonable degree of confidence in replacing or eliminating asbestos in most automatic transmission friction elements, however, some elements may be difficult to replace directly with new materials without some modification to the transmission.

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A. E. Anderson

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May 13, 1977

At the conclusion of the PM meeting, it was suggested by Supply Staff that a "Ford only" meeting be held, June 15, 1977 in which we (A. Anderson and myself) present an Asbestos Overview to various personnel involved with asbestos containing friction materials.

M. Weintraub

M. Weintraub

Polymer Science Department

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Att.

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Inter Office

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Supply Staff

July 12, 1977

Mr. D. T. Axon

Subject: Development of Non-Asbestos Products

For your information, Materials Strategy received a request to review NAAO Purchasing forward year plans. An interesting topic in the plan is asbestos, which reads "Proposed new OSHA standards (0.5 to 1.0 fibers/cc) for airborne exposure may force many Ford suppliers to cease production of asbestos brake and clutch linings and gasket materials. NAAO Purchasing and Product Engineering have established a program to expedite development of alternate materials." After reading the NAAO statement, I contacted various Engineering activities this morning to identify the names of individuals developing asbestos-free gaskets, brake linings, clutch facings, and transmission clutch plates. In each instance the design engineer advised that he was aware of proposed OSHA rules to limit airborne asbestos contaminants to .5 fiber/cc but that work was continuing on the asbestos products and, to their knowledge, assignments to develop asbestos-free parts were not expected.

I discussed development of asbestos-free parts with Frank Abar, Manager, Program Control and Planning Department, T&C Division, and he advised that development of asbestos-free products will not be initiated until funds are authorized for development. Abar said he requested funding for a minimal advance transmission program with asbestos-free parts but the request would have to be approved by some "mythical" central Engineering activity and he does not expect funding. Abar said he did not believe much, if any, work would be initiated until funding was authorized. Additionally, Abar stated that suppliers do not appear to be concerned with meeting .5 fiber/cc and, in his opinion, there is little need to proceed with a development program until there are better indications that development expense is justified.

D. P. Catty

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cc - B. B. Murray

003120

PQ

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Rec'd 9/14/77 new

ENGINEERING ASBESTOS PLAN

PURPOSE

To establish an engineering plan anticipating the effects of proposed changes in the federal regulations governing environmental exposure to asbestos.

BACKGROUND

On October 9, 1975, the Occupational Safety and Health Administration (OSHA) proposed (among other regulations) a lowering of the permissible occupational exposure limit for asbestos from the current 2 fibers per cubic centimeter to .5 fiber/cc.* The action was based upon known links between asbestos exposure and certain diseases (asbestosis and several forms of cancer). Since that time, the proposed standard has been attacked by asbestos and mining interests as being too restrictive, and by some medical authorities as not being restrictive enough. The latter propose .1 fiber/cc as a standard. These developments have contributed to OSHA's delay in scheduling the formal hearings that normally precede issuance of a final standard. In the interim, both government and industry have sought support for their positions through studies and conferences (see example in Attachment 1). The hearings are unreliably reported to be scheduled "this fall or next spring."

ASSESSMENT

Despite firm evidence that the current standard is inadequate, our survey of the regulatory situation over the past few months leads to a conclusion that tighter environmental restrictions on asbestos will be promulgated. Timing and level are uncertain, but a staged tightening, as has been done in Sweden, is possible. (See Attachment 2 for foreign situations.) Since a fairly restrictive standard already exists, and asbestos legislation has a long history and organized lobbies (particularly the construction industry which uses a large percentage of the asbestos mined), no emergency standard of a disruptive nature is probable. Instead, we expect an orderly process of increasing restriction that will raise the cost of asbestos-containing products but not otherwise restrict the supply.

If we speculate that the orderly process would result in a standard of 1 fiber/cc on January 1, 1979, and .5 fiber/cc on January 1, 1981, the following results can be expected:

- . No court challenges, or a small effort by the construction industry.
- . Mines in Canada not affected--no supply shortage.
- . A few marginal users curtail production.
- . Friction materials suppliers install controls; prices rise on finished components.
- . Auto industry continues to use asbestos-containing friction materials.
- . R and D effort on substitutes determined both by initial price increase and by future pricing projected for meeting .5 fiber/cc.

* These values refer to the 8-hour, time-weighted average number of asbestos fibers longer than 5 microns in length collected on a micropore filter in the breathing zone of workers exposed to airborne asbestos.

ASSESSMENT (continued)

The foregoing can be compared with the different results expected if the standard is abruptly set at .5 fiber/cc by January 1, 1979. This is judged unlikely.

- . Court challenges delay implementation for at least a year.
- . Investments in new or old mines curtailed, but supply not immediately affected.
- . Prices rise on related components--some parts suppliers inform auto industry of impending curtailment of production.
- . Costly crash programs on substitutes initiated in auto industry, target Job 1, 1980.

Even less likely is a standard of .1 fiber/cc because it is very near background level.

IMPACT ON FORD

A study of the engineering uses of asbestos has shown that Ford is directly concerned only with the friction materials segment of the asbestos industry (as outlined in Attachment 3). Ford purchases transmission bands, brake and clutch friction materials that contain asbestos, and thus would be affected by the impacts of regulatory action. These impacts are of two types: internal, and in the supply chain. Ford has no internal compliance problems because purchased parts contain only bound asbestos fibers that do not contaminate the environment.* Supply chain compliance problems were recently investigated by NAAO Purchasing (Materials Planning Department). This study assumed an orderly tightening of the standard and concluded that:

- . Major parts and materials suppliers are just now reaching compliance with the 2 fiber/cc standard and have plans or active programs to meet the proposed standard.
- . The severity of the problems depends on the standard.
- . Nearly all suppliers wish to continue to supply Ford with asbestos-containing products.

Our assessment of the supply situation is that asbestos products will continue to be available for the next several years, but that costs will rise as suppliers install control equipment. Ford should continue to rely on suppliers to solve their compliance problems and supply parts to Ford.

RECOMMENDATIONS

The above assessments predict an orderly tightening of the asbestos standards and a resulting cost increase in asbestos-containing parts. It is concluded that the Company must respond to this situation with programs in the following areas to ensure that it remains cost competitive.

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* Wear debris from brake and clutch friction pads are nonfibrous and therefore noncarcinogenic. Some monitoring of brake and clutch repair areas for loose asbestos fibers may be necessary.

RECOMMENDATIONS (continued)

1. Continue to monitor supplier compliance programs and results. Responsibility: VMD&P and NAAO Purchasing.
2. Continue to monitor costs of asbestos-containing components and compare these with those for alternate materials. Responsibility: NAAO Purchasing and VMD&P.
3. Initiate first-stage Advanced Engineering projects for 1978 in Chassis and Transmission and Axle Engineering Offices to assess the costs and problems associated with alternate materials for clutch and brake linings and transmission bands. These projects would rely on significant supplier input coordinated through Supplier Research. (The suppliers are interested.) They need not be targeted for specific model years but may be seen as insurance projects to protect against costly crash programs later. They should include studies on friction materials compatible with aluminum drums, discs and clutch plates. Responsibility: PEO's (Advanced Engineering).
4. Support the engineering effort with parallel projects within the already-existing friction materials study group within Research Staff. Responsibility: Engineering and Research Staff.
5. Review supplier asbestos compliance and engineering programs, cost comparisons, and Ford programs prior to the 1979 advanced budget allocations to determine course of action for 1979. Responsibility: VMD&P.

011436

Vehicle Materials Development & Planning
August 26, 1977

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