

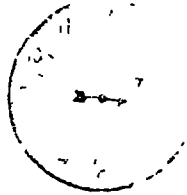
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Transmission and Axle Engineering

February 23, 1977

Mr. G. F. Bolling

G. F. Bolling

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Subject: Asbestos Usage

Reference: Your Communication of February 10, 1977 to P. D. Fadow, et al,
Same Subject

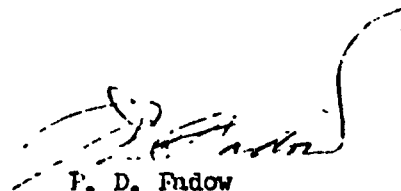
Transmission and Axle Engineering is concerned that the availability of asbestos containing components from our suppliers may be seriously affected if OSHA regulations become unduly restrictive.

It seems appropriate to develop a company position regarding the use of asbestos containing materials. Over the last several months, communications have originated from your office, Engineering and Research Staff, and Personnel and Organization Staff indicating two extremes: (1) Not to panic as OSHA requirements can be met, or (2) Completely eliminate asbestos as being the appropriate approach. Firm Company direction is needed to protect the products and avoid unnecessary expenditures.

Transmission and Axle Engineering has a major involvement in asbestos usage as all the automatic transmission bands and clutch plate facing materials contain 2% to 25% asbestos. An appropriate replacement for asbestos in these friction elements is not readily attainable, and for this reason, is of major concern. We estimate a program of one to three years is required for evaluation and durability testing of proposed asbestos substitutions.

Other asbestos containing items such as gaskets and phenolic molded converter reactor and thrust washers can be re-engineered, but one year's lead time and expenditures of \$1-2 million are required. See attachment.

It is Transmission and Axle Engineering's recommendation that a Corporate position on the continued use of asbestos be developed, including a contingency plan for asbestos substitutes/replacements on the affected components.


P. D. Fadow

JLM:cm

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Transmission & Axle Engineering

Components Containing Asbestos

Purpose

The purpose of this paper is to indicate Transmission & Axle Engineering current position and timing for replacing asbestos, assuming asbestos must be eliminated from Engineering materials.

<u>Component</u>	<u>Alternate</u>	<u>Timing</u>
1. <u>Automatic Transmission</u>		
. Converter reactors	Aluminum	1 year
. Converter thrust washers	Glass & clay filled phenolic	8 months (See Note 1)
. Gaskets - C4 servo cover and front pump; C6 servo cover	Nitrile cellulose	6 to 9 months (See Note 2)
. Band linings and clutch plate facings	See Note 3	1 to 3 years
2. <u>Manual Transmission</u> - No materials containing asbestos.		
3. <u>Axle and Driveshaft</u>		
. Gaskets - carrier to housing	Nitrile cellulose	6 to 9 months (See Note 2)
. Limited slip differential discs	See Note 3	1 to 3 years

Note 1: Testing (by Converter Section) has progressed to the point of 95% confidence of incorporation within 8 months.

Note 2: Bench and vehicle testing program is required; a 95% confidence exists that the substitution can be made without change of design or installation practice.

Note 3: Most products contain from 6 to 25% asbestos. Our major suppliers, Borg-Warner and Raybestos, are investigating and testing leaving out the asbestos and introducing non-asbestos substitutes. Raybestos will submit (April, 1977) non-asbestos C6 clutch plate facing material.

Asbestos in Transmission Components

Background

- What the Asbestos Problem Is - There are three possible results of breathing air with asbestos fibers. These are:

Asbestosis: which is a condition in which the inhalation of asbestos fibers causes the lung tissue to scar, rendering the scarred areas non-functional.

Two Types of Carcinogenesis: One type results in cancerous attack of the lungs. This is the same form of cancer for which the danger to smokers is increased three to five times. The danger for smokers who regularly inhale asbestos fibers is increased, perhaps another twenty times.

The second type results in a cancer called Methylphilioma, which attacks the area between the lungs and the chest cavity. This form is only caused by inhaled asbestos fibers.

- The Cause - Although not well-defined, the theory is that fibers with a 5 to 10 aspect ratio (length/diameter) and a length of 5 microns or more are the culprits. Also involved seems to be the nature of these fibers, which occur as twisted strands similar to a stranded rope. These fibers are attacked by antibodies, when the system fails to distinguish them from viruses or other harmful agents.

It is assumed that other materials which occur as fibers similar to asbestos, would also cause similar problems. Talc, which is essentially the same combination of minerals as asbestos does not cause similar problems. Thus, it appears that physical form of the material, rather than chemical, constituents, are the controlling factors.

To prove that other similar fibers would cause similar health problems, the National Cancer Institute purposely produced glass fibers similar to the natural asbestos fibers and found that similar medical problems resulted. Fortunately, typical fiberglass is not similar in either size or form to asbestos fiber, and as a matter of fact, extreme effort was required to produce the fibers for the experiment

- What Asbestos Does for Us - Asbestos imparts heat resistance to all transmission and axle components in which it is used.

Gaskets - For gasket applications, if temperatures are not above 300° to 350°F, there are substitute materials readily available. For higher temperatures, new developments might be required, but should not be too difficult to achieve.

Phenolic Reactors - For phenolic reactors, asbestos appears to offer a higher degree of structural interlock between base polymer and filler than other fillers which are similar in price and simple substitution of an alternate filler material is not likely with current technology. Thus, return to aluminum reactors is seen as the only short term approach, if an arbitrary decision to ban asbestos is made.

Phenolic Thrust Washers - It appears that structural requirements of the converter washers are not beyond the capabilities of other filled phenolic materials, and a phenolic washer using alternate fillers is expected to be released by the summer of 1977. Replacement fillers for asbestos, i.e., glass and clay, are currently being tested by the Torque Converter Section. Testing has progressed to the point of 95% confidence of incorporation.

Friction Materials - Transmission and axle uses of composition friction materials include about 35 clutch plate or brake band applications encompassing about 13 distinct friction materials, all of which contain asbestos in the range of 2% to 25 or 30%. Nearly all are above 6%.

In friction element applications, asbestos improves durability. We do not have a substitute for asbestos in these components. Friction material manufacturers usually consider their facing materials as proprietary and do not divulge the make-up of their products. We do know that they are working at eliminating asbestos.

In addition, asbestos, being a mild abrasive, provides mild wearing-in for the mating drums or separator plates. Without this break-in effect, it is possible that surface characteristics on separator plates or drums would require closer control during manufacture and handling. These surfaces can be altered by changing finishing operations and selecting sheet steel for surface characteristics. Friction surfaces could be etched, blasted, ground, etc., to impart a particular wear or frictional characteristic.

Summary

It should be evident from the above that each case involving asbestos should be evaluated individually, since costs of arbitrarily banning asbestos could be greater than increases due to the costs of improved handling techniques at our suppliers' manufacturing facilities.

The Car Product Development Group, Vehicle Materials Engineering, has been requested to establish a company position relative to continued usage of asbestos.

February 21, 1977
(Revised)

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