

ASBESTOS SITUATION

Presented to: Ford Motor Company

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There are a number of different types of asbestos fiber available but Chrysotile asbestos, which is hydrous magnesium silicate is the principle commercial type and this is used in most conventional friction compositions. Asbestos fiber is used in friction formulations because it offers a degree of reinforcement and elasticity to an otherwise brittle binder system, it is a poor conductor of heat and thus protects the friction material from surface heat, it is chemically resistant, has the proper hardness and physically breaks down under heat in an ideal way. Under the application of heat the asbestos fiber begins to loose its water of crystallization. This change occurs at 600°F and at 1000°F the rate is very rapid. When the water is driven off asbestos loses its crystalline properties and becomes a powder, it is this physical change which occurs at the friction interface under the influence of heat that is generated by the kinetic energy of braking that causes not only heat to be adsorbed but new friction surfaces to be generated. Without this change new braking surfaces would not be created.

If we propose to replace the asbestos now present in our friction formulations then we must look for a material or combination of

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materials that will impart good reinforcing properties to the binder, be heat resistant but decompose to a powder, be softer than the rotor but also impart desirable frictional properties to the composition. In the final phase this replacement must wear well, be noise free and inexpensive.

Our approach to developing a non-asbestos system has involved taking our best basic formulation and evaluating a number of fibrous type reinforcing fillers and combinations of fibers and fillers to find a suitable combination that can be used in place of asbestos.

We have developed a disc pad material that demonstrated good frictional properties, good wear and actually passed the performance parts of the FMVSS 105-75 test on a 1977 LTD II. The material exhibited severe surface cracks and in a second test of the same material some of the pad surface was lost due to this cracking. We have been working with this basic formulation and have made improvements that have almost completely reduced the tendency of this material to crack after exposure to high temperature. We expect to resubmit this material in the next several months after we have concluded our evaluation.

We have also developed a non-asbestos material that is a semi-metallic. It utilizes steel fiber and powder in place of asbestos. This material has demonstrated good wear and performance but may be more costly to make than the conventional non-asbestos material. We don't have enough experience with this material to comment on its long term compatibility with conventional rotor materials or how well it will wear in extended traffic tests.

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In 1976 the allowable asbestos fiber limit was reduced from five fibers/cc to two fibers/cc. Although there has been a great deal more bad press about asbestos in the past two years, there has not been any definite move to reduce the level below the two fiber/cc limit.

Even though our production and laboratory facility meet the two fiber/cc standard we have an on-going program to improve those areas that are currently yielding the highest counts. If the permissible levels were to be reduced to 1.5 or 1.0 fibers/cc we would expect that these modifications would allow us to meet newer tougher standards.

It appears that there is an adequate supply of asbestos and the threats to nationalize the Canadian mines were just that, a threat.

Since the end of 1971 the price of a ton of 5K fiber has increased from \$193.50 to \$501. and this is scheduled to increase 6% effective January 1979. Over this period of time the price has increased at a compound rate of 13.5% per year. It is obvious that the price of asbestos will continue to increase in the future.

If there has been any questions about the ease of finding a replacement for asbestos in friction materials, I hope this paper has cleared up any misgivings that might have existed.

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I believe we are close to an acceptable material that will meet most but probably not all of the requirements that are currently being imposed by Ford and the Government. It might be worthwhile establishing what the best non-asbestos system can do and proposing a new set of requirements for the government to consider for a non-asbestos friction vehicle.

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