

cc: V. J. Labrecque

April 22, 1968

TO: R. M. Burns
FROM: S. M. Lillis
W. J. Sheehan ✓
SUBJECT: New Products
RE: Clutch Facings

We preliminarily explored the clutch facing business as it relates to Dana and could relate to Victor Divisions. Obviously, there are many factors to be considered and many details to be worked out. One thing is obvious, it is a business that seems to invite our participation. We can sum it up briefly as follows:

CONCLUSION

The clutch facing business embodies fabrication methods foreign to Victor operations.

The component materials are part and parcel of Victor's technology and know how.

The whole market seems to invite a new and progressive approach.

The piece price suggests that potential profits are Victor's and Dana's for the taking.

To do the necessary job for material development, product design and process development, an adequate number of qualified personnel must be added to Victor's technical staff.

RECOMMENDATION

Victor should seriously explore the possibility of going into the clutch facing business.

Victor should lock this in early, like right now, because the whole situation appears to be ripe for Corporate P. R. & E future plans.

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DANA-175

CONTACTS AT CLUTCH &
MARINE DIVISION

On Friday, April 19th, we visited the Clutch & Marine Division, Ft. Wayne, and met briefly with Mr. Phil Mazziotti, General Manager. He introduced Marty Hermanns, Chief Product Engineer - Clutches. They were interested to know that Victor Division was considering the development and marketing of clutch facings.

Mr. Hermanns pointed out that they knew very little about clutch facing. He said that they used specified grades from qualified vendors for specific clutch assemblies. They did not buy to Dana Specs but bought by grade number from the specific vendor.

There are two basic constructions:

- 1) Asbestos plus resin with wire reinforcements.
- 2) Asbestos plus resin and no reinforcement.

The wire is generally brass but they have facings with steel and aluminum wire. The facings may have chips or slivers of copper or steel intermixed in the body and surface of the facing. The facings have historically been consistent and reliable. C & M periodically qualifies the different grades by physical tests that check out significant performance properties. We have requested a copy of one of these data sheets for our review. Three of the most significant properties are:

- 1) Frictional wear
- 2) Coefficient of friction
- 3) Burst strength at 500°F.

Mr. Hermanns said that he felt that Dana should go into the clutch facing business. He advised us to start with the wire reinforced facings. He indicated that he would enthusiastically support this approach.

EVALUATION TESTS

He took us on a tour of the Clutch Laboratory facilities where we saw some of the test equipment used to qualify the facings. This included the high temperature spin burst test which spins a facing @ 500°F at increasing RPM's to the point of physical

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destruction. This is a brute force test, used for many years, but considered to be one of the most significant. The value of the wire reinforcement becomes very important when you see this test unit.

The friction test units are basic, tried and true, reliable and relatively unsophisticated. As Mr. Hermanns said, all the test operations invite improvements but results are so reliable and relate so well to performance, that he hesitates to spend money at this time to change them. We agree with him on these points.

The basic test concepts are wear and destruction. The tests do reveal the different characteristics of the various facing constructions and also reveal the matched characteristics of facing grades from different vendors.

CLUTCH & MARINE PRODUCTION PARTS

Following our visit with Mr. Hermanns, we went to the Auburn Plant to meet with Messrs. Bud Lemper, Plant Manager, and Chief Fac. Engr., Howard Sink. Mr. Lemper took us on a tour of the plant and we picked up several samples of clutch facings, identified as follows:

- * 1838-19G Rusco - Russel Mfg. Co.
- * 1959G Rusco - Russel Mfg. Co.
- * 219X 120 Thermoid - H. K. Porter Co.
- * 219X 16 " "
- * U.S. 1133 R-M - Raybestos Manhattan
- ** 1488 R-M - Raybestos Manhattan

- * Samples attached.
- ** Sample to be obtained

CLUTCH FACING MANUFACTURING METHODS

We asked each individual about the manufacturing process. The comments seemed to indicate that clutch facings call for a combination of traditional art, witches brew and brute force engineering. Mr. Zink said, when he saw the operation, that 90% seemed to be a yarn factory and 10% clutch facing.

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Essentially, the basic component is wire covered with spinning asbestos fibers. The asbestos yarn is saturated in a resin or rubber-resin bath and then air dried in a twoer. It is then fed randomly into barrels.

When making the pre-molded biscuits the yarn is fed in a turning form, usually mounted vertically, where the I.D. is formed on a mandrel. The yarn fills the form until the O.D. is formed. The loosely woven biscuit is then placed in a hot mold and the facing formed under heat and pressure. The I.D. and O.D. are formed to size with the pinch off of excess material. The part is apparently not cured in this operation because there is a subsequent oven cure. A grinding operation on both sides finishes the facing. It is obvious that the facing must be flat and parallel in the finished state. This factor was not emphasized and is taken for granted, but is most significant, in our opinion.

DESIGN FACTORS

Both the Thermoid and R-M facing are flat and unformed. The Rusco designs have angular grooves which are differentially distributed from I.D. to O.D. around one face of the facing. Rusco stamps patent #2,901,388 on their facings. It has expired late in 1967. It is assumed that the patent refers to the grooves.

The fact that RM and Thermoid do not incorporate grooves indicates that they don't consider them necessary.

PATENT INTERFERENCE

It is assumed that Victor could work on the flat facings, without patent interference, because both Thermoid and R-M follow that. We shall ask John Teigland to search this out and give us an opinion.

MARKET POTENTIAL

All in all, the clutch facing business seems to invite a new and progressive approach. There certainly is old art existing in today's technology. In our opinion, it is possibly too old.

Dana can get little technical advice, from current suppliers, because they haven't got the answers. Considering that Dana buys \$1,500,000 of clutch facings per year, we would be working with a captive market to develop capabilities to cover the rest of the market.

We have no estimate of the total market potential. It should be surveyed. Parts sell to C & M Division for \$.60 to \$1.50 per piece, with the average price of \$1.00.

The present approach utilizes ancient methods and expensive spinning grade asbestos fibers. Undoubtedly the suppliers have considered new approaches but the market has been so receptive and supine, that they continue with the old methods.

VICTOR-DANA APPROACH

We feel that the following steps should be taken to investigate this thoroughly:

1. Have Victor personnel visit the current supplier's plants to learn all we can about present methods. C & M has entree, and could get us in.
2. Victor should review performance requirements of the facings.
3. A) Victor should consider a new approach to the fabrication of the facings using:
 - a) Plain brass or steel or aluminum wire.
 - b) Shorter asbestos fibers mixed into and onto a wire matrix.
 - c) New or improved resin combinations for the parts.
 - d) The incorporation of steel and copper metal chips after we've established the reason and need for them.
 - e) An entirely new and different approach to the design and composition of the facing.
3. B) Victor should further consider the traditional approach of carding spinning asbestos fibers and making wire reinforced yarn.
4. Victor would have easy access to C & M Division testing facilities and would receive expert opinions on the merits of developed parts.
5. Victor would have to develop a reliability in manufacture to assure a reliable product.

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We should consider what design approach would be most feasible to make a satisfactory product. Thought will be given to this aspect and a commentary presented to you.

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