# OFFICE MEMORANDUM

DATE: November 14, 1975

TO: L. T. Oehler
Engineer of Research

FROM: M. A. Chiunti

SUBJECT: Security Steel Insert and Deflected Locknuts.
Research Project 75 NM-442, Research Report No. R-983.

Samples of "Security" steel-insert and deflected locknuts were received by the Laboratory in June 1975 for evaluation to determine their adequacy for use by the Department. The locknuts were submitted by Security Locknut, Inc., of Franklin Park, Illinois.

The insert type locknuts are manufactured by drilling and counterboring a standard hex nut to accept a threaded elliptical insert made of heat treated spring steel. Locking of the nut on the bolt is accomplished by the tension provided by the elliptical insert against the threads of the bolt.

The two-way deflected type of locknut consists of a standard hex nut which is "dimpled" on two opposite sides to distort the threads thus providing the locking mechanism.

The subject steel locknuts would be suitable for use by the Department if the corrosion resistance criteria could be met. This, however, poses other problems. The steel insert type locknuts require bolts with class 2A threads and a 35 to 45 degree chamfer on the threaded end, so that the bolts would have specific requirements for compatibility with the nuts. In order to perform adequately in the Michigan environment, hot dip galvanizing of exposed steel hardware is required, unless the material is stainless steel. The steel-insert type nuts are available in corrosion-resistant materials, but the spring-steel insert would not be corrosion resistant. This type of nut is designed for extreme vibration applications and costs about $1.00 each in plain steel, 1-in. heavy hex. Stainless steel would obviously be considerably higher. Also, since hot dip galvanizing leads to considerable variations in thread diameter, these nuts would not be compatible with galvanized bolts. The same would be true, in general, for the deflected-type locknuts, because the retaining torque depends upon the closeness of fit between bolt and nut. Galling also is a problem on galvanized fasteners, where fit is tight and a lubricant is not provided.

Other possible alternatives to hot-dip galvanizing, would be the use of stainless steel or aluminum of the proper alloy. Again, the cost of stainless steel would probably be prohibitive.

The supplier was contacted to determine the availability of aluminum two-way deflected type locknuts. Recently, Security Locknut, Inc. submitted samples for evaluation in sizes ranging from 3/8 to 1 in. and manufactured from either 6061-T6 or 6262-T9 aluminum; both of these alloys would be acceptable. Torque tests were made for comparison of the deflected-type nuts with elastic insert stop nuts. However, performance of the locking mechanism on the deflected-type locknuts, when compared to elastic insert type locknuts, is much less positive. For example, a 1/2-in. deflected locknut could be turned by hand after the first installation; the torque was not measurable by torque wrench, this indicates that the locknuts would not perform the functions for which they are intended. In comparison, elastic insert type locknuts of the same size required from 30 to 55 lb-in. of torque during the fifth removal. Another deflected-type locknut of larger size, galled on the bolt, and the bolt was twisted off.

On the basis of Departmental requirements, cost factors, and evaluations performed, we recommend these products not be allowed as alternatives to those presently being used.

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