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BEARING REPAIRS BY INJECTION

INTRODUCTION

Bearing repairs are costly, recurring and time consuming maintenance activities. Often, in addition to bushing replacement, holes must be built up and rebored and pins or trunions must be replaced resulting in downtime and lost production. A new product, Nu-joint, currently being tested at Industries James Maclaren Inc. in Mont Laurier, Québec, has the potential to greatly reduce the cost associated with worn bearings.

Nu-joint is an acrylic-based polymer which is injected in a molten state through grease fittings into worn bearings to fill any voids and eliminate play (Figure 1). This material is manufactured by Automotive Innovations Ltd. of Denver, Colorado and was introduced into the United States automotive repair market in 1982. It is being used on vehicle front end ball joints, idler arms, tie rod ends, and other swivel joints or pivot-type bushings by organizations such as the U.S. Army and Air Force and the Idaho Department of Transportation. In Canada, C.S.A. certification is currently being sought for highway vehicle use. Off-road applications to date include center pins of articulated loaders and excavator bucket pins but there are many other potential applications, the most likely being boom and implement pins.

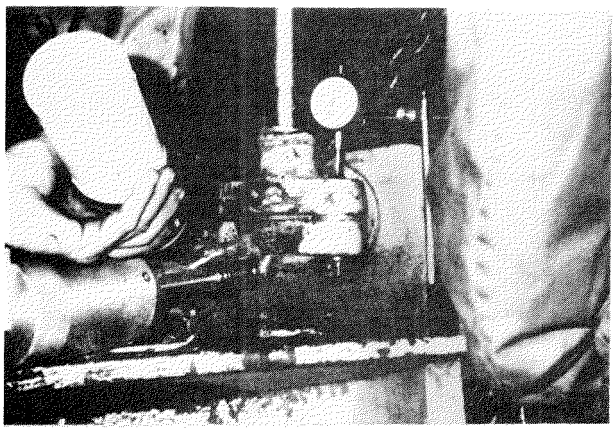

Figure 1. Figure 1. Insertion of Nu-joint in bearing.

INSTALLATION EQUIPMENT AND PROCEDURE

Injection of the Nu-joint material is done with an air-powered injection tool. The procedure begins with unloading the joint and placing a temporary seal over any openings where the Nu-joint material might escape during injection. Once the joint has been prepared, the grease nipple is removed or a hole is drilled and tapped and the injector nozzle is screwed in place. Next, the bearing is heated to approximately 100°C to prevent the Nu-joint material from cooling before filling all the voids. Bars of Nu-joint, approximately 50 mm long by 16 mm in diameter are then inserted into the nozzle, heated by a torch or electric heater for a few minutes as indicated by a timer and injected.

Once injected and cooled, the Nu-joint material hardens to a non-brittle state with a compressive strength of 11 500 psi (79 000 kPa). The bearing should then be greased according to normal procedures. When the bearing again becomes worn through normal usage, the injection procedure can be repeated.

The injector tool costs approximately $1000 and the bars of Nu-joint are $30 each. The life span of this material is not yet known for heavy equipment in the forest industry. It has, however, been given a 5-year or 50 000-mile (80 000-km) guarantee for automotive use in the United States.

TRIAL AT JAMES MACLAREN INDUSTRIES INC.

As a test, the blade leveling cylinder ball and cap bearing of a Caterpillar 140G grader was chosen (Figure 2). These bearings, of which there are a left and right on each machine, absorb the majority of the vertical shock loads conveyed through the grader blade. Typically, they are rebuilt every 500 to 800 operating hours with steel or Teflon bushing insertions.

143 Place Frontenac, Pointe Claire, Québec, Canada H9R 4Z7 (514) 694-1140 Télex: 05-822652 Fax: (514) 694-4351

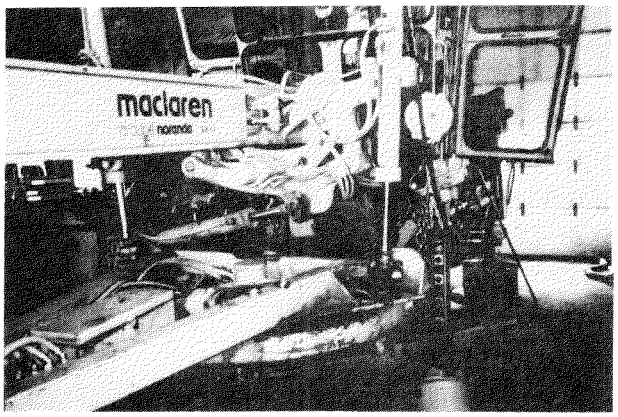

Figure 2. Blade leveling cylinder of Caterpillar grader.

The installation procedure was completed in 45 minutes. In fact, this bearing was more difficult to seal than pin and bushing type bearings because of its design. A clamping jig for this type of bearing would speed up the process.

After the joint cooled, no play could be measured as compared to a 5-mm play prior to injection. Three bars of Nu-joint were required, which represents a cost of $90. The normal rebuild cost for this joint is $20 for a bushing and 30 minutes of labour unless the trunion ball must be replaced. If so, the cost rises to $220 for the trunion ball and bushing and 4 hours of labour. For the purpose of the test, the other leveling rod bearing was rebuilt with a conventional bushing. In a year, it will be possible to compare the durability of the two bearings repairs.

CONCLUSIONS

The use of Nu-joint has the potential to reduce bearing rebuilding costs. However, each application should be tested individually. Methods must be devised to seal the joints and to ensure that they are unloaded and properly aligned prior to injection. More information is required on the life expectancy of this product in forestry machine applications.

In this regard, the joint chosen for testing at Industries James Maclaren Inc. is a good choice. It is a high-impact joint with a relatively short life and should provide a good comparison with conventionally-rebuilt bearings within a year. Also, it is a "worst case" joint for the injection process because of its geometry. Therefore, it is an all-around difficult application for the Nu-joint material.

FURTHER INFORMATION

The information contained in this report is based on limited field observations and is published only to disseminate information to FERIC member companies. For further information, contact:

E. Hébert
Mechanical Superintendant
Industries James Maclaren Inc.
Mont Laurier, Québec
J9H 3G8
Tel. (819) 623-2591

Canadian distributor of Nu-Joint
High-Tech Industries Manitoba Ltd.
669 Lorette Ave.
Winnipeg, Manitoba
R3M 3T7
Tel. (204) 663-1402

Québec distributor of Nu-Joint
R. (Rudy) J. Leptich
Promec Auto Products Inc.
932, R.R. #1
St-Sauveur, Québec
J0R 1R0
Tel. (514) 227-3441

Wayne A. Williams, Eng.
Wood Harvesting Group