

# Special Modifications

## Certified Bearing Specialist Solves Bearing Issue on Automatic Cutter for Tissue Rolls

Eddy Swiben, branch manager at BDI Canada, explains how to problem solve on an automatic cutter for tissue rolls.

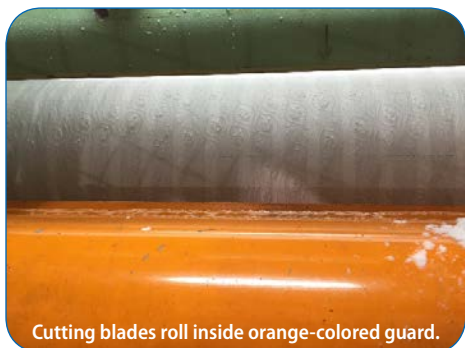
"This is a very major paper tissue manufacturer that sells paper tissue rolls all over America." They roll paper tissue just like newsprint paper mills do. When the product is finally done and dried, they need to roll it on a light carton core 20-ft. long.



Machine for rolling and cutting paper tissue.

It is then separated from the feeding roll and has to be cut every 4 in. in order to fit any domestic bathroom tissue roll holders.

To do so, a second, 20-ft. long shaft carrying blade discs every 4 in. standing under the first tissue roll is then automatically coupled to a small drive on the side of the machine through a linear and a rotary motion.



Cutting blades roll inside orange-colored guard.

The reason why it has to be coupled and uncoupled is because space is needed for the feeding roll to feed the enrolling roll without the paper coming in contact with the cutting blades.

The linear motion is needed to couple the shaft carrying the blade discs while the rotary motion is needed to roll the blades on the 20-ft. long tissue roll in order to cut 4 in. rolls.

The manufacturer of the machine understood that the load to be controlled on the stub driving shaft was mostly axial.

Considering the fact that a very slight misalignment might occur during the stroking motion, he chose to install a Double Effect 543 series thrust ball bearing with sphered housing washer.

The OEM considered that the balls of the bearing were going to control the axial load against the sphered thrust washers and took for granted that once coupled, the bearings of the 20-ft. roll would support the end of the driving shaft. He underestimated, however, the radial load to carry, as this bearing design cannot accept any radial load. It will work for a while, but not as it is supposed to.

He also considered that the sphered housing washer was going to cope with the slight misalignment (the bushing he installed at the other end of the driving shaft was to keep the linear motion mostly straight). Again, he was almost right, but bushings can wear in a short period of time.

Standing beside the machine for so long, I realized that all of his thinking was okay with a small exception: The sphered thrust washers cannot cope with an excess of misalignment caused by the bushing wear at the other end of the driving shaft.

The manufacturer also under evaluated the amount of fibers exhausted from the product that contaminated the inside of the supposedly sealed device. These fibers were contaminating the anti-friction (bearing) and friction element (bronze bushing) to a stage where it was wearing the bushing and therefore caus-



Certified Bearing Specialist

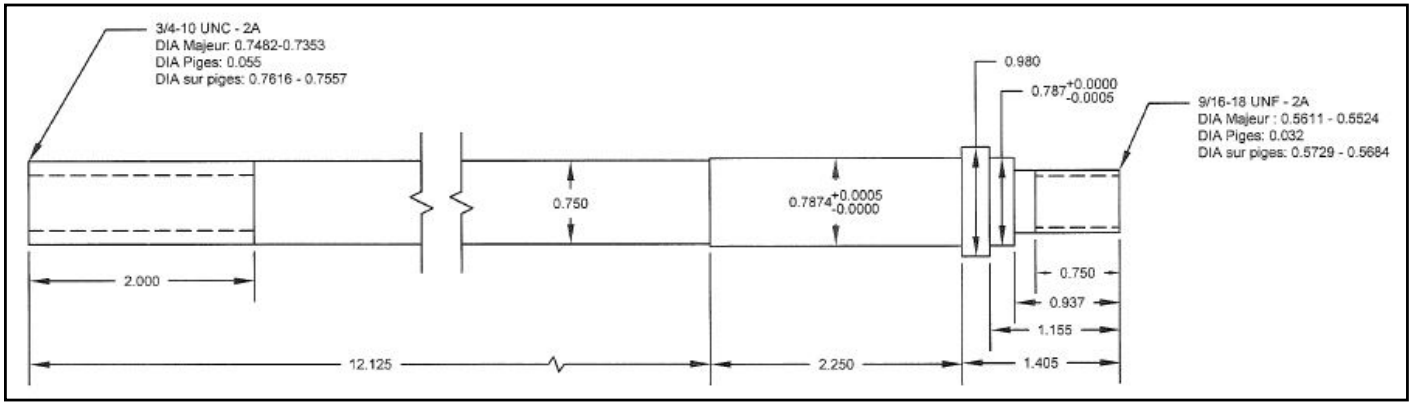
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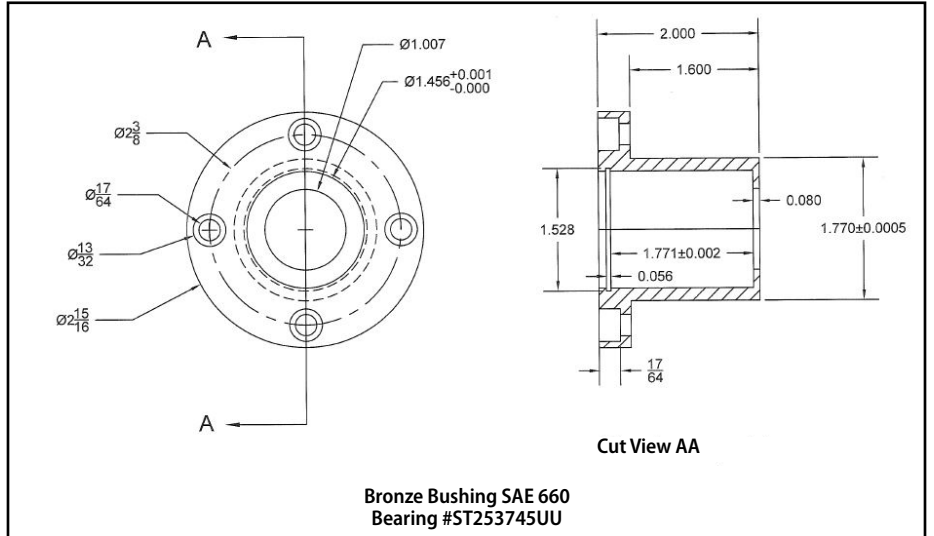


ing an excess of misalignment of the driving shaft.

We simply needed to control the misalignment by rectifying the linear motion and better seal the device. Linear motion is easily controllable with the use of a ball bushing bearing, like we all know, but standard all bushing bearings are not designed for rotary motions.

What was making this situation unique were the linear AND the rotary motions of the driving shaft. When coupled and driving, the 20-ft. long roll needed to be accepted at the same time by the same shaft action.

In order to do so, the OEM had installed a special bronze bushing at the other end of the driving shaft. It worked well, but only for a limited period of time. After a certain period, the bushing wears and misalignment occurred again. The double thrust ball bearing



with sphered housing washer cannot take the excess of misalignment (the bearing burn).

This customer was used to changing the bearing and the bushing on a regular basis for so many years that it was kind of normal for him to do so.

BDI Canada Inc. decided to design a special modified shaft on which we have installed new bearings. This time, though, we decided to change the double thrust ball bearing and sphered washers to two tapered roller bearings in order to accept the radial load, which could not be taken by the ball thrust bearing.

We made drawings according to our specifications, tolerances and combined all specifications from what we learned at the BSA course. We then brought it to a professional machine shop to make this special shaft.

Now the real challenge was the stroking and rotary action of the shaft.

We could NOT get rid of the bronze bushing, as it was quite specially designed and part of the housing itself.

We modified this special bronze device to a steel one, drilled and tapped a lubrication hole for a grease fitting to be installed and fit a hardened bushing inside. We hardened the modified shaft so that we could use a linear/stroke/rotary ball bushing to travel on that hardened shaft that can also rotate on the hardened bushing in the new steel housing (which was making this application special). This new bushing was lubricated through the new lubrication fitting and was able to:

- Rotate with the shaft in harmony with the tapered roller bearings at the other end.
- Work in a linear motion on the hardened shaft as well as rotating on the bushing when the blade shaft was coupled and uncoupled.
- Keep the tissue fibers out as we selected a sealed linear/stroke/rotary ball bushing.

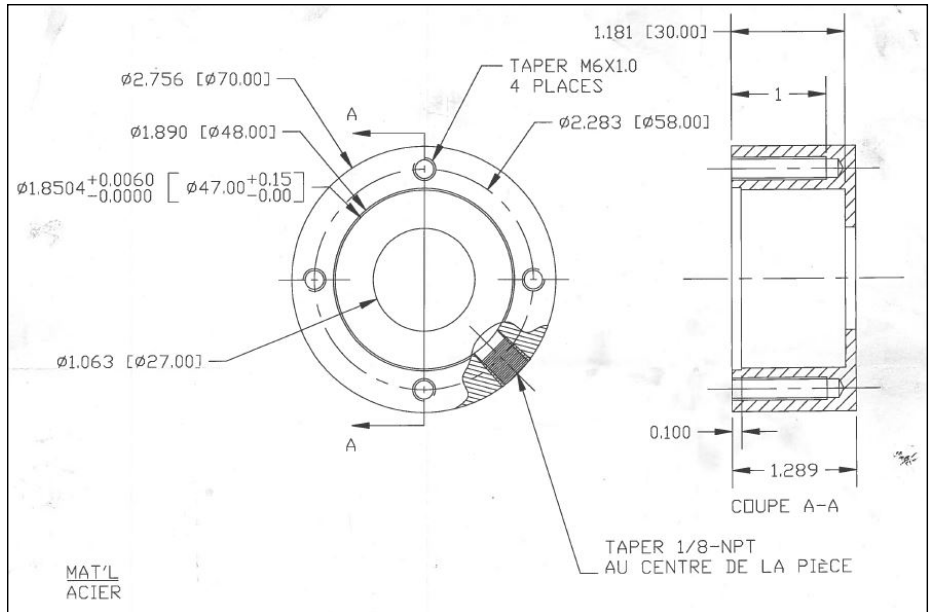
Our customer was quite shocked to see our capabilities of redesigning applications of an OEM with great success. He expressed his very high esteem towards those distributors such as BDI



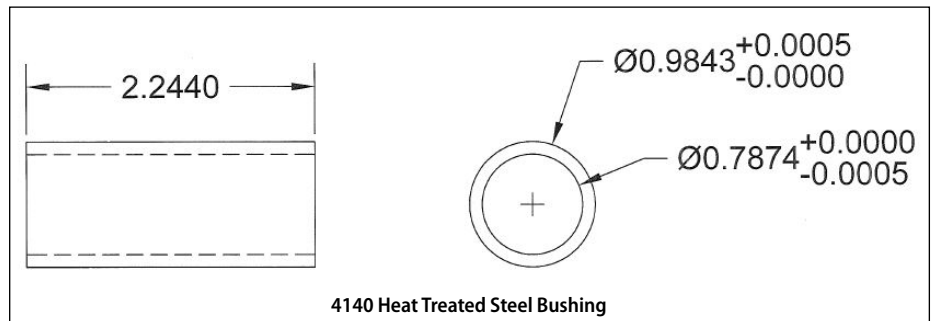
who understand the importance of training their representatives to an extent where they can improve mechanical performance of their equipment, lower downtimes and make their equipment more profitable.”

**Biography:**

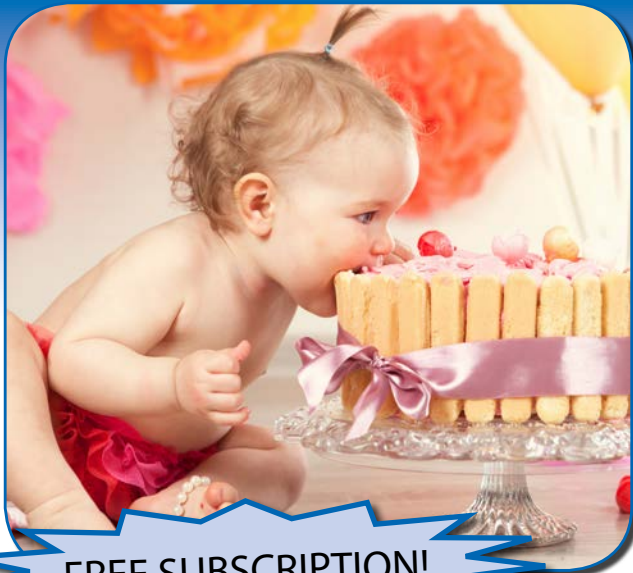
**Eddy Swiben** has been dedicated to BDI, Canada for the past 20 years and is a proud certified bearing specialist. Eddy is a true team player and proud to be a part of BDI Canada. His 20 years of experience, coworkers, company and CBS designation make him a valuable salesperson to both BDI Canada and its customers. **PTE**



BDI's customer is happy. Since then they have not changed any bearings, bushings or seals. The customer keeps the drawings, detailed specifications and identification nomenclature of the hardened steel bushings, tapered roller bearings and the rotary/stroke/linear ball bearings on file.



4140 Heat Treated Steel Bushing



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