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ask the expert...

TUBE RACES—ESSENTIAL ELEMENTS IN GLASS MANUFACTURING

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Tube race bearings are vital components in equipment systems widely used in the glass production process. Here, Pyrotek's Buddy Bell* responds to questions commonly posed by customers and explains more about these components.

Q: Tube races— what are they, what do they do and what are their unique features?
A: There are commonly two types of tube race bearings: carbon and stainless steel.

The carbon type tube race bearings consist of two steel metal races, top and bottom. Six steel pins are attached to these races to hold the six carbon segments in place. The carbon inserts act as a thrust bearing which supports a steel bevel gear and ceramic rotating tube or rotating Turbex tube. The ceramic tube rotates in the liquid glass to keep it homogeneous along with being able to raise or lower the tube for proper weight control.

The stainless steel ball type bearings consist of two metal races with 80 to 90 steel balls, depending on the size of the races, sandwiched between the races. The metal races rotate on the steel balls and act as a thrust bearing for the rotating tube or rotating Turbex tube in the same way as the carbon type mentioned above.

The customer sends his used steel ball races to Pyrotek, which are then checked for any warping. The races are then machined and drilled to accept the six steel holding pins and special treated carbon inserts.

Q: How do they work?
A: The carbon inserts act as a thrust bearing that supports a bevel gear and ceramic or Turbex rotating tube. The ceramic tube fits into a bevel gear bracket that rides on the races / bearings. This is driven by a pinion gear, which rotates the bevel gear. This in turn rotates the ceramic tube. This tube rotates in the liquid glass to keep it homogeneous and is able to be raised or lowered for proper weight control.

Q: What are the operational advantages?
A: There is less resistance, resulting in a lower demand on the motor amperage compared with running the ball bearings. The difference in wear is even more advantageous. The wear on the carbon inserts, if any, is more even and consistent, allowing for better weight control of the glass and no wear to the steel races. The steel ball bearings, on the other hand, tend to wear the races and balls unevenly, causing the tube to fluctuate and generate inconsistent glass weight problems.

Another cost advantage is that carbon inserts only need to be replaced during required change outs, and there is no need to replace the races. In some cases the inserts have lasted three to four years with very little wear. In contrast, steel ball assemblies must be replaced as a unit; some plants must replace them yearly. One customer stated that his maintenance plan included checking the carbon inserts once a year and changing them out every 2–2.5 years compared to changing steel balls and races every year.

Typical Pyrotek tube race bearings

Continued on page 2

Ask the Expert...

Continued from page 1

INSTALLATION AND SET UP

Some further questions and answers provide a better understanding for installation and operation of the tube bearings.

Q: What is the procedure for installing the tube race bearings / carbon inserts?

A: Prior to installation, the customer-supplied tube races are sent to Pyrotek and machined to accept the steel pins and carbon inserts. These races, pins and carbon inserts are considered a complete assembly. Customers install them the same way as with the steel ball bearing type, except that with the carbon tube race assembly the carbon inserts slide onto metal pins.

Q: What are the special points to be aware of during start up?

A: Customer plant operators indicate that in some cases, they have to tighten the clutch on the drive motor during start up to work in the new carbon inserts. This generally takes about an hour, after which the pressure on the clutch is backed off to maintain a smooth operation. It was also noted that with carbon inserts, the clutch is backed off to where the motor requires less current compared to using the steel bearings.

Q: Does the bearing need to have air-cooling to operate properly?

A: Yes. Cooling air needs to be maintained in the same manner as for the steel type bearings. The air should be filtered to prevent a sand blasting effect caused by rust and other contaminates.

Q: What about direct flame?

A: The carbon should be protected by shielding from direct flame, which could give rise to premature wear and failure of the carbon insert.

Q: How are the carbon inserts inspected?

A: The plant should disassemble and inspect the inserts, making sure to mark the races and inserts. If no visible wear is noted, they should be put back into their initial position, as marked during disassembly. Afterward, the above-mentioned procedure is repeated, with tightening the clutch motor until the tube starts to rotate properly for about an hour of running-in time. The clutch pressure can then be reduced for smooth running while also maintaining proper cooling air.

Q: What is the procedure for replacing the carbon inserts?

A: The process would be the same: the plant would disassemble and inspect the feeder in the same way as with the steel bearings, except the customer would only need to remove the old carbon inserts and install the new replacement parts. Replacement pins are also available if required. Afterward, the same above-mentioned procedure of tightening the clutch motor is carried out, and followed by reducing the clutch pressure.

In addition to the tube race sets outlined here, Pyrotek supplies a wide range of other feeder products for glass manufacturing, including Wollite 30 ST-1 expandable refractory material used to insulate the pouring spout, orifice ring and cover blocks. Other refractory products are provided to include spouts, orifice rings, plungers, stirrers and cover blocks.

**** Buddy Bell is a Glass Sales Engineer with Pyrotek Inc. , based in Carlisle, Pennsylvania, USA. Buddy has ten years experience in the glass industry with Pyrotek both in sales and manufacturing, and seven years experience working in glass plants. Buddy's expertise centers on container glass.***