High-Temperature Bearing Failures-Engineering a Solution

By Eric Ford, Vice President of Sales and Marketing, Graphite Metallizing Corp.

*In this **Heat Treat Today** Original Content article, read how an automotive manufacturing plant is able to solve high-temperature bearing failures by upgrading to bearings that use a self-lubricating material that can operate in extreme temperatures. Author, Eric Ford, vice president of sales and marketing at Graphite Metallizing Corp., shares how these bearings decreased the need for unplanned and costly maintenance of parts in the case study that follows.*

An automotive engine manufacturing plant in the Midwest upgraded the bearings in their gas nitriding ovens after encountering numerous failures with rolling element bearings.

This large manufacturing plant runs automated gas nitriding furnaces for treating their various engine components. A flame curtain, at the entrance to the furnace, produces a vertical stream of combustion products to minimize both the infiltration of room air into the furnace chamber and the disruption of the furnace atmosphere inside. The bearings for the conveyor rollers, closest to the flame curtain, are subjected to intense heat for a short period of time, about 30 seconds, which is enough to cook the grease in the bearings and degrade their performance.

In many automotive plants, these machines are running 24/7 for up to six months at a time. Any breakdown of this equipment has serious consequences in terms of profitability and delivery schedules.

An example of a flame curtain in an industrial setting (Photo source: Graphite Metallizing Corp)

Excessive Downtime

The plant was having trouble with the repeated failure of the rolling element bearings, located just prior to the furnace's flame curtain. These bearings were failing within six months, causing unscheduled maintenance and downtime. Though there was an automatic grease system, temperatures of approximately 300°F resulted in the grease being cooked away rapidly, resulting in conveyor roller seizure.

When the bearings seized, production on the line stopped. The furnaces then needed time to cool sufficiently for maintenance personnel to be able to access and replace the bearings. Starting the system up again wasted yet more production time.

It was taking three people about four to six hours to replace the bearings and start the furnace again each time the bearings failed. These unscheduled shutdowns cost tens of thousands of dollars in production loss, labor, and materials. In addition to the expense of the downtime, there was also the added safety risk of handling parts when unloading the furnace and performing maintenance on the equipment, which was still hot.

Successful Trials

At a heat trade show during this time, the production manager of the plant learned about Graphalloy bushing materials; Graphalloy is the name for a specific family of proprietary graphite/metal alloys developed by Graphite Metallizing Corp of Yonkers, NY. Its featured qualities

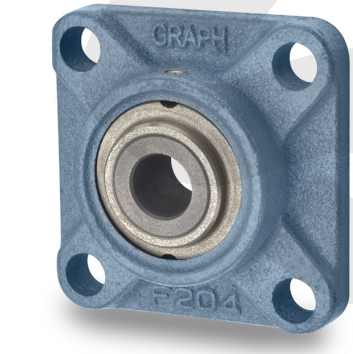
The conveyor transporting the parts has bearings to support the load and convey the product through the furnace. (photo source: Graphite Metallizing Corp)

include non-galling, corrosion resistant, dimensionally stable, and can operate at temperatures from cryogenic to higher than 1000°F (538°C). These materials work very well in severe environments and services due to their self-lubricating properties – no grease or oil is required. There are more than 100 grades of these high-temperature bushings which are designed for specific conditions.

Soon after the show, company representatives went to the plant and proposed a simple drop-in replacement for the current greased bearing flange block assemblies. The production manager agreed to test a few of the company's 4-bolt flange blocks with copper bushings, and they were installed a few weeks later.

The target was a difficult one: The production supervisor said that a doubling of the lifespan of the roller element bearings would enable the plant to stick to its twice-annual scheduled maintenance intervals. By achieving this goal, unscheduled maintenance shutdowns would be avoided.

During the one-year trial period, the high-temperature bushings were a success. Based on the positive result, the production manager installed additional bushing assemblies of this brand type during subsequent scheduled maintenance dates, until all furnaces had been converted to new self-lubricating bushings.



Flange Bush 845 (photo source: Graphite Metallizing Corp)

Update: Saving Time and Money

The original bearing assemblies, installed over six years ago, have been operating without a single failure or showing any appreciable wear.

By replacing the metal bearings with newer graphite bushings, the automotive company eliminated at least two unscheduled shutdowns and dozens of hours of maintenance work per year. According to the production manager, using this has saved this automotive giant hundreds of thousands of dollars to date. HTT

For more information, visit Graphite Metallizing Corp. online at www.graphalloy.com

Graphalloy 4-bolt flange block in service. (photo source: Graphite Metallizing Corp)

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