

Composite bearings live nearly unnoticed in Florida citrus plant

TOM HUGHES, Managing Editor

Citric acid seeps from the hundreds of oranges and grapefruit moving along the conveyor-like washers. An acidic shower rains down to wash the fruit. If you set out to create an application that would test a bearing unit's mettle, you could hardly design a better one than the two brush washers at Caulkins Indiantown Citrus Co.

Such conditions in the Indiantown, Fla. plant pose a constant threat of contamination to the bearing units supporting the washers' multiple shafts. Even the method of cleaning the washers — a high-pressure spray of water mixed with caustic soda — is potentially damaging.

The powerful washdown can flush lubricant right out of the bearings.

Over the years, the brush washers have made short work of just about every traditional bearing solution — nickel-plated housings, cast-iron pillow blocks lubricated with grease lines, and pillow blocks with solid lubricant packs. No matter which method, most bearings failed within 9 or 10 weeks.

Finally, in an ex-

periment 3 years ago, Caulkins installed two MRC composite mounted bearing units on one brush washer. Not only did the units work effectively for that entire season, they are still running today. The test was so successful that Caulkins purchased 120 of the composite units and is replacing all present cast-iron blocks.

Housing corrosion

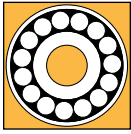
"We had a tremendous problem with rusting of cast-iron housings," says Joe Delisle, Caulkins maintenance supervisor. "The rust could flake off, and we'd have to replace the housing whenever it happened. But rust, of course, is not a problem with composites."

The MRC unit is specially designed for the harsh environments of the food and beverage processing industry. Made of a reinforced polymer, the unit's housing resists the corrosive ef-



Good for you; not for bearings. As citrus fruit travels on brush-washer conveyor toward elevator, it also gets a sanitizing shower. Brush-shaft bearings down below must take citric acid seepage plus phosphoric-acid shower solution. New composite-housing bearing with double sealing keeps bearings from dying of excessive Vitamin C and cleanliness.





PRODUCT FOCUS: BEARINGS

fects of frequent washdowns and chemicals such as citric acids and cooking fats. And a double-protection seal guards the insert bearing.

How they run

During the 6-month processing season at Caulkins, the two brush washers clean more than 4 million lb of oranges and grapefruit daily. The fruit is transferred from a holding bin via conveyor to the washers, which are outside the plant. The washers move the fruit along to an elevator, which brings it inside for squeezing.

Each washer consists of about 30 long, horizontal shafts which rotate in the same direction and are equipped with brushes. Two bearings, one at either end, support each shaft. The washers clean and convey fruit simultaneously. As the fruit rides along toward the elevator, spray heads above the washers release a sanitizing shower composed of phosphoric acid and water. As the brushes rotate, they scrub the fruit.

"The washer bearing housings are continually exposed to contaminants," says Mr. Delisle. "Citric acid from the fruit can wash into a bearing and harm the lubricant. And the sanitizing spray is extremely powerful."

Trials

Metal bearing housings have generally succumbed to the severe conditions within a few months of installation. At one time, Caulkins used nickel-plated housings, a common option in the food-processing industry. In plated housings, a protective coating is bonded to all exterior surfaces of the base metal. But the coating has a tendency to peel or chip in the brush washer environment, according to Mr. Delisle, and exposure to food acids can turn it black. At Caulkins, nickel-plated housings soon corroded and had to be replaced.

Another problem, lubricant contamination and subsequent attack on bearing running surfaces, also dogged brush washer bearings. A few years ago, Caulkins tried cast-iron pillow blocks lu-

bricated by means of grease lines. As a special precaution against contamination, the bearing units were purged by re-greasing manually every day, sometimes two or three times a day, increasing maintenance costs. Even so, the bearings failed within about 6 weeks.

The company then switched to a cast-iron pillow block with a solid lubricant pack, which resists washout better than traditional greases and oils. But the change offered only marginal performance improvement. These units, which are currently in use on both washers, normally last 7 to 10 weeks — barely half the processing season.

Reinforcements

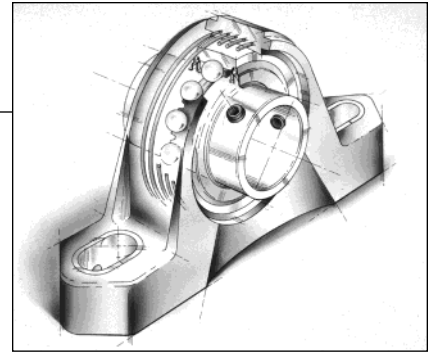
Only the composite mounted bearing unit offers substantially longer life. The housing will not chip, peel, or corrode. Also, it is reinforced with an embedded steel coil. As a result, the housing's radial breaking load is three times greater than the insert bearing's static load rating. The coil also provides increased thermal stability, ensuring that the bearing remains firmly seated at steady temperatures to 250 F.

In addition, the composite housing has good shock load resistance. It can withstand impacts such as a misdirected hammer blow that would crack a cast-iron block.

Double sealing

A double-protection seal keeps contaminants from entering the housing and damaging the bearing. One part of the seal, a metallic flinger, is phosphated and coated with phenolic resin. It seals mechanically by producing a centrifugal effect. The second part — low-friction rubber lips — provides an added barrier against process contaminants and washdowns. The insert bearing is lubricated for life with FDA-approved grease.

"We've been in business over 20 years," says Jim Wigginton, Caulkins purchasing specialist, "and to my knowledge, the double-lip seal appears to be more effective than anything we've had in the past."



Steel coil molded into housing adds strength and stability. Zinc-coated or black-oxide treated bushing inserts reinforce housing bolt holes. Housing's spherical bore accepts spherical outer ring surface of insert bearing, letting the unit compensate for initial seating alignment errors. Exterior flinger is seal's first line of defense, backed up by rubber lip seals. Space between is filled with grease, and so is bearing. MRC can supply units in 2-bolt pillow-block style, and in 2 and 4-bolt flange units.

Projected savings

From the changeover, Caulkins expects to gain considerable savings both in decreased material costs and reduced downtime. Because of the short life of metal bearings on the brush washers, the company was accustomed to spending \$5,000 per season in replacement housings alone. Mr. Wigginton estimates that Caulkins will save \$2,200 this processing season by making the switch to composite units, which are priced competitively with standard metal pillow blocks according to the manufacturer. If the newly installed composites perform as reliably as the test units have, savings will be even greater in subsequent years.

Frequent bearing failures in previous years affected brush washer readiness and increased labor costs. "The new bearings should reduce brush washer downtime significantly," says Mr. Wigginton. "And that will help increase our production efficiency." ■