



By Ed Parr

# Conversion in Aguai

Claudio Olivio Mattiazzi, the maintenance supervisor at Ibéria Industria de Embalagens Ltda, was caught between the proverbial rock and hard place. He saw the advantages of converting bearing lubrication from force-fed oil to high-temperature, synthetic grease on his two 1995-vintage, 97-inch single facers, but he knew that management was not likely to approve the budget.

Some Original Equipment Manufacturers charge up to US\$20,000 for the housings and seals necessary to convert heated roll bearings from oil to synthetic grease. Mr. Mattiazzi's estimates were well in excess of US\$10,000. Then, there was the cost of the grease.

Heated roll bearings in some single facers require as many as eighteen 1-kilogram tubes of perfluoropolyether/polytetrafluorethylene (PFPE/PTFE) grease per fill — about US\$2,700 per

**Ibéria maintains a 26,500 square meter plant which employs 575 employees in the industrial district of Aguai, a city in the northeast sector of the state of São Paulo, Brazil.**

machine — not counting top-offs during operation. PFPE/PTFE grease is probably the most expensive synthetic grease on the market, but you do get what you pay for. This grease withstands temperatures up to 260°C, which makes it ideal for a single facer's heated roll bearings. Because PFPE grease is completely fluorinated, it delivers excellent thermooxidative stability, an

essential characteristic for extended lubrication intervals. In corrugating that spells making bearings last the life of the rolls. In addition, PFPE greases are nonflammable, non-toxic, chemically inert, and ozone-safe.

Though neither the conversion nor the grease costs are small sums in the US, they seem even larger in Aguai, a city with a population of 35,000 in the northeastern sector of São Paulo, Brazil, where Ibéria's 26,500 square meter plant is located.



(Left) Denilson Stanguine Ferreira, Irlei Felipe, and Paulo Sergio Magalhães de Souza, three members of the Ibéria maintenance department, pause after installing FARO shielded corrugator roll bearings lubricated with NyeCorr 140 PFPE/PTFE grease. The FARO/Nye system significantly reduces the cost of converting singlefacers lubrication from oil to high-temperature grease.



(Right) Mr. Carlos Pereira of Capma Ltda., Jundiai, São Paulo, Brazil, and Mr. Claudio Mattiazzi, maintenance supervisor at Ibéria Industria de Embalagens Ltda, Aguai, São Paulo, Brazil.

Though the state of São Paulo has the highest Gross Domestic Product in Brazil, the largest industrial complex in South America, and 40 percent of Brazilian industrial production, its per capita income is only US\$8,300, a statistic that served to magnify Mr. Mattiazzi's conversion budget.

Furthermore, it's seldom easy to change systems when business is good, and it was very good for Ibéria. Founded in 1987, Ibéria has four sister companies with a total of 1,043 employees. Ibéria, the largest division, has 575 employees in a country where only a very small percentage of factories employ a hundred or more workers. The company serves more than 3,500 customers in a broad range of industries, including food, glass, ceramics, chemicals, textiles, steel, beverages, and other diverse products. Its product line includes corrugated board, corrugated packaging, shredded paper, Kraft paper, and box covers. Quality is exemplary. Ibéria earned an ISO 9001 certification as well as Nestle's prestigious NQS quality award, a plus for a company that does about 40 percent of its business in the food industry.

Ironically, Mr. Mattiazzi's track record didn't help his conversion proposal. He did an excellent job keeping his single facers up and running. Despite their six-plus years of service in a plant that operates around the clock seven days a week, the oil-lubricated single facers still turned out 6,500 tons/month at an average speed of 9,000 linear meters/hour. Nonetheless, Mr. Mattiazzi was convinced they could do better.

"I knew we could improve productivity if we converted to grease," Mr. Mattiazzi said. "The circulating oil system was very labor intensive. We always had to closely watch for electrical, pneumatic, and mechanical failures — any of which could stop production. The system required hydraulic and electronic components that had to be imported, making them even more costly. Then, there were the costs of disposing waste oil and effluent contamination was always an issue. In-plant oil spills and leaks posed safety hazards to employees. And roll changes were very time-consuming because of the build-up of carbon deposits."

But all these were the "hidden costs" of maintaining an oil system and such costs are difficult to quantify.

## AN INTERNATIONAL SOLUTION

What Mr. Mattiazzi needed was a less expensive way to convert from oil to PFPE/PTFE grease — an opportunity he found at Capma Ltda., a company headed by Carlos Pereira in Jundiai, São Paulo. Capma represents several international firms that supply products to the corrugating industry, including Comer, Cerini, Technolab, FARO Bearings, and Nye Lubricants. Since 1996, Mr. Pereira has grown a successful business bringing high-technology products and services from these suppliers to the corrugating industry in Brazil. By combining products from FARO Bearings and Nye Lubricants, two companies that frequently collaborate in the North American market, Mr. Pereira paved the way for the conversion at the Aguai plant.



Ibéria prides itself on a clean, safe work environment. Since the conversion of their singlefacers lubrication from circulating oil to PFPE/PTFE grease, “the problem of oil contamination in the work place has been eliminated,” said Ibéria maintenance supervisor Claudio Olivio Mattiazi.

In the early 1990s, FARO Bearing’s parent company, FARO Industriale, a specialty-bearing manufacturer headquartered in Italy, recognized that many heated roll bearings in single facers required an unusually large amount of expensive grease. However, FARO engineers noted that most of the grease fills the housing. The bearing itself requires a much smaller volume of grease for proper lubrication. With this in mind, FARO designed and introduced the first shielded versions of its standard corrugating roll bearings. They contain stamped metal shields around the open bearing. In addition to keeping wear-inducing contaminants out of the bearing, these shields confine the PFPE/PTFE grease to the bearing, eliminating the need to fill the entire housing.

Mike Forbes, president of FARO Bearings in Sarasota, Florida, explained, “In an S&S HKD or HKE single facer, for example, FARO shielded bearings reduce the amount of PFPE/PTFE grease needed by 40 percent. In a Simon 300PSF, 70 percent less grease is needed. Importantly, these shielded bearings are designed to fit existing housings, so they eliminate

the cost of re-machining the housing. Further, because the housings are not filled with grease, roll-changes are faster and cleaner.”

FARO shielded bearings are currently available for Agnati GO10 and GO12; Koppers 200/300 series; Langston XA and XD (hydraulic and mechanical only); S&S HKA/HKE/HKD/HKL; Simon 200 and 300PSF; and others.

While FARO Industriale introduced shielded corrugator bearings in other parts of the world in 1994, FARO Bearings only recently introduced them in North America and through Capma in South America.

Nye Lubricants was the other element in the conversion formula Capma proposed to Ibéria. Founded in 1844, Nye is a US company located in Fairhaven, Massachusetts, that has specialized in the formulation of synthetic lubricants for about 40 years. Its lubricants are used in thousands of discrete components in automobiles, appliances, power tools, electrical connectors, spacecraft, recreational equipment, medical apparatus, and other devices. In 1996, Nye introduced NyeCorr 140, a



PFPE/PTFE grease for heated roll bearings in single facers. A year later, Nye introduced NyeCorr 346, an economical synthetic ester grease for preheater bearings. NyeCorr 346 enables plants to switch safely from a more expensive PFPE grease, to substantially reduce the cost of lubrication without hurting preheater bearing performance. Capma distributes Nye products in Brazil.

NyeCorr 140 is particularly adapted to use with FARO shielded bearings, according to Mr. Forbes.

"NyeCorr 140 contains 250 percent more anti-corrosion and anti-wear additives and a base oil evaporation rate approximately 400% lower than comparable PFPE greases. Since the grease is retained in the bearing and does not circulate through the housing, a high-viscosity product with a low evaporation rate works best. With its 500 centistoke base oil and less than 3 percent evaporation rate, NyeCorr 140 fits the bill perfectly," Mr. Forbes said.

As the Brazilian representative for both FARO and Nye, Mr. Pereira was able to offer Ibéria a very economical conversion scheme. Instead of paying more than US\$10,000 for new seals, flanges, grease, bearings and other components needed for its oil-to-grease single facer conversion, Ibéria paid less than US\$6,000 per single facer — a budget Ibéria's management approved. The shielded bearings also keep the cost of PFPE/PTFE grease to a minimum. Mr. Mattiazzi said that since the conversion, he uses only one tube of NyeCorr 140 for each pressure roll bearing during assembly. Every two months, one more tube is used to relubricate all six heated roll bearings.

He also uses the less expensive ester grease, NyeCorr 346, in the preheater rolls, which are relubed every two weeks.

"This new system cuts lubrication expenses about 33 percent and I no longer have to dispose of about 1200 liters of oil every year," Mr. Mattiazzi said.

## PRODUCTIVITY IMPROVES

Ibéria not only found an economical way to switch from oil to high-temperature grease. The conversion led to the productivity enhancements Mr. Mattiazzi knew he could achieve.

Mr. Mattiazzi said, "With the higher-temperature capabilities of the PFPE grease, we actually set new speed records for the plant just two days after the conversion. The bearings work more smoothly and with less vibration thereby allowing higher velocity on the machines, which in turn caused an increase in production. Our single facers now average 9,650 linear meters per hour, nearly 8 percent faster than with the oil lubrication. Further, after the conversion, the single facers average 8154 tons/month, a 25 percent improvement over the old lubrication system."

Mr. Mattiazzi also noted other benefits, including faster roll-changes and reduced single-facer maintenance.

"Since the change from oil to grease, the problem of oil contamination in the work place has been eliminated. We have also realized savings in hydraulic equipment, electronic components, maintenance, and treatment and clean up of the oil," Mr. Mattiazzi said.

John Graham, corrugating industry director at Nye Lubricants, sees a lesson for others in the Ibéria conversion.

Graham said, "In the US alone, there are hundreds of corrugating plants that still use old oil-based single facers as primary equipment. And there are hundreds more that still maintain oil systems as their secondary lines. Despite the high maintenance and environmental dangers associated with oil systems, conversion costs have been considered too prohibitive. Now, the cost savings offered by FARO's shielded bearings is a good reason for these plants to take a closer look at conversion."

"Like everyone, we are always fighting to get better results," Mr. Mattiazzi said. "Our goal is to be producing with absolutely no unplanned shut-downs. This conversion package has been a giant step toward this objective." ■