RBC's "triple threat" of Solutions for Neckers. BCF15/814ST- Lubed-for-life double row ball bearing cam follower with steel outer ring

Bearing innovations for maximum machine performance

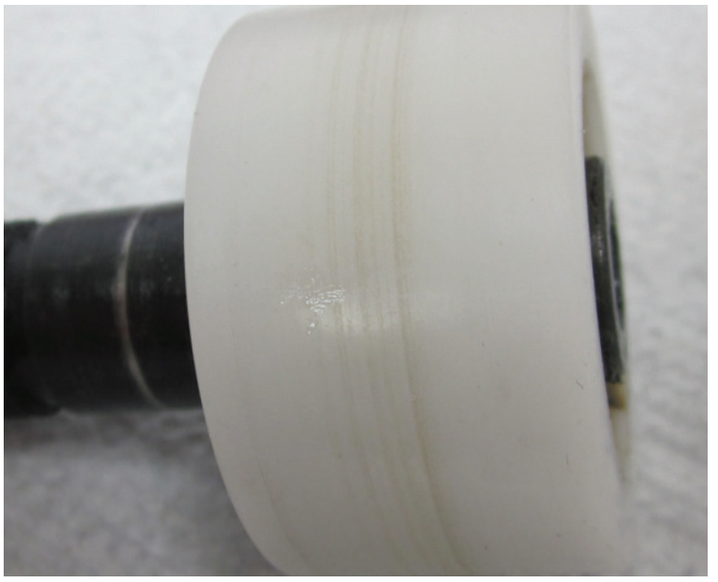
RBC Bearings has a quest to improve bearing performance on neckers, while reducing machine maintenance and downtime. *CanTech* reports

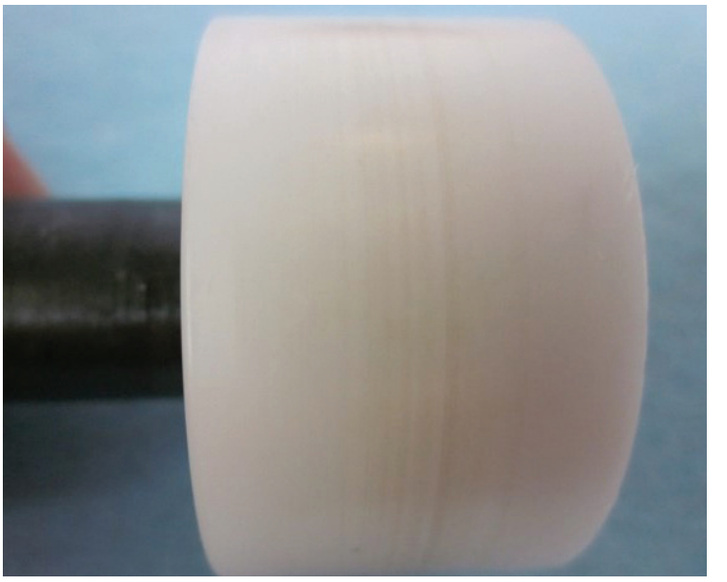
Faster, Faster, Faster! As the industry is clamouring for more production with less down time, the production machinery is in dire need of components that are built for the new demands. As the machines are pushed to new limits, the metallic components, like bearings, experience different loading conditions, duty cycles and heat can be detrimental to the bearings' long-term performance. Elevated temperatures break down the lubrication's ability to develop the proper lube film between two metallic components.

BEARINGS SPECIALIST

RBC Bearings has committed itself to understanding the production demands and most troublesome applications in a can manufacturing production facility. While keeping in mind that every plant is striving to gain more production by running faster and longer, RBC designs products with just that in mind. Knowing that the necker is one of the most important assets in the plant in meeting production goals, RBC Bearings has focused on the cam followers, developing solutions to maximise speed capability, reduce maintenance and extend life, station by station.

RBC engineers first began this work in the early 2000s by addressing many of the shortcomings of the needle bearing being used, the biggest of which was the inability to support thrust loads. These thrust loads are unavoidable in the necker due to its orbital motion, which causes a speed differential ▷



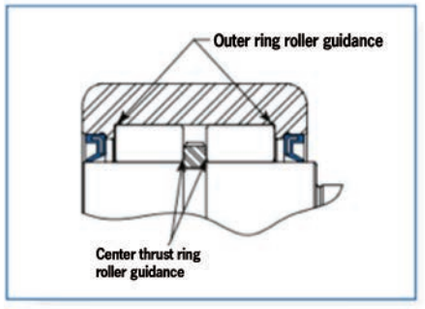


RBC can extend the life of bearings and master cams

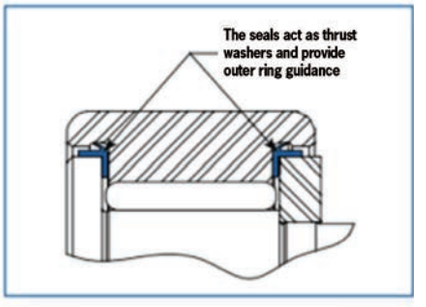
across the outer ring.

To address this, RBC designed a double-row cylindrical bearing with a patented centre thrust ring. This centre thrust ring not only provides roller guidance, but also allows for optimal thrust load support with zero-gap design. Additionally, this new design uses larger rollers for longer life and load carrying capability and utilises a better seal, more suited for these high-speed applications. This bearing design was quickly adopted by can plants around the world and proved to be a great improvement by providing increased speeds, increased load capacity, and a longer, more reliable bearing life.

Around 2010, RBC engineers went to work with the objective to design a cam follower that would allow plants to remove the error-prone lubrication systems and protect expensive cams from metal-on-metal wear. It was important to eliminate the need for these annoying lube lines, as they are thin and delicate. With hundreds of lube points per machine, they can easily be bent, snap off or wax up from elevated heat. All these issues can result in starving the bearing of its vital grease flow. Also acknowledging the expense and time associated with cam replacement, we wanted to design a cam follower that would cause little to no wear of the cam. By moving away from the steel outer tire to a material that is more lubricious and softer than the cam itself, the cams should effectively last forever.



Cylindrical Roller Cam Follower



Needle Roller Cam Follower

Building upon over 80 years of cam follower design experience, RBC was able to supply a new, patented, high performance cam follower for the necking stations. The development includes two light weight, maintenance-free ball bearings in place of the traditional needle rollers. These greased-for-life ball bearing cam followers, with a low friction, self-lubricating outer ring, have the added benefit of reduced weight and lower rolling resistance. When combined with the removal of the auto lube components there is a considerable reduction in rotational mass resulting in significant energy savings per line.

The outer ring material was carefully selected for optimal performance and durability. An extensive review of engineered polymers and a study of their mechanical properties resulted in the selection of the ideal material. RBC engineers defined the proper assembly method of two high-quality, greased-for-life ball bearings into the selected polymer outer ring to assure perfect fit and shape to effectively spread loading across the contact patch. The final result is a cam follower that is a drop-in replacement for the original all-steel roller cam follower that required constant re-greasing.

In-house testing was conducted at the RBC West Trenton, NJ facility. The newly developed cam followers were tested under rotational speeds and loads that simulated the average running conditions of the most popular necking units used in can plants around the world, and several rounds of testing demonstrated the new cam follower is up to the task. It also demonstrated that it outlasts similar competitor's products by a factor of two.

Once the design was internally validated, the RBC team worked with the can plant back-end supervisors to intensively trial these new cam followers in actual field conditions to ensure they would pay dividends in the necking line.

In the field-testing program, the plants would outfit one complete necking station with the new maintenance-free cam followers and run at full production speed – between 2,150 and 3,400 cans per minute. Cam followers were pulled for evaluation after two months, four months, six months and 12 months of operation. These cam followers were returned to RBC and a thorough post-test examination was conducted to rate performance success and determine design improvements. A detailed report was written at each stage and reviewed with the can plant.

As the product demonstrated success, the good word spread, and the field test program expanded to include up to 20 can plants in North America and Europe. The entire programme spanned four years and resulted in can plants around the world converting their necking lines over to the new maintenance-free cam follower.

And plants found the value! Moving to lubed–for-life bearings enabled plants to remove those messy and unreliable lubrication lines while extending the life of bearings and master cams. Light weighting the system allowed for faster production speeds. Due to this success, can plants have estimated the savings these bearing provide to be as high as $400,000 annually.

Can plants have claimed that they spend up to 30 man hours a month cleaning lubrication in and around the cams. This excess grease can cause contamination residue on the product and make for an unsafe and slippery work environment… not to mention being messy and costly! Using lubed-for-life bearings, the necker operates much cleaner and is easier to work on!

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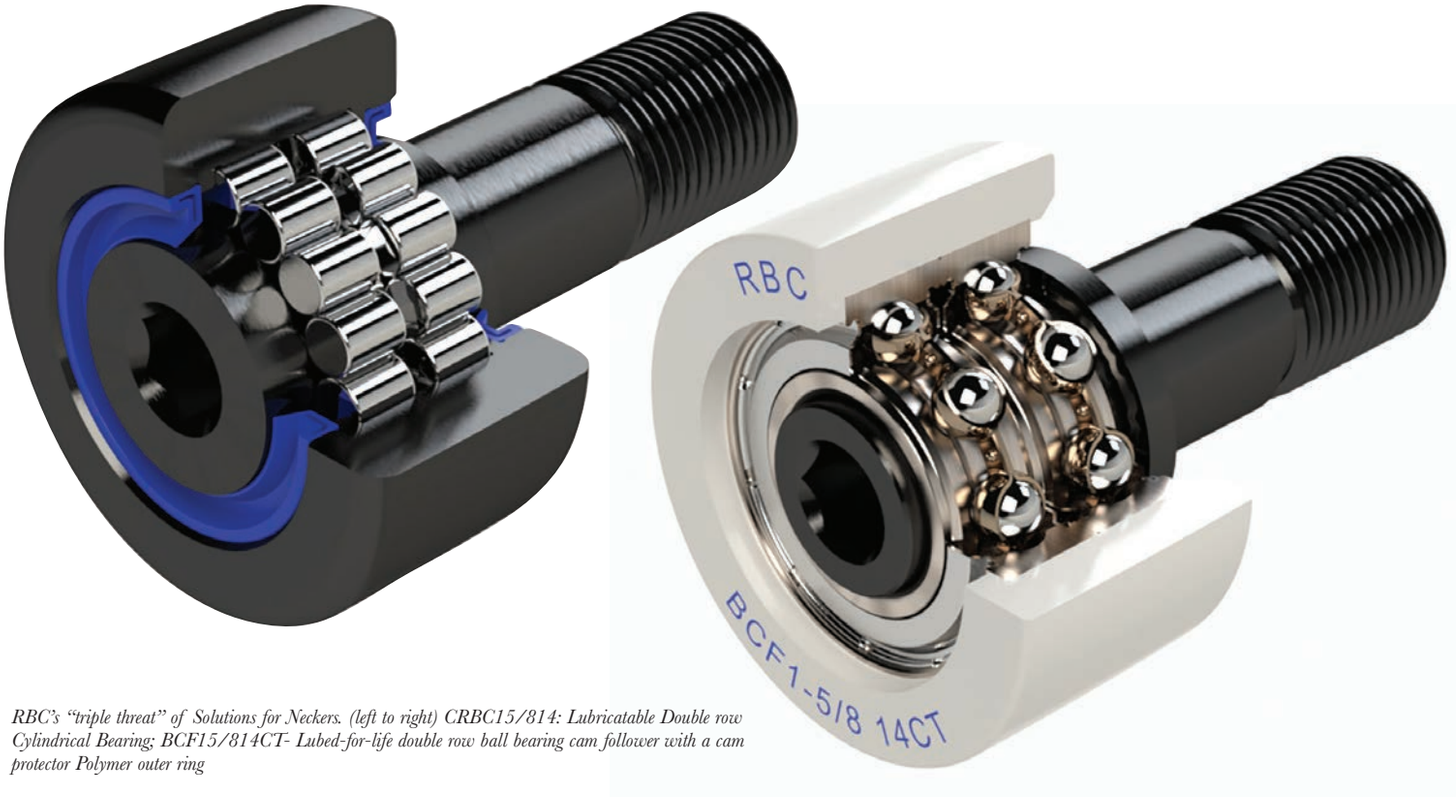
RBC has continued to expand our patented, maintenance-free technology to other applications in can plants. With the expansion of this product, we're able to take a tailored approach to selecting the right cam follower for any and every necker operation. Some plants (or even stations within the plant) run hotter. Some plants run faster. In others, cam surface condition is not as smooth and free of dents and debris.

For this reason, they have adopted a supply approach we call the "triple threat" of necker bearing offerings. Using the same internal sealed and lubed-for-life ball bearings for the rolling elements, we utilise a steel tyre material for maximum durability and protection from worn cams and other more demanding application conditions. This steel tire outer with low fiction ball bearings has allowed can plants to increase their production speed. CT



RBC's "triple threat" of Solutions for Neckers. (left to right) CRBC15/814: Lubricatable Double row Cylindrical Bearing; BCF15/814CT- Lubed-for-life double row ball bearing cam follower with a cam protector Polymer outer ring