Robot R&D: Bearings

Accuracy describes how closely a robot reaches a commanded position. When the absolute position of the robot is compared to the commanded position, the error calculated is the measure of accuracy. Chris Johnson, managing director of precision bearing specialist SMB Bearings, explains how quality bearings are integral for improving accuracy in the robotics industry.

Alongside repeatability, accuracy is one of the most important characteristics of robotic equipment. If the positioning of the robot is out, even by just 1mm, it can spell disaster for production, and for the condition of the equipment. For example, if a pick-and-place robot accidently hit the side of a bin as it attempted to reach for an item — the impact could damage the robot and shut down operations.

There are several methods of improving accuracy in robotic equipment, including additions to external sensing, such as a vision system or Infra-Red sensors. However, one factor that can improve accuracy in all cases, is selecting the right bearings during the research and development (R&D) stage of bringing a new robot to market.

Bearings may seem like a small consideration across the complexity of the entire process. That said, making the right selection can have a significant impact on the accuracy and effectiveness of the robot.

Space conservation

The space available inside robots is often incredibly limited, with manufacturers aiming to produce smaller and more compact robots — particularly for the growing collaborative robot market. Thin section bearings are ideal for space conservation, as they deliver higher speeds and offer higher levels of design flexibility.

These bearings have very little difference in size between the internal and external ring, they are light weight and condensed, making them an ideal choice for robots, where both footprint and weight are at a premium.

Thin section bearings may be small, but there’s a lot that can go wrong if you buy just any brand. If the rings are not perfectly formed, even a minute discrepancy will stop the bearing running smoothly, causing fluctuations in the accuracy of the bearing.

This is where the quality department come in during your robot R&D process. By testing samples, quality assurance must check the manufacturing process has ensured the highest possible degree of roundness in both rings, as well as assuring every bearing in the batch is manufacturered to the same high standard.

Tight tolerances

When you buy a batch of bearings, you would expect them to all be the same. Yet, this shouldn't be taken for granted. Tolerance levels and dimensional accuracy does vary across bearing types, materials and brands. It makes sense that any error in bearing measurement, will carry forward into the accuracy of a robot's movement.

So, what's the solution? If you want a safe bet, EZO thin bearings are known for their quality control and advanced manufacturing techniques. This results in very low tolerances and high levels of dimensional accuracy that other brands may struggle to match. Similarly, you may have your own testing facilities in house to check tolerance, and we'd encourage you to carry out these tests for yourself.

Optimal grease fill

It's clear that consistency is crucial — and the same applies to how much lubricant is used in bearings for robots.

As robotic movements need to be predictable and accurate, some friction is essential to ensure control. Trial and error is therefore required to find the correct friction coefficient and its corresponding percentage grease fill for optimum performance. In fact, this is exactly what The Shadow Robot company did, in the development of the new Smart Grasping System.

With these steps ensuring bearing quality during the R&D process, robot manufacturers can guarantee accurate and predictable movement. If you are in need of precision bearings for robot applications, contact the experts at SMB Bearings on sales@smbbearings.com.