Nearly a decade ago, a manufacturer of optical inspection equipment came to us with a dilemma: Its equipment was having problems … well … focusing.

Despite incorporating state-of-the-art technology into the product's overall design, the focusing mechanism was underperforming. It wasn't a reflection of the lens itself, whose materials and workmanship were industry bests. Rather, as the overall mechanism required smooth, incremental movements powered by a miniscule motor, it was highly susceptible to the slightest variations in starting torque. This made it a bearings issue. And like all of our customers' challenges, we addressed it systematically.

First, we introduced higher precision catalog bearings, but the motor couldn't generate sufficient power to drive the mechanism consistently. Additionally, despite a reduction in fill amount down to 10%, adding the requisite grease lubricant created drag that compromised functionality.

That's when our engineers came up with an innovative solution: We changed to ceramic balls inside of the stainless steel rings, which allowed us to run the bearings without any lubrication. Additionally, we trimmed the bearing's ball complement from 13 to only five, while achieving precision and consistent movements with the focusing mechanism. The entire design took roughly nine months to complete, a process that included multiple levels of samples. After significant trial and error, we arrived at a version that, nine years later, continues to perform for our customer.

AST's in-house capabilities, including a clean room, proved critical to the project's success. The ability to disassemble the bearings, replace the steel balls with ceramic balls, re-install the retainer, and perform final inspection in a cleanroom environment made the entire process turn-key for the manufacturer, a rarity in the bearings industry.

We continue to manufacture this custom bearing assembly today, completely in-house (assembly, processing, cleaning). It has proved exceptionally durable while delivering uniformly consistent results for our customer.

Innovation is an integral part of the culture at AST, the ability to find solutions where ones previously did not exist. When trying to find a bearings solution that minimized torque, our engineers reduced the ball count and turned to ceramic balls, a lightweight material with a very high polish, which collectively reduced torque. Additionally, the dissimilar ring materials allowed the bearings to run without lubrication. While such a setup is typically discouraged, it was AST's ability to recognize how this unique configuration in this specific instance could deliver the desired results that turned this into a success story.

It is the ability and willingness to assess a problem and consider solutions — no matter how seemingly theoretical — that distinguishes AST as an industry leader in ball bearing technology.

Let our team of experts help with your specific needs. Contact them here or learn more about our custom solutions.

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