



NES' digital stitching service enhances bearing source qualification program

Napoleon Engineering Services is your answer for bearing qualification

OLEAN, N.Y. – Napoleon Engineering Services (NES) had long ago set itself apart with its Source Qualification Inspection program.

A unique bearing reverse engineering initiative, Napoleon Engineering's SQI provides an in-depth, analytical look at a bearing manufacturer's design intentions, manufacturing capabilities and overall quality of workmanship. It has been performed, with unparalleled results, for hundreds of Original Equipment Manufacturers (OEM) over the years, allowing them to confidently qualify the best bearing and supplier for their desired application.

It is, perhaps, the Olean, N.Y.-based bearing company's defining triumph.

In the last two years, however, this program's capabilities have only become greater. And that's due primarily to NES' introduction of "digital stitching" on tapered roller bearings (TRBs) and its capacity for bearing modeling.

But what, exactly, does it mean by "digital stitching?"

Well, NES' inspection engineers work closely with the NES inspection department to develop enhanced technical information about the interaction between contacting surfaces within a tapered roller bearing. The inspection department

provides the data that's produced by three different inspection machines – a Mitutoyo Contracer, Taylor Hobson Form Talysurf and Zeiss Coordinate Measuring Machine (CMM). The inspection engineers then digitally stitch that information together to create an accurate image of the exact location and form of all contacting surfaces of the cone, cup and rolling element.

NES' RENOWNED SQI is comprised of a series of thorough inspections. But the purpose is largely two-fold: to determine the differences in design between two sources of product and establish the differences in the quality of

workmanship. For Part 1, NES compares the supplied or industry-accepted design values of a manufacturer with the measured and calculated values obtained by the stitching of raw data. “When you have the data from those three measurement machines, you can build a digital bearing model,” said Kyle Brook, Napoleon Engineering’s inspection and testing manager.

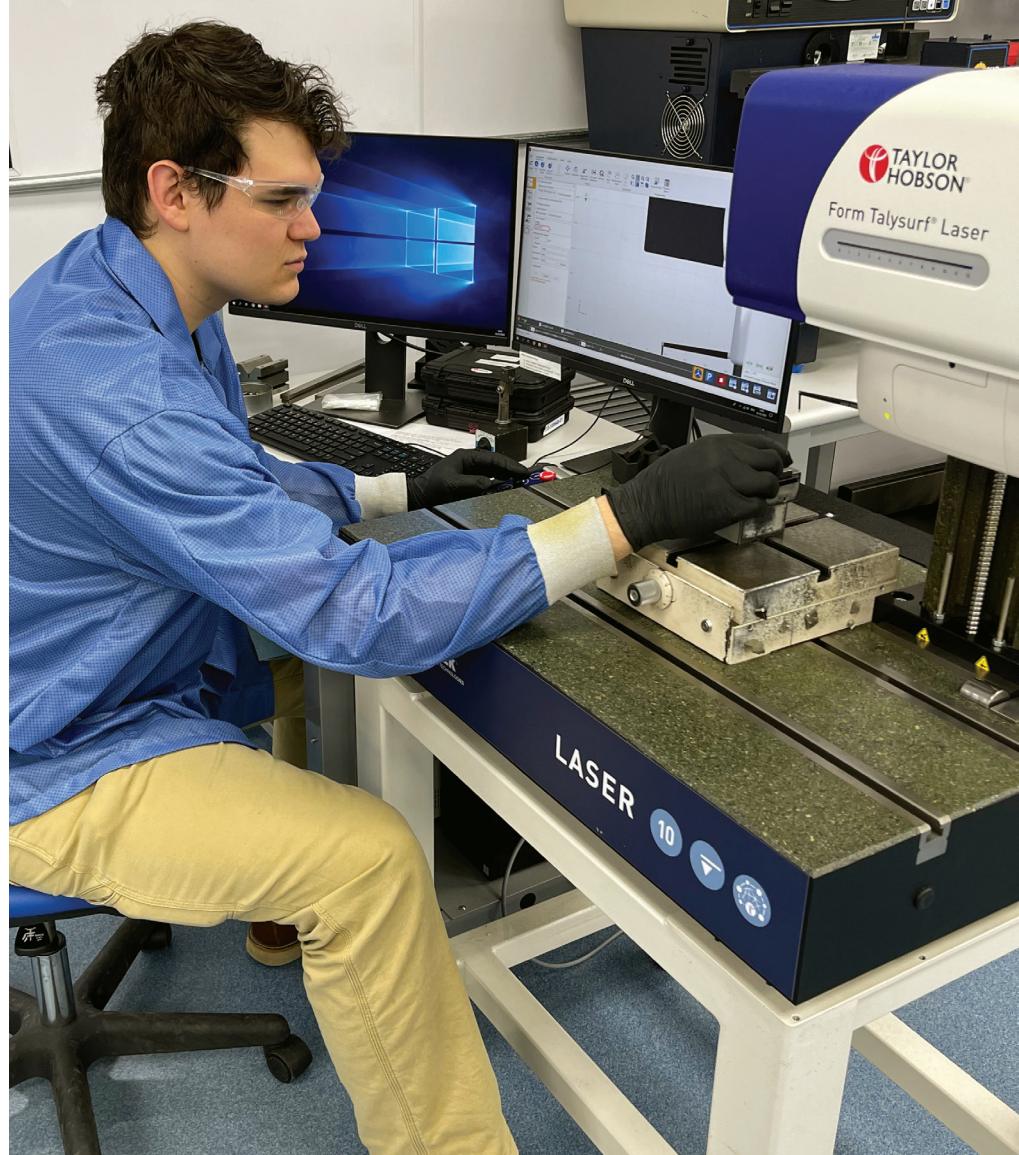
To accomplish Part 2, NES uses this technique to take an advanced look at contacting surfaces.

“We can now visually show our customers exactly how the contacting geometries align and interact with each other at a microscopic level to determine the impact on product quality,” Brook said. “This provides us with fantastic visuals compiled by our digital stitching. We’ve rebuilt the bearing in such a way that it shows us the deviations from true intended form and overall differences in quality regarding the effective surfaces.”

NES conceived this portion of its SQI in 2022. It built and developed the program over the course of a few months and performed an initial internal test on multiple sets of bearings that summer. In the aftermath of a highly successful outcome, its ownership was handed over to Brook and the inspection team, who oversee the program today.

THE FIRST customer for whom NES conducted its digital stitching service extensively was a major heavy truck axle and transmission OEM. This OEM also wanted an enhanced data sheet from NES that it could input into its Romax integrated driveline software for bearings and gears to better determine bearing output characteristics, such as expected life. The Romax programmer wanted to improve the accuracy of the input geometry beyond that of the previous decade of work between the two companies.

This compelled NES to provide more accurate numbers for attributes like effective center, theoretical sharp corners and other calculated TRB values. NES developed the measurement techniques that are required for its digital stitching software to generate those results. In



the end, NES not only provided the OEM with the detailed information for which it was seeking but established a successful template moving forward.

“So, we put that together and said, ‘OK, we can offer that consistently to all customers,’” Brook said. This has allowed NES to enhance the value of its SQI, to strengthen what was already one of its most highly regarded services, one that includes visual inspection, noise testing and analysis of material chemistry, microstructure and hardness. And it’s led to a greater reliance on North America’s most experienced bearing reverse engineering organization.

“Our comparisons are more standardized and they’re more detailed,” said Brook, when asked how the addition of the digital stitching component has made Napoleon Engineering Services better. “We’re looking further under the hypothetical microscope. We’re digging in deeper

and we’re more consistent and more standardized in our evaluation.

“We’re doing it the same way over and over again and we are digging a little bit deeper into the finer points of the differences in quality between two suppliers and the design between two suppliers.”

TWO YEARS later, NES has continued to adapt to a more sophisticated manufacturing standard, Brook said. As part of this world, customers expect more in terms of input values for their modeling systems. “I think we’re meeting or exceeding those expectations,” he added.

The next step for NES will be to provide its own bearing modeling in tandem with its SQI. “Now we that have this capability, we’d take our newly created digital output for tapered and cylindrical roller bearings and create an exact bearing model,” Brook went on.



“We can take those digital values and put them into our bearing modeling software and start to provide very real estimates of stress distribution and bearing life and determine at what loading a bearing is subject to impending failure. And that becomes real, tangible value for OEMs when comparing design and

manufacturing quality between suppliers.”

What does this ultimately mean for NES and its customers?

“I think we can attract more OEM customers,” Brook noted, “and give them additional risk reduction with quantified

values for life and stress, which is exactly what they need. That’s what this gives us the power to do.”

(Courtesy of J.P. Butler, Marketing Coordinator, Napoleon Engineering Services.)