

RAM NDT PRODUCT TESTING... SOUND WAVES THAT MEASURE QUALITY

RAM (Resonant Acoustic Method) NDT (Non-destructive testing) offers an approach to product testing that presents distinct advantages to manufacturers. At least, the people at Capstan Atlantic think so. For almost a year now, they've been using this state-of-the-art technology that utilizes sound to completely and reliably test product quality.

“The RAM NDT unit we've employed in our manufacturing process has enabled us to provide one hundred percent product testing,” says Vice President of Engineering Rich Slattery. “To put it simply, it provides a peace of mind that lets us sleep at night.”

In its 100,000 square foot facility staffed by 230 employees, Capstan Atlantic produces a variety of structural parts for the automotive industry.

But their niche is making multi-level, high performance precision gears for automotive power train systems.

They supply parts for the big three automotive makers in the United States as well as Japanese transplant facilities.



THE PRESSING NEED OF GEAR PRODUCTION

Capstan Atlantic's production facility involves a complex metallurgy process that begins with an

iron-based, powdered alloy. Additions such as chrome, nickel, molybdenum and graphite are added for strength, ductility, and wear resistance. The powder blends are compressed to varying densities, depending on the requirements of the application. And the newly formed gears are then sintered on 65-foot continuous belt furnaces at a temperature over 2,000 degrees Fahrenheit.

Although the methods Capstan Atlantic employs are very robust and effectively minimize the chance of

defects, the process still requires a 100% test for structural integrity.

Therefore, product testing is an essential element in the quality assurance program.



Prior to investing in the RAM NDT unit, the company used a non-destructive, one hundred percent torque test method. But it didn't deliver the level of performance and reliability that put their minds at ease. It was subject to human interpretation, it was very slow and therefore costly, and it didn't guarantee 100% conformance.

"We felt that the manual testing approach was too uncertain for us," says Senior Development Engineer Eric Day. "Because of the demanding, highly competitive nature of our industry, we wanted a testing method that qualified every single component that left our facility. We found it with the RAM NDT unit. It has made a powerful impact on our company and significantly added to our peace of mind."

"Our previous method tested around 40-50 parts an hour," says Rich Slattery. "But the RAM NDT unit tests 600-700 parts an hour. The improvement in the level of effectiveness and efficiency we've experienced with the RAM NDT is phenomenal!"

A SOUND APPROACH TO PRODUCT TESTING

To understand how the RAM NDT unit works, consider the operation behind a bell or tuning fork. When you strike either instrument, it vibrates, emitting a sound. An instrument that rings true produces a consistent sound. And this consistency in sound reveals the structural integrity of the instrument. That is the basis for RAM NDT technology. When struck by a tiny anvil, components like gears emit a natural frequency as part of their structural response. This unique and measurable signature is then compared and analyzed against both good and bad product. Just like a cracked bell will not ring true like a structurally sound bell, components can be tested in the same manner. If a gear is cracked, lacks the correct density or misses other characteristics of a structurally sound product, the flaw will be exposed when their signature deviates from what has been identified as good product.

The RAM NDT unit tests the whole part for both external and internal flaws and provides an objective, quantitative analysis that eliminates errors involving human interpretation and judgement through the use of sophisticated equipment. A dynamic sensor captures sound and a high-speed analog to digital convertor translates the sound into measurable data. Since a defective part will shift in its structural resonance, this shift is identified when compared to pre-defined data. In effect, the RAM NDT listens to the structural response of a part and evaluates it against the statistical variation from a control set of good parts in order to screen defects.

The criterion used to represent pre-defined data is established by way of templates. The resonant signature of both good and bad product is captured in order to provide objective, measuring variables for comparison. Once these templates have been established through up front programming, the RAM NDT is a self-regulating unit that involves little maintenance and eliminates the need for a trained operator. And even better, it's very fast.



“We’ve incorporated the RAM NDT unit right on our assembly line,” says Rich Slattery. “It doesn’t slow our production one bit. Components pass through it right before packaging. Any product that doesn’t pass inspection is removed from the line automatically. And gears that pass inspection are immediately packaged and shipped in a streamlined operation.”

Manufacturers need not worry about durability either. From the rugged microphone and industrial electric impactor to the NEMA smart digital controller, the RAM NDT is designed for industrial environments. Its durable, physical construction is perfect for plant floor, high volume, test applications.

BENEFITS THAT ARE RIGHT ON PITCH

For Capstan Atlantic, the RAM NDT not only contributes to peace of mind; it also contributes to the bottom line. According to Rich Slattery, the RAM NDT system they currently use saves the company “33 cents on each gear produced over the previous method.” And since the company



ships around 5,000 gears a day, that amounts to a total savings of \$1,660 per day. Furthermore, since the unit eliminates the need for a specially trained operator, it also reduces personnel costs. But the best part is in knowing the company has achieved the highest level of quality assurance possible.

“When I go home at the end of the day, I don’t spend the night worrying about whether or not a gear slipped through our quality system and was shipped to a customer because I know every single gear produced on our line has been thoroughly, and completely tested. It’s hard to put a price tag on that,” says Slattery. “But it is easy to figure the

consequences involved in a field failure. That's every manufacturer's worst nightmare."

For Capstan Atlantic, a defective part in a drive train system represents a customer "walk home." In other words, the automobile breaks down leaving the occupants stranded. In this scenario the cost of tear down and customer reimbursement could easily exceed the purchase price of the RAM NDT unit. But that's really only the minimum affect. And it involves proving that the defective part was an isolated event. Because otherwise, it might result in a recall—an ordeal that could easily put a company out of business.

"With our present system in place, I'm confident that everything checks out as it should," says Eric Day. The level of quality assurance is far superior to our previous method."

"I guess you can say the RAM NDT unit has allowed us to walk away from worrying about walk home field failures," says Slattery. "Since it's been in place, we've enjoyed one hundred percent success."



Although there was a learning curve initially, once Capstan Atlantic mastered the new system, they found it relatively easy to use. And not only did it require less engineering support, but also the data captured by the RAM NDT provided feedback that contributed to other quality improvements. "We discovered that additionally, the unit has enabled us to recognize things about our process and make improvements upstream that have increased our product yield by reducing process variation," says Slattery.

Today the people at Capstan Atlantic sleep easy because they have complete confidence in their RAM NDT unit. Backed by state-of-the-art technology that delivers precise, one hundred percent testing, it reduces both your worries and your costs.

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