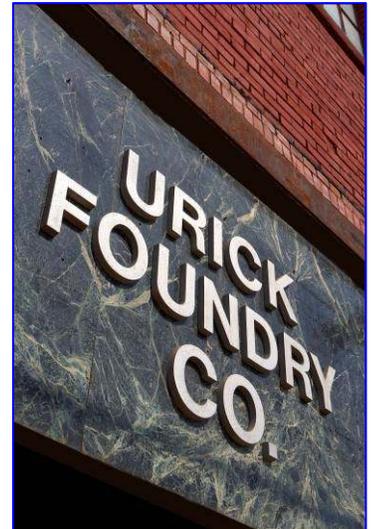


USING SOUND TO VERIFY QUALITY

Urick Foundry, a manufacturer of complex ductile iron castings, found that RAM (Resonant Acoustic Method) NDT (Nondestructive testing) from The Modal Shop offers advantages over alternative quality testing methods. Since 2005, Urick has been using state-of-the-art RAM NDT technology to completely and reliably test each casting they produce.

“We have 14 NDT-RAM units now at each of our production stations doing 100% inspection on the ductile iron parts we manufacture. The setups are consistent and easy to operate. They all network to a central database for excellent product control,” says Foundry Director Dan Mayton.

Urick made the decision to test 100% of their ductile iron castings years ago. Supplying a diverse set of industries, including railroad, heavy truck, hand tools, and construction equipment makes it essential for them to objectively test all ductile castings prior to shipment. Urick’s castings hold down subway tracks all over the world, are part of motor mounts for 18-wheelers, locomotives and rail cars, bridges, exercise equipment, and have countless other uses.



STRENGTH WITH FLEXIBILITY

Urick specializes in high quality production of engineered ductile iron castings.

A division of Ridge Tool, the Urick Foundry is located in Erie, Pennsylvania, and employs approximately 100 dedicated workers. Urick is very proud of its competitive costs, especially given its rapid turnaround and 100% product testing.

Ductile iron is a type of cast iron with a composition that makes it more flexible and elastic than other metals, with fewer cracks and brittleness. Castings are produced for use in the transportation industry, hand tools, construction, small equipment including exercise



machines. The properties of ductile iron make the pouring of castings a bit tricky. The inoculation of the molten iron with magnesium creates the possibility of nodularity “fading” if the castings are not poured quickly. Urick uses a delayed in-mold technique, which minimizes the variations that affect product quality.

ACCURATE YET RUGGED QUALITY TESTING EQUIPMENT

Every casting produced is tested for the manufacturing consistency of the structural integrity and nodularity using NDT-RAM. This process evaluates the natural resonant frequencies of every casting produced to determine if any internal or external discontinuities exist that could affect the performance of the casting.



Durability of the test system was also key for Urick. From the rugged microphone and industrial electric impactor to the NEMA4 packaged smart digital controller, the RAM NDT design excels in industrial environments. Its durable, physical construction is perfect for plant floor, high volume, test applications.

“What I like most about NDT-RAM is the durability of the machines. Our old equipment broke down frequently. NDT-RAM system components are designed to withstand continuous operation in the harsh environment of dust, sand and dirt in the foundry. Since switching, our repair bill has gone down tremendously,” says Mark Sullivan, Urick Quality Control Manager.

Urick utilizes a standard NDT-RAM system configuration consisting of the primary components: LanShare Digital Signal Process Analyzer, industrial electric impact hammer, microphone, and NDT-RAM software. The unique feature Urick takes advantage of with all 14 of the systems running on the plant floor is centralizing control of every system at a single location. Each LanShare analyzer has its own IP address making centralized control easy to set up over Urick’s internal computer network. This makes daily setup changes



easy as production changes and simplifies organization of data for statistical process control analysis.

A SOUND APPROACH TO QUALITY CONTROL

NDT-RAM detects resonant frequency shifts which can occur due to variances in dimension, geometry, weight, voids, cracks, density, bonding, and missed manufacturing processes. The entire procedure takes seconds per part, allowing for efficient quality-control testing of all parts in the process line.



The technology works like the striking of 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 can “finger print” the structural integrity of the instrument. This unique and measurable signature is then compared and analyzed against both good and bad products.

Ductile iron, due to its composition, “rings” quite well, making it compatible with NDT-RAM. Just like a cracked bell will not ring true like a structurally sound bell, castings can be tested in the same manner. If a casting is cracked, lacking the correct density or missing other characteristics of a structurally sound product, the flaw will be exposed when its signature deviates from what has been identified as a good product.

“The NDT-RAM units allow us to test multiple frequencies, which means we can test for different things – density, cracks, other imperfections. They are tied to weight stations and easily adjust to different weights,” according to Sullivan. “The units can’t be adjusted by individual operators. We like being able to control the testing centrally, and have the data all come to one computer for analysis. Also, no “part preparation” is required and parts are fully inspected in seconds. The same system can test many different castings.”



The NDT-RAM unit tests the whole part for both external and internal flaws and provides an objective, quantitative analysis that eliminates subjective errors involving human interpretation and judgment. A dynamic pressure sensor captures sound and a high-speed analog to digital convertor translates the sound into measurable data. Since a defective part will have a shift in its structural resonance compared to a good part, this shift is identified when compared to a predefined range of acceptable parts' data. In effect, the NDT-RAM 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.



Although there was a short learning curve to adjusting criteria templates, they found it easy to use. Not only did it require less engineering support, but the data captured by the RAM NDT provided feedback that contributed to other quality improvements.

“The equipment is easy to read and operate. The clear red or green light read-out lets us know right away if the product is within the control limits,” says Mayton.



Improved control, ease of operation, and significant cost savings make for a sound justification for Urick's investment in the state-of-the-art NDT-RAM technology.

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For further information about NDT-RAM and to find out how a NDT-RAM system can benefit your quality assurance program, contact THE MODAL SHOP, INC. 3149 E. Kemper Road, Cincinnati, OH 45241-1516, Internet: www.ndt-ram.com, Toll free (800) 860-4867, (513) 351-9919, Fax (513) 458-2172, or e-mail: ndt@modalshop.com.