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## Weld Got Away Again?

"Final Sonic" is a term often used to describe the last test of welded tube before it is stamped and shipped. This test, done on the finishing floor determines ultimate product quality. A good question might be: just how effective is this test?

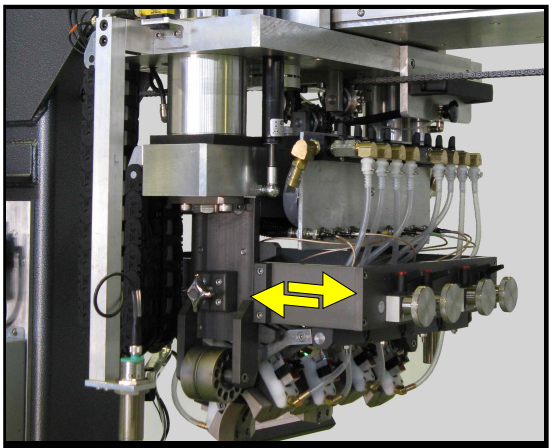

Photo shows enhanced array system. The section marked with arrows is the quick-change test head.

To do a final weld test it is necessary first to locate the weld and then to transport either the welded tube or the test apparatus over the full length of the piece making sure, at the same time, to test over the ends.

Simple enough, but here are some obvious pitfalls to this seemingly simple process:-

a) If a mill employee is locating the weld there is always the chance of human error or negligence; along with the uncertainty of the real weld location within the band that is visually apparent. (The weld itself is only 0.25mm wide).

b) The weld is often located and the pipe is later transferred to a testing station. This process can result in shifts in weld position.

c) The weld line itself may twist along the length of a pipe.

d) If a conveying system is used, it may twist the pipe as it travels.

One or more of these forces is almost always at work to ruin the test, so the key to the whole process is to get the ultrasonic apparatus within range of the weld and to keep it there. This poses problems beyond the scope of this simple article, problems that QA and production people must pay close attention to.

For our own part, as equipment suppliers, InspecTech has looked at several options to make the off-line test more reliable. An obvious solution is to try to increase the effective testing range of the equipment, such that weld location errors are less significant. This must help, but it is not a panacea for sloppy testing technique.

One way to increase the effective testing range is to add transducers to the equipment. This has two major downsides: more transducers means more complex set-up for the operators and secondly, test heads become long and ungainly; overall a poor return on cost and effort.

This fall, Inspectech shipped the first of our enhanced discrete array systems. We have increased the number of active testing channels to 8, but the size of the test head and the set-up controls are exactly the same as a conventional 4-channel unit. A further enhancement lies with the transducer assemblies that are complete "cassettes", which are changed according to pipe size. This has two major advantages. Transducers are matched optimally to pipe size for best possible effective working range and also change over for the operators is quick with minimal margin for error.

A truly effective final sonic test requires many levels of expertise, but the new array test head can play a major role to help minimize the uncertainty.

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## Tube or Pipe.....Vive la différence!

What is the difference between Tube and Pipe? Not a lot, both are round with a hole down the middle. Not so, however for the codes of practice governing the industry; ASTM has different codes for tube and pipe, and for us the differences in NDT requirements can be quite pronounced.

Mechanical Tubing is the subject of ASTM standard A513. Pipe, both welded and seamless is the subject of ASTM standard A53.

With regard to welded product, (the variety that interests us the most), A53 requires mandatory NDT on the weld seam. Inside flash condition does not seem to be a consideration.

On the other hand, A513 for Mechanical Tubing, NDT is supplemental; required only if the purchaser requests tested material. However, A513 gives several different grades and definitions of inside flash condition, varying from flash in to fully flash removed.

Both standards reference ultrasonic, eddy current and flux leakage as acceptable test methods, and both standards reference ID & OD notches as reference defects. However, one strange feature is common to both standards: they give eddy current users a break, and permit the use of drilled holes as the sole reference defects. This is in fact a huge concession to the eddy current method, meaning that no proof is required that the test system is doing anything other than inspecting the surface area of the weld without penetrating it. It also exempts eddy current users from any kind of demonstrated ability to detect longitudinal defects.

By contrast, the API is now requiring all test methods to demonstrate sensitivity to ID and OD notches as well as drilled holes, essentially removing the concession to eddy current users. This begs the question as to how much longer it will remain at ASTM.

The flux leakage test method will detect ID and OD notches equally as well as drilled holes, and thus demonstrates that it is testing the entire thickness of weld material. Ultrasonic testing also tests the complete weld, but is less friendly to flash-in material. This can limit the use of ultrasound for tube producers under A513 (supplemental), unless the product is always ID flash removed.

How can we offer such an unbiased judgement of test methods?
Easy… we make all three types of test equipment.

Author's note: The preceding item is an overview only of prevailing standards. Tube and pipe producers should study the full text of the appropriate standard before establishing a test procedure.

## Meet The People

Hocine Mouzarine

Hocine graduated with a Bachelor's degree in Electrical Engineering in Algeria.
He then went to France where in 2004 he earned a Master's degree in Testing and Measurement.

Arriving in Canada in 2007, he settled first in Quebec, obtained a Quebec Junior Engineers Licence then moved to Ontario where he joined InspecTech in 2011.

Over the past two years Hocine has enjoyed learning a lot about NDT and about InspecTech's testing systems. He is now involved in the engineering department designing and maintaining firmware and hardware for different testing devices.

His hobbies are soccer, video games, and learning languages.

Hocine Mouzarine

## Office Closings

For our international customers, here is a list of Canadian holidays and observances for our offices for the next several months.
Our automated answering machine can take messages during evenings, weekends and holidays.

Our offices will be closed for:

| Holiday | Date |
|---|---|
| Christmas Break | Dec. 25 - Jan. 2 |
| Family Day | February 17 |
| Good Friday | April 18 |
| Victoria Day | May 19 |
| Canada Day | July 1 |

Dates subject to change.

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