

THE EVOLUTION OF ULTRASONIC IN-LINE INSPECTION

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The main task of in-line inspection (ILI) is the early detection of potentially hazardous pipeline anomalies (e.g. metal loss) and precise sizing thus providing reliable input data for integrity assessment. For the inspection of liquid pipelines ultrasonic tools offer specific advantages with regard to resolution and measurement accuracy.

In-line inspection by means of intelligent pigging has become a standard application to ensure the safe operation of pipelines worldwide. Ultrasonic inspection tools have proven very successful for crack inspection as well as for metal loss inspection of liquid pipelines.

Established in the early eighties, these tools have been considerably improved by taking advantage of the progress in electronics, data processing technology and data storage capabilities as made available from other application areas.

By timely implementation of the available state-of-the-art technology in the field of data recording, data processing and data storage the performance of ILI tools has continuously improved over the years. An important aspect of these improvements is the measuring resolution resulting in the detection of smaller defects as well as better sizing capabilities. Another instrument that is becoming more and more important for the proper design of ultrasonic ILI tools and their optimized application is ultrasonic modelling.

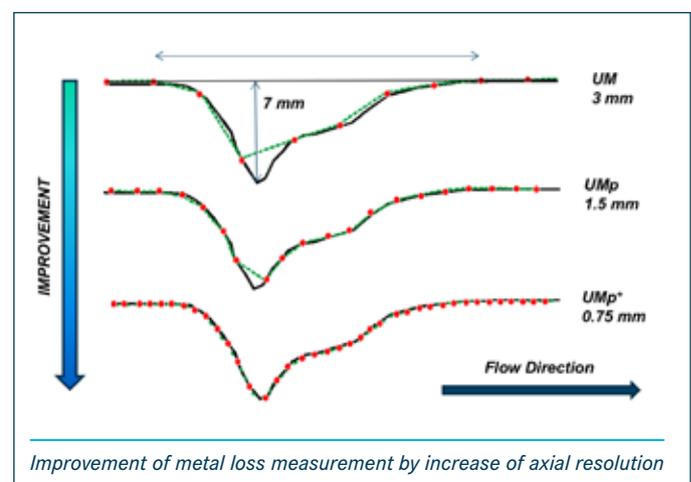
The measuring resolution is one of the most important characteristics of an ILI tool. It is related to the minimum defect size that can be reliably detected as well as to the precision of how accurate a defect profile can be determined. Currently achieved measuring resolution allows for the reliable detection of tiny pinholes at higher inspection speeds than previously available.



Testing of ultrasonic inspection tool at the NDT Global test yard

For metal loss inspection, operator requirements have become more stringent. These requirements are often based on problems related to pinhole corrosion characterized by small but often deep corrosion damage.

This inspection challenge has led to the development of new generations of high-resolution tools over the last 10 years. Resolution must take into account the relationship between axial resolution and the maximum inspection speed that is acceptable to ensure a specified axial resolution.



Improvement of metal loss measurement by increase of axial resolution

High-resolution tools can now be operated at inspection speeds that in most cases do not require the pipeline operator to reduce the pumping speed and thus the throughput of his pipeline. The progress of ILI will continue in the future although the performance capabilities of latest ILI tools have already reached a very high level compared to the first generation tools.