



Dry contact ultrasonic inspection technique in automatic systems.

MATVEL nodularity control

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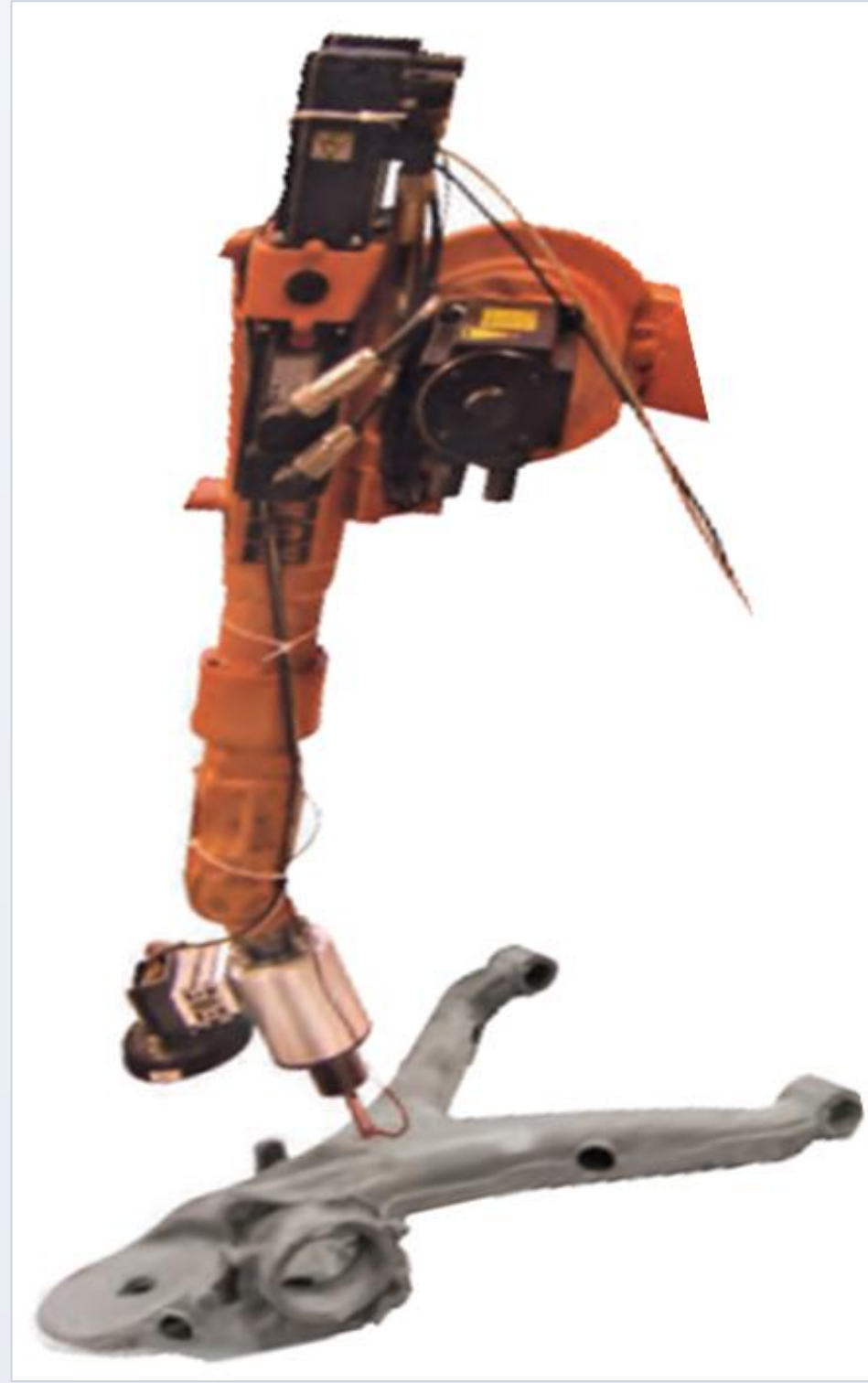
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INTRODUCTION

One of the most challenging issues for automatic integration in ultrasonic systems is the coupling of the probe with the component to be tested. Most common systems use water or oil in local or total immersion.

The following paper will present an innovative dry coupling system, where no coupling media is needed, that can be applied into different, fully automated, inspection techniques.

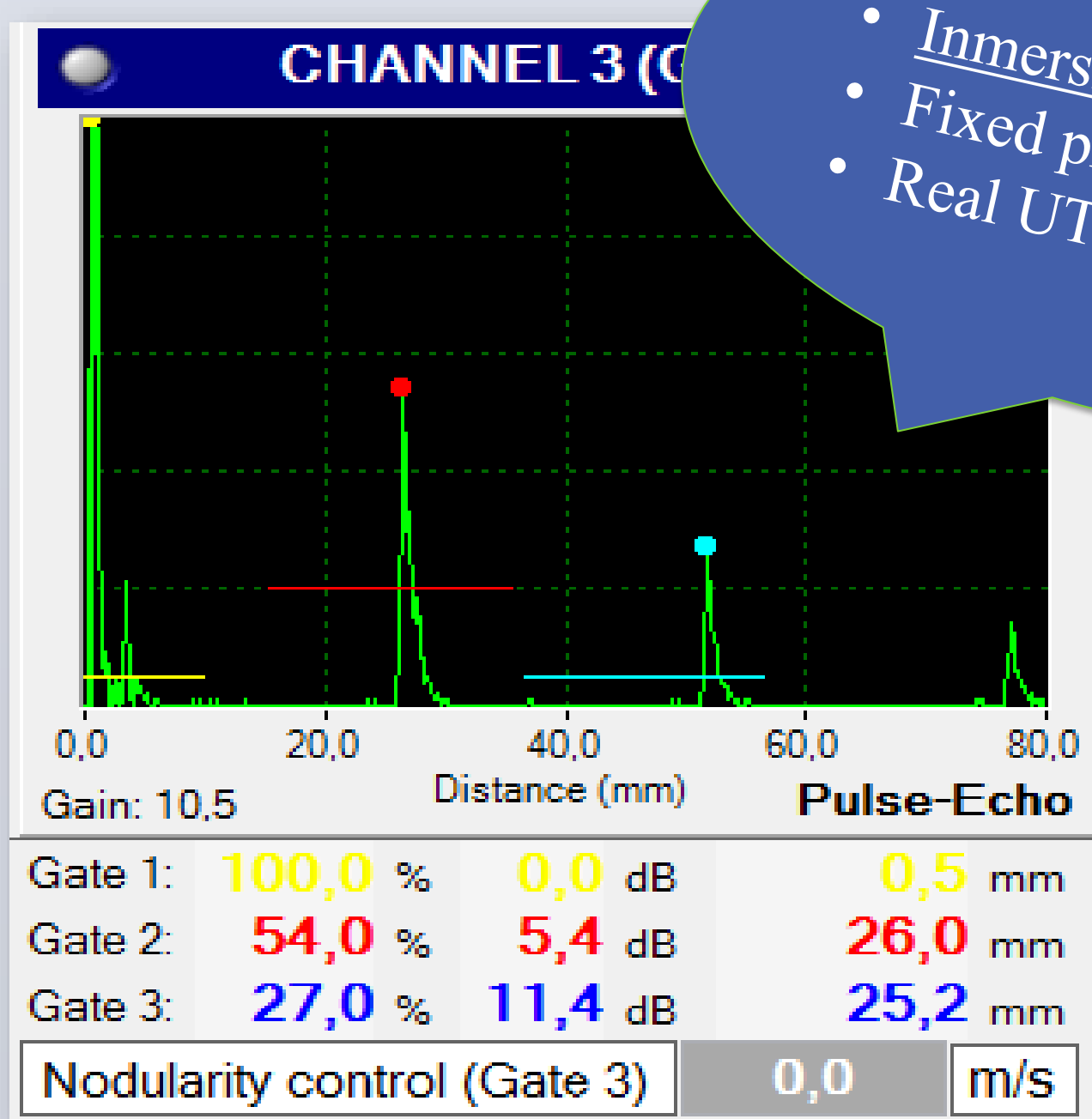
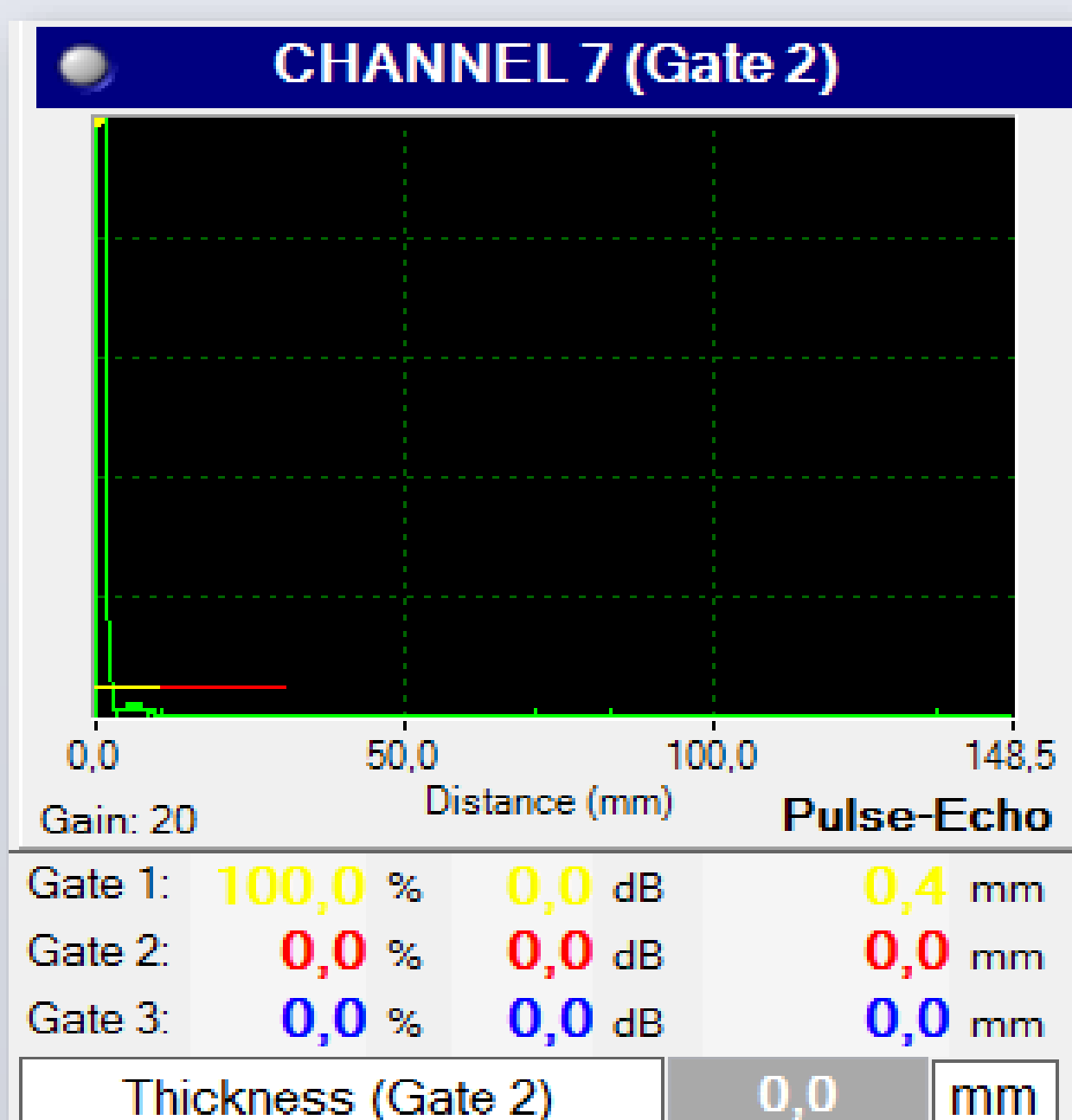
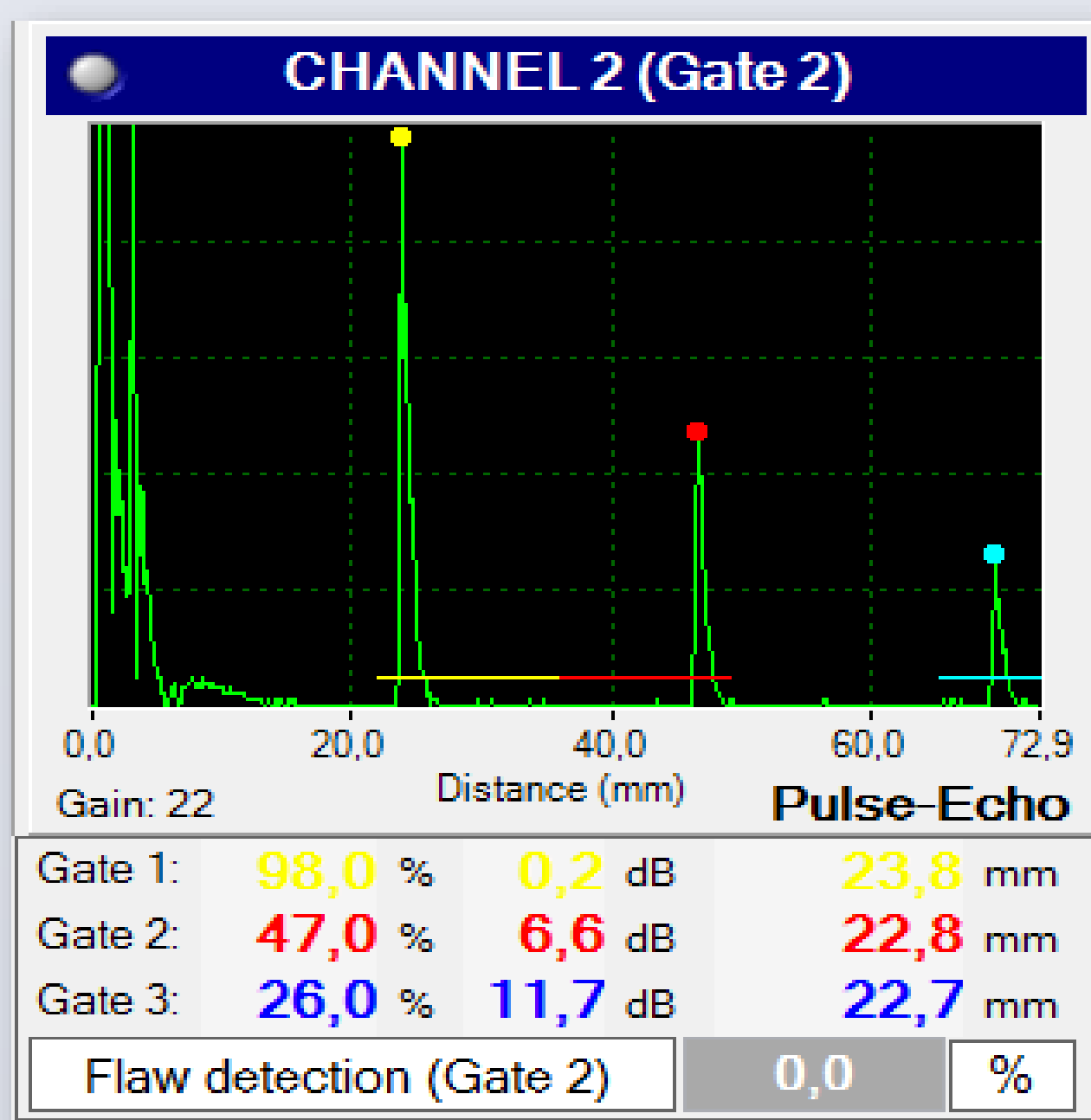
A particular application of this Dry contact inspection technique is MATVEL UT Nodularity control.



OBJECTIVES

The MatVel is an up to 8 channel state of the art digital ultrasonic nodularity control system for industrial applications in the cast iron industry; uniquely offering dry coupled ultrasonic measurement capability. The system is suitable for manual or in-line spot testing of components. This is achieved by using a customized transducer and delay line.

The MatVel combines all the functionality of an outstanding flaw detector together with specific add-ons customized for the application. The system can therefore meet the requirements for any set up, with live A-scan signal presentation and direct reading of acoustic velocity, thickness measurements and flaw (in spot) detection.



- Immersion technique.
- Fixed probes distance.
- Real UT Velocity

To optimize the performance of the MatVel a specific series of transducers has been developed. Depending on the thickness range of the component at the test area, there are a range of state of the art delays of differing dimensions available: interchangeable spherical, rounded tip cylindrical or thin flat. The specific design of the delay has been developed for optimum coupling, acoustic impedance matching and durability under challenging mechanical and environmental testing conditions on rough casting surfaces.



CONCLUSIONS

MATVEL What for?

MATVEL 80 is a complete system for Nodularity, thickness measurement and flaw detection in iron castings.

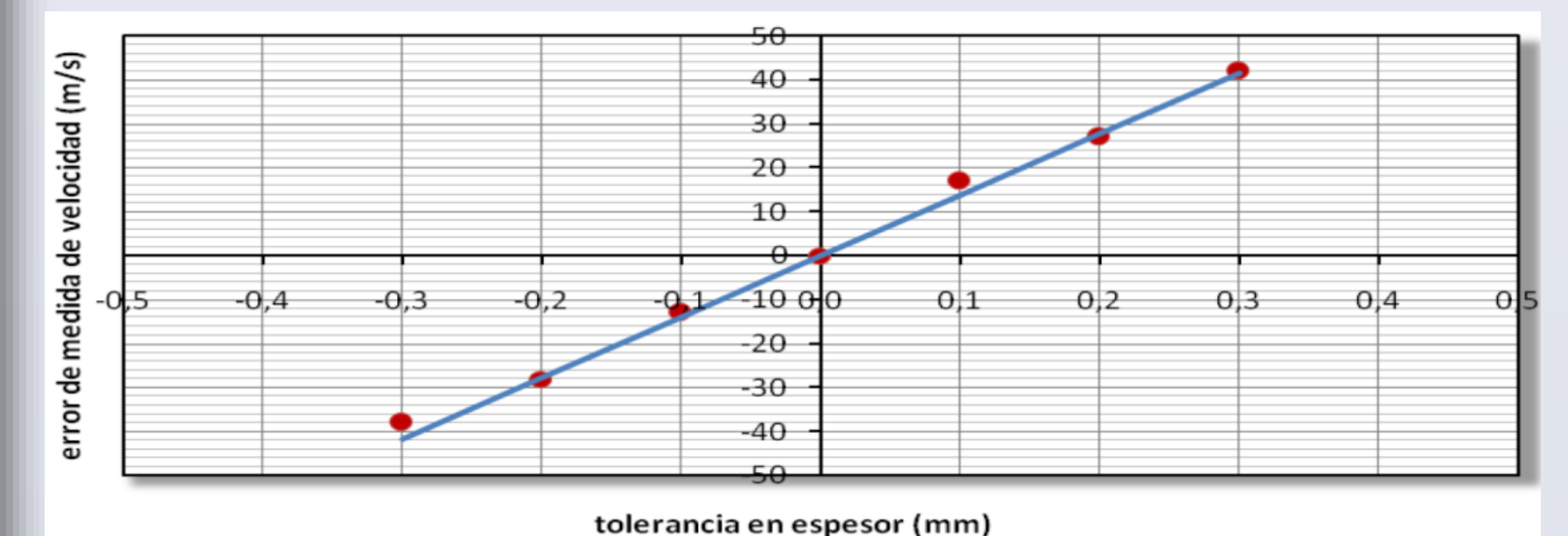
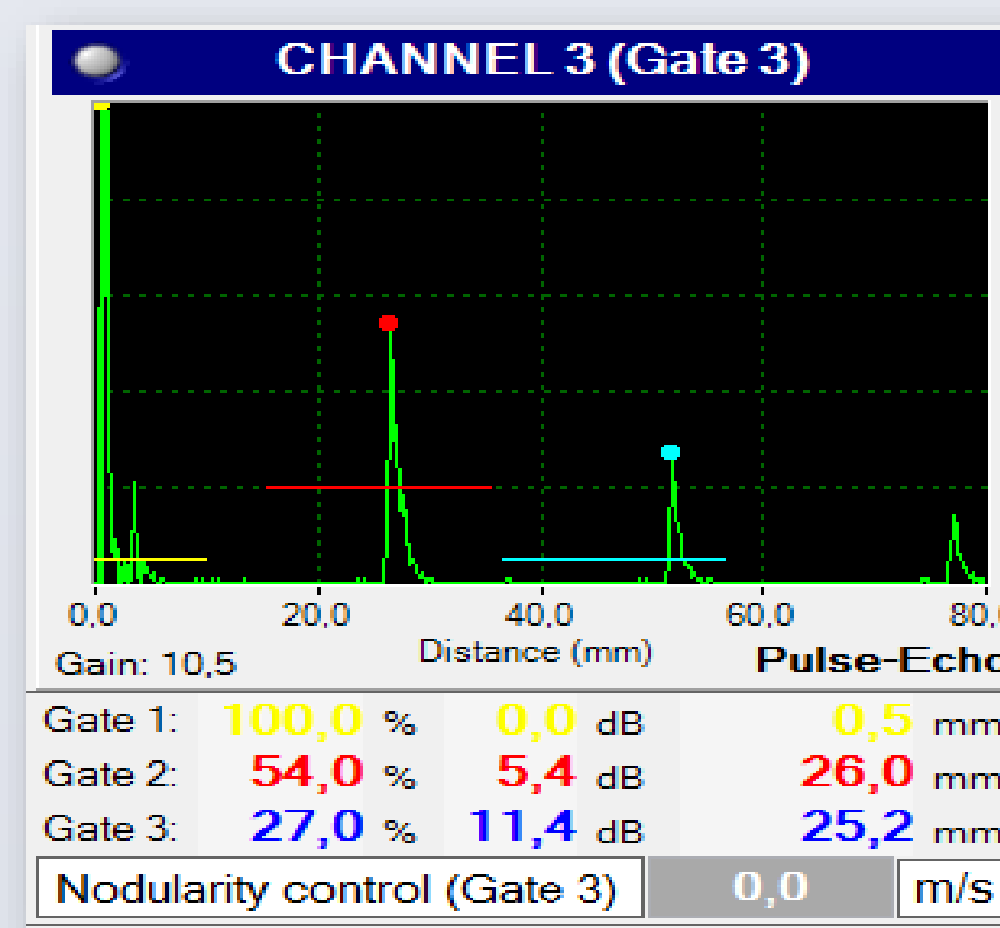
Advantages:

- Manual and Automatic mode
- Dry contact probes or immersion technique
- Direct velocity, thickness and flaw measurements
- Programmable alarms

Main features

- Manual Multichannel system up to 8 independent channels and 3 gates per channel.
- Easy user interface, one app for UT control and external configuration.
- Real time information, fast internal calculation.
- Automatic calculation for: UT velocity calculation, Defect detection, Real thickness
- Internal synchronization and easy connection for external integration, PLC, reporting etc

Tolerancia (mm)	t (mm)	C (m/s)	Error real (m/s)	dif C %	calculo error (m/s)
-0,3	40,60	5.635	-38	-0,67%	-41,61
-0,2	40,70	5.645	-28	-0,49%	-27,74
-0,1	40,80	5.660	-13	-0,23%	-13,87
0	40,90	5.673	0	0,00%	0,00
0,1	41,00	5.690	17	0,30%	13,87
0,2	41,10	5.700	27	0,48%	27,74
0,3	41,20	5.715	42	0,74%	41,61



Dry Contact: small tolerance in UT velocity due to real vs nominal thickness

Configuration

MATVEL 80 it is an autonomous module ready for the integration on the most common process lines as one additional step or to be installed in a separate inspection cabinet.

Main components:

- Socomate 8 channel UT PC Board with remote pulser
- Digital I/O outputs PC Board, and PLC,
- 2 or 4 MHz transducer
- Spherical or membrane delays (acc. to thickness)
- Software app. for automated control,
- Acquisition, evaluation, reporting.

Unique dry couplant technique

Different shapes for the delays are available together with different probe configurations (frequency and dimensions) to assure the best approach to the customer part. Delays composition with excellent SNR and more than 40.000 tests per rubber balls and 10.000 tests per membranes.

REFERENCES

This system developed in Tecnitest has been taken to the following companies:

- Fundería Condals
- Casting Ros
- Fagor Ederlan
- Autoparts WUHU CO. LTD
- Robert Bosch

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