

# Quality Control of Complex Geometries

## Application Notes

**Background:** Mission success depends on reliable, high performance parts. Effective quality control of manufactured parts is necessary to ensure that they perform their intended function without fail. This is especially true for advanced parts with complex geometries. One way of verifying conformance to specification is through thickness gaging. On complex parts, accurate and repeatable thickness readings can be difficult to obtain with standard mechanical measurement methods. More advanced methods, like radiography, are expensive and have their own limitations. For these type of application, Ultrasonic Thickness Gaging provides a precise, reliable, and economical solution.



Ultrasonic Thickness Gaging delivers precise measurement of wall thickness by sending out a sound wave and “listening” for the return echo. This “pulse-echo” method only requires access to one side of a wall, enabling measurement where one side of the part is obstructed. Probe faces can be small, and attached to angled handles, allowing measurement of within physically restrictive dimensions. Measurements can also be performed quickly. Once a probe and gage is set up for a specific material, contact with the part at different locations will yield instant and repeatable readings.

## Equipment:



[TG-410 Thickness Gage](#)

## Key features

- Single and dual element transducers
- Contact, delay/immersion, through-transmission, shear mode
- High-Speed LCD display
- Freeze-screen direct access button
- SplitView: Dual A-Trace display
- SplitScan: View A-Scan and time-encoded B-Scan simultaneously
- Peak Echo Hold: Fixed or timed “waterfall” reset
- Default and user programmable setups
- Rugged aluminum case with rubber end caps
- Windows based Data Transfer software optional

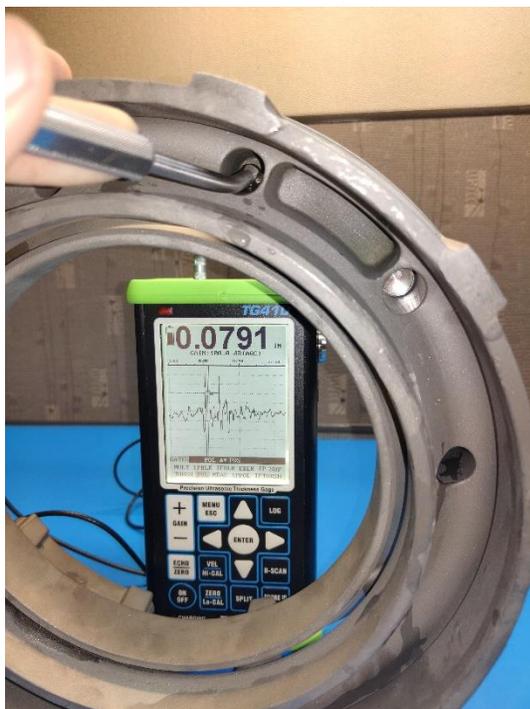
# Quality Control of Complex Geometries

## Application Notes

**Technical Outline/Procedure:** A regular customer of NDT Systems required assistance in improving their quality control process. They needed to measure the wall thickness of various regions on the pictured part, but were not able to take reliable readings with other methods they tried. It was determined to use an NDT Systems TG-410 Thickness Gage in conjunction with an AE12205-A ultrasonic probe. The TG-410 is an A-trace capable device with adjustable gain and gates, and the AE12205-A is a 12MHz pencil-style probe with an angled shaft.



Cast parts are generally acoustically attenuative, and the higher frequency needed for precise measurements can be difficult to resolve without a waveform trace and adjustable gates. By setting the gain high enough on the TG-410, and blocking out the excess noise from the initial pulse, repeatable measurements down to four decimal places with an 80% FSH are achievable. The delay line on the AE12205-A enables higher gain settings than a comparable contact transducer by delaying the interface echo, allowing the user to determine which signals are noise and which are valid echos.



After observing the successful measurement of the part, the customer decided to purchase the TG-410 and the AE12205-A, and to implement them in their production quality control process.

For thicker parts manufactured with more acoustically attenuative materials, pairing the AE12205-A with the NDT Systems Novascope 6000 Precision Thickness Gages would be a more robust solution.

Please contact NDT SYSTEMS for information on similar applications and solutions.