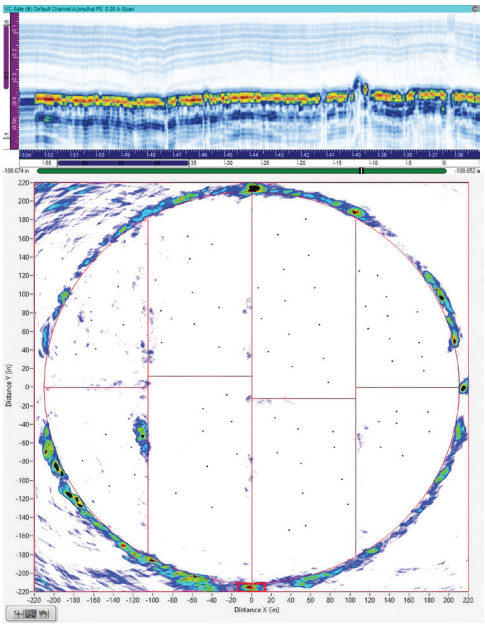
Structural Integrity Associates, Inc.®

TANK INSPECTION SOLUTIONS
NONINTRUSIVE AND ROBOTIC NDE SERVICES





TANK INSPECTION WITHOUT THE DISRUPTION

Periodic inspection of storage tanks has traditionally involved draining the tank, cleaning it, and sending personnel inside. That approach costs time, takes the tank out of service, and creates confined-space risks.

Structural Integrity Associates (SIA) takes a different approach. You may be meeting API 653 inspection intervals or a license renewal commitment. Either way, we start by defining the inspection scope your program actually requires, then choosing the least intrusive method that meets it. When we can inspect from the outside of the tank, we do. When equipment has to go inside, we have technology that often allows deployment without draining the tank or sending people in.

These technologies were first developed for nuclear plant aging management programs. They now support conventional power generation, petrochemical, and municipal utility facilities.

TANK FLOORS FROM OUTSIDE THE TANK

SIA's Guided Wave Phased Array (GWPA) technology scans the floor annulus from the external tank chime. The tank stays in service, and no one goes inside. This is the floor zone where corrosion often starts and where many inspection programs require coverage.

- Floor annulus scans from the tank chime
- No draining or tank entry
- Minimal surface preparation
- Identifies and prioritizes areas for future monitoring or follow-up NDE

EXTERNAL WALL AND ROOF INSPECTION

On the tank exterior, SIA deploys a remotely operated magnetic crawler that climbs carbon steel shells and can be retrofitted with a variety of probe types, including:

- GWPA for large area volumetric coverage
- Phased Array Ultrasonic Testing (PAUT) and/or Time-of-Flight Diffraction (TOFD) probes for weld examinations
- Ultrasonic and/or PAUT probes for thickness mapping
- Automated weld tracking with multi-probe setups
- Corrosion mapping
- Repeatable, programmable scan paths
- Magnetic wheels for vertical and overhead travel on carbon steel

If needed, SI can manually perform all of the inspections mentioned above, in addition to performing pulsed eddy current inspections on insulated structures to minimize or avoid insulation removal.



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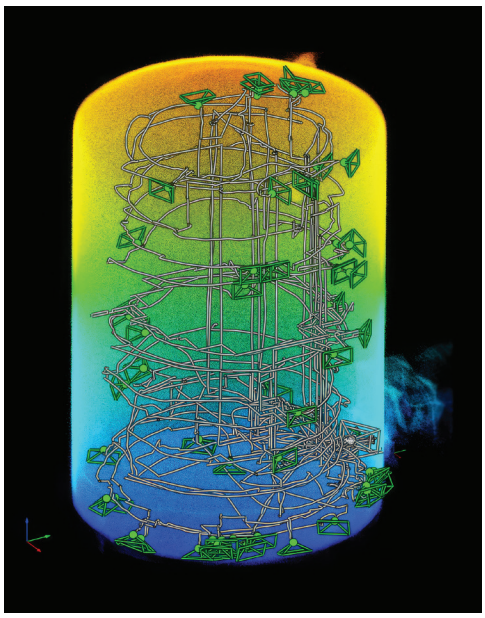
ROBOTIC INTERIOR TANK FLOOR & WALL INSPECTION

When a full-floor examination is needed, SIA's submersible robotic crawler carries the inspection technology into the tank. One of the main benefits of SIA's approach is the use of GWPA technology to quickly providing 100% volumetric screening of the tank floor or shell to pinpoint areas for more detailed examination with localized techniques.

- **100% volumetric floor coverage** via our robotic platform
- **Capable of climbing walls** to allow shell examination from the internal surface.
- **Fits through existing tank access points**, so no new openings are needed
- **Quick sensor changes between GWPA, UT, PAUT, EMAT, etc."**
- **Acoustic positioning system**: sound pulses travel from the robot to receivers on the exterior tank wall and track the robot's absolute position at all times. Positioning does not depend on cameras, so it works in murky or opaque liquid and is not subject to encoder error or drift.
- **Repeatable results**: The robot serves as a delivery system for multiple NDE technologies:
  - **Guided Wave Phased Array (GWPA)**: rapid, full-coverage screening of large areas with minimal surface preparation
  - **Ultrasonic Thickness Testing**: quantitative wall thickness measurements using traditional transducers and/or non-contact EMATs that can provide thickness measurements with up to 0.25in lift off if needed."
  - **SIPEC Electromagnetic Thickness Testing**: SIA's proprietary dynamic pulsed eddy current technique. Scans through internal liners and up to several inches of sediment.

REMOTE INTERNAL VISUAL INSPECTION

When a tank needs a complete visual inspection, SIA deploys the drone that fits the tank's condition. In drained tanks, a collision-resistant indoor drone covers walls, floor, and roof in one deployment, inspecting 100% of internal surfaces in as little as a single shift. Simultaneous Localization and Mapping (SLAM) with LiDAR keeps it oriented in GPS-denied spaces and maps the tank interior while capturing high-resolution video. In tanks that stay filled, where a flying drone can't go, a submersible camera drone maneuvers on all axes and records detail with a high-resolution camera with a wide 200° field of view. Onboard SONAR assists imaging and navigation, and a manipulator arm retrieves objects from the tank. Either way, no personnel enter the tank, and no scaffolding is needed. Together with the robotic crawler, this gives you visual and volumetric interior inspection from one provider.



Built for Confined Spaces

- Collision-resistant indoor drone
- Navigates cluttered, GPS-denied environments
- High-intensity lighting system

Accurate Mapping & Documentation

- High-resolution photo and video
- Simultaneous Localization and Mapping (SLAM) with LiDAR and visual odometry cameras

BEYOND THE INSPECTION

SIA engineers turn inspection data into decisions:

- Disposition and detailed evaluation of findings
- Finite element analysis (FEA) and fracture mechanics flaw assessments
- Engineering handbooks developed before the inspection for real-time disposition of findings
- Integration with MAPPro™ for risk ranking and future program planning
- Cathodic protection system assessment and modernization
- Inspection scope development aligned with API 653, your integrity program, or your aging management program

Need broader NDT support across your petroleum or petrochemical facility? Integrity Specialists, an SI Solutions company, provides field inspection services for tanks, piping, and pressure equipment.

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