



**SONOMATIC**  
RAIS  
SPHERA

INTRODUCTION



**SONOMATIC**  
**RAIS**  
**SPHERA**

A FAMOUS SCOTSMAN DAVID LIVINGSTON ONCE SAID  
"WE ARE PREPARED TO GO ANYWHERE, PROVIDED IT IS FORWARD"

## WORKING IN AND INSPECTING SPHERES/VESSELS

- ✦ By definition a confined space is not designed for continuous employee occupancy hence very little consideration has been given to the preservation of human life within these confined spaces.
- ✦ Between 2011 to 2018, 1030 workers died from injuries involving a confined space, asphyxiation was the leading cause of death.
- ✦ Just four years ago in 2019 - Houston - 2 employees working in confined space died from exposure to hydrogen sulphide gas.
- ✦ These confined spaces included tanks and vessels. We must find a better way to move forward.



## SPHERA - NEXT GENERATION INSPECTION

SPHERA is the result of our creative and innovational Team at Sonomatic RAIS.

Our engineers, technicians and industry experts worked together to create a concept that paves the way for a safer, more effective and economical approach to inspecting inside confined spaces. Changing the way the data is collected, significantly increasing the quality and quantity of the data and ultimately reducing confined space entry, costs and the impact to our environment.



# SPHERA

**NOUN [SFĪR-A].**

A SEMI AUTONOMOUS WELD INSPECTION CRAWLER  
FOR THE INTERNAL AND EXTERNAL INSPECTION OF  
SPHERES AND OTHER CARBON STEEL VESSELS.

# SPHERA



SONOMATIC

PORTABLE

HIGH - RESOLUTION

EFFICIENT

REMOTE - CONTROLLED

ATONOMOUS

PROVIDING AN

✦ ECONOMICAL

✦ CLEAN

✦ SAFE

SOLUTION FOR THE INSPECTION OF SPHERES

# SPHERA

## API/HSE ADVISEMENT ON INSPECTING SPHERES

"A full inspection of welds on aging assets is to be completed as defects that were impossible to identify during manufacture, have found to be growing in the high tensile strength of the plates used on the spheres, leading to failures around the world."



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VIDEO OF SPHERA IN ACTION



SPHERA IN ACTION



# SPHERA



1 HEALTH & SAFETY

2 COSTS

3 ENVIRONMENT

# HEALTH & SAFETY

SPHERA MEANS THERE IS NO LONGER A REQUIREMENT FOR A LARGE NUMBER OF OPERATORS TO CONTINUALLY WORK INSIDE A CONFINED SPACE.

✦ Provides a semi-automated inspection meaning once the calibration and set-up checks have been completed, there is no requirement for anyone to work inside the sphere.

- Various disciplines of people working together in a confined space are no longer required.
- Working at height inside a confined space for prolonged periods of time is no longer required.
- Over-reaching and stretching when doing manual inspection methods such as MPI is no longer required.
- Working with abrasive cleaning methods such as wire brushes is no longer required.

✦ All Technicians and the pilot are located externally, monitoring the Inspection from a safe distance - where possible, inside our purpose-built vehicle equipped with monitoring and communication equipment.

✦ Inside the sphere The HALO is deployed to support SPHERA and the umbilical as the crawler maneuvers around the welds. - if the crawler detaches, the HALO system immediately arrests the fall, bringing the crawler and umbilical to a controlled stop.

# COSTS



## SIGNIFICANTLY REDUCES NON-PRODUCTION TIME

- ✦ Crawler requires a Team of three, greatly reducing costs with savings on labor. Inspection campaign - based on a 14 meter wide Sphere, Sonomatic estimate the Inspection to take approx 15-17 days. Dependent on factors such as hours of access provided to Sonomatic RAIS by the client, weather, cleanliness of sphere, etc.
- ✦ The more we learn, the faster this process will become, the financial gains will be significant as the sphere returns to service early.
- ✦ The ability to carry out visual inspection in real-time means the client can highlight areas of concern quickly and can decide to move the Crawler back to the area and either deploy additional methods to further investigate, or simply gain confidence he/she is satisfied with the visual over the identified area.



# ENVIRONMENT



SONOMATIC RAIS SUPPORT THE PLEDGE ISSUED BY SIR JIM RATCLIFFE IN SEP 2022 - "INEOS ROADMAP TO ACHIEVING NET ZERO EMISSIONS BY 2050 - AND TO MEET THE IMMINENT "REDUCTION TARGET OF 33% BY 2030."

- ✦ Sonomatic offers an option to add our patented laser to the crawler if there is a concern of rust or debris existing in the sphere.
- ✦ Our carbon footprint is reduced because we only require a Team of 3, whereby the existing system can have up to 12 + people inside the sphere at any one time.
- ✦ Commuting efficiently - Transportation is a major source of CO2 emissions and accidents! with the significant reduction in personnel required for the project Sonomatic RAIS reduce our emissions by using only one vehicle for the project.
- ✦ Sonomatic RAIS are working with our supply chain partners to identify products that are harmful to our environment and where possible replace them with sustainable use products that are energy efficient and reusable to the maximum extent.
- ✦ Replace any aggressive and damaging methods with alternative less impactful techniques, ideally, clean, green energy.



# KEY FACTORS

✦ Confidence in the integrity a high quality inspection with repeatable verification of the results and in full compliance with regulation and best practice can bring.

✦ Duration of the actual inspection time will be reduced significantly – providing massive savings on down-time from production.

✦ Minimal man entry – HSE risk reduction.

✦ Reduced total cost of inspection.

✦ Reduced impact on the direct and global environment.

✦ Leading the way with innovation .

# KEY FEATURES



- ✦ Phased Array and Time of Flight Diffraction (ToFD) Inspection detects surface and subsurface breaking defects, including traverse cracking.
- ✦ 16 Element ACFM probe capable of scanning up to 90mm in single scan, scanning for surface breaking defects.
- ✦ 3D Profiler takes a detailed image showing height, depth and width of the defect initially identified by ACFM or Phased Array Inspections.
- ✦ High Definition Video, and Lighting Systems - allowing us to accurately view the weld and surrounding areas.
- ✦ All footage is captured, recorded and sent to the client for analysis and acceptance.
- ✦ Supported by The HALO - Safe Fall System/Rescue Plan.

# LIMITATIONS

- ✦ Surface condition (any loose rust or dust will influence the moveability).
- ✦ Weld condition and profile (any weld spatter has a potential to cause detachment).
- ✦ Sphere needs to be ferromagnetic.
- ✦ Manway needs to be greater than 440mm.
- ✦ Any furniture inside the sphere will have a potential of being a restriction.
- ✦ Access - closer we get to the sphere, the better chance we have of collecting quality data.





 **SONOMATIC**  
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SPHERA

3D ANIMATION SHOWING SPHERA AND THE HALO

ANIMATION



SONOMATIC  
RAIS



PEOPLE / SAFETY / QUALITY / INNOVATION

# THE TEAM!



✦ Neil King, Technical Consultant and co-author of IGGN 30.

✦ Lukasz Korziuk - Sonomatic RAIS Advanced NDT Manager and PCN Phased Array and ToFD Level II , UT Level III.

✦ Alasdair Blair - Sonomatic RAIS Technical Manager and Eddy Current Welds Level III, ACFM Level III.

✦ Christian Shaw - Sonomatic RAIS Rope Access Manager - IRATA Level III.

✦ Colin Barker - Sonomatic RAIS Regional Manager (South).

✦ Tracy Anderson - Sonomatic RAIS - Vice President.

The background of the entire image is a close-up of a robotic arm. The arm is primarily white and grey, with several purple LED light rings and white spotlights. A digital display on the arm shows '00:10'. The scene is dimly lit, with the lights from the robot providing the main illumination.

“May You Never Stop Reaching, Stumbling, Exploring, and Learning”