

# Elevating mobile robotics with aerial NDT



2025  
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VOLIRO 

## Time-consuming and hard to implement

Non-destructive testing (NDT) techniques such as wall and coating thickness measurements detect corroded or eroded surfaces. Most such inspections take place at height and include hard-to-reach locations such as angled surfaces.

**Problem:** Current solutions are usually time-consuming (e.g. scaffolding) and often can't reach all necessary locations (e.g. cherry pickers, magnetic crawlers).

**Voliro's solution:** Measurements at any height and from any angle in a short time (e.g. 1-2 hours for a complete storage tank)



## Time consuming and puts personnel at risk

Verifying the function of lightning protection systems on wind turbines is essential for the safety of these assets. In Germany this inspection is mandatory once a year and insurances are in the process of establishing it internationally.

**Problem:** Current solution with rope access takes 6+ hours per turbine

**Voliro's solution:** 20-30 minutes per turbine with Voliro T



## DRONE EVOLUTION — FROM DRONES TO AERIAL ROBOTS



**2013**  
**Drone**

First reliable self-flying drones with manually attached cameras



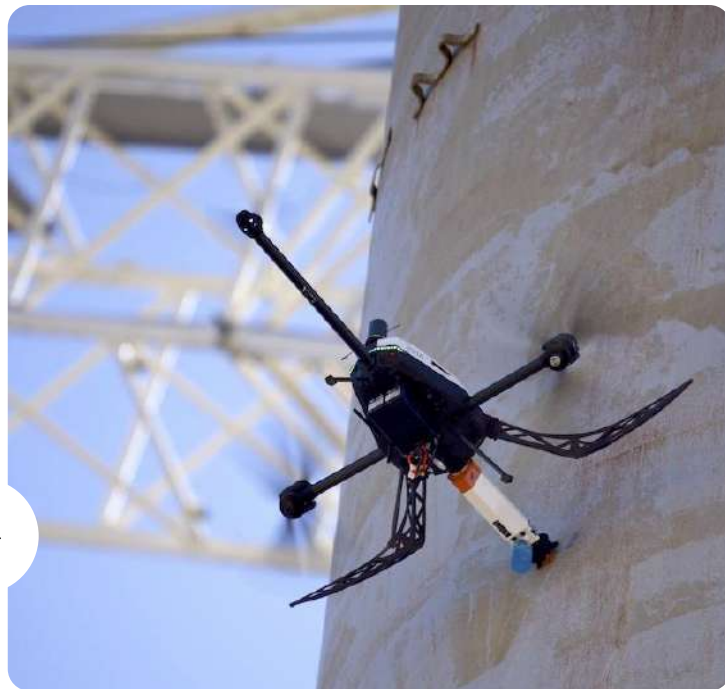
**2015**  
**Video drone**

Live video feed from the drone to the ground controller



**2017**  
**Industrial drone**

Ruggedized hardware with advanced sensors (e.g. thermal)



**2022**  
**Aerial robot**

Completely novel hardware design to enable contact and interaction with surfaces



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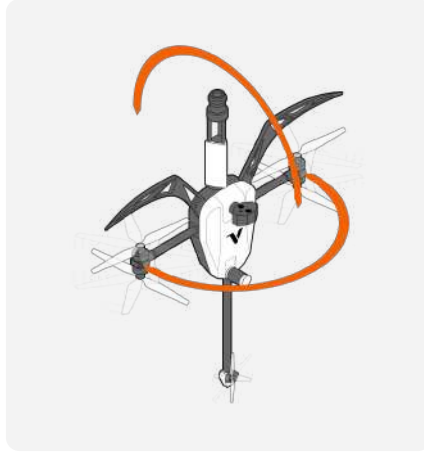
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## AERIAL ROBOTICS CAPABILITIES



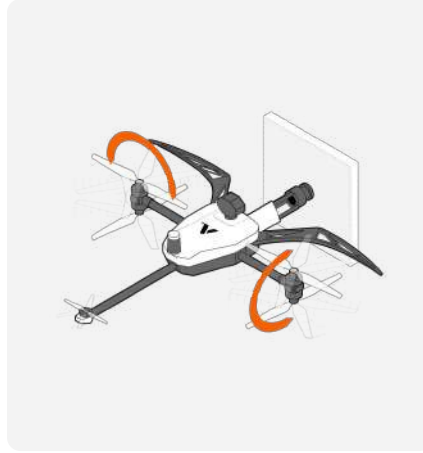
### Contact and interaction

Applies up to 30 N of force and several Nm of torque to structures



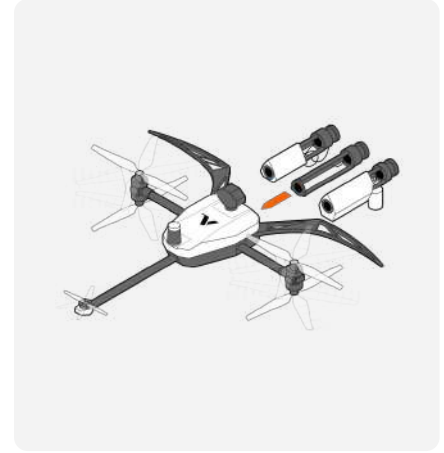
### Any orientation

Tilts 90 degrees up- or downwards to establish contact in any direction



### Stability and constant force

Resists against heavy winds and gusts with independently tilting rotors



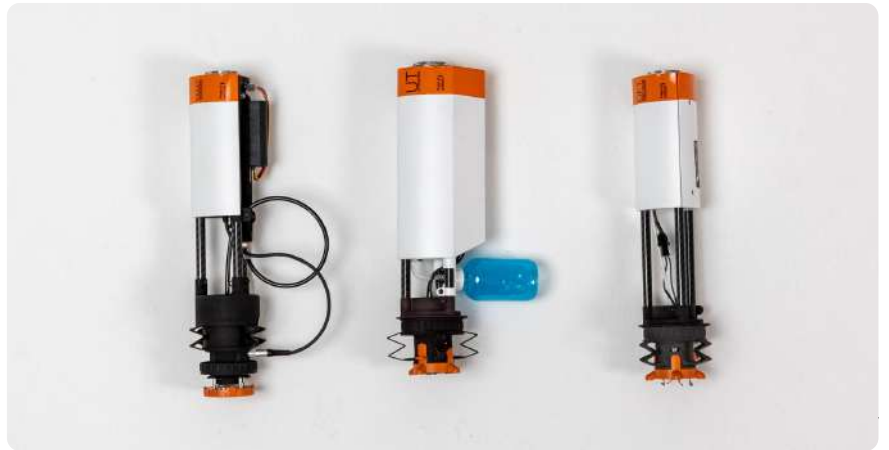
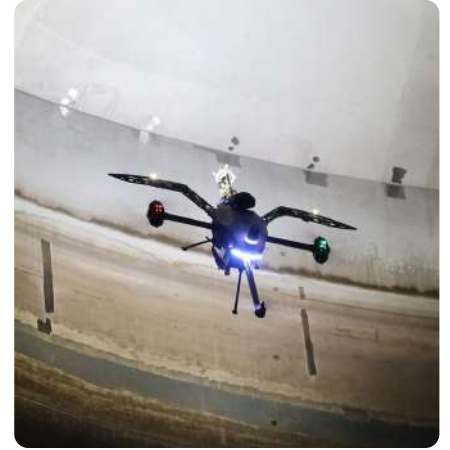
### Robotics platform

Modular payload architecture for NDT, wind turbine LPS testing and third party integrations

## A flying robotic platform

Contact-based inspections:

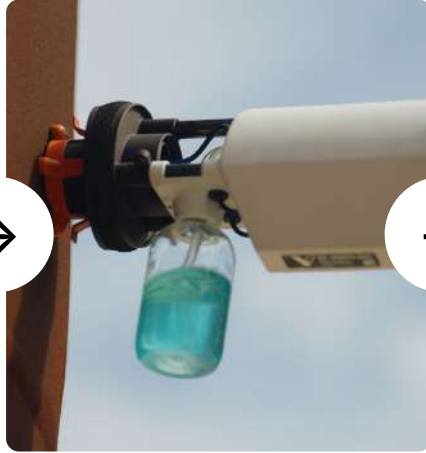
- At height
- Outside and inside
- From any angle
- Various sensor payloads



END-TO-END WORKFLOW



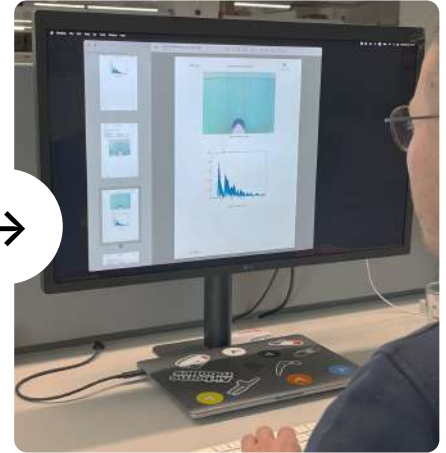
Calibration



Measurement in the air



Reading on the ground



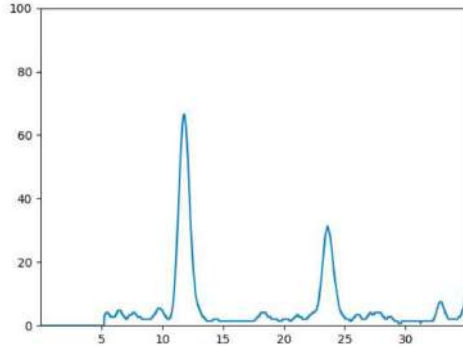
Analysis of the report

## REPORTING

### 2.3.2 Results

Table 12: Location 2 Major Findings

Point	Timestamp [s]	Measured [mm]	Reference [mm]	Comment
1	29 August 2023, 08:46:21	12.213	-	-
2	29 August 2023, 08:46:54	12.148	-	-
3	29 August 2023, 08:47:57	12.048	-	-
4	29 August 2023, 08:48:13	12.363	-	-
5	29 August 2023, 08:48:54	12.148	-	-
6	29 August 2023, 08:50:04	12.323	-	-
7	29 August 2023, 08:50:19	12.263	-	-
8	29 August 2023, 08:44:38	6.168	-	-
9	29 August 2023, 08:44:57	6.226	-	-



### Point 1

GPS position (latitude, longitude): 51.87163701, 4.28793208

Table 13: Details results for Point 1 on Location 2

<b>Thickness [mm]</b>	12.213	<b>XYZ Coordinates [m]</b>	92.29	-7.08	71.06
<b>Rotation</b>	Pitch: 0.1°	<b>Timestamp [s]</b>	29 August 2023, 08:46:21		



Figure 30: Location 2 - Point 1

## CASE STUDY

# Wall thickness measurement: Furnace and smoke stacks

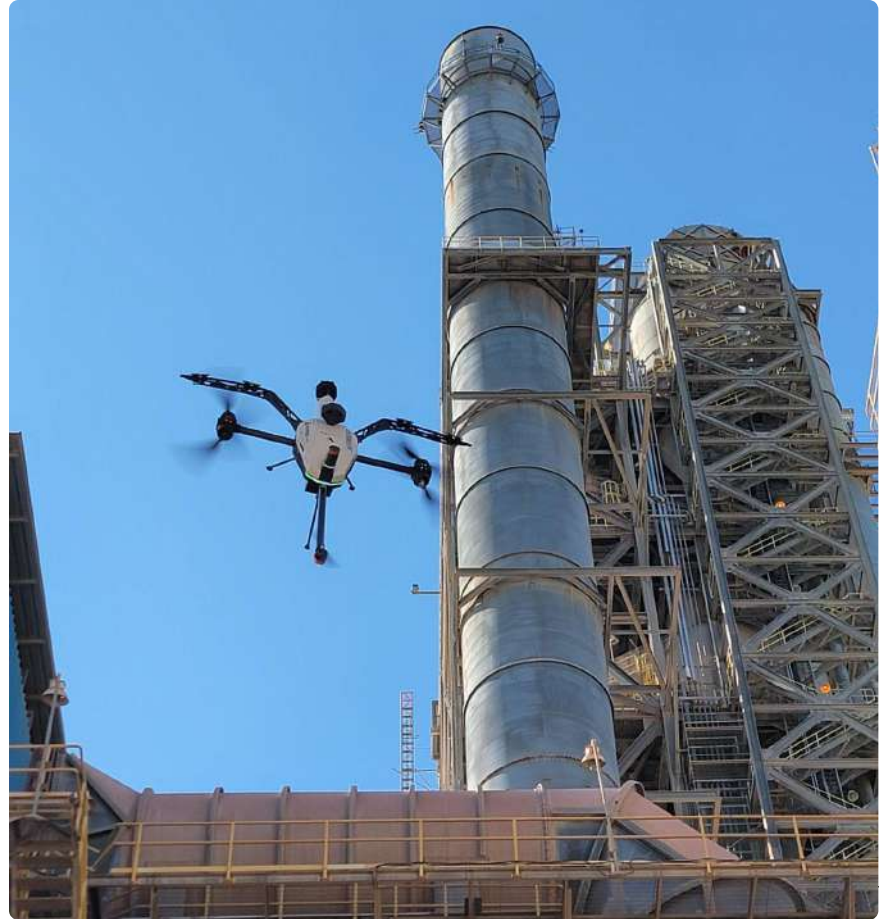
### Benefits:

- No scaffolding required
- Reduced crew size
- Nobody exposed at height

### Case study outcome:

- Saved 24 days of work
- Saved the client \$165,000

[LinkedIn post](#)



CASE STUDY

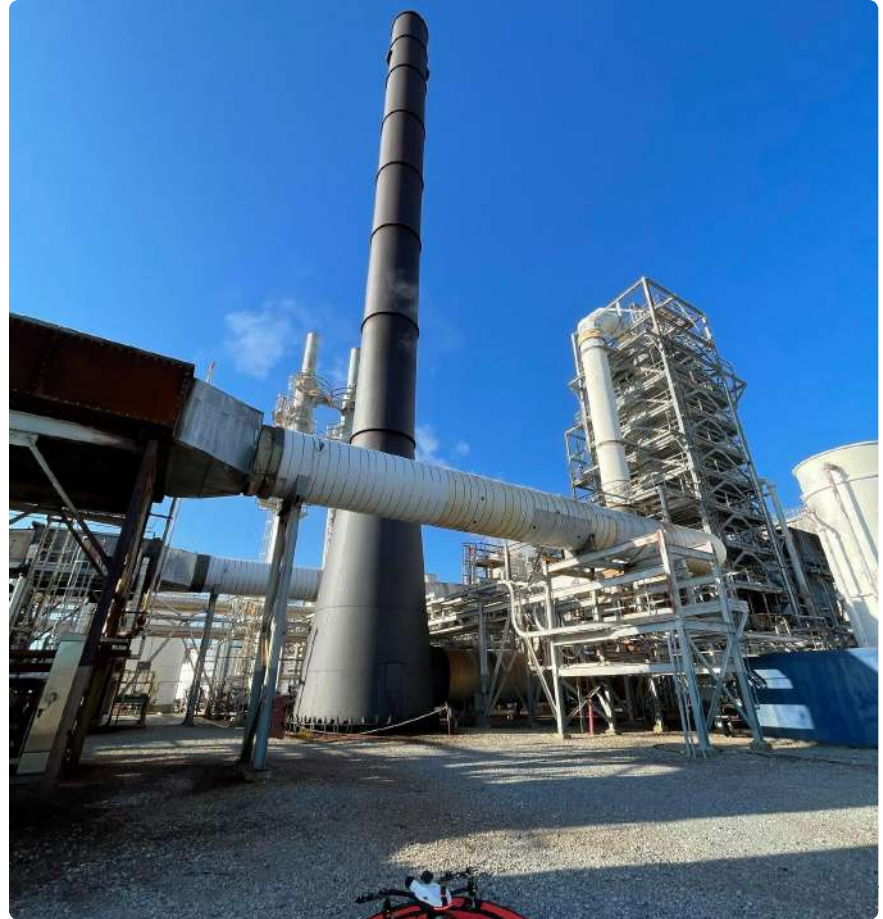
## High temperature wall thickness measurement: Furnace stack

Benefits:

- No asset downtime required
- Surface temperatures up to 260 °C / 500 °F
- Nobody exposed at high temperature or height

Case study outcome:

- 180 ft stack in 1 h 40 min
- 200 measurements



## CASE STUDY

# Wall thickness measurement: Furnace and smoke stacks

### Benefits:

- 100 readings per hour
- No scaffolding or rope access required
- Readings at hard-to-reach locations

### Case study outcome:

- Two complete stacks in less than 2 hours
- No downtime, inspection on operational stacks

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## CASE STUDY

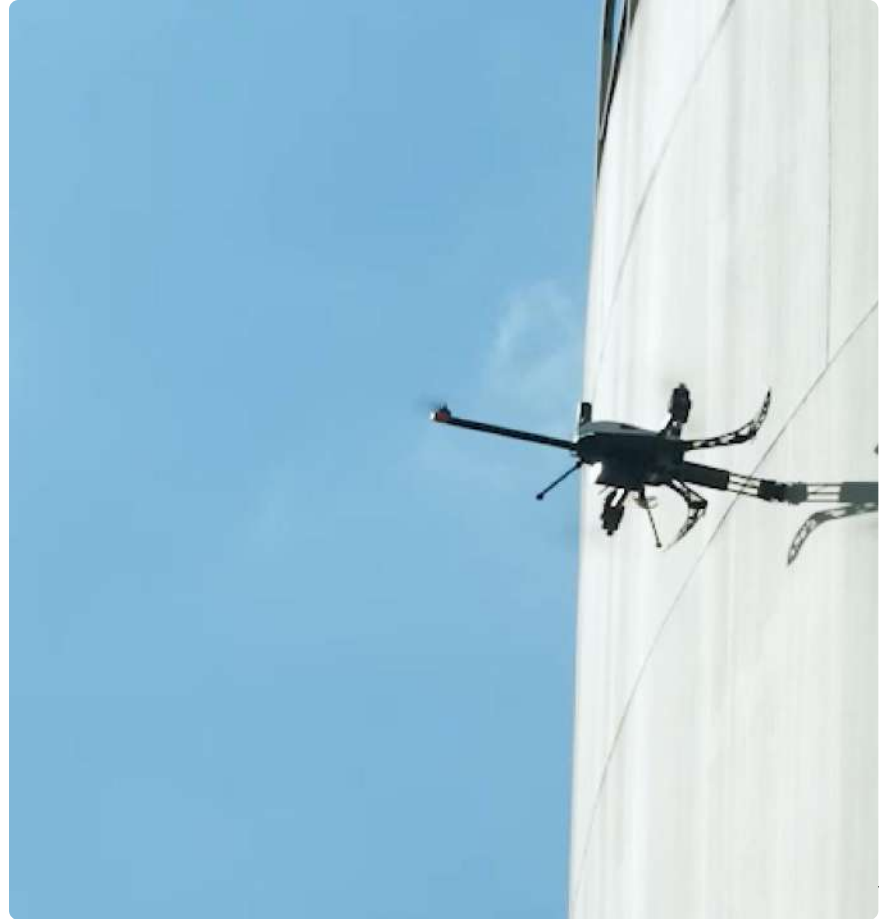
# Wall thickness measurement: Storage tank (outside)

### Benefits:

- 120 readings per hour
- 5-10 tank inspections per day
- No scaffolding required

### Case study outcome:

- Saved 615m<sup>3</sup> of scaffolding
- Saved 400 working hours for installation and dismantling



## CASE STUDY

# Wall thickness measurement: Storage tank (outside)

### Benefits:

- 120 readings per hour
- Readings on the walls and roof
- Readings at hard-to-reach locations
- No cherry picker required

### Case study outcome:

- 5 tanks completed in 1 day
- 75 minutes for 1 tank
- 8 scanlines



## CASE STUDY

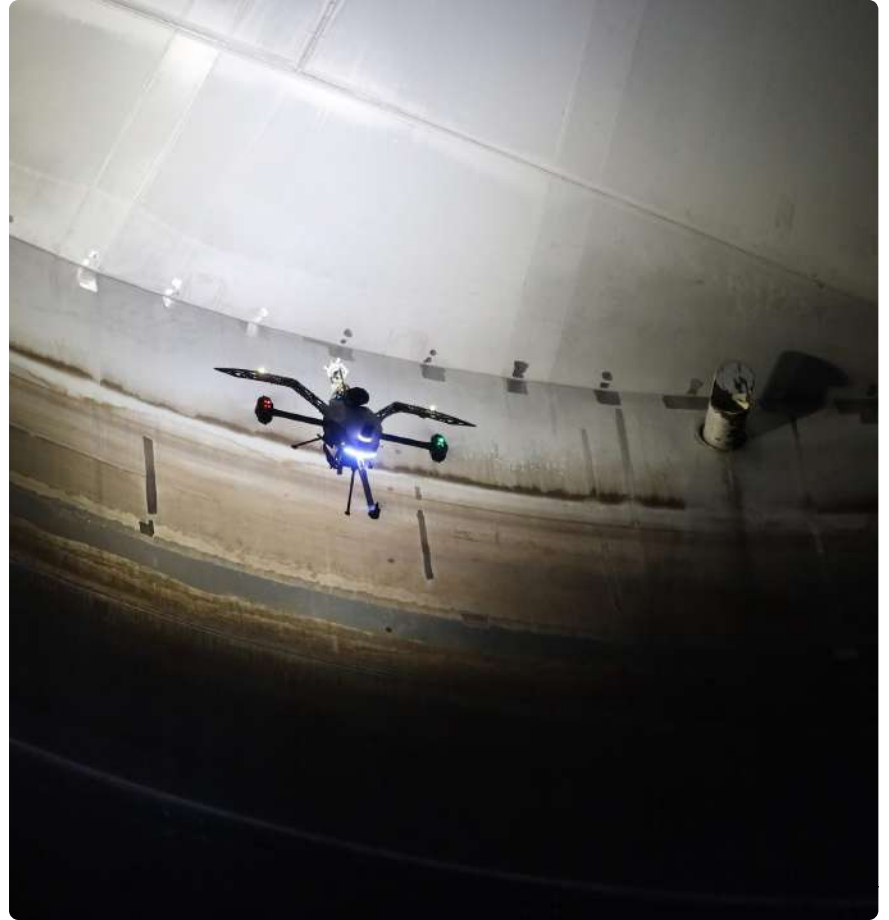
# Wall thickness measurement: Storage tank (inside)

### Benefits:

- 120 readings per hour
- Readings on the walls and roof
- Readings at hard-to-reach locations
- No scaffolding required

### Case study outcome:

- 5 tanks completed within 1.5 days
- 700 readings



## CASE STUDY

# Mining inspection: Ore extraction surge bin hopper

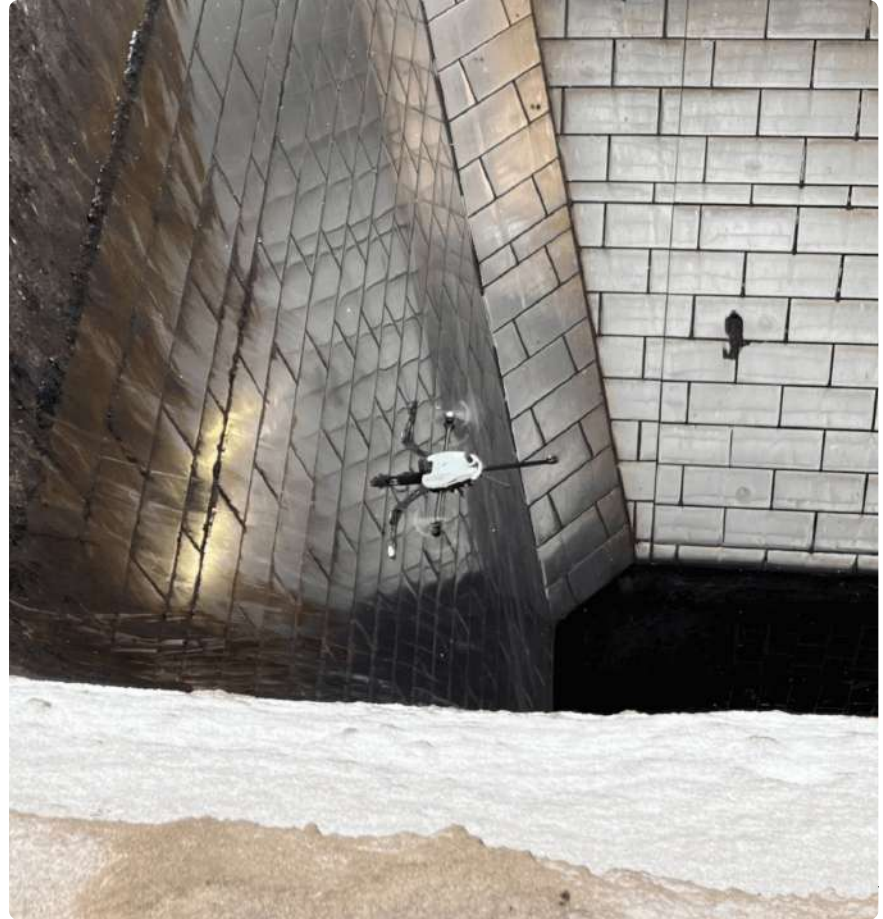
### Benefits:

- No scaffolding required
- Avoided costly downtime
- Nobody exposed at height

### Case study outcome:

- Inspection time was reduced from 2 weeks to 40 minutes
- Saved the client \$1.2M CAD in cost savings
- Reduced high-risk activities and ensured continuous operation of the equipment.

### [Case study](#)

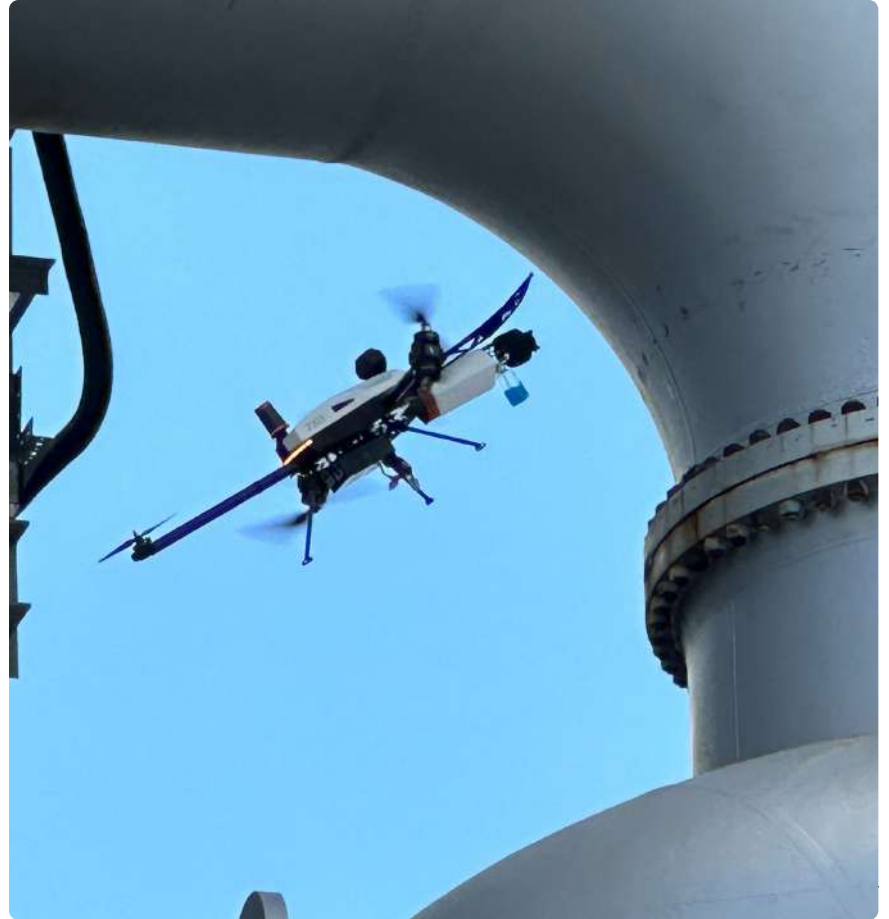


## Wall thickness measurement: Overhead piping

### Benefits:

- 50-100 readings per hour
- No scaffolding or rope access required
- Readings at hard-to-reach but critical locations (e.g. pipe elbows)

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## Wall thickness measurement: Downcomer pipe

### Benefits:

- No surface preparation with EMAT
- No scaffolding required

### Case study outcome:

- Saved weeks to build up a platform to reach
- Points taken around the pipe including the angled section
- No downtime, measurements taken at high surface temperatures



CASE STUDY

## Wall thickness measurement: Fire suppression ring

Benefits:

- 50-100 readings per hour
- No cherry picker required
- Reliable readings on small pipe diameter

Outcome:

- 30 readings around the fire suppression ring
- Avoided berm modification required for cherry picker access

[Success Story Video](#)



## CASE STUDY

# Wall thickness measurement: Cement kiln

### Benefits:

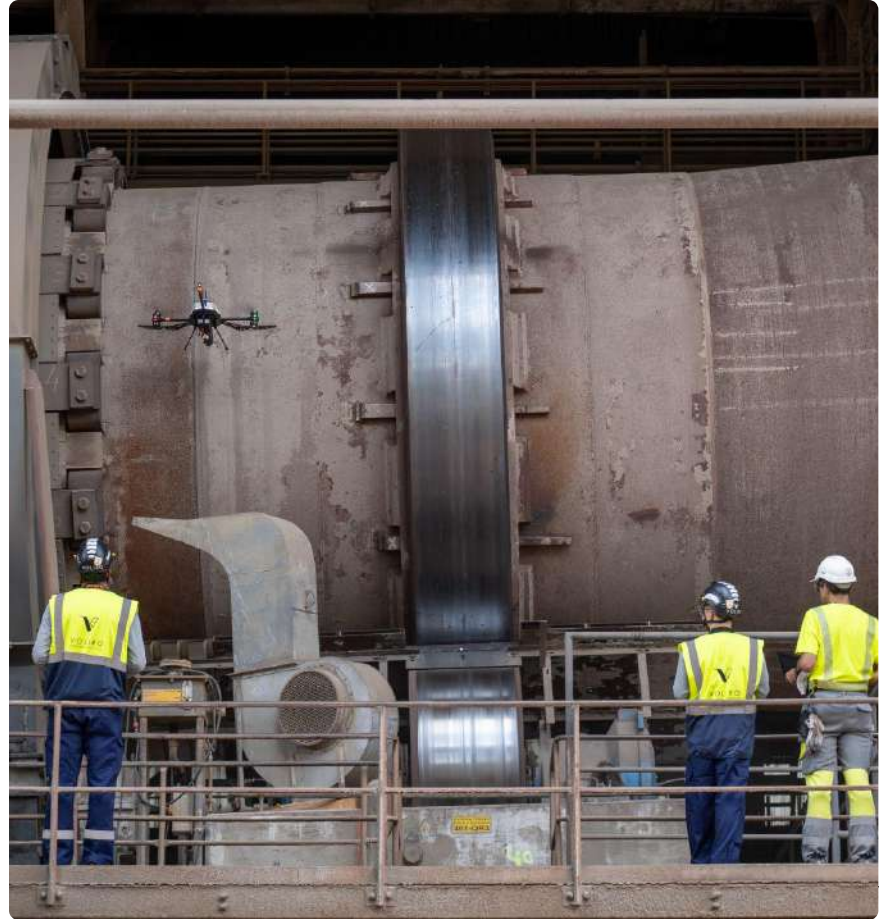
- No surface preparation with EMAT
- No cherry picker required

### Case study outcome:

- 4x reduction of inspection time
- 3x more measurement points
- Avoid the requirements of a cherry picker

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CASE STUDY

## Wall thickness measurement: Shiploader

Benefits:

- No platform on water required
- No scaffolding required

Case study outcome:

- Inspected locations that have never been inspected
- 50 points taken in region of interest
- Avoid the requirements of building a platform on water

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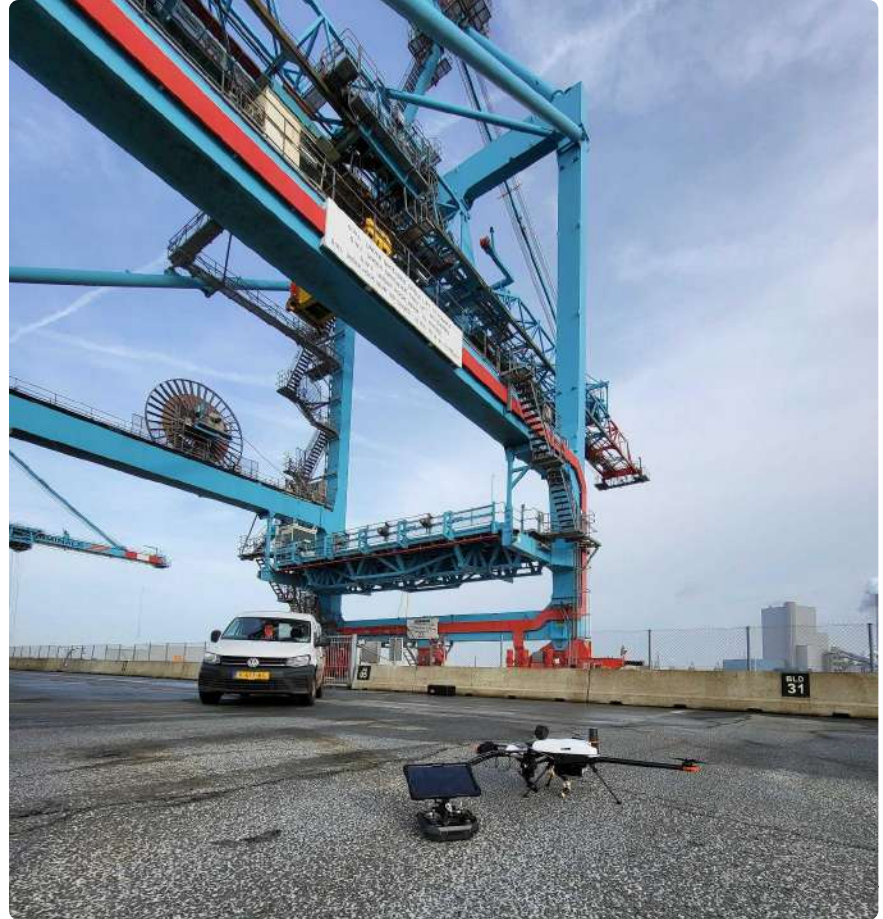
# Wall thickness measurement: Harbor crane

## Benefits:

- Additional measurements taken in difficult to access areas which could not be inspected easily
- Point measurements with Voliro T possible on and near visible rust spots

## Case study outcome:

- EMAT measurements work on flaky paint surface
- Existing solution was to take measurements at easy to access locations (eg. on steps), not in the regions of interest
- Possible to do a much thorough survey in half a day



CASE STUDY

## Coating thickness measurement: Transmission tower

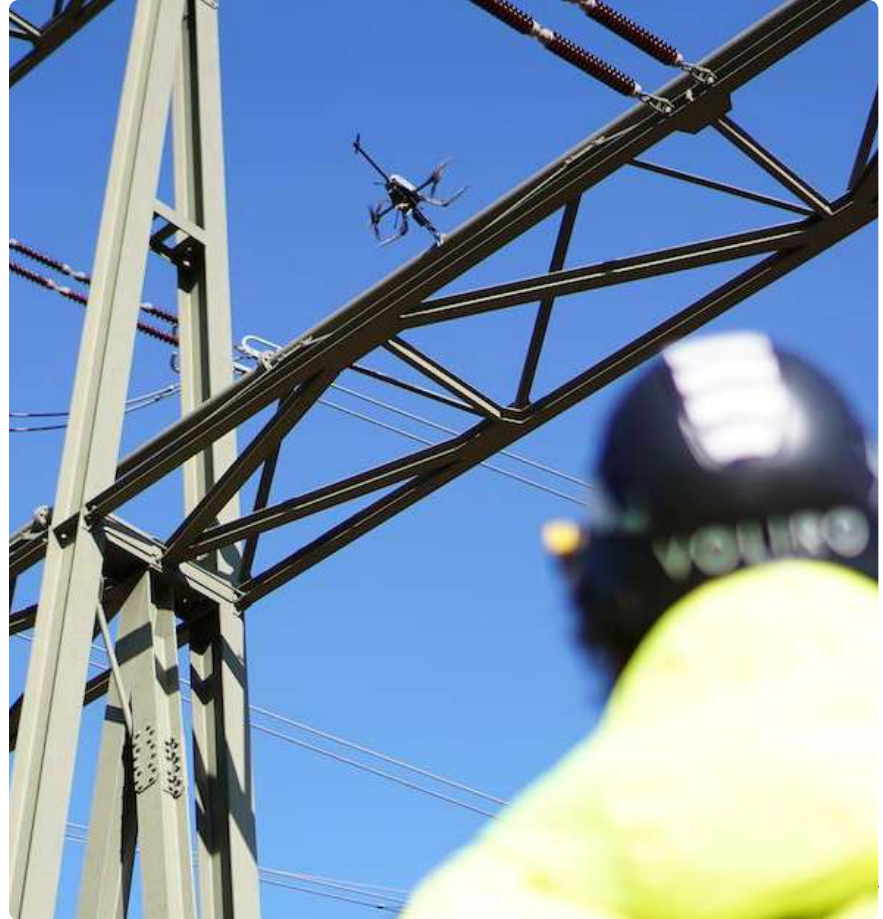
Benefits:

- Inspection on operational tower
- No coordination of shutdown
- Immediately after painting

Case study outcome:

- 10+ towers inspected per day

[Success Story Video](#)



## Lightning protection system test: Wind turbine

### Benefits:

- 20-30 minutes standard inspection time
- 1 person operation
- 1 stop inspection in any rotor orientation
- 250 meters inspection height
- No access to the hub or nacelle required

### Case study outcome:

- 10-12 wind turbines inspected per day



## CASE STUDY

# Lightning protection system test: Offshore wind turbine

### Benefits:

- 20-30 minutes standard inspection time (excl. setup)
- 1 person operation
- 1 stop inspection in any rotor orientation
- 250 meters inspection height
- No access to the hub or nacelle required
- Take off from the turbine platform or vessel



## VOLIRO CUSTOMERS

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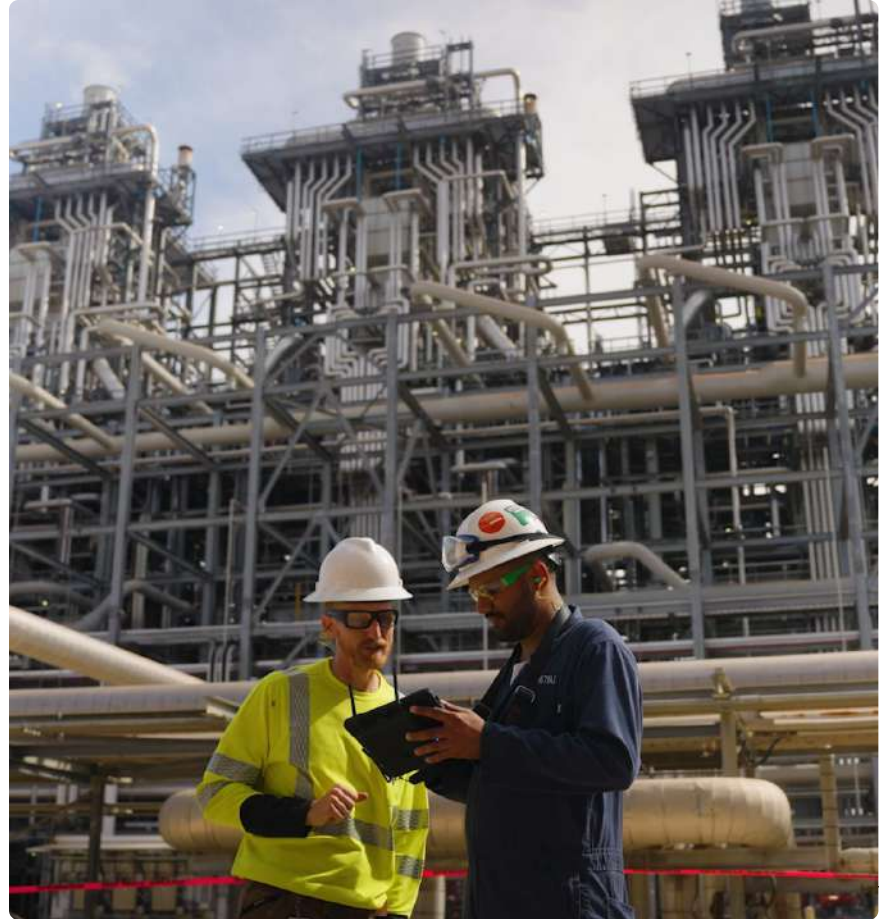
## A platform with unmatched customer experience

In the ever-evolving field of robotics, our Voliro T drone, offered through a yearly subscription, is the perfect fit for the NDT industry:

- Versatility with the largest selection of NDT payloads
- Safe investment due to compatibility with future payloads and hardware improvements
- Always up-to-date with software and feature updates
- Predictable budget with no hidden cost, everything included

Subscription includes:

- Drone and payloads
- Training and support
- Insurance
- Software updates
- Annual hardware refresh and recertification





THANK YOU

Book your demo now: [sales@voliro.com](mailto:sales@voliro.com)

# Voliro T

## Key technical specs

Size (folded):	78 × 78 × 34 cm / 30¾ × 30¾ × 13½ in
Size (unfolded):	118 × 109 × 34 cm / 46½ × 43 × 13½ in
Navigation:	RTK GPS & optical flow/LiDAR (for GPS-denied)
Cameras:	4K 12 MP, FoV 80° & FoV 40°
Wind resistance:	12 m/s max, 6 m/s for precise interaction
Temperature:	-10 to +40 °C
Batteries:	2× 6S, 99.9 Wh (airplane portable)
Flight time:	10-14 min (depending on payload)

