

Robotic Cleaning Presentation



Site Map



CSE Worker Impact

OSHA Statistics

Over 4.8M

workers enter confined space annually

OSHA Statistics

128

on average, workers die in confined space annually

NIOSH Statistics

60%

of CSE fatalities are rescuers

Ecorobotics Safety Data

0
5 Year
Severity Rate

0
5 Year
DART

0
5 Year
Recordable Cases

Why You Need Ecorobotics



Substantial Cost Reduction



Up to 2000 barrels per day Removal Rate



50%+ Reduction in Waste Volumes



90% Reduction in Crew Size



Elimination of CSE



Industry Leading Safety Record



Markets Served



Oil & gas



Chemical plants



Pulp & paper mills



Municipality



Agriculture



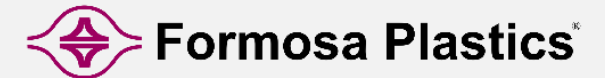
Power plants



Materials Managed

- > Wastewater and Bio Solids
- > Molten Sulfur
- > Crude/Refinery Sludges and Liquids
- > Chlorine Sludges
- > Cat Fines
- > Paper Process Liquors
- > Acid/Caustic Sludge and Liquids
- > Hazardous Chemical Derivatives
- > Pyrophoric Sludge/Liquids
- > Any Vacuumable or Pumpable Material

Clients Include



Customer Feedback



Safety performance is **BEST IN CLASS.** Internal feedback was **WOW!!**

Operations Manager
Gulf Coast Chemical Facility



Project was completed in a **much safer, timelier, and cost-efficient manner.**

Outage Manager
Gulf Coast Refinery




Impressive **unique technology,** done **without any human entry**

Asset Gate Keeper
Gulf Coast Refinery



High value for your **willingness to work with our team.** **Great job!**

Sourcing Manager
Chemical Manufacturing Company



ecorobotics

An aerial photograph of an industrial facility at dusk. The sky is a mix of deep blue, purple, and orange. In the foreground, a large, light-colored metal building with a dark roof is illuminated. The word "ecorobotics" is written in bright white letters on the side of the building. A yellow forklift is parked in the open bay of the building. The surrounding area is dark, with some other industrial structures visible in the distance.

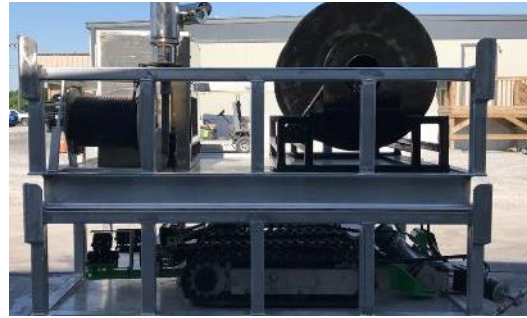
Equipment Package



Triplex Pump
60 gpm



Umbilical Reel



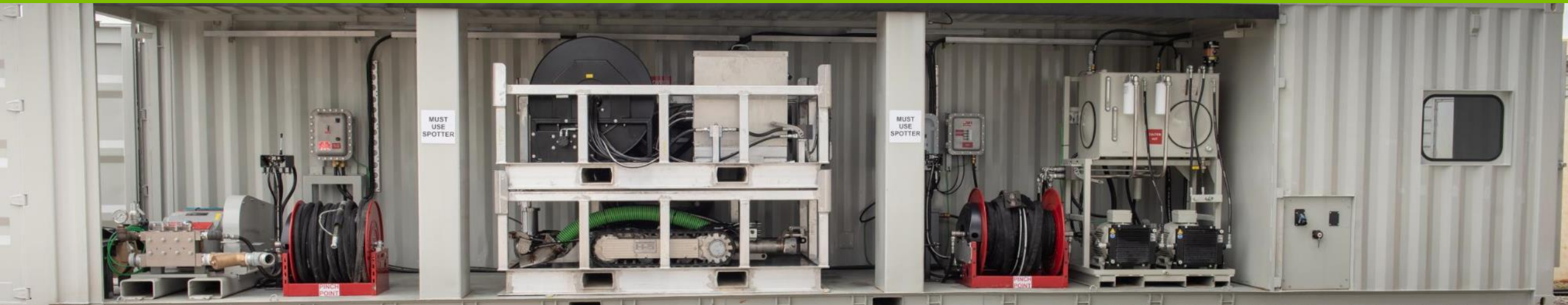
Electro-Hydraulic
Manifold Skid



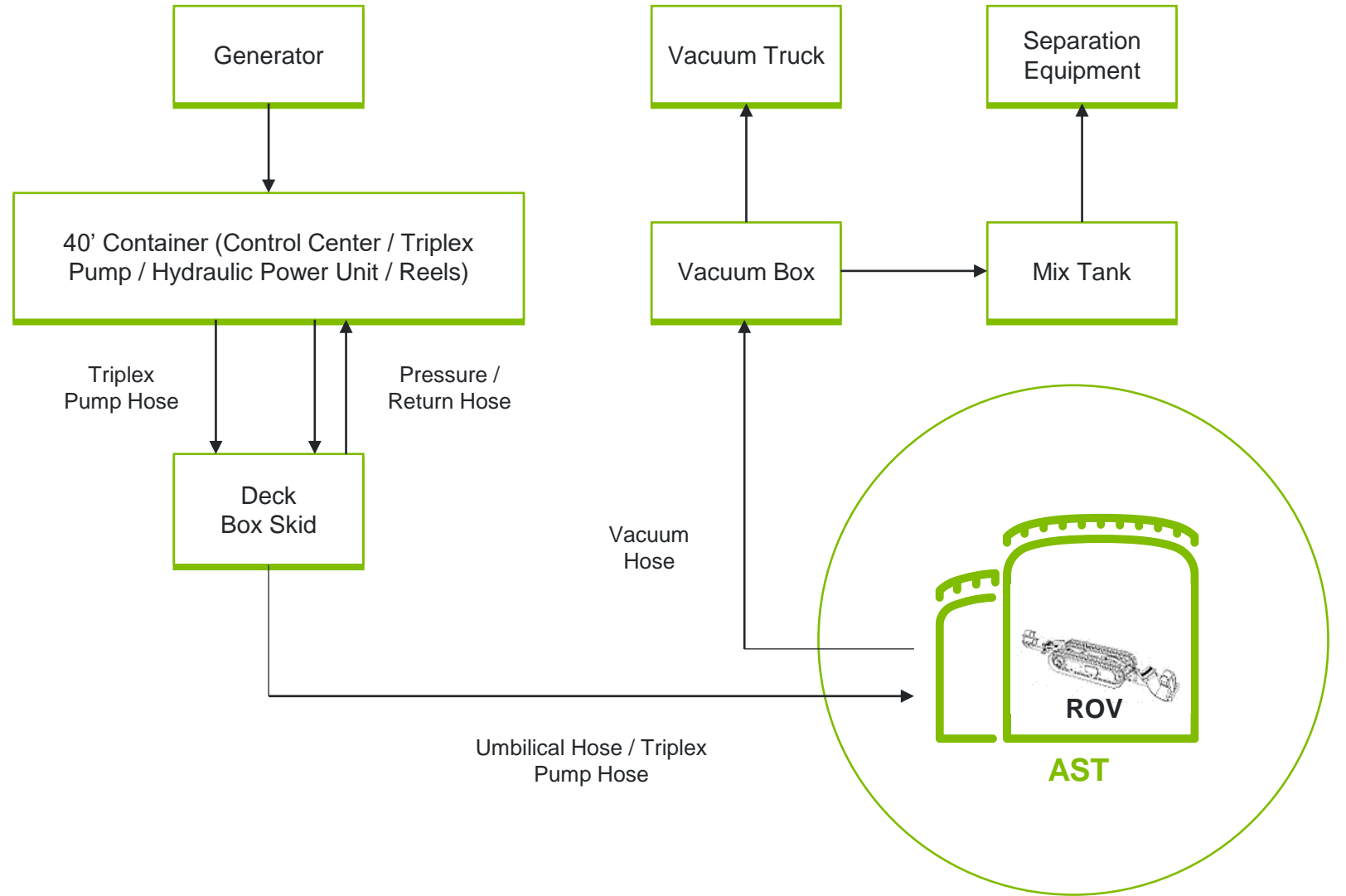
H5 - Vacuum Head
H5 - Articulating Arm



Control Cabin
Live Video



Standard Equipment Layout



Memberships



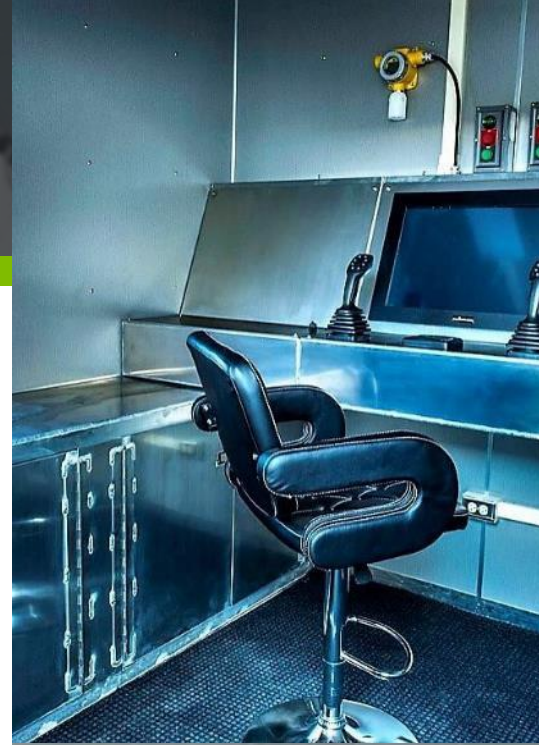


Custom Technology

Developed In-House

Robotic Cleaning System

- > Electric over Hydraulic control system
- > Adaptable to a 4" or 6" vacuum hose
- > Stainless steel chassis
- > Comes with 160' of umbilical hose
- > Designed to fit through a 24" manway



Applications

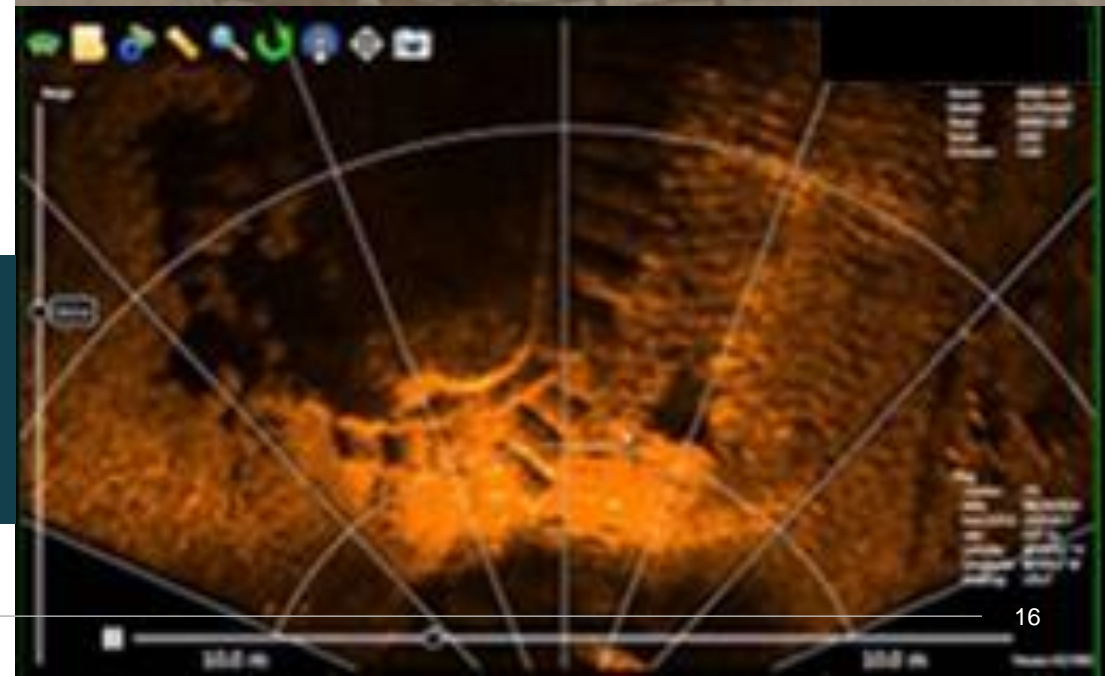
- Storage Tanks
- Basins
- Sumps
- Pits
- Culverts
- Cooling Towers

Online Cleaning System

- > Capable of Solids De-Bulking Online
- > De-Bulking with onboard hydraulic solids-handling pump or vac assisted diesel pumps
- > Suction inlet designed to reduce turbidity during cleaning operations
- > Side-scanning sonar for navigation in tanks or basins
- > Can produce up to 60yrd³ per shift of solid waste

Applications

- Storage Tanks
- Cooling Towers
- Sumps
- River Inlets
- Pits
- Open Top Storage

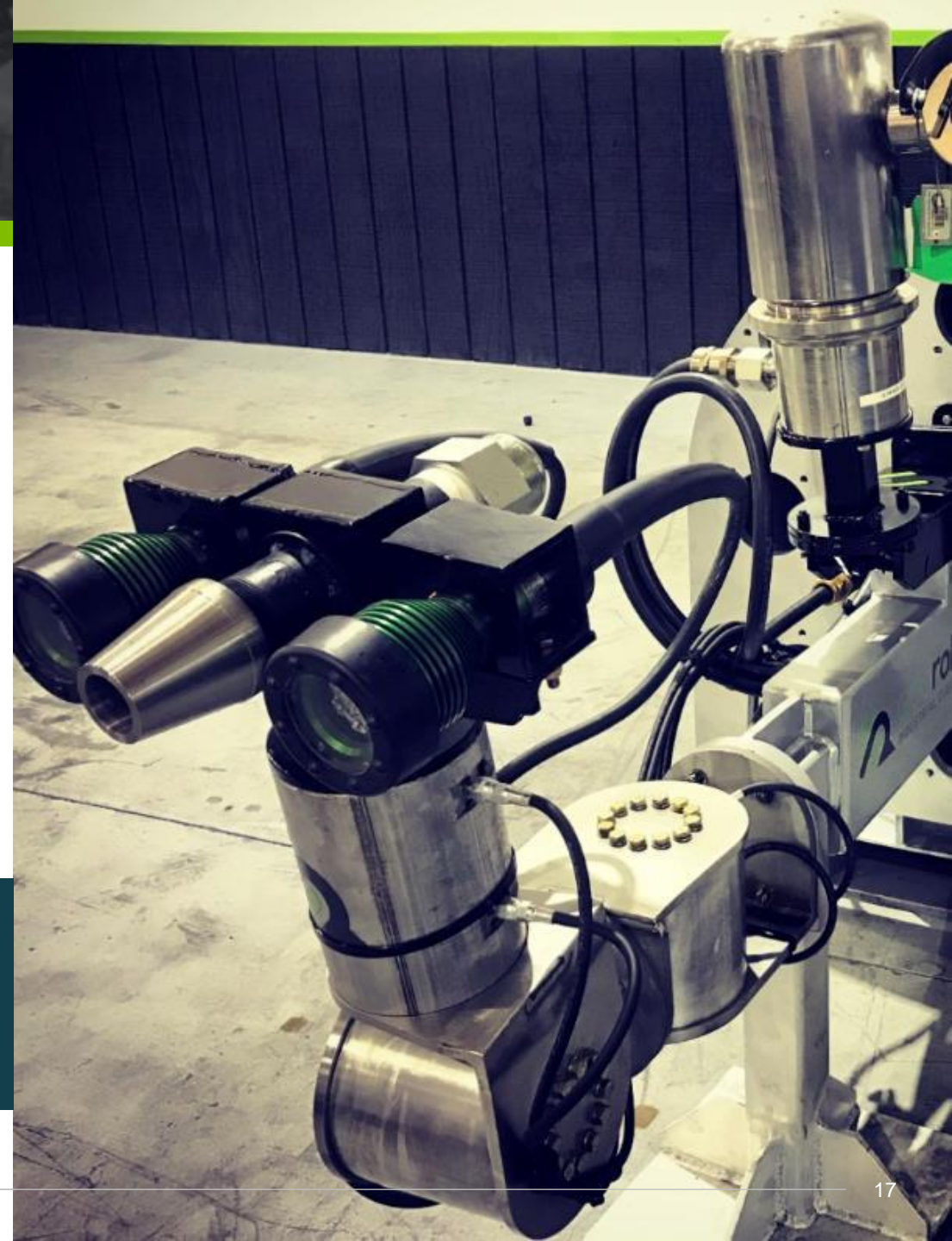


Viper Cannon Cleaning System

- > Arm with Full 360 Degrees of Articulation
- > Capable of Spraying up to 150'
- > Designed to Fit Through an 18" Manway
- > Class I Division I Lighting and Camera System
- > Standard 450 gpm @ ~200 psi / Capable of 40,000 psi

Applications

- Bullet Tanks
- Below Ground Tanks
- Sumps
- Above Ground Tanks
- Pits
- Wash Down Operations



Pit Viper Cleaning System

- > Magnetically or Manway Mounted
- > Arm with Full 360 Degrees of Articulation
- > Capable of Spraying up to 60'
- > Designed for a 16" or larger Manway
- > Operates on Standard Fire Water

Applications

- Small Storage Tanks
- Small Tight Confined Spaces
- Bullet Tanks
- Wash Down Operations
- Pits
- Separators



Additional Robotic Applications

Applications

- Tank Roofs
Fixed/Floating
- Frac Tanks
- Process Train
Vessels
- Bullet Tanks

Project Planning and Reporting



Project Planning

- > Bids based on removal rates
- > Job walks are conducted prior to bidding
- > Detailed Safety Plan available
- > Plot plans provided when requested



Daily Project Reporting

- > Daily Production Rates
- > Daily Spend vs PO Amount
- > Schedule – Actual vs Plan-to-Date
- > Signed Daily Tickets



QA/QC Maintenance Program



Pre-job / Post-job Maintenance Program:

- Maintenance tracking system for each component
- Failure analysis process utilized in order to improve equipment reliabilities



Reliability:

- Each system/component is tested prior to project dispatch



Field Maintenance Program:

- Trained Field Service Technicians are available for maintenance or repair in the field for long projects or for emergency repair



Training Program



Training Facility



Virtual Field Operations



Classroom & Operational Training



Training Course



Regulations



General Troubleshooting



Robotics System Technology



Field Maintenance



Project Analysis



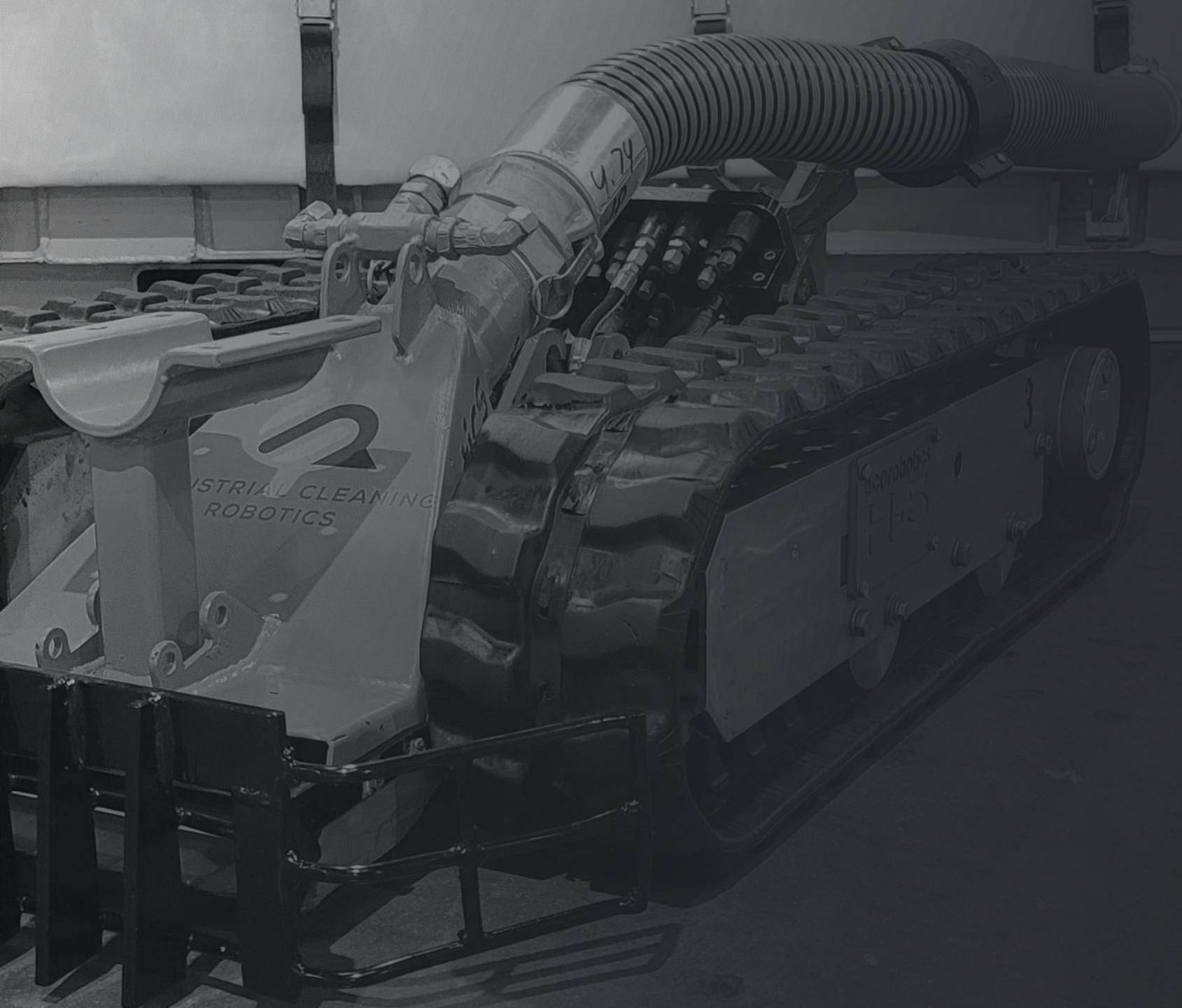
Decontamination



Operating the Robotic System



Pre and Post Training Requirements



Case Study

Above Ground Storage Tanks

Above Ground Storage Tanks

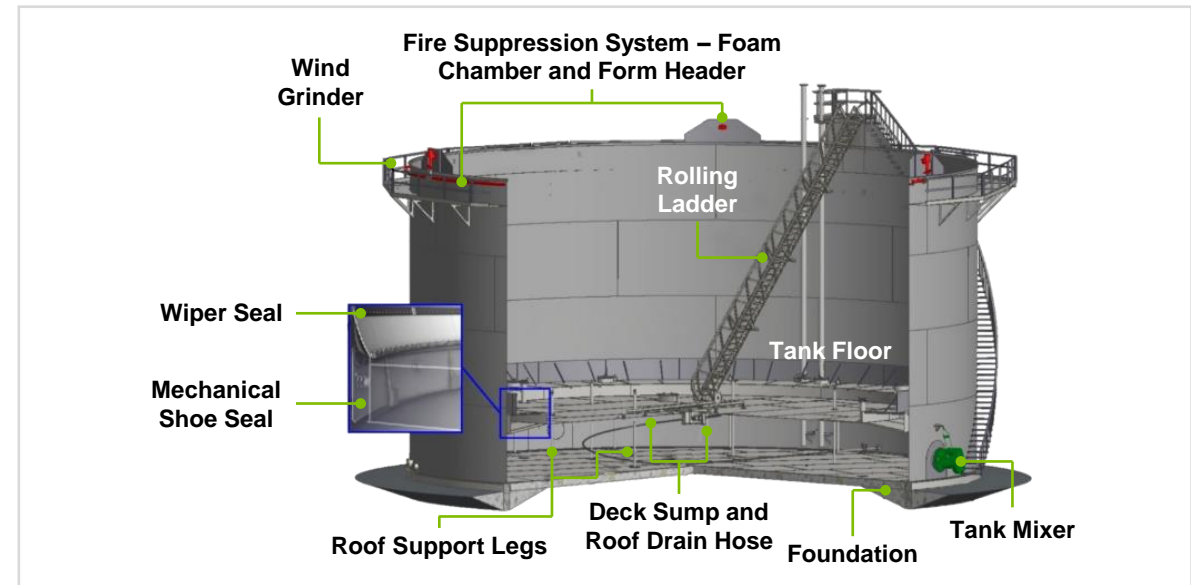


Barrels Removed 9,542 9,542

Shifts 21 48

Barrels Removed per Shift ~500 ~125

CSE Hours 0 3,840



Tank

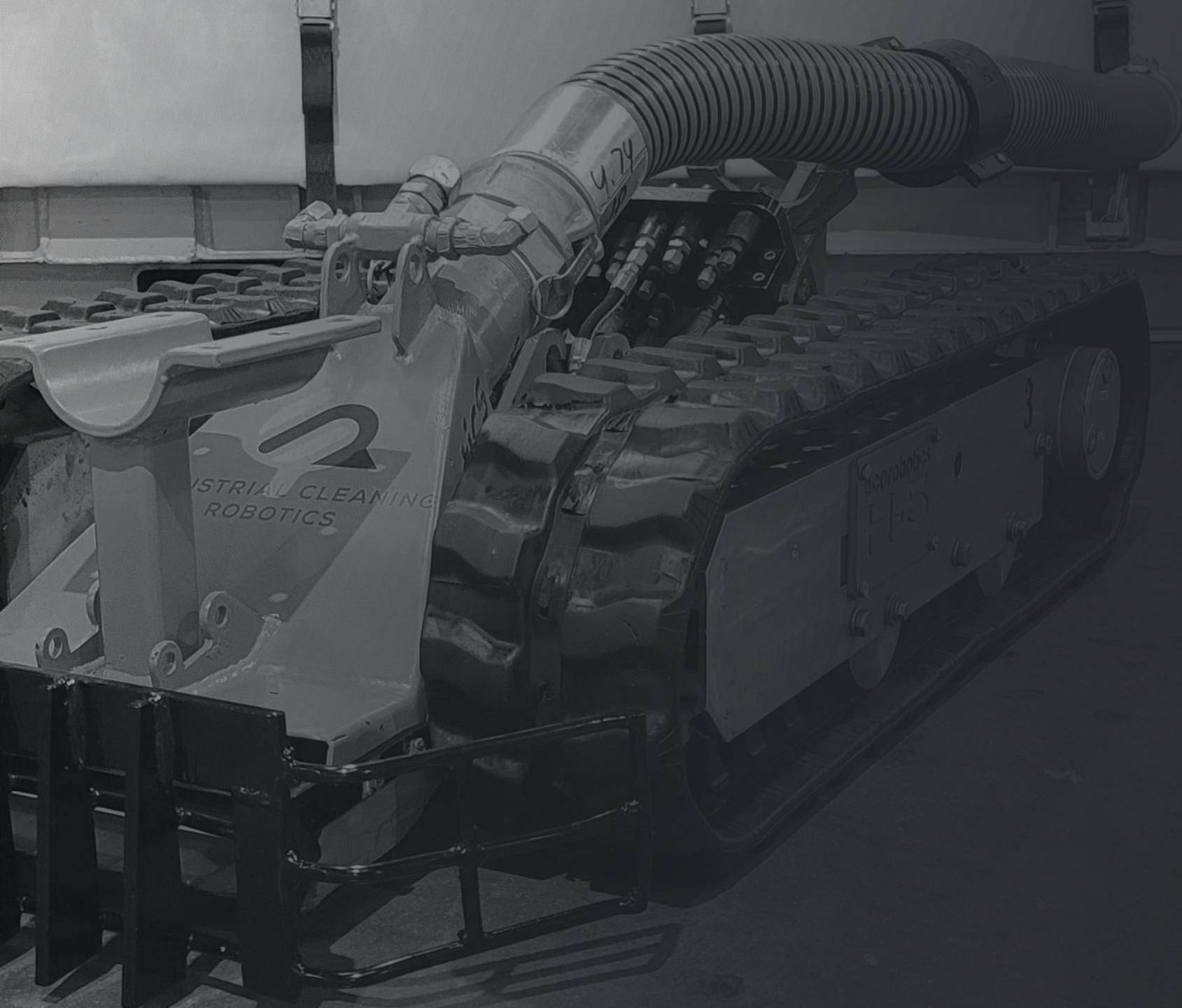
Closed Top; 150' Diameter with estimated 3' of crude oil

Crude Tank



Cat Fine Tank





Case Study

Clarifier

Clarifier



**Barrels
Removed**

18,400

6,500

Shifts

24

24

**Barrels
Removed
per Shift**

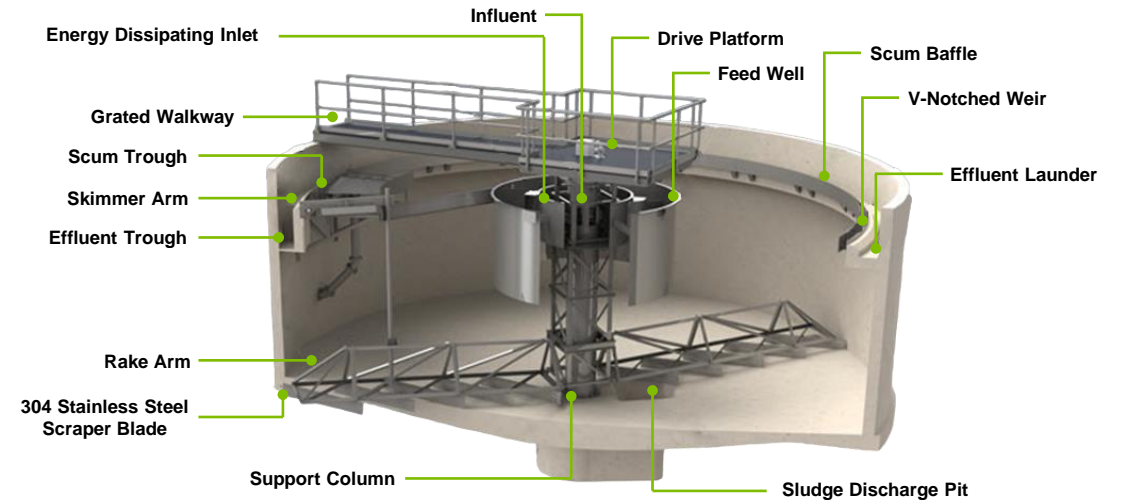
~767

~271

CSE Hours

0

1,440

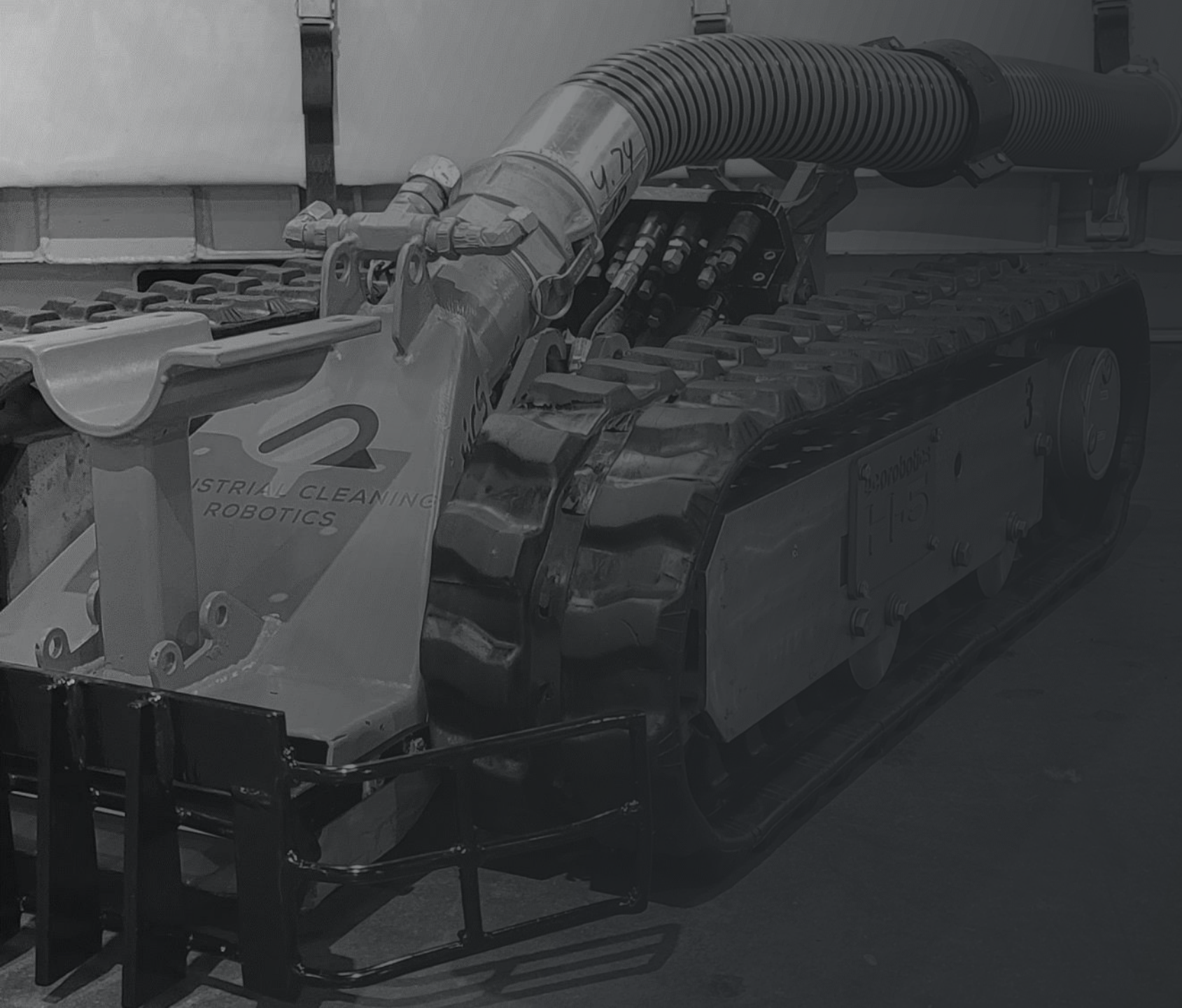


Clarifier

Closed Top; 85' Diameter x 30'
Height, 2' Coned Floor

Clarifier Tank





Case Study

Sumps

Sumps



**Barrels
Removed**

1,600

Never Been
Completed

Shifts

2

Never Been
Completed

**Barrels
Removed
per Shift**

~800

Never Been
Completed

CSE Hours

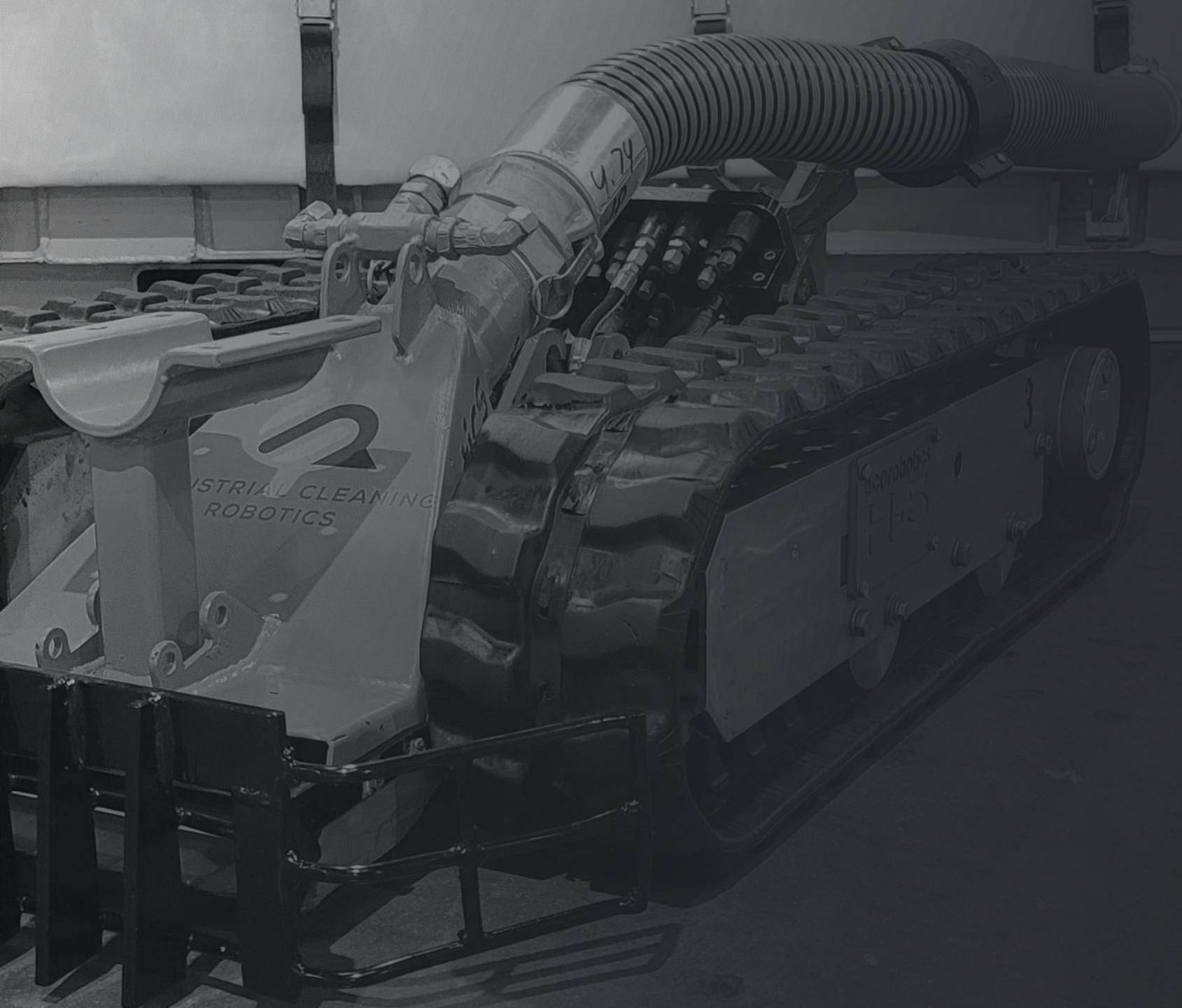
0

Never Been
Completed



Chlorine Sump





Case Study

Cooling Tower Basins

Cooling Tower



**Barrels
Removed**

2,830

Never Been
Completed

Shifts

5

Never Been
Completed

**Barrels
Removed
per Shift**

~560

Never Been
Completed

CSE Hours

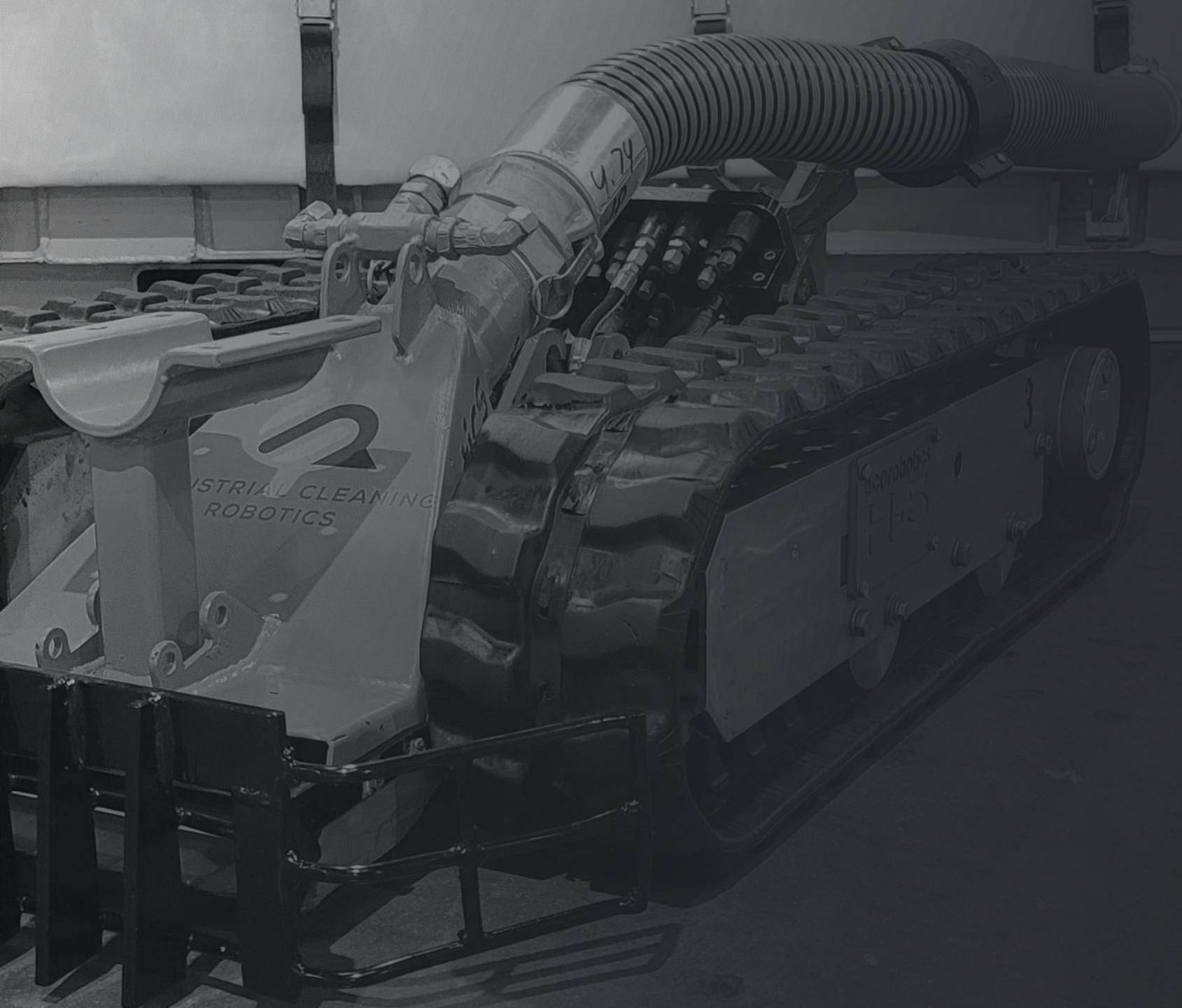
0

Never Been
Completed



Cooling Tower Basin





Case Study

Trenches and Ditches

Trenches/Ditches



**Barrels
Removed**

1,500

1,137

Shifts

23

95

**Barrels
Removed
per Shift**

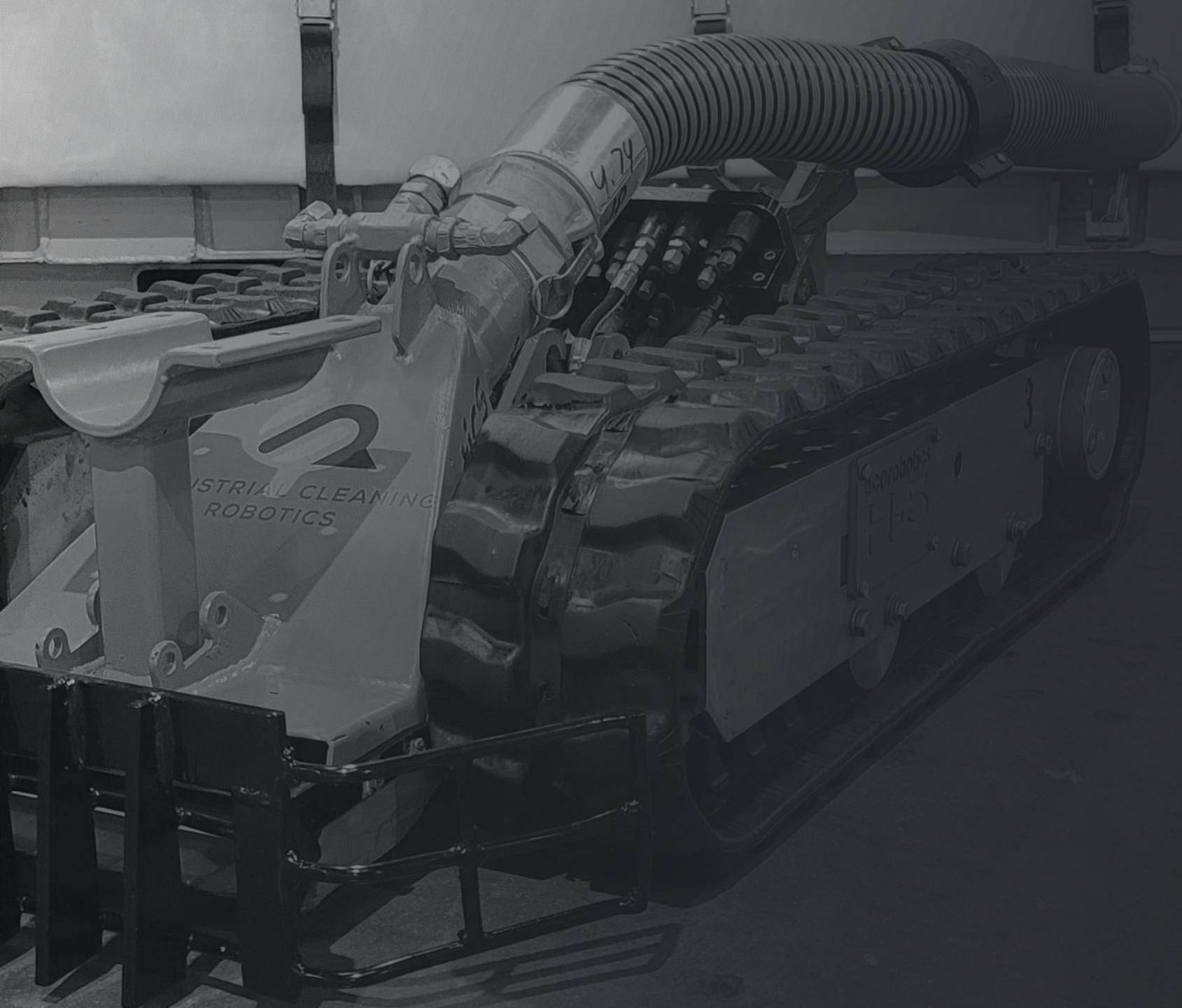
~65

~12



Trench





Case Study

Piping and Culverts

Piping/Culverts



**Barrels
Removed**

1,200

Never Been
Completed

Shifts

3

Never Been
Completed

**Barrels
Removed
per Shift**

~480

Never Been
Completed

CSE Hours

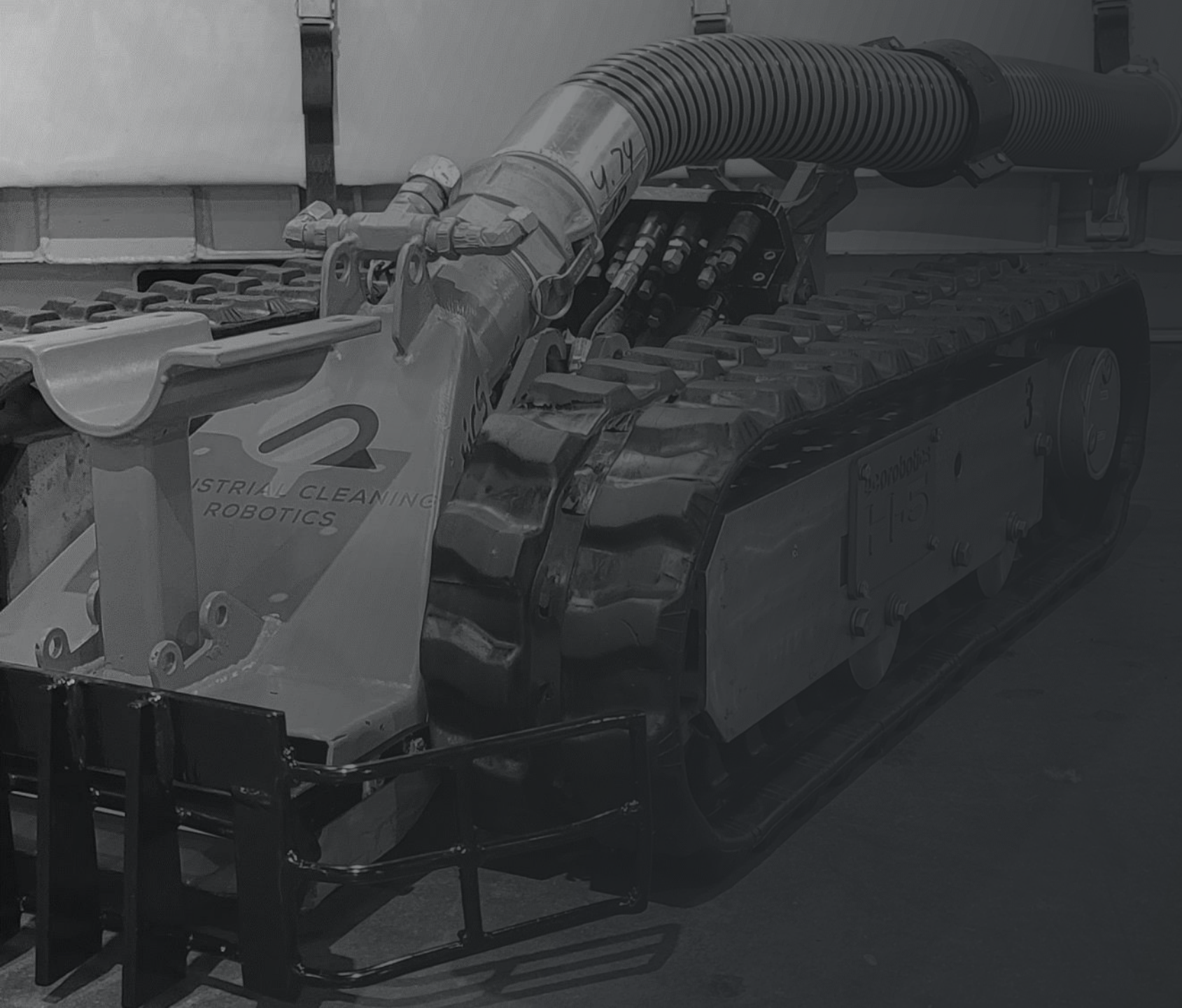
0

Never Been
Completed



Clarifier Inlet Piping





Case Study

Acid Tanks

Acid Tanks



Barrels Removed	802	800
Shifts	7	14
Barrels Removed per Shift	~204	~70
CSE Hours	0	138



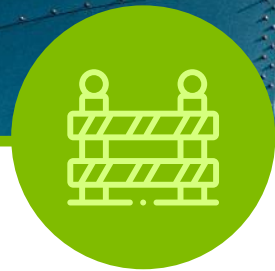
Tank

Closed Top; 55' Diameter,
40' High Steel Tank

Ecorobotics Technology Delivers



Reduce
costs



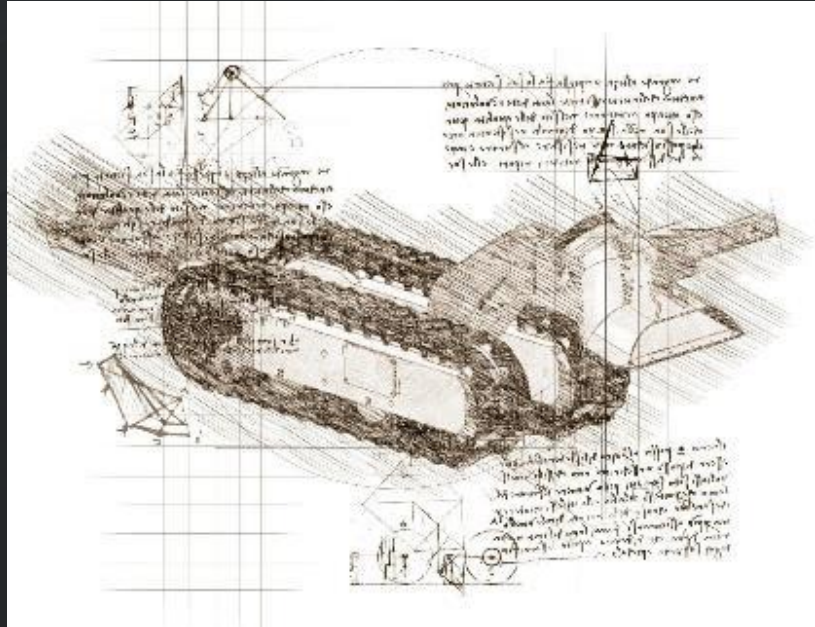
Eliminate
confined
space entry



Decrease
turnaround
time



Modernize
your process



Robotic Cleaning Presentation

