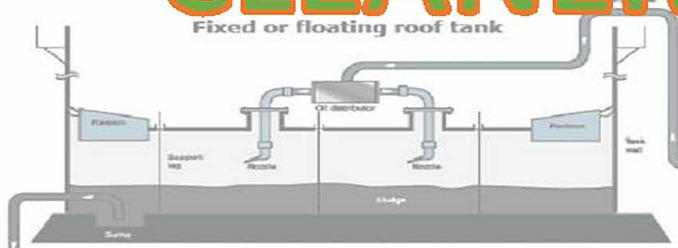
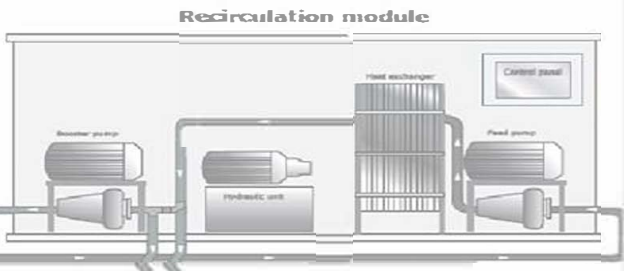
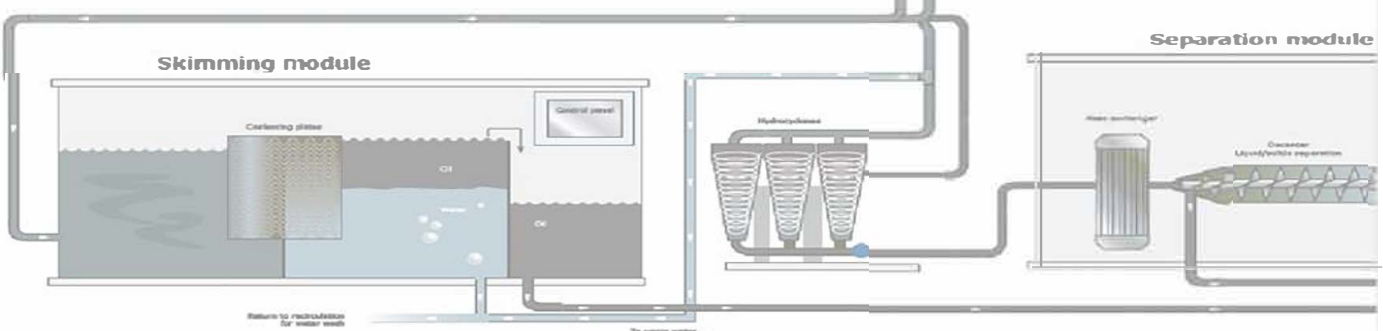
FIRST RECYCLER

INSPECTION AND TANK CLEANER SYSTEM

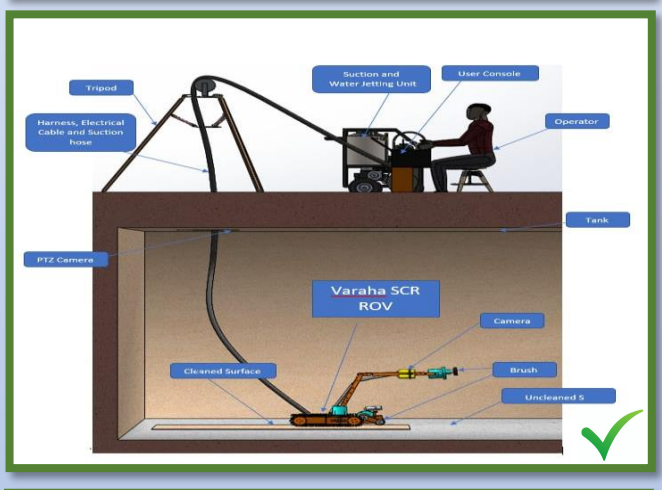


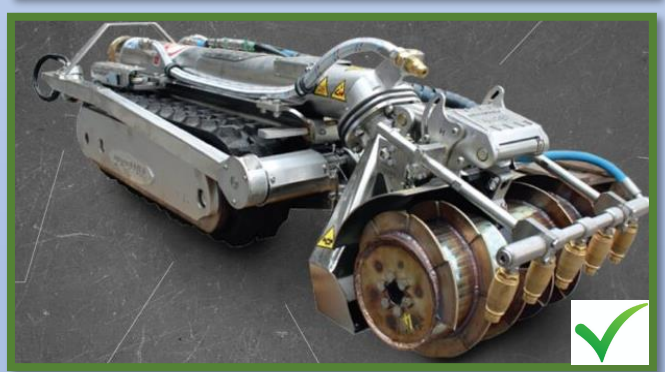




ADVANTAGES

- Safety during operations.
- Reduction of risks associated with manual labour.
- Time saving.
- Operating costs reduction.
- Less downtimes of the plants.
- Increased production.





FIRST RECYCLER

We propose the following solutions:

- Tank Explorer - In-Service Robotic Bottom Inspection
- High Pressure Jetting Equipment For Cleaning
- Floating Roof Cleaning With Nozzles
- Robot For Cleaning

Note: The water mixed with the washing oil can be recovered with the related installations but can also be treated with the centrifugation system.

FIRST RECYCLER

• *Tank Explorer - In-Service Robotic Bottom Inspection*

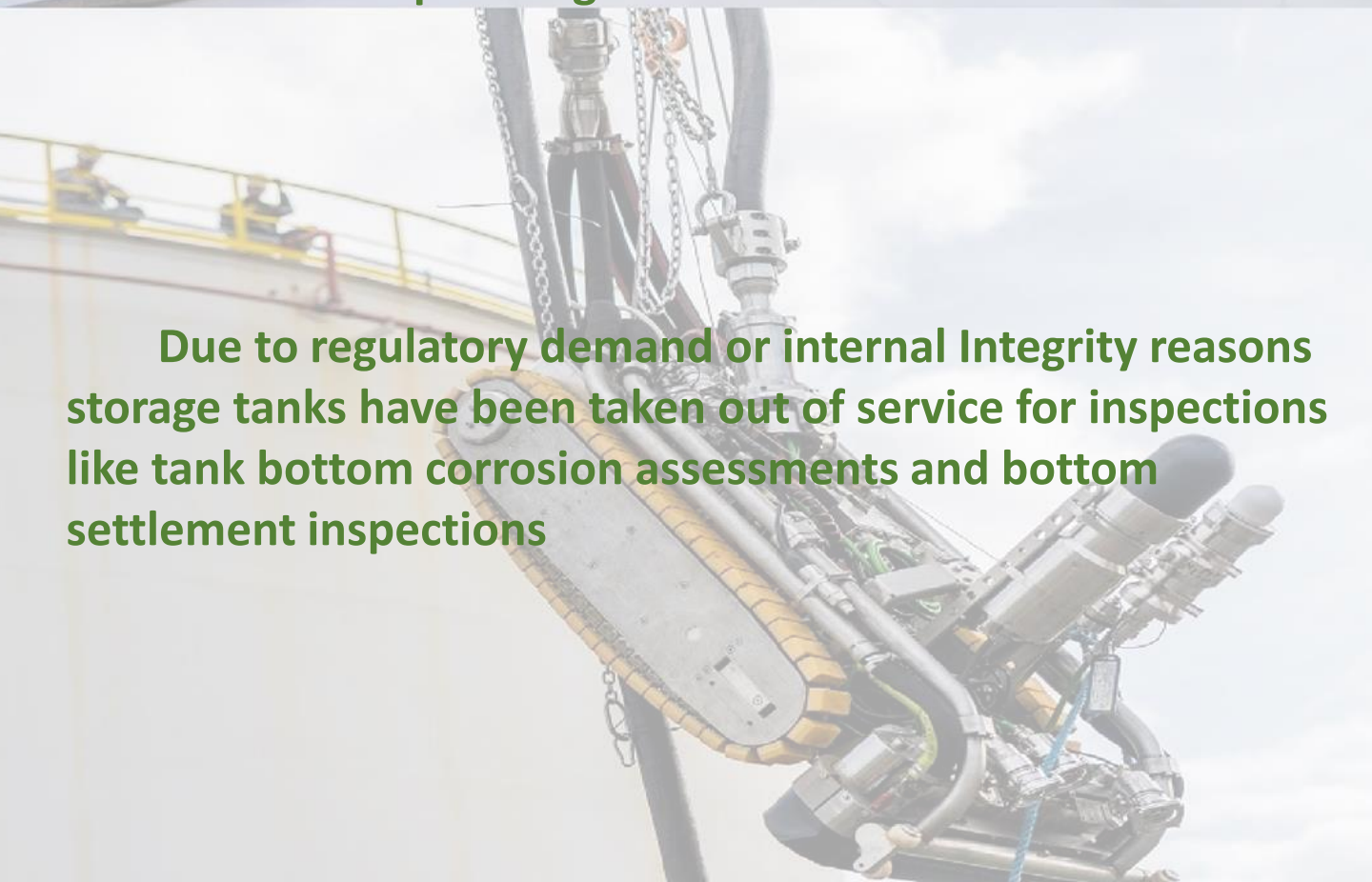
Tanks are designed and manufactured in many different variations for the safe storage of a range of products. We can inspect storage tanks containing high and low flashpoint products.

Tank floor corrosion. Let our Explorer get to the bottom of it.

Safe, trusted, certified. Entirely Robot.

Regular tank inspections are required for a number of reasons, including:

- License to operate
- Tank integrity assessment
- Maintenance planning



Due to regulatory demand or internal Integrity reasons storage tanks have been taken out of service for inspections like tank bottom corrosion assessments and bottom settlement inspections

• *Tank Explorer - In-Service Robotic Bottom Inspection*

With Intero's ultrasonic (UT) Explorers Robots this inspection can be performed during operation, it now means there is no longer any need to empty the tank. In this way you can significantly reduce costs of in-service inspections and the effects of downtime, while cleaning costs and (off-spec) product waste are reduced too.

Tank bottom settlement measurements are commonly taken when the tank is out of service and empty. However, the same data set obtained from the robotic online tank floor corrosion inspection can also be used to assess the tank bottom settlement.

This will not only provide a more accurate and a realistic settlement assessment with the product in the tank but also provide a full, high resolution settlement display of the tank bottom rather than the spot checks on selected locations using out of service inspection.

• *High Pressure Jetting Equipment For Cleaning*

This system is a mobile, fully integrated process system offering internal cleaning of tanks for oil products like gasoline, diesel oil, kerosene, chemicals and petrochemicals. The system is automated meaning that there is no need for humans to enter tanks during the cleaning process.

For oil product tanks	
Oil types Gasoline Diesel oil Kerosene / jet fuel Edible oils Chemicals Petrochemicals etc.	**Tank capacity** Up to 30,000 m³ (Up to 186,000 bbl) **Tank diameter** Up to 35m (Up to 115 ft)

Now the system has combined traditional vacuum truck facilities with tank cleaning and separation processes, delivering an entirely new, mobile solution to tank cleaning.

The process is very simple. As seen in the diagram below, one or more specially designed tank cleaning nozzles are installed via openings in the tank to be cleaned. Once connected to the truck, the cleaned-out sludge is separated so that the cleaning liquid can be re-circulated back into the tank through the nozzles. This enables more sludge to be fluidised and pumped out for separation.

• *High Pressure Jetting Equipment For Cleaning*

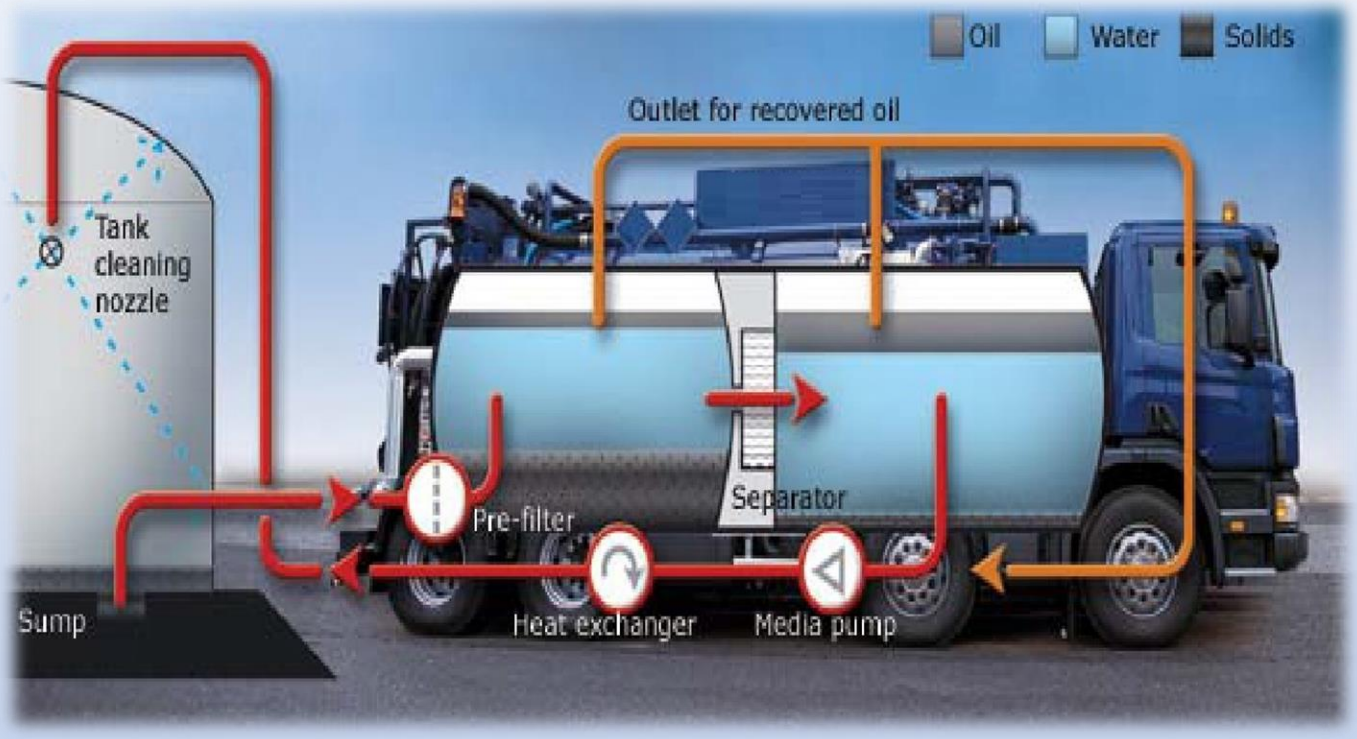
Once the tank is emptied of sludge, it may undergo a last hot-water wash. After ventilation, the tank is now opened for inspection and is ready for hot-work if needed.

The tank cleaning nozzles are a key element in the cleaning process. They ensure that all internal surfaces on the bottom, walls and roof are cleaned, thus optimising the cleaning result.

The nozzles produce far-reaching, low pressure, high-impact rotating jets, which provide efficient cleaning of all internal surfaces in a precise indexed pattern, making use of re-circulated cleaning liquid.

Tank cleaning nozzles operating at low pressures have proved far more efficient in terms of time and water usage compared with traditional high pressure methods.

• High Pressure Jetting Equipment For Cleaning



• High Pressure Jetting Equipment For Cleaning

Easy to operate

- Hydraulically driven
- PLC-operated and -controlled
- Operation of the nozzles by user-friendly touch screen
- User-friendly SCADA software facilitates programming, report¬ing and external communication

technical specifications

Materials	Stainless steel 304/316, NBR, bronze
Weight	SE - SNS® without drive unit: 69,5 kg (153,2 lbs) Drive unit: 11,8 kg (26 lbs)
Lubricant	Grease lubricated
Working pressure	3 - 15 bar (43.5 – 217 psi)
Max working temperature	82°C (179°F)
Tank roof types	Fixed roof with internal floater. Oil tanks with damaged roof
Man-hole Flange installation	API Ø 20"/ 24" /30"
Media connection, flanges	Victaulic 3" (standard) DN80 PN16 Flange (option) 3" ANSI Class 150 Flange (option)
SCADA system	HMI: Explosion proof touch screen PLC: Allan Bradley PLC
Approvals	ATEX-certified for operation in 1G/2G (Zone 0/1) Category 1G (Zone 0) = Inside the tank Category 2G (Zone 1) = On the tank roof EC - Type Examination Certificate Number: Baseefa06ATEX0079X

• *High Pressure Jetting Equipment For Cleaning*

Operational excellence in tank cleaning

The Side Entry - Single Nozzle are a vital part for achieving operational excellence with ATS tank cleaning process. The design and ope-ration of the nozzles give tank owners distinctive benefit regarding cost-efficiency and increased safety as further explained in the below list:

- Interchangeable Drive Unit with all Types
- Increased personal and operational safety

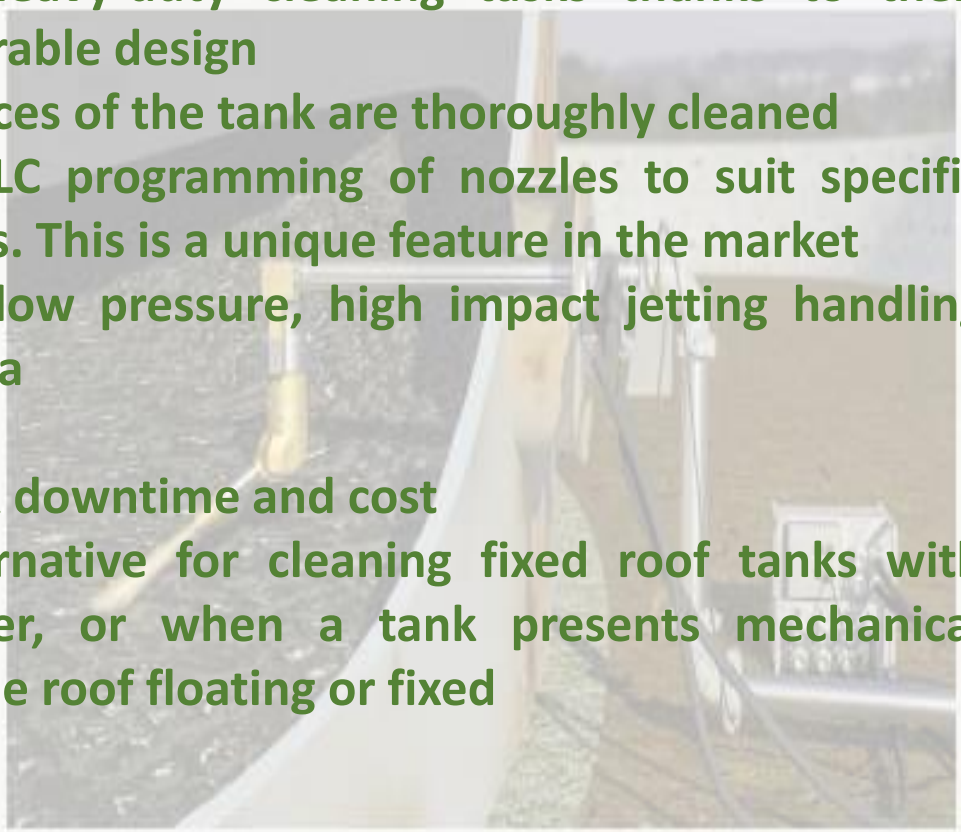
Non-man entry: The nozzles truly eliminates the need for human entry into tanks, minimizing hazards to human and maximizing safety

Unique cleaning result:

- Can handle heavy-duty cleaning tasks thanks to their robust and durable design
- All inner surfaces of the tank are thoroughly cleaned
- Customised PLC programming of nozzles to suit specific cleaning needs. This is a unique feature in the market
- Far-reaching, low pressure, high impact jetting handling crude oil media

Reduction of tank downtime and cost

- Excellent alternative for cleaning fixed roof tanks with internal floater, or when a tank presents mechanical problems in the roof floating or fixed



• Floating Roof Cleaning With Nozzles

This's patented system offers an automated, non-man entry oil tank cleaning and oil recovery process. Mobile and modular, it is especially designed to clean large-volume above-ground oil storage tanks.

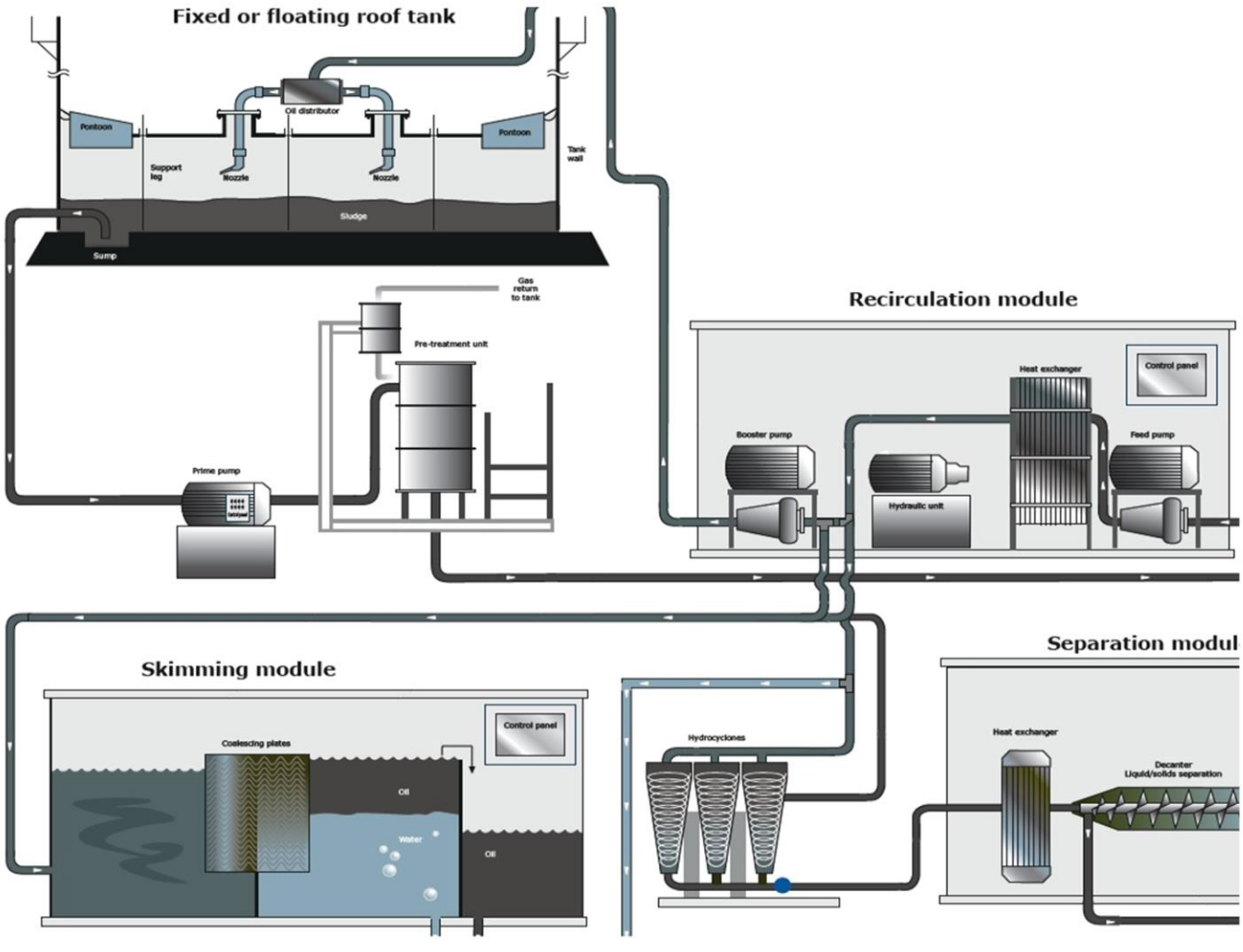
Is suitable for both floating and fixed roof tanks with tank volumes up to 200,000 m^3/1,240,000 bbl with sludge contents easily exceeding 30,000 m^3/185,000 bbl. Can also be used in tanks containing crude oil, heavy fuel oil, catalytic cracker residue, slop oil, and similar. Tank cleaning and oil recovery take place simultaneously.

The process modules are built into 20-foot containers, enabling straightforward transportation and optimum manoeu-vrability. The system includes modules for suction, recirculation, skimming and separation. Other optional auxiliary units such as an office/lab container, inert gas generator, and steam and power generator are available.

Benefits of choosing this system: Compared with manual and semi-automated methods, this system is an efficient and cost-effective solution offering a wide range of benefits:

- Non-man entry; operators do not enter the tank.
- Safe
- Efficient; offering desludging, tank cleaning and oil recovery in one integrated process.
- Fast; with a reduction in tank down-time of up to 80 per cent.

• Floating Roof Cleaning With Nozzles



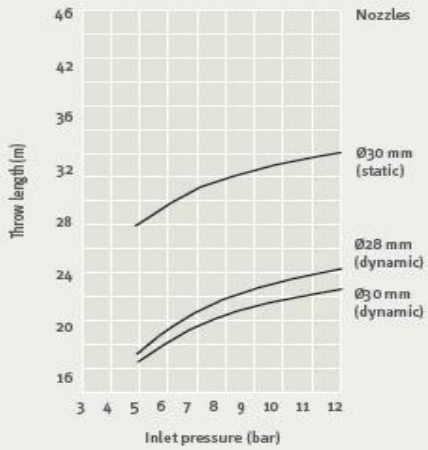
technical specifications

PROCESS MODULES	Installed power capacity kW/HP	Other consumption (discontinuous)	Performance capacity	Length m/ft	Width m/ft	Height m/ft	Weight kg/lb
Suction module	57 / 76	N/A	Suction: 150 m³/hr at 5 bar / 660 USg/m at 72 psi	4.050 / 13'3"	1.200 / 4'	2.591 / 8'6"	3500 / 7700
Recirculation module	88 / 118	Steam: 0 - 4000 kg/hr / 0 - 8800 lbs/hr	Flow to nozzle: 100 m³/hr at 12-15 bar / 440 USg/m at 172-215 psi	6.058 / 20'	2.438 / 8'	2.896 / 9'6"	17000 / 37400
Separation module	87 / 117	Steam: 1000 kg/hr / 2200 lbs/hr Fresh water: 1 m³/h / 4.4 USg/m	High-speed separator: 75 m³/hr / 33 USg/m Decanter: 15 m³/hr / 66 USg/m	6.058 / 20'	2.438 / 8'	2.896 / 9'6"	10000 / 22000
Skimming module	2 / 3	N/A	N/A	6.058 / 20'	2.438 / 8'	2.896 / 9'6"	6000 / 13200
General module specifications	Electrical power supply: Available in 400V/50 Hz or 440V/60 Hz, other on request Operating altitude: 1-1000 m / 1-3200 ft above sea level Working ambient temperature 0-40°C / 32-104°F. Other temperature ranges on request Process temperature: Media temperature max 80°C / 176°F Module containers: 20' High Cube (HC) containers approved for transport						
AUXILIARY UTILITY EQUIPMENT (OPTIONAL)							
Office/workshop container	4 / 5	N/A	N/A	6.058 / 20'	2.438 / 8'	2.896 / 9'6"	5000 / 11000
Auxiliary storage container	1 / 1	N/A	N/A	6.058 / 20'	2.438 / 8'	2.896 / 9'6"	Varies
Power generator 400 KVA / 320 kW		Fuel: 120 l/hr / 32 USg/hr for all 4 BLABO® modules	N/A	6.058 / 20'	2.438 / 8'	2.896 / 9'6"	6000 / 13200
Power generator 500 KVA / 400 kW		Fuel: 150 l/hr / 40 USg/hr for all 4 modules					
Nitrogen generator 250 Nm³/h / 8800 SCFH	48 / 64	N/A	N/A	6.058 / 20'	2.438 / 8'	2.896 / 9'6"	7000 / 15400
Nitrogen generator 500 Nm³/h / 17600 SCFH	96 / 129	N/A	N/A	6.058 / 20'	2.438 / 8'	2.896 / 9'6"	10600 / 23300
Steam generator 5000 kg/hr / 11000 lbs/hr	15 / 20	Fresh water: 5 m³/hr / 22 USg/m without reuse of condensate Fuel: 400 l/hr / 105 USg/hr	N/A	N/A	N/A	N/A	N/A
Cold-tapping tool	Cold work: Complies with API/IP definition of cold work Certification: Certified and approved by notified body Ignition preventative measures: Include using 'spark reducing material' in the construction of the tool, temperature control facility and limitation of the speed of moving parts.						

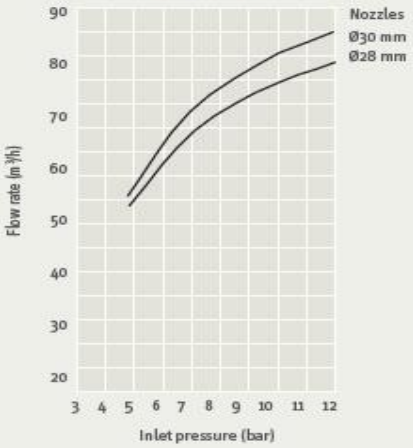
• Floating Roof Cleaning With Nozzles

performance

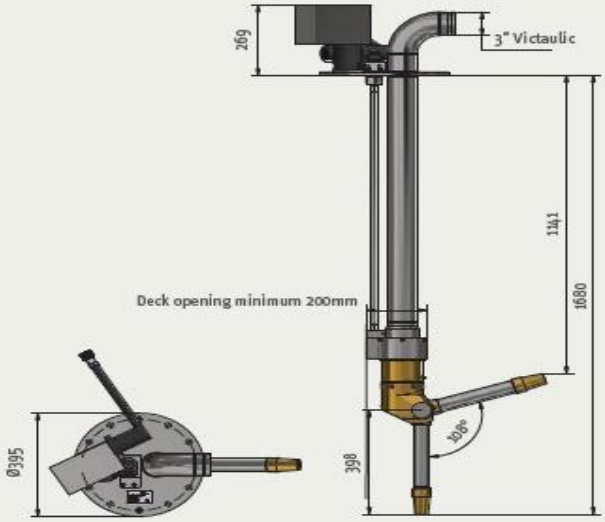
Horizontal throw length

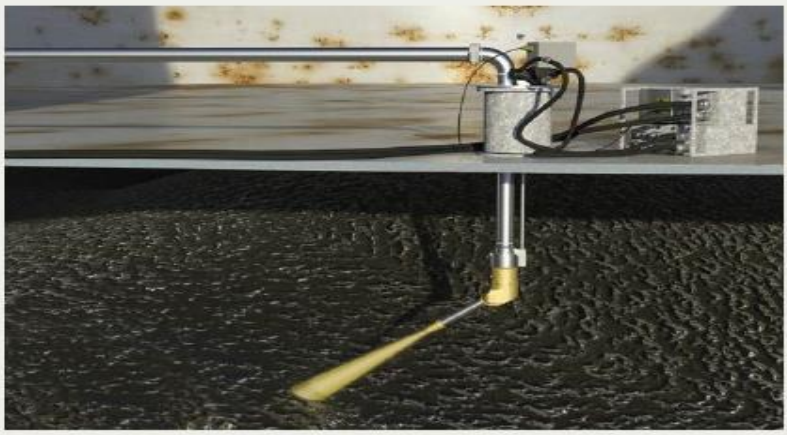


Flow rate



Dimensions (mm)





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Easy to operate

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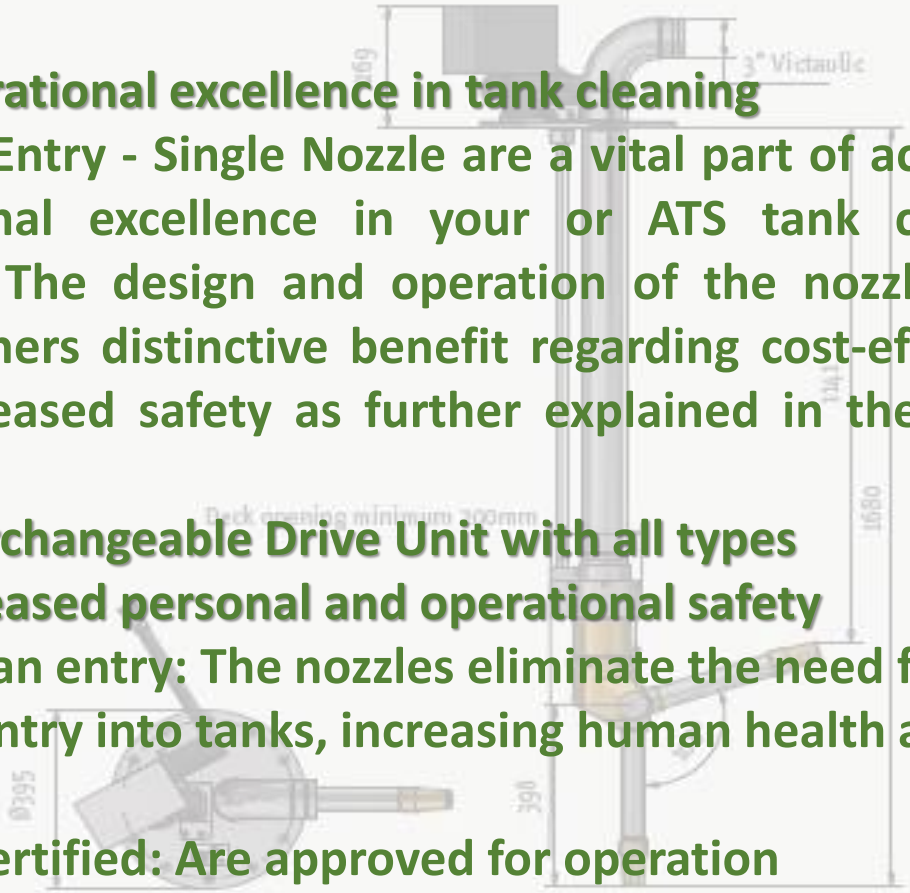
• *Floating Roof Cleaning With Nozzles*



Operational excellence in tank cleaning

The Top Entry - Single Nozzle are a vital part of achieving operational excellence in your or ATS tank cleaning process. The design and operation of the nozzles give tank owners distinctive benefit regarding cost-efficiency and increased safety as further explained in the below list:

Interchangeable Drive Unit with all types

Increased personal and operational safety

- **Non-man entry: The nozzles eliminate the need for human entry into tanks, increasing human health and safety**
- **ATEX-certified: Are approved for operation in potentially hazardous atmospheres category 1G/2G (Zone 0/1)**

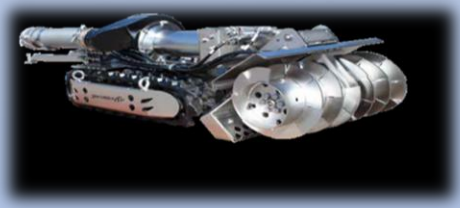
Unique cleaning result

- **Can handle heavy-duty cleaning tasks thanks to their powerful, durable design**
- **All inner surface of the tank is cleaned**
- **Customised programming of nozzles to suit specific cleaning needs**
- **Far-reaching, low pressure high impact jets**

Reduction of tank downtime and cost

- **Easier and faster preparation of hot-work**
- **Use recirculated oil as their primary cleaning media**

• Robot For Cleaning



FIRST RECYCLER

• Robot For Cleaning

ADVANTAGES

- Safety during operations.
- Reduction of risks associated with manual labour.
- Time saving.
- Operating costs reduction.
- Less downtimes of the plants.
- Increased production.

It works in the confined space while the plants remain in full operation, thus preventing a costly shutdown.

FIRST RECYCLER

• Robot For Cleaning

Increases productivity:

- Cleaning Robot can be operated by a two-man team.
- Reduced duration of cleaning operations.

Increase safety and reduce liability:

No Confined Space Entry Required: Eliminate the dangers associated with confined space entry by sending our robots into dangerous confined spaces instead of risking human lives.

Eliminate the need for special clearance to enter the confined space.

MINI ROBOT EXCAVATORS TANK CLEANING SYSTEM

Tank, basins and vessels need to be cleaned. Regularly. Contractors and asset owners – such as refineries or chemical and pharmaceutical plants – need to get the job done assuring safety, cost saving and business continuity.

Starting from this assumption, has been a pioneer in developing a No Man Entry Tank Cleaning system: a full stack solution made of a remotely controlled Robot, a power pack, a control room, a Vacuum Trucks and pumps.

Why Robots?
They are the best solution for eliminating human exposure in Atex Zone 0 and this leads to less downtime of the plants, more productivity and a high return on investment. This Robot can also be equipped with multiple accessories in order to accurately remove sediments of every kind and consistency: viscous, oily, liquid or even solid.

FIRST RECYCLER

WORKING TOOLS

Everything you need to perform at the best (frontal augers with drums or picks, high flow and high-pressure water tools, ecc.). Every material, from sticky sludges to oil, can be removed easly.

ATEX ZONE 0 CAMERAS AND LIGHTS

Remote operations need clear visual. Our waterproof and Atex Zone 0 cameras and LED lights will be your eyes in the darkest tanks.

HYDRAULIC CONTROL UNIT

The Hydraulic Control Unit (mounted in a 10ft or in a 20ft container) ensures 100% No Man Entry operations allowing the operator to drive the Robot from a remote distance, increasing safety, efficiency and productivity.

MAGNETIC TRACKS

This Robot offers his strengthened magnetic tracks, ensuring the best traction effects (4950N*) still preserving the integrity of the finest coating.

CONTAINER FOR STORAGE ALL THE EQUIPMENT

Compact for easy handling: there is enough space for the storage of all the items required on site. Even the suction hose needed to clean a 100m diameter tank!

Way of working

Only a standard cleaning truck or a specially developed suction or pumping unit is required to run the tank cleaning robot.

The standard robot is designed to withstand 150 to 200 bar, but can be adjusted for high pressure washing up to 500 bar.

• Robot For Cleaning

MINIROBOT

Clean the most narrow and dangerous places.

MINIEX

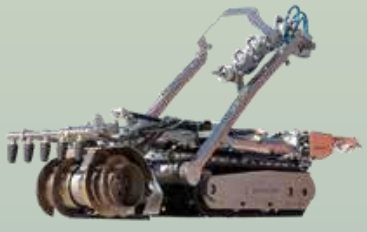
Versatile mini digger for construction.

ROBOT

Remotely operated vehicles with pumps for underwater cleaning.

REMOTE CONTROL SYSTEM 4.0

The solution to control the robot via wireless transmitter and receiver.



ATEX ZONE 0 PRODUCTS RANGE

The complete systems for a safe operation in ATEX Zone 0.

ATEX
ZONE 0

ATEX ZONE 0 CCTV SYSTEMS

ATEX certified cameras, LED
lights and monitors.

• Robot For Cleaning

OPTIONALS CCTV SYSTEM ATEX VERSION AVAILABLE

TECHNICAL DATA
MINIROBOT **XXS**

SUCTION HOSE

from Ø 4” - 100 mm

MANHOLE

from Ø 18” - 450 mm

DIMENSIONS

L	43” - 1100 mm
H	12” - 300 mm
W	14” - 380 mm
	243 lb - 110 kg

TECHNICAL DATA
MINIROBOT **XT**

SUCTION HOSE

from Ø 3” - 80 mm

MANHOLE

from Ø 16” - 400 mm

DIMENSIONS

L	35” - 900 mm
H	11” - 290 mm
W	13” - 325 mm
	175 lb - 80 kg

APPLICATIONS

- Ducts/collectors/tunnels.
- Large and small tanks.
- Under conveyor belts.

ADVANTAGES

- Increased safety.
- Manual labour reduction.
- Time and costs saving.

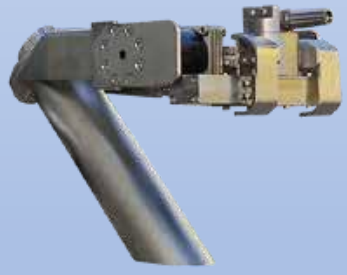
• ***Robot For Cleaning***

OPTIONALS FOR **MINIROBOT**

AUGER CONFIGURATION FOR MATERIAL DISGREGATION

WIDE SQUEEGE TOOL PLUS HIGH PRESSURE WATER NOZZLES FOR SURFACE CLEANING

COMBI NOZZLE FOR HIGH PRESSURE WASHING AND FLUIDIFICATION



HYDRANT TOOL FOR HIGH FLOW OR HIGH PRESSURE DIRECTIONAL WATER JETTING

• Robot For Cleaning

FIRST RECYCLER

MINIEX

OPTIONALS

ATEX VERSION AVAILABLE

Miniex is an innovative and versatile excavator suitable for both construction and remediation activities. The machine shows its best skills working in confined spaces and areas suspected of pollution and contamina-tion. Miniex can be equipped with a hose passing between the two tracks for the suction of the material while connected to any vacuum unit (vacuum trucks, suction excavators, etc.).

TECHNICAL DATA

STANDARD CONFIGURATIO N

L	79” - 2000 mm
H	44” - 1100 mm
W	20” - 500 mm
	882 lb - 400 kg

SUCTION CONFIGURATION

L	79” - 2000 mm
H	44” - 1100 mm
W	30” - 760 mm
	1280 lb - 580 kg

SUCTION HOSE

from Ø 6” - 150 mm

FEATURES

- Two hydraulic driven tracks.
- Manual or remote-control configurations available.
- Quick connection system to the hydraulic source.

APPLICATIONS

- Tunnels.
- Big sewer pipes.
- Tanks.

FIRST RECYCLER

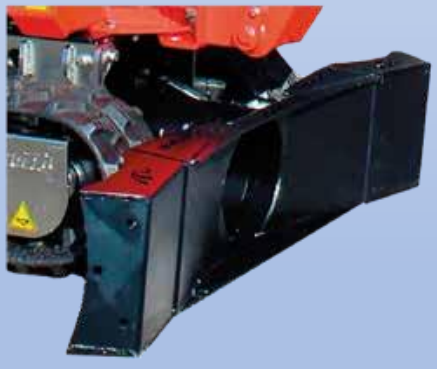
OPTIONALS FOR MINIEX MODELS

MiniEx models can be equipped with different accessories: some of these can be mounted on the mechanical arm and are designed to better remove specific types of materials; some others modify the structure of the robot, adapting it to different working environments.

HYDRAULIC CUTTING HEAD

HYDRAULIC HAMMER

SUCTION CONFIGURATION



FRONTAL STABILIZERS

• ***Robot For Cleaning***

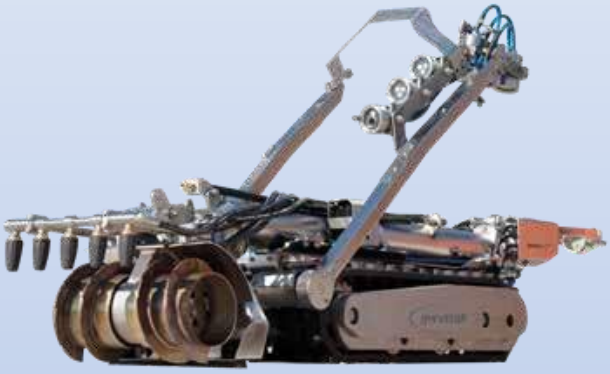
FIRST RECYCLER

ATEX CAMERA SYSTEM

ROBOT AND ASSOCIATED EQUIPMENT

Robot **and Associated Equipment is a complete system composed of an ATEX Zone 0** Robot **an ATEX Zone 1 control unit and a power unit, which can be combined together depending on the customer's needs. The full equipment can be stored in two 10ft certified marine containers or all in one 20ft certified marine container (both solution are certified for ATEX Zone 1).**

Robot **is a tracked robot, designed to be connected to the suction hose of a suction machine to clean stora- ge tanks. It can be customized with tools and water nozzles; it is remotely controlled and monitored via ATEX Zone 0 certified cameras mounted onboard.**



FEATURES

- System is fully hydraulic.
- Hydraulic proportional commands to control all the move- ments of the machine.
- SIL 2 hydraulic protection unit for ATEX certified machine in operation.
- Quick connection system to the external hydraulic source.
- ATEX Zone 0 certified video inspection system.
- High pressure/high flow water jetting configurations.
- Various tools and options available.

CONFIGURATION WITH

- Wet and dry vacuum trucks.
- Positive displacement pumps.

FIRST RECYCLER

THANK YOU !