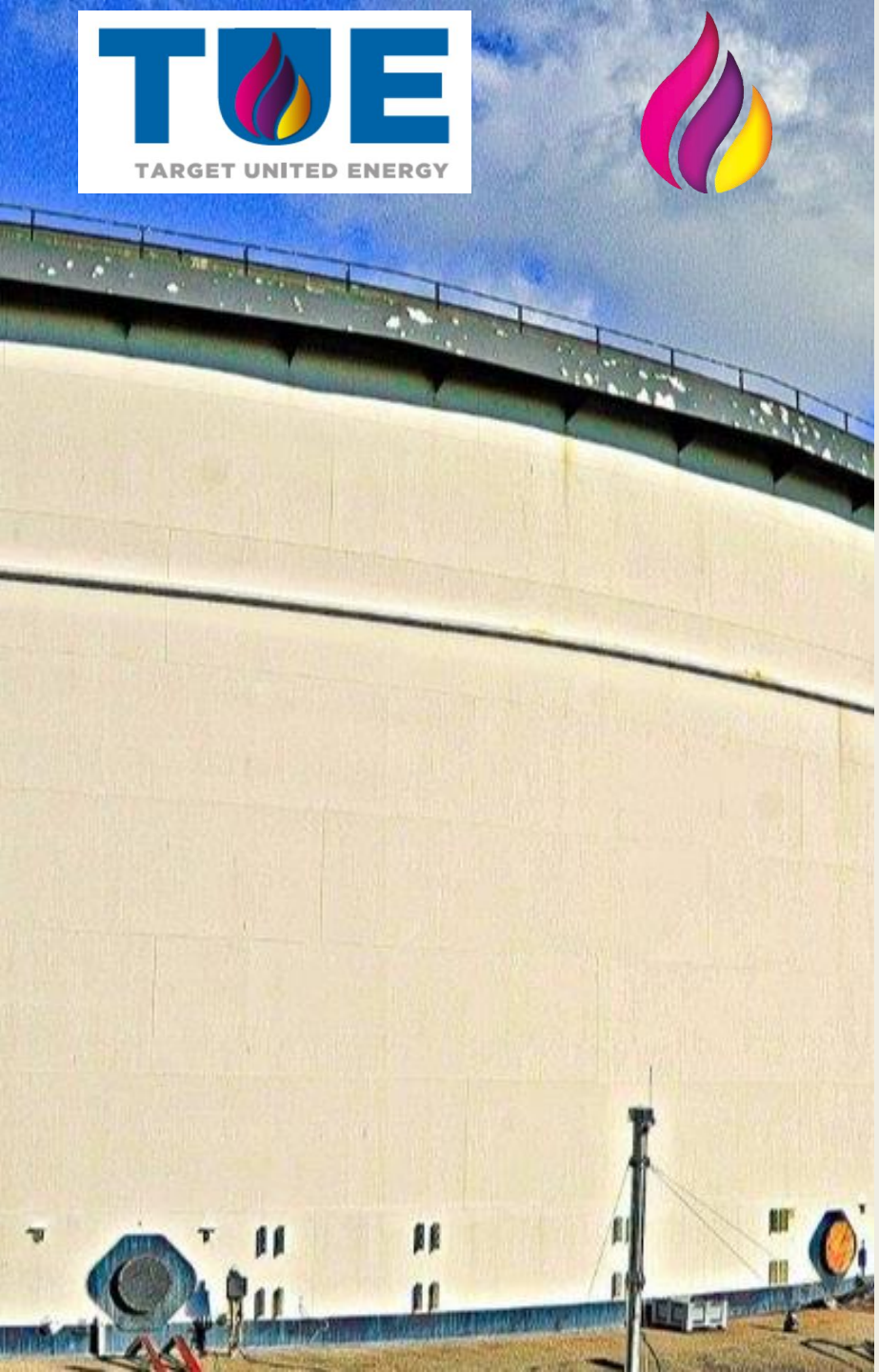
TARGET UNITED ENERGY

ROBOTIC TANK CLEANING: PART OF IR 4.0

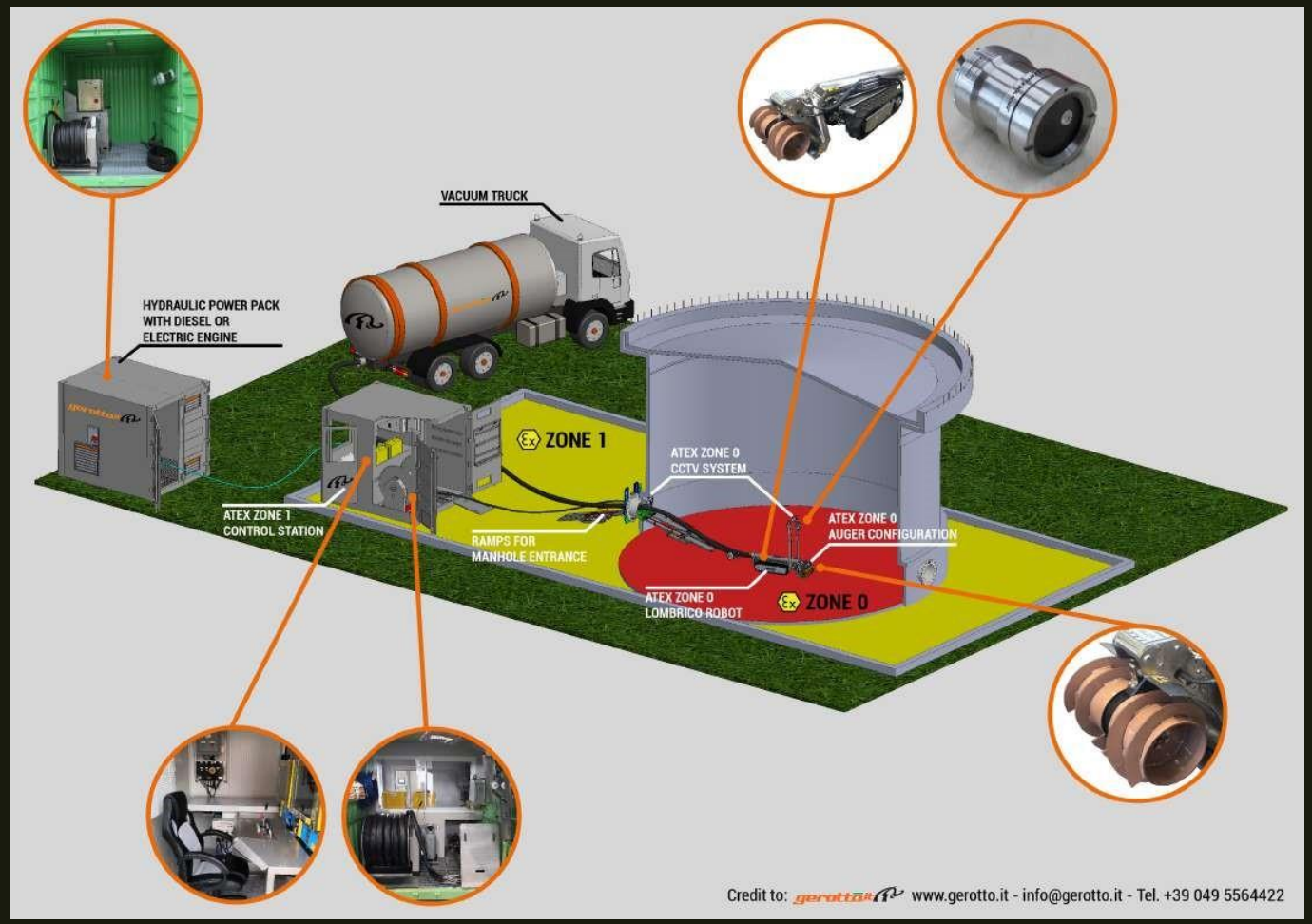
Presented by:
TUE - Management



Storage Tank

- Nowadays, most crude oil storage tanks or other hydrocarbon tanks are cleaned using several so-called “NON MAN ENTRY” systems, where using extensive manual labor for final cleaning is still necessary. Our unique ATEX Zone Zero Tank cleaning system is simple and effective, it has been proven reliable and safe, With the ESOT system now available to service-provider companies within the oil and gas industry, there is now an opportunity to supply SAFE solution to clients, “SAFETY FIRST”.
- The Atex Zone Zero Tank Cleaning System is suitable to be used in all the kind of Above-Ground Storage Tanks with a manhole of minimum 600mm/24” in diameter.

TARGET UNITED ENERGY



Tank Cleaning system

- A standard system is mainly composed by the following main components which are customizable according to the jobs site main requirements
- Atex Zone Zero Certified Robot;
- Atex Zone Zero CCTV System;
- Atex Zone 1 Certified Control Station;
- Hydraulic Ramps System;
- Non Atex Hydraulic Power Pack;
- Power Pack Safety Box;

Your Answer to Safety and Cost

- System reduces high risk for staff of contamination and exposure to carcinogenic substances, Fumes and Toxic gases.
- Dramatically cuts your sludge removal cost
- Reduce total workforce (only three operators per one shift)
- Increase operational efficiency and minimize shutdown time (by 30%-40%)
- Meets increasingly stringent environmental regulations
- Navigates easily through obstructed and hard-to-reach areas
- Save workforce and improve safety through automation
- Fast and straightforward deployment of cleaning system and the start of sludge removal from tank
- Minimal use of manual labor in oil tanks, with a reduction close to 95 %-100% in comparison to conventional manual cleaning and sludge suction
- Four cameras for ATEX ZONE 0 for control robot inside tank

Robot

- Atex Zone Zero Robot equipped with 100mm/6” suction hose, Auger Configuration with brass made drums, high pressure and high flow nozzles installed on board, extra counterweights, mounted and arm for lifting the cameras above the level of sludge/ material.
- The Robot itself is composed by two independent steering tracks, by a suction hose installed on board with an UP/DOWN and a LEFT/RIGHT movements possibility, by a wide range of interchangeable tools which could be used according to the different scenarios that every tank will show after the manhole will be opened

MOBILE APP

Camera System

- The one of its kind Atex Zone Zero Camera System which goes together with the robotic system is composed by a part of it which is installed on the robot itself, where a certain amount of Atex Zone Zero Certified Cameras are predisposed according to the customer requests.
- A part of it is installed (from the outside without the need of any men entry) inside the tank, as the customer can chose to have other cameras installed on the various lateral or roofs manholes of the tank, to give a better view of the working environment.
- Full recordable option which can be monitored through a dedicated App designed for the system.

Control Panel

- Atex Zone 1 Control Unit (skid mounted) with Manual hydraulic controls, electric commends for cameras' lightening intensity regulations, 19" Atex Zone 1 certified monitor, Atex Zone 1 Certified grounding system, washing system for the camera lens cleaning, DVR option,
- The control Station System is a very simple installation with the goal of making the life of the operator as easy and comfortable a possible during the working operation,.
- A parto f it is installed on the Atex Zone 1 Certified
- Control Station where explosion proof monitor(s) (Atex Zone 1 Certified) reinstalled according to the agree system specifications.

TARGET UNITED ENERGY

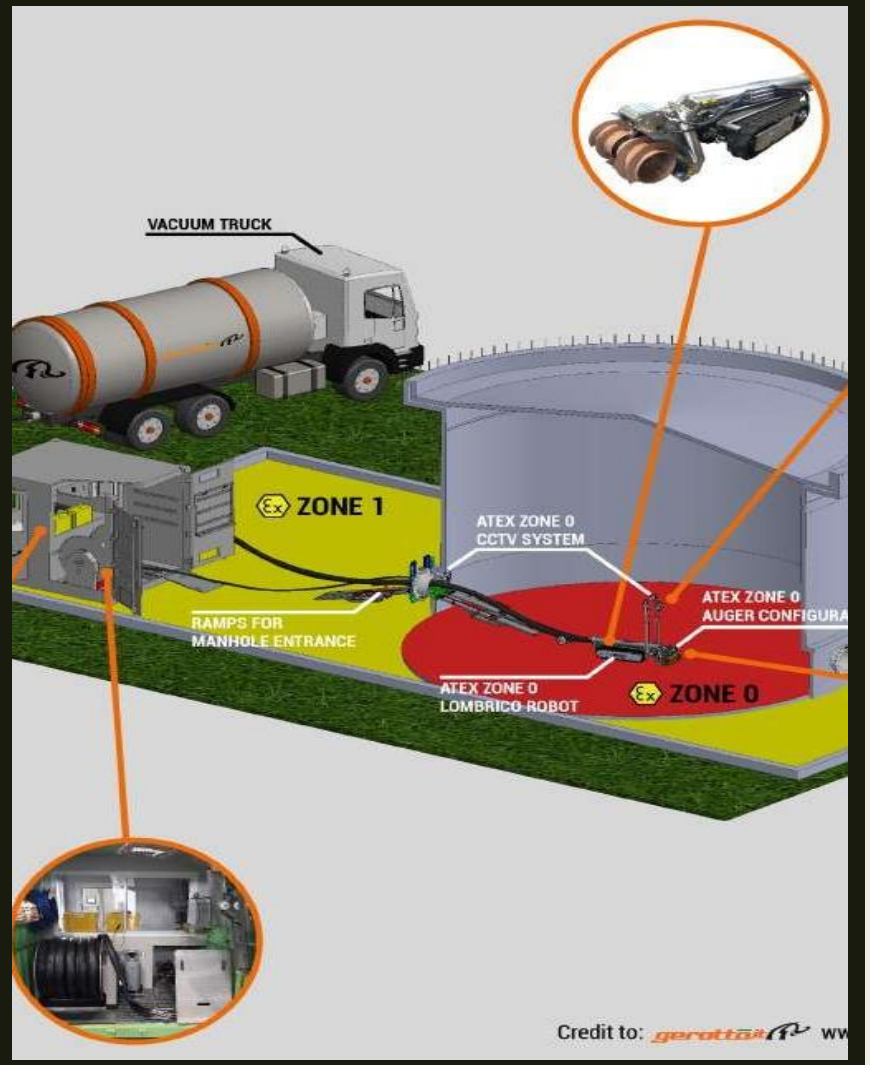
Hydraulic Ramps System

- Due to the narrow dimension of the manholes for entering the tank, and the needs of not having anybody entering the manhole, not even for bring a piece of equipment in, Gerotto have developed a system of ramps, suitable to be used and installed on manhole starting from a diameter of 24”.
- The ramps are composed by 4 parts:
  1. *The external one;*
  2. *The internal one;*
  3. *The flange for the manhole;*
  4. *The support for the hydraulic connection of the robot and for the suction hose connected to the robot*

Non Atex Hydraulic Power Pack and Power Pack Safety Box

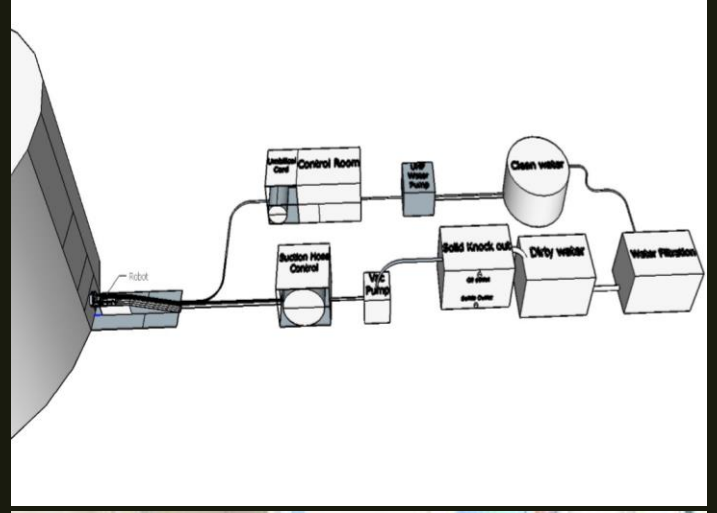
- Being our machine completely hydraulically driven, with the only need of electrical power being 12 V taken directly from the power pack as well, it needs hydraulic oil to run and to provide its services.
- This hydraulic supply, comes form the kind of power pack as above and the flow and the pressure needed comes directly from a hydraulic pump connected to a hydraulic circuit. [L SEP]
- This hydraulic pump may be driven from diesel hydraulic power packs, gasoline drive ones, electrical and pneumatically driven as well.
- Being the Robot certified according to the Atex Zone Zero Directive and regulation, We work to supply our customer not only the safety in the operation of the robot, but also the safety of the complete system, checking continuously, through the use of a special device called Power Pack Safety Box, that all the working condition are safe and ensured, as grounding, overpressure or overflow.

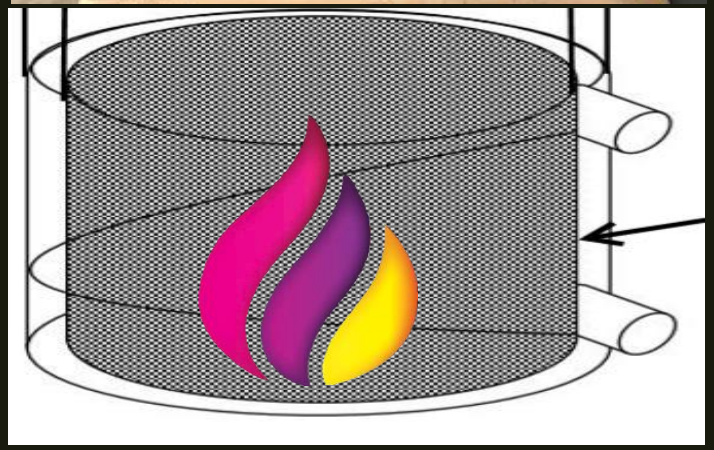
TARGET UNITED ENERGY



Set Up

- Positioning of the different components of the tank cleaner system on site. Power packs goes in the safe area, control panel in the Zone 1 area, together with the robot, cloys to the manhole;
- Connections are made: power packs connects to the control panel and control panel to robot. All hydraulic hoses and electric cables are properly connected according to the user manual provided;
- Earthing of the complete system is ensured and grounding will be monitored constantly by the system itself;
- Manhole is open;
- Analysis of the situation inside, evaluation on how to proceed;
- If the material in front of the manhole is a lot, some has to be remade using the vacuum hose from the outside, until there will be enough space for the internal ramp to be mounted and for the robot to drive directly to the bottom of the tank;
- Ramps are installed;
- Vacuum hose is connected on the back of the robot;
- Hydraulic power pack is turned on according to user manual provided;
- CCTV System is activated;
- Robot drives into the tank according to user manual of the ramps provided;
- Cleaning process can start;





Sludge Removal Process

- Sludge will be pumped using vacuum pump which the suction is attached to the Robot and the discharge is attached to the solids knock out.
- Solids pumped from the tank using zone 0 robot and Vacuum pump
- Solids/liquids pass through knock out drum and solids are dropped out to 10m3 Skip
- Liquids are carried over to settling tank
- Oil is skimmed from settling tank using diaphragm pump to skip to be returned to process.
- Water is pumped from settling tank through 100-micron- 50 micron filtration skid to water holding tank
- water in holding tank will be used to slurry solid waste inside the tank if required through HP pump which is connected to zone 0 robot
- Solids inside the settling tank will be pumped to vacuum tanker using vacuum tanker suction hose

High Pressure jetting using M7 Robot

- Cleaning of tanks for inspection takes a high volume of scaffolding for tank shell to be cleaned depending on the height of the tank and high volume of Manpower.
- M7 requires 1 operator and is equivalent to 3 operators using a lance system.
- Magnetic tracks to reach areas that would require scaffolding access
- Winch system to prevent the robot from falling from height
- Suction vacuum system can be attached for removing liquid waste during HP jetting operations.
- Fully automated with 50m reach control system