Proposal: NEPA

Background/Need:

Above ground storage tanks (ASTs), predominantly made from steel, are normally found in areas close to large population centres and near coastal industrial zones where the corrosive environment is harsh due to saline spray, humidity, aggressive chemicals stored and high temperatures. There was nearly 129 million m^3 of tank storage capacity in Europe in 2023, 86% which is for oil and fuels (fetsa.eu). Most these tanks are over 30 years old and the corrosive environments in which these operate makes the danger of leakage acute. Approximately 55% of storage tank accidents are caused by tank failure, in particular cracks and ruptures mainly caused by corrosion. The tank bottom is particularly prone to corrosion both internally from corrosive sludge, and externally from contact with damp ground. There exists the potential of damage to the environment (e.g. soil and groundwater contamination), plus endangerment of civilians and working personnel as well as interrupting the operator's business.

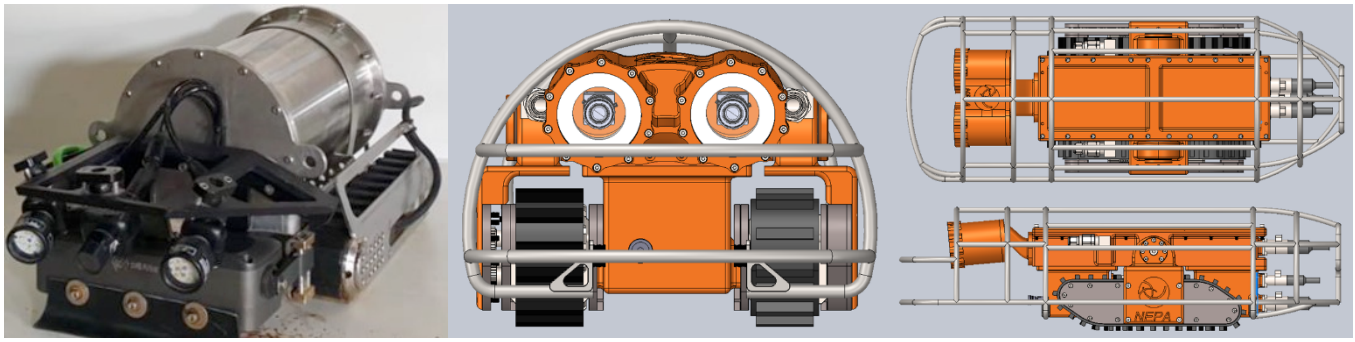
Only wall corrosion and welds can be inspected from the outside. While internal and external corrosion on the tank floors can only be inspected from the inside. Current industry SOPs, based on API 650 and API 653, are to periodically evacuate the AST contents to another vessel, open all the tank hatches, clean and de-gas or neutralise chemicals, requiring the tank to be out of service for up to four weeks at a cost of €500,000 to €1,000,000.

Robotic solutions have been developed to avoid danger to human operators, although these often have a large footprint and bulky tethers resulting to complex manoeuvring and long inspection time. Some robots only surface clean, becoming stuck in the sludge, or are not intrinsically safe for use in flammable/explosive environments, or are only able to inspect offline, further limiting their effectiveness.

This represents a major opportunity to bring to the market a new product, NEPA, which will improve the safety and reliability of tank storage, whilst reducing the cost of maintenance.

Proposal concept and solution:

NEPA is a small intrinsically safe robot to perform in-service inspection. The submersible robot uses magnetic tracks to crawl around a tank using an ultrasound probe to make measurements of floor and wall thickness. The design aims to obtain the smallest possible footprint to allow entry via the smallest manholes of liquid storage tanks. For the robot to perform an inspection in an explosive and flammable environment, the robot operation must avoid sparking which can create an explosion in the tank due to heat and the presence of vapour.



a) b)

Figure 1: a) Current NEPA prototype; b) Proposed redesigned NEPA

Project aims and objectives:

The overall objective of NEPA is to redevelop the NEPA robot ready for ATEX level 0 certification, and capable of traversing through up to 30cm of sediment to get to the tank floor.

Consortium, roles and grant:

Confirmed:

- **Innvotek Limited**, UK SME. Consortium lead. Role: Development of the NEPA prototype, exploitation and dissemination, project management.

Other proposed partners:

- **Inspection Services Company**. Role: User specifications, prototype demonstration and validation.

Work programme and funding scheme:

Globalstars call with Japan. Full call details here:
https://www.eurekanetwork.org/programmes-and-calls/globalstars/globalstars-call-with-japan/
The call deadline: **21st January 2026 12:00 AM (CET)**