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GreenTank



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Deliverable 2.7

Proof of Function at Site

Workscope

The main task was to demonstrate the function of the robotic solutions with induction disbonder for efficient coatings removal on vertical and horizontal surfaces in storage tanks. An optional chiller system should be commissioned for use in combination with the robotic solutions. The proof of function should ideally be done outside and inside on real tanks within the scope of the 20.000 m² target work area for the project.

Summary

The project has succeeded in making all essential equipment available for dissemination and work on storage tanks. During the development work of the robotics, delays were experienced. This was caused by long delivery time of some critical parts and need to redesign of the flat bottom crawler for reasons outlined in D 2.3. The cooling unit was sourced off-the-shelf from an external supplier and tailored to fit for mounting on the equipment. Ideally, all equipment was intended tested on real tanks owned by larger tank owners in Germany. However, shortly after start-up of the project, there was a drastic drop in oil prices resulting in significant reduced maintenance activity with few tanks made available for test work. Some work and dissemination activity has meanwhile been done in other territories and continents, subject to availability. While the flat bottom crawler has been used in real tanks, the vertical crawler has so far only been tested on our demonstration wall in Dorsten, constructed as an integral part of the project. Both demonstrators however are working satisfactorily.

Proof of function and achievements

Flat bottom demonstrator

In order to comply with different local requirements, there are two versions of the flat bottom demonstrator available, one for 24V operation and one for 110/220V. It has successfully been used in real tanks with different coatings and surface conditions. Average stripping rates meets the expectations of 15-20 m²/hr, which is a significant improvement compared with grit blasting. The speed will vary depending on coating type and thickness but remain a faster solution even when a sweep blasting operation using grit often is required to meet the standards of surface structure (SA 2,5). Video material and documented results are being used for further promotion and dissemination activities.



Vertical crawler for curved surface

The vertical magnetic crawler was initially intended used on both interior and exterior tank walls. While most tanks are coated with a thin layer on the outer wall, the interior walls are usually coated with thicker coating on the lower sections (1,5 – 2 m).

Tests on the test wall have shown that the crawler can easily operate on the interior vertical surface, using manual scraping of the paint after heating. Under ideal conditions it can achieve stripping rates of 12-18 m²/hr which is close to the expectations on thick coatings. Despite offering high stripping rates, the vertical crawler is less in demand on exterior surfaces where time is less of a constraint. Consequently, use of the magnetic crawler with induction disbonder is preferred used on the lower section interior walls. Further improvement with mounting of an automatic scraper on the crawler is being evaluated.



Chiller Unit

The RPR system requires water-cooling and the machine will stop operating at water temperatures above 38° C. Working inside storage tanks often experiences ambient temperatures in excess of 30° C implying that a water cooling devise is required to safeguard continuous operation.

As a part of the GreenTank project, RPR has developed and introduced a tailored chiller unit, named AX 5A. It is a modified version of a standard of-the-shelf system from a well-reputed supplier to the industry. It has been fitted with a stronger pump and safety features that are mandatory for use in combination with the RPR equipment. This includes such as special lifting devices, integrated water tank, CE labelling and use of environmentally friendly cooling media. The unit is available as a plug-and-play solution that can operate at ambient temperatures up to 43° C.

