

Trying something new is never easier – in this case the benefits made it worthwhile

# Venturing into automated tank cleaning

In early 2010, a big Gulf Coast Refiner (GCR) needed three crude oil storage tanks cleaned, of which two were neighboring tanks. The GCR was searching for a safer, more predictable and faster way of cleaning oil storage tanks, compared to the conventional tank cleaning methods.

Making the move from conventional cleaning systems to automated can be a big decision. There are many factors to consider:

**Worker's health and safety:** Tank operators increasingly face the risk of litigation claims relating to health and quality of life relating to worker activities

**Environment:** Increased regulatory requirements require tank operators to minimize air emissions and hazardous waste generated from cleaning tanks.

**Storage capacity and reduction of downtime:** Terminal operators want as little downtime as possible, but it is required every so often to allow for integrity inspection. To fit around this tank cleaning schedules need to be predictable and fast.

**Oil recovery:** The value of hydrocarbons means that it is important to recover as much entrained oil as possible from tank bottom sludge

The company decided to try out a non-man entry automated cleaning systems, Blabo. This was offered by Houston-based Cinatra, which has the rights to the Denmark-based tank cleaning specialist Orecó's technology in North America.

The fact that two of the tanks were neighboring tanks allowed for fast change over from one tank to the



The Blabo tank cleaning system in action at a big Gulf Cost Refiner

other with a minimum of modification to the piping and ground mobilisation.

Taking tank 2 as an example of the cleaning process – it is a Ø212 ft external single deck floating roof tank used in waxy crude oil service. The tank had not been cleaned for several years, and contained at the start of the project around 31,600 bbl of high viscosity sludge that could not be stripped from the tank by existing onsite means. Tank 2 was the second tank in the project. Most of the ground mobilisation was already in place. Complete mobilisation was therefore performed in only 4 days, versus a typical similar tank mobilisation of 7 days.

During the stripping of the tank, starting from landing of the roof, Cinatra was replacing the pumped out oil with onsite generated nitrogen @+95%,

thus simultaneously insuring an inert atmosphere with less than 8% Oxygen (According to ISGOTT and API2016). By merely replacing the oil with nitrogen two important things are achieved; minimisation of air emissions and elimination of venting needs.

Upon completion and customer verification of mobilisation, installation and hydro test an initial batch of 1,500 bbl (240m<sup>3</sup>)

cutterstock was transferred by the refinery into the tank and the desludging process started. The total desludging period lasted only 14 days during which period a total of 99% of the oil was recovered to the GCR using only 10 batches of cutterstock with an average batch size of 1,900 bbl (300 m<sup>3</sup>).

Upon having achieved a sludge-free tank, 1,500 bbl (240 m<sup>3</sup>) of fresh water was

DATA SHEET	Tank 2
Tank size	212 ft (65 m)
Tank Content	Crude oil
Roof	Floating single deck roof
Tank bottom	Cone down
Sludge content	31,534 bbl (5,011 m <sup>3</sup> )
Cleaning nozzles	8 pcs. Single Nozzles Sweepers
Total active process time	16 days
Mobilization and installation	4 days
Demobilization	4 days
Recovered oil from sludge	31,304 bbl (4,975 m <sup>3</sup> ) / +99%
Cutterstock used and recovered	18,782 bbls (2,985 m <sup>3</sup> )

introduced. The oil/water mixture was recirculated and heated to 71°C over the skimming tank, simultaneously allowing for recovering of 235 additional barrels of high quality oil, and recycling of the water phase back to the storage tank.

The recycling of the water phase significantly minimises the quantity of waste water generated. Two days after initiating the water wash, the tank cleaning process was completed. At that point the gas concentrations in the tank were less than 10% LEL and 0.5ppm benzene. The tank was left to ventilate for 24 hour to bring the oxygen concentration above



**A close-up of the modular and mobile Blabo system**

20%. Once achieved the tank was inspected and cleared for entry to remove

rim seal, remaining solids, flushing of roof legs etc. Total oil recovery tank 2

amounted to 31,304 bbl (4,975m<sup>3</sup>) which is more than 99% of the initial oil.

Cinatra received the first two Blabo systems in the second half of 2009, and have since performed several tank cleaning projects in US.

The entire process is from start to finish a non-man entry system, meaning no personnel have to enter the tank before or during the cleaning process. Naturally this has a significant HSE advantages compared to the 'old' ways of tank cleaning. ●

**For more information:**

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