achieve

Case Study

Autonomous Pipeline Inspections

❯ Supermajor Oil & Gas

Learn. Improve. Achieve

Summary

❯ **Challenge**
Pilot and Test the use of autonomous pipeline inspections.

❯ **Root Cause**
Expensive annual requirement for use of manned vessel.

❯ **Output**
'Buy the Data', X-Ocean complete inspections, client buys data only.

❯ **Results**
£900K (cash) annual savings with bonus of environmental & safety & impact.

Autonomous Pipeline Inspections.

Case Study
Lean six sigma

Overview

Use of auonomus drones (Unmanned Surface Vehicle (USV)) to inspect near shore (3-12m depth) subsea piplines, required for integrity and safety. Historically this was completed by surface vessels, the use of USV's represented a cost saving of $900K (USD).

Capable of operating 24hrs a day, 7 days a week. Fitted with a multi beam echo sounder the XOcean USV was controlled remotely via satellite, real time images were available to at operations centre where the pilots were responsible for avoiding collisions.

Define

- Annual inspection for subsea pipeline required to ensure integrity.
- Use of autonomous, unmanned surface vessel (USV) to replace crewed surface vessel.
- Possible cashable saving of $900K with bonus of safety and environmental advantages.

Within the Caspian Sea there were over 1,500 KM of pipelines taking oil and gas from the platform(s) to the onshore terminal. To ensure the integrity and therefore safety of these pipelines an inspection regime was in place. Every couple of years various sections of the network are examined against a schedule, historically this was usually carried out by hiring a manned surface vessel, the Svetlomor 2, a 60m ship with a crew of 30.

With an inspection plan of 900KM planned of 'near shore' pipeline the current process had an estimated cost of $1.9M (USD). This highlighted an opportunity to automate their pipeline inspections using Unmanned Surface Vessels (USV's) to complete these inspections. XOcean was one such supplier, they offered a service whereby the client could 'buy the data', in this way XOcean would complete the inspection and the client would buy the data when it was collated. With this service being priced at $1M (USD) there was a potential saving of $900K (USD).

Measure

- 900Km of 'near shore' pipeline chosen for the trial.

- Controlled by satellite the USV was capable of operating 24hrs a day, 7 days a week.

Within the Caspian sea over 1500KM of active pipeline was in place, based on depth the network was categorised into three groups; near shore (3-12m), shallow (12-25m) and deep water (upto 500m). The team selected 'near shore' with an inspection length of 900Km for the scope of this trial.

The solution proposed by XOcean was to use a specially designed vessel that was capable of operating 24hrs a day, 7 days a week. Fitted with a multi beam echo sounder the USV was controlled remotely via satellite, real time images were available to XOcean's operations centre where the pilots are responsible for avoiding collisions.

Analyse

- Robots controlled by satellite considered as entry technology for industry 4.0.

The use of autonomous machines, robots, to replace the need for humans is not necessarily new. However, this technology represents a step change in how robots are used and controlled. The average robot within a factory follows a predetermined program, completing the same, repetitive, task many times over. Benefiting the manufacturer in many ways. This technology is more dynamic, more responsive and represents a bridge into the fourth industrial revolution. In this example, compounded by commercial terms, the data gathered was analysed manually. However, through the Internet of Things IoT, and Big Data, the 'robot' could feasibly communicate its findings making autonomous maintenance a realistic next step.

Improve & Control

- Tiered visual management and daily huddle meetings was the method for quickly escalating a just do it solution for authority.

The opportunity arose during a daily huddle meeting, followig the principal that 'visual management makes hidden problems visible' one of the team proposed the idea of using USV's.

As their was a 'tiered visual management' process in place, this idea was quickly escalaed to the level where authority could be granted. The data collection went well and served as a spring board for further use of autonomous vehicles.