TechnipFMC

Case study:

Sure-Cut® Analyzer Field performance

Case Study

Analyzing Sure-Cut® field performance

Challenge

In collaboration with a multinational oilfield services company and a supermajor, M-Flow provided a 1" Sure-Cut® to be installed on an offloading buoy fast loop. The Sure-Cut® analyzed data covering 26.3 thousand barrels, with seven different oil types (API variation from 17 to 37). During this analysis zero maintenance or manual recalibration was required.

The objectives

- Validate the accuracy and reliability of Sure-Cut analyser based on comparison with different water cut measuring methodologies (In-Line Sampler and Karl Fisher analysis)
- Evaluate density compensation effect and performance for different crude types with API varying from 17 to 37

Solution

The workscope

The Sure-Cut® was installed horizontally in series with an API 8.2 compliant auto-sampler. A total of 64 data sets were logged by the Sure-Cut® between September 2015 and May 2016. Sure-Cut® outputs were time stamped, flow weighted average water-cut, compensated for API and temperature. The client provided corresponding In-Line Sampler (ILS) and Karl Fischer analysis for each offload.

Analysis was carried out to compare the Sure-Cut® performance with ILS uncertainty. A further study was carried out on the impact of oil type on analyzer uncertainty, based on the seven different types of crude oil offloaded (Figure 1 overleaf). Data were also analyzed for calibration drift over time and density uncertainty against third party instrumentation that was used to give temperature and density inputs to the Sure-Cut® (Figure 2).

The backup for ILS, in the case of custody transfer, is analysis of Vessel Tank Composite (VTC) and Free Water (FW). Analysis was carried out on seven heavy oil loads to show how the analyzer can combine different data sets to identify high water-cut slugs and act as a backup for ILS failure (Figure 3).

The Sure-Cut®'s reliability was also scrutinized. No maintenance, cleaning or manual recalibration was required during the nine months test. The Sure-Cut® was reset once due to a communications error.

An economic scenario was applied to the results from selected analyses. It demonstrated that the return on investment for a Sure-Cut® is made on as little as a single offload.

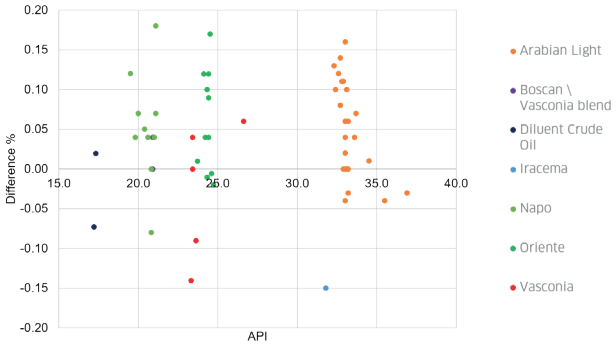
Results

Uncertainty vs. ILS was +/- 0.14% with the largest discrepancy vs. ILS at +0.18%

- Average reading difference vs. ILS 0.04%
- Uncertainty vs. ILS quote is 2 x SD (95% confidence). The API 8.2 error is quoted at a similar magnitude
- At 1% water-cut, ASTM method quotes lab (Karl Fischer) uncertainty as +/- 0.1%. It was concluded that the Sure-Cut® uncertainty floor is at the same magnitude as validation methods

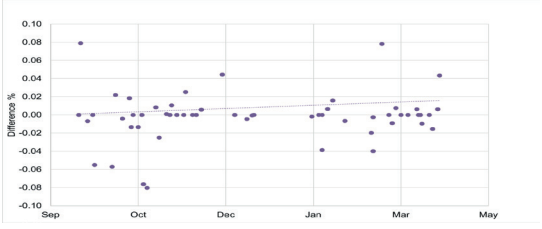
Minimal oil density variation impact on density compensation feature (Fig 1 Sure-Cut® vs. ILS)

Data from the seven different types of crude oil that passed through the Sure-Cut® showed that there was no significant change in its performance.



Minimal calibration drift during test period (Fig 2 Sure-Cut® vs. ILS)

The Sure-Cut® maximum drift for the duration of the test was smaller than <0.02% demonstrating excellent reliability results.



Sure-Cut® Analyzer

Slug and higher cut measurement (Fig 3 Sure-Cut®)

Substantial slugs of free water were measured in the initial offloading phase.

- Analyzer base level = 0.085% = 581 bbls
- Remainder seen by analyzer = 2,385 bbls
- VTC = 615 bbls and FW = 2,350 bbls
- Sure-Cut® shows accurately the split of free and suspension water

The benefits

- No maintenance, cleaning or manual recalibration required during this test installation (Duration 8-9 months)
- Improve project economics, economic analysis demonstrates that ROI on a Sure-Cut is made on as little as a single offload
- The Sure-Cut is Suitable for different types of oil (API variation for 17 to 36)