THE INSTITUTE OF PETROLEUM

Research Project

Evaluation of the performance of meters in loading gantries.

Phase 1 – Gas Oil Tests

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SGS Redwood Services

The Institute of Petroleum

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Evaluation of the Performance Of Meters in Loading Gantries

Phase 1 – Gas Oil Tests

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Summary

This report describes the first phase of a project undertaken by SGS Redwood under the sponsorship of The Institute of Petroleum. The project is concerned with the performance of various types of meters in loading gantry installations. During the first phase, a PD meter, a straight-bladed turbine meter, a helically bladed turbine meter and a Coriolis meter were tested on gas oil.

The test programme was designed to evaluate the performance of each of these meters under the following conditions:

1. In an "ideal" installation with 20 diameters of straight pipe upstream and 10 diameters downstream of the meter.
2. In a simulated gantry installation with the bends and components copied from a real gantry.
3. In a second gantry installation with the disposition of the bends and other components differing from the first.
4. In the ideal installation but over a range of product temperatures.

The results of this phase of the project confirmed previous experience indicating that a conventional straight-bladed turbine meter does not give satisfactory performance in a typical gantry installation. Its performance was severely affected by the installation, its linearity was not acceptable and in the second gantry rig its output was completely unstable.

The three other meters were all affected by the installations, but to a much smaller extent than the turbine meter. Indeed, in every case the effects were seen only at the lowest flow rates and would therefore have a minimal effect on their performance in a loading gantry. All three meters gave excellent repeatability throughout.

The linearity of the PD and helically bladed turbine meters both increased in the simulated gantries but remained acceptable for gantry metering. The linearity of the Coriolis meter improved in the simulated gantries, giving the best linearity of all the meters tested. Perversely its performance in the ideal installation was not acceptable, being affected by an excessive error at the lowest flow rate. This point will be raised with the manufacturer.

The performance of each meter was affected by product temperature. In every case the effect was sufficient to produce significant errors when a gantry meter is proved at one temperature and used at another. Although the technology is available to correct the errors, it is rarely applied. Consideration should be given to the introduction of such corrections.

The results of this phase of the project indicate that (subject to one feature of the Coriolis meter's performance which is to be investigated) the PD meter, helically bladed turbine meter and Coriolis meter all give acceptable performance on gas oil and could be considered for gantry operation. Phase two of the project will provide valuable information on other products.