KUWAIT 2ND FLOW MEASUREMENT TECHNOLOGY FOR OIL & GAS CONFERENCE

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Radisson Blu Hotel, Kuwait
Implementation of Metering Systems TRAIN 4: Challenges and Solutions

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Contents

- Objective of metering system
- Over all completeness for closure of Plant MB
- Components of a metering system
- Selection Criteria of a metering system
- Redundancy philosophy
- Installation & Maintenance issues
- Commissioning issues
Objective of the system

- Single stream measurement or for overall unit
- Basis of Purchase /Sale (Energy Volume Weight)
- Expected accuracy for each measurement
- Increase in number of factors in calculation reduces accuracy (Ex Coriolis meter for Mass. Ultrasonic for Volume).
- For energy composition is needed. Over all accuracy with product of accuracy. (0.5% for meter +1 % for composition, overall accuracy is 1.5%)
- It further complicates when Material balance closure in Tons but accounting in different unit.
Completeness of metering system

- Inclusion of Regeneration gas, flare and drain streams
- Missing streams - Difficult to complete balance
- Use of different unit complicates further
  - Gas Products - Energy - Gross / Net basis
  - Liquid products - Weight basis
  - Feed streams - Energy basis
Components of metering skid

- Inaccuracies to be minimized
- Ultrasonic - Velocity - Volume
- Coriolis - Weight
- Least factor involvement to be preferred
- Temperature - Pressure - Composition - Density
- Approved calculations to be applied for conversion to minimize error
Redundancy of metering skid

- Unit is designed to operate without shutdown - Online proving facility mandatory
- Spare meter with MOV line-up envisaged in design
- Isolation valves (MOVs) available for each stream
- Depressurisation system in place for maintenance
- Multi-stream analysers for analysis
- Critical streams with fast sampling need to have independent analyser
Installation issues

- Sample outlet routing need to be planned
- Sample should not be routed to flare if recovery is desired
- Pressure drop in process side to be designed accordingly to facilitate sample recovery
- Requirement of sample pump to be finalised
- Length of sample piping to be minimised
Maintenance issues

- Frequent cleaning of filter in sample conditioning system to ensure sample flow
- During proving and testing, master station program to be modified to avoid flow duplication
- Sample pump operation and maintenance need to be performed periodically
- Periodical analyser calibration with standard sample
Inclusion of all components in analyser

Loss due to lower energy value - Estimated as 6.5 Million USD/yr (For 0.1% error in C6 measurement)

If C6 and C7 is not measured, error is increased beyond acceptable limit

<table>
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<th></th>
<th>Vol %</th>
<th>Wt %</th>
<th>Energy %</th>
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<tr>
<td>Error in C6</td>
<td>0.5</td>
<td>1.9</td>
<td>1.8</td>
</tr>
<tr>
<td>Error in C7</td>
<td>0.1</td>
<td>0.4</td>
<td>0.4</td>
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Conclusion

- Metering skid scope and facility to be well planned in design in deciding the system for measurement.
- Composition has major role, therefore analyzer should measure all components.
- Water should not be missed in measurement and calorific value calculation.
- All streams has to included.
- Maintenance of issue to addressed as part of design.
Thank you
Questions