



FLOW MEASUREMENT OF LCGO AT DCU



“Flexim’s ultrasonic clamp-on flowmeter has been working well this far and no ambiguity has been observed as of yet. Thanks to Flexim’s non-intrusive measurement technology, we were able to replace the failing orifice measurement in the hazardous area without much effort and without any disruption to plant operation.”

Sudip Mondal,
AGM-instrumentation,
HPCL-Mittal Energy Limited



Measuring Task

Non-intrusive flow measurement of Light Coker Gas Oil (LCGO) at the Delayed Coking Unit (DCU) at HMEI’s Guru Gobind Singh Refinery

HMEI’s Guru Gobind Singh Refinery (GGSR) is a zero-bottoms, energy-efficient, environmental-friendly, high distillate-yielding complex refinery that produces clean fuels that meet Euro-IV specifications. The refinery has one of the highest Nelson Complexity Indices in the region and is designed to process a wide variety of crude oils including heavy, sour and other opportunity crudes.

Process automation has been at the heart of HMEI’s strategic vision in building a smart refinery. Leveraging the latest technology and partnering with the best gives HMEI superior operational performance and profitability with strict adherence to safety and environmental standards.

The GGSR has a state-of-the-art delayed coking unit (DCU) with four coking drums and a processing capacity of 2.77 million metric tonnes per annum (MMTPA). In delayed coking, the long-chain hydrocarbon molecules from the residue of vacuum distillation (VDU) are thermally cracked at high temperatures into lighter distillates, coker gas oils and solid coke, which are further processed into marketable fuel products such as LPG, gasoline,

diesel, fuel oil and petroleum coke.

Delayed coking is a semi-batch process where one or more pairs of coke drums are used for the thermal cracking and coking process. Simultaneously in each pair of coke drums, one drum is online for the coking process while the other drum is offline undergoing decoking. The semi-batch process poses special challenges for process control, as process parameters like temperature, pressure and flow change rapidly.

The conventional flow measuring instrumentation in refineries still consists of ΔP meters such as orifices or wedge meters. Those ΔP measurements have only a very limited measuring range and cause high maintenance. Deposits on the measuring orifices impair the measuring accuracy, a clogging of the thin differential pressure lines leads to a failure of the measurement.

The plant operators were therefore looking for a way to replace the failure-prone orifice measurement on a line for cold Light Coker Gas Oil (LCGO) with a maintenance-free flow measurement.



Solution

Non-intrusive flow measurement with a FLUXUS® clamp-on ultrasonic system from Flexim has proven to be the ideal solution. For the local sales engineer, it was a routine task to demonstrate the suitability of Flexim's technology for the measurement task with his portable flowmeter. So it was decided in Bathinda to equip the LCGO pipeline with a FLUXUS® F721 stationary measuring system. Due to the special requirements for reliability of the measurement, it was designed with two channels and two pairs of transducers. This also allows for a particularly high measurement accuracy to be achieved even under non-ideal installation conditions. The measuring point was set up without any disruption to the normal operation of the plant.

Unlike traditional differential pressure measurement, the acoustic method offers high measurement accuracy over an enormous measuring range. The clamp-on ultrasonic transducers mounted on the outside of the pipe are not subject to wear by the medium flowing inside and do not require any maintenance. Based on the convincing experience with the LCGO measurement, more measuring orifices are to be replaced by clamp-on ultrasonic systems from Flexim in the future.



HMEI's Guru Gobind Singh Refinery at Bathinda, Punjab © HMEI



The Delayed Coker Unit (DCU)
© HMEI



Measuring point with the clamp-on ultrasonic transducers, installed in Variofix C mounting rails.



A FLUXUS® F721 is used as measuring transmitter.

Measuring Points and Instrumentation

Pipeline	8" Sch 40
Media	cold Light Coker Gas Oil
Temperature	~ 105 °F
Pressure	~ 250 psi
Measuring Device	1 stationary ultrasonic FLUXUS® F721 flowmeter (dual-channel version) 2 pairs of clamp-on ultrasonic transducers type CLM2N52, installed in transducer mounting devices Variofix C

Advantages

- Precise and reliable flow measurement from the outside of the pipe
- No process stop required for installation – full plant availability
- No leakage risk, no wear and tear from the media flowing inside, virtually maintenance-free
- No pressure drop, saving of energy
- Excellent collaboration between plant engineers and Flexim's local sales and support team

Customer

HPCL-Mittal Energy Limited (HMEL), Guru Gobind Singh Refinery, Bathinda, Punjab, India

Formed in 2007 as a Public Private Partnership joint venture between the Fortune 500 company, Hindustan Petroleum Corporation Limited (HPCL, a Government of India enterprise) and Mittal Energy Investments Pte Ltd. (MEIL), Singapore (a Lakshmi N Mittal company), HMEL's production assets represent the single largest investment in any sector in the state of Punjab.

HMEL's Guru Gobind Singh Refinery at Bathinda, Punjab, is strategically positioned to service the energy demand of North India. Unleashing a hydrocarbon revolution in Punjab, the 11.3 million metric tonnes per annum (MMTPA) complex is an anchor investment for further downstream industrialisation in the region.



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AR-202306-HMEL-US

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