

# LEVEL MEASUREMENT IN DELAYED COKING UNITS

Reliable level control and improved  
utilization of drum capacity



 **BERTHOLD**

# MEASURING THE LEVEL IN DELAYED COKING UNITS

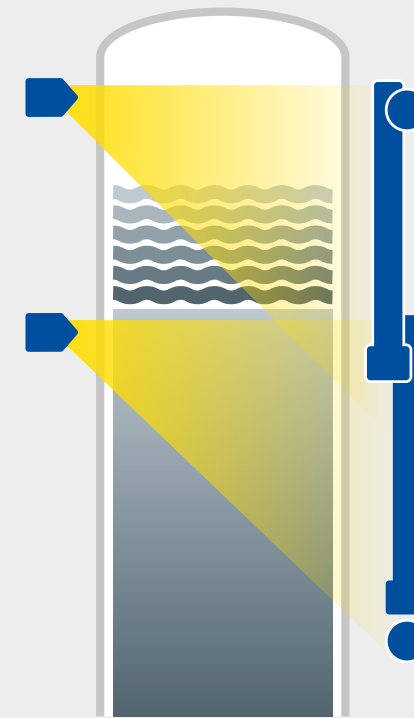
The delayed coker is the only semi-continuous batch process in the refinery, which means that the feed is continuously switched between two drums in a time-based cycle. The fresh feed, usually from the vacuum tower bottoms, is fed to the bottom of the coker fractionation tower to help pre-heat the feed and mixed with the bottom hydrocarbons. This mixture is then passed to the heater to apply the energy required to thermally crack the large hydrocarbon chains. After that the heated resid is pumped to large drums to allow for the cracking and expansion of the fluids, whereby the lighter cracked hydrocarbons are taken off the top of the drums to the fractionation tower. As the heavy hydrocarbons are cracked, the resulting hydrocarbons are then converted into a vapour due to the high temperature. As the vapours escape the viscous liquid, they tend to create a foam layer. This foam layer can vary depending on many parameters such as operating temperature, pressure of the drum, type of crude, charging rate etc. A foam over in a delayed coker unit can be a costly event, not only causing loss of production but also requiring a lot of manual labour to clean coke out of the overhead lines and fractionation tower. In order to increase throughput of the unit, one of the most important objective is to safely and reliably fill the drum higher, however, to achieve this, one must have a reliable measurement method for the foam front in the drums.

## Optimal control of the DCU process

Due to the conditions in the coke drum, a level measurement is a very challenging task. Where other measuring technologies tend to fail or end up being extremely unreliable, Berthold's radiometric level technology is ideal for monitoring the coke level due to its non-intrusive nature. Since large temperature variations through the whole operational cycle of a coke drum are a known issue to the operators, our patented automatic stabilization technology based on cosmic radiation has proven to be the most important feature to guarantee a stable and reliable level measurement without the need for recalibration. Separate level alarms ensure additional process safety. The same applies for the fractionator. Our level detectors are used to monitor the bottom liquid level – an important parameter for the efficient control of the complete coking cycle. A big advantage is that measurement is unaffected by surface turbulences, product falling down from the trays, different product densities, or scaling/coking.



## COKE DRUM CONTINUOUS LEVEL AND HIGH LEVEL ALARM



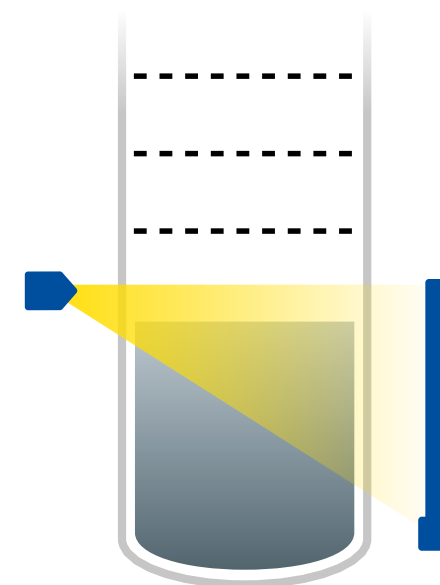
### Customer Benefits

- Improved utilization of drum capacity
- Efficient use of anti-foam agent
- Increased throughput
- Safe and reliable operation

### Special Features

- Use of 8 m long TowerSENS detectors (longer measuring range possible by cascading detectors)
- Immune to interfering radiation: X-Ray Interference Radiation (XIP) or Radiation Interference Discrimination (RID) ensure continuous operation e. g. during weld inspection
- Outstanding compensation functions: (Gas Property Compensation (GPC) and Product Buildup Compensation (PBC)) prevent falsification of measured values by process influences, such as fluctuating gas properties or wall build-ups
- SIL2 / SIL3 certified detectors available

## FRACTIONATOR LEVEL MEASUREMENT OF BOTTOM LIQUIDS



### Customer Benefits

- Reliable prevention of pump cavitation
- Increased efficiency of distillation process
- Safe prevention of foam or liquid entering the upper fractions
- Unaffected by foaming, plugging, build-ups or changes in temperature or pressure
- Easy to install on existing columns– no process downtime

### Special Features

- Continuous level measurement, typically 2 ... 4 m measuring range
- Installed on the cylindrical bottom of the column
- Redundancy can easily be provided
- Typical arrangement uses Cs-137 point sources and scintillation rod detectors
- On small diameter columns Co-60 rod rod sources achieve best measurement results
- SIL2 / SIL3 certified detectors available



## THE EXPERTS IN MEASUREMENT TECHNOLOGY

Berthold Technologies stands for excellent know-how, high quality and reliability. The customer is always the focus of our solution. We know our business!

Using our varied product portfolio, our enormous specialized knowledge and extensive experience, we develop suitable solutions together with our customers for new, individual measurement tasks in a wide variety of industries and applications. Berthold Technologies is specialised in radiometric process measurements for 75 years. This is our core competence with state-of-the-art and cutting edge products and solutions covering a vast range of industries and applications.

### **We are here for you – worldwide!**

The engineers and service technicians from Berthold Technologies are wherever you need them. Our global network assures you fast and above all competent and skilled assistance in case of need. No matter where you are, our highly qualified experts and specialists are ready and waiting and will be with you in no time at all with the ideal solution for even the most difficult measurement task.

**Berthold Technologies GmbH & Co. KG**

Calmbacher Straße 22 · 75323 Bad Wildbad · Germany  
+49 7081 177 551 · [industry@berthold.com](mailto:industry@berthold.com) · [www.berthold.com](http://www.berthold.com)

