Fluid Catalytic Cracker (FCC)

Industry: **Refining**
Product: **GD40 and GD402**

Introduction

The U.S. refineries represent approximately 23 percent of the world's petroleum production, and the United States has the largest refining capacity in the world. Petroleum refining is an industry, which is undergoing intense amounts of scrutiny in the United States from regulatory agencies and environmental groups. As a result, releases of pollutants caused by corrosion leaks are becoming a high consequence event. The Clean Air Act of 1990 has forced refiners to implement a number of costly measures to reduce their impact on the environment, both with the types of products they produce and the manner in which they operate their refineries.

An oil refinery is an industrial process plant where crude oil is processed and refined into more useful petroleum products, such as gasoline, diesel fuel, asphalt base, heating oil, kerosene, and liquefied petroleum gas. The measurement of hydrogen purity throughout a system allows for efficient control of the process. The top gas generated at the top of the distillation column in a petroleum refinery's fluid catalytic cracker (FCC) is used to produce gasoline and LPG. As the composition of this gas varies depending on the running conditions of the cracker as well as the composition of the crude oil, its density (molecular weight) must be constantly monitored and measured.

Process

In the petroleum refining system, an atmospheric distillation column or reduced-pressure distillation column is used to refine crude oil into gasoline, kerosene, and lubrication oil. In addition, the petroleum refining system incorporates an FCC to distill high-octane gasoline and LPG from the heavy contents of the crude oil. In many refineries the FCC unit serves as the primary unit, converting, or cracking low-value crude oil heavy ends into a variety of higher value, light products. In the US, the primary function of the FCC unit is to produce gasoline. Modern FCC units can process a wide variety of feedstock and can adjust operating conditions to maximize production of gasoline, middle distillate olefins (LCO) or light olefins to meet different market demands.

The top gas generated in the fraction column of the FCC goes through a heat exchanger and is then pumped to a high pressure. The resulting gas content is transferred to the LPG recovery system and the liquid content to the gasoline generation system. In this process, it is important to measure the density (specific gravity) of the gas because the data is essential as a critical parameter in controlling the operation of the FCC. In addition to being used to monitor the system and the quality of the product, this measurement can also help prevent pump pressure surges.

The GD402 Gas Density Meter has been introduced for this explosion protected application. It features an intrinsically safe and explosion-proof design, fast response, and a dust-proof, anti-corrosive, and flame-proof construction. GD402 will ensure stable and rapid measurement of gas density under hazardous conditions. It is capable of displaying specific gravity and molecular weight readings derived from the density data, and it will greatly reduce the workload by ensuring continuous and accurate measurement.

Expected Benefits

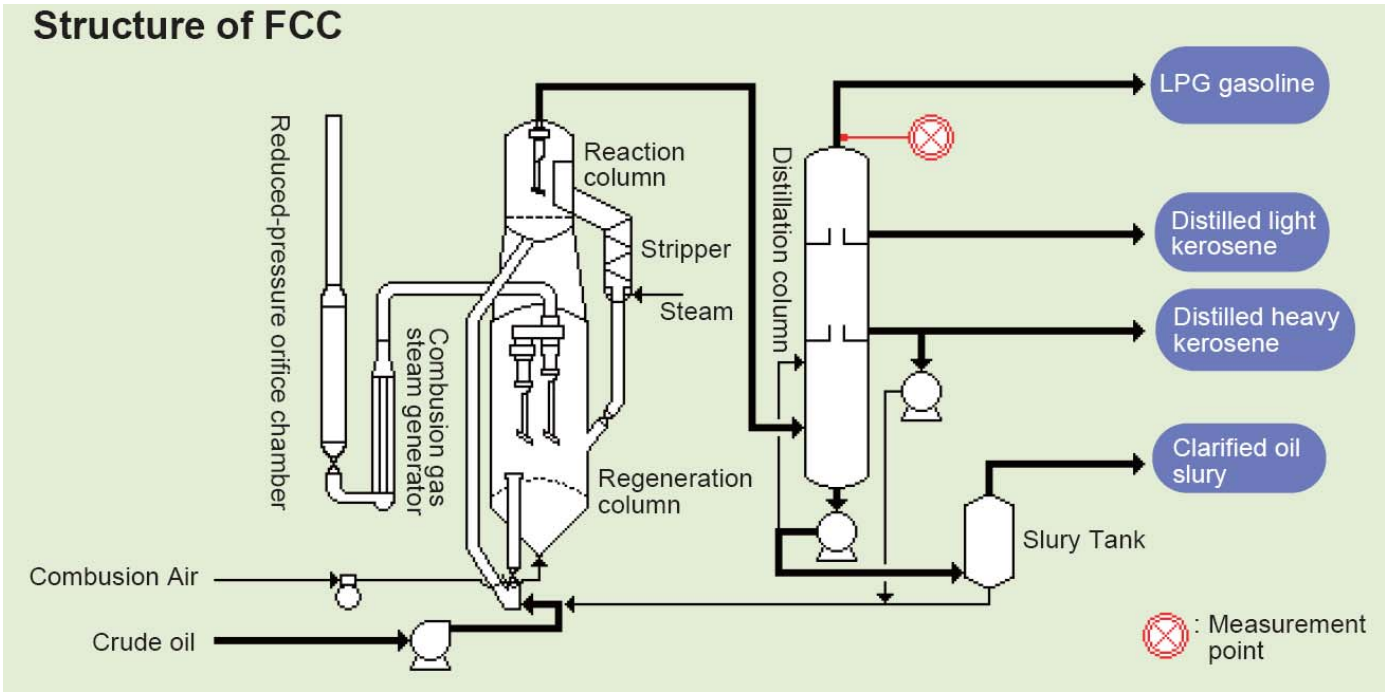
– Ensures stable and rapid measurement of gas density under hazardous conditions
– Capable of displaying specific gravity and molecular weight readings derived from the density data
– Greatly reduces the workload by ensuring continuous and accurate measurement

Field Data

Process conditions
Measurement point: Outlet of the top fraction column in the FCC

Temperature:	34ºC
Pressure:	75 kPa to 180 kPa
Humidity:	Wet
Gas Composition:	O_2, N_2, CO, H_2, H_2S, C_1 to C_5
Dust:	None

Measurement Range: 1,600 to 1,800 kg/Nm^3



Product Recommendations

Analyzer: GD402 Gas Density Meter
Sensor: GD40 Gas Density Detector

* For additional information or assistance with these applications, please contact Analytical Product Marketing

Notes

* The cubicles for the detector and converter are separated to prevent the gas in the sampling section from cooling and liquefying while the converter is operating.

* The capillary tubes for introducing the gas that is to be measured and the inside of the cubicles are heated with steam so that the heavy contents (C5 or more) will not liquefy.