Advanced Cyclone Technology from Ducon Environmental Systems Inc for FCC Refinery Process

FCC cyclone reliability and catalyst losses from reactor and regenerator cyclones are very important profitability factors for world refineries.


Ducon Refinery FCC Cyclone Installation

FARMINGDALE, NY, USA, January 5, 2024 /EINPresswire.com/ -- Fluid catalytic cracking (FCC) is one of the most important conversion processes used in petroleum refineries. It is widely used by refineries to convert the high-boiling, high-molecular weight hydrocarbon fractions of petroleum crude oils to more valuable gasoline, olefinic gases, and other products. Refineries are constantly in a challenging environment to improve their process reliability and reduce both operational and maintenance costs to remain profitable which isa direct result of keeping the FCC process cyclones operation at an optimum level.

A recent survey of major refiners showed that the FCC cyclone reliability and catalyst losses from reactor and regenerator cyclones were the main cause of concern in FCC operations. As a result, most FCC technology licensors such as: such as, Shell, UOP, Exxon, Axens, Technip, Stone Webster, KBR, and IFP rely on the major FCC cyclone vendors such as Ducon Environmental Systems Inc.(DES) (www.duconenv.com) for their experience and capabilities in this field. DES, a company established since 1938, is the pioneer in the FCC cyclone technology as it originally developed it in the 1960's and secured numerous early patents in this field.

DES Researchers and engineers have worked over the years to enhance the design of reactor cyclones to optimize catalyst collection efficiency and minimize the underlying pressure drop. Computational fluid dynamics (CFD) simulations and advanced modeling techniques have been

developed to better understand the fluid dynamics within the cyclone, leading to improved designs and long service life.


Regenerator Vessel head fabrication in Ducon Shop

The amount of catalyst circulating between the regenerator and the reactor amounts to approximately 5 kg per kg of feedstock, which means that an FCC unit processing 75,000 barrels per day will circulate about 55,900 ton per day of catalyst. FCC catalysts are fine powders with a bulk density of 0.80 to 0.96 g/cm3 and having a particle size distribution ranging from 5to 150 µm and an average particle size of 30 to 100 µm. The design and operation of an FCC unit is largely dependent upon the chemical and physical properties of the catalyst. The platinum based catalyst and the mixture of hydrocarbon vapors flow upward to enter the reactor cyclones at a temperature of about 535 °C and a pressure of about 1.72 bar. The regenerator section however operates at a temperature of about 715 °C and a pressure of about 2.41 barg. Both reactor and regenerator stages have multiple parallel cyclones with multiple stages in series to collect the catalyst depending upon the configuration.

> For more than five decades, Ducon is a recognized leading supplier to the world's refineries and has supplied more FCC Cyclones to refineries and petrochemical plants worldwide than any other company."
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> *Aron Govil*

Advances in materials used in reactor & regenerator cyclones aim to enhance their durability and resistance to wear and corrosion, especially considering the harsh conditions within FCC process. This can lead to longer operational life and reduced maintenance costs. There is a fundamental difference between first and second-stage FCC cyclones maintenance due to their erosion patterns. Higher particulate loading in first-stage cyclones result in little to no cone erosion, whereas lightly loaded second-stage cyclones can exhibit severe cone erosion. The key difference in erosion pattern lies in the differences in the solids flow patterns and the location of vortex formation inside the cyclones. The vortex depth in the first stage cyclone is much shorter because higher particulate level adversely impacts the vortex formation. Whereas, the second-stage cyclone with lower particulate loading, allows the gas to spin at higher velocities in the cone section and form a longer vortex which in turn causes greater erosion on the second stage cyclone cone area.

Now with advances in technology, implementation of sensors and monitoring systems allows for better control and optimization of the FCC process. Real-time data on cyclone performance can enable operators to make adjustments, improving overall efficiency and product quality.


Aron Govil, President of Ducon Environmental Systems Inc.

Aron Govil is the President of Ducon Environmental Systems Inc. and has over 30 years of experience in FCC Cyclone manufacture and operations.. Ducon is a leading supplier of custom engineered FCC Cyclone systems including: Reactor & Regenerator cyclones, Hanger systems, regenerator and third & fourth stage vessels and separators, and dipleg valves. Ducon has an ongoing record of hundreds of successful operating FCC cyclone installations since the 1970's that operate reliably and maintenance free for many years. Additionally, Ducon secured numerous FCC Cyclone technology patents during the 1970's and 1980's and has continued to make improvements inits technology. Ducon is a recognized leading supplier to the world's refineries and has supplied more FCC Cyclones to refineries and petrochemical plants worldwide than any other company. Through expert manufacturing, proven technologies, innovative engineering, and on-time delivery Ducon can ensure customer satisfaction through it advanced FCC Cyclone technology which achieves over 99.9% catalyst collection efficiencies for particles smaller than 5 microns in several design configurations. Ducon's name is synonymous with superior engineering, rugged construction, and high quality workmanship. The name to consider for your next FCC Cyclone project!

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