INFO

DAHLMAN

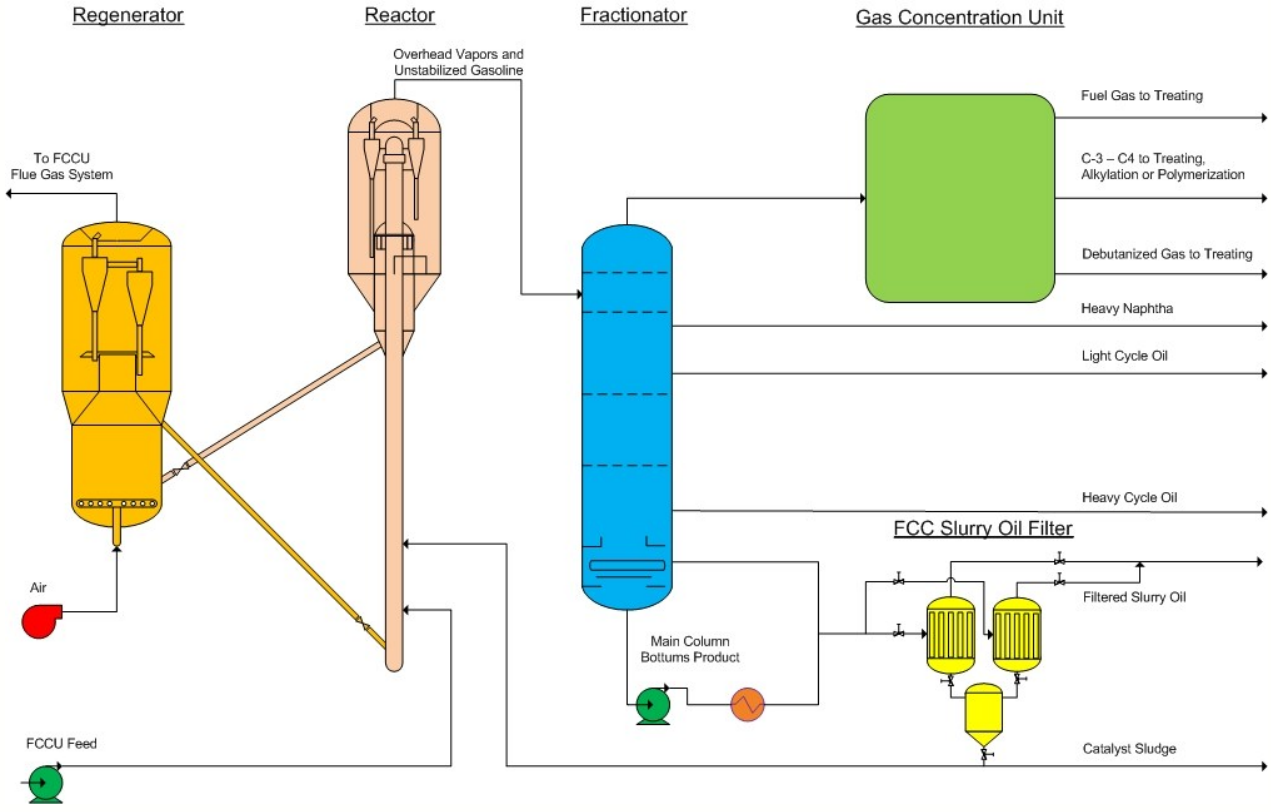
FLUID CATALYTIC CRACKING SLURRY OIL FILTRATION

Overview Developed in the late 1930's, Fluid Catalytic Cracking is still the primary conversion process in modern refineries. The Cat Cracker unit is the key to profitability for most refiners; efficient and successful operation determines whether a refiner can be competitive in today's market or not.

The FCC reactor contains a fluidized bed of catalyst with an equilibrium particle distribution range between 20 and 150 microns. In the reactor, coke forms on the catalyst as a result of condensation reactions and deactivates the catalyst. In order to prevent the formation of coke and to continuously keep providing energy to drive the endothermic cracking reaction, the catalyst is circulated between the reactor and the regenerator to burn off coke. Reaction products leave the reactor in a gaseous state after passing through cyclones that remove the majority of entrained equilibrium sized catalyst particles and smaller catalyst fines. The latter have a great chance of escaping capture in the reactor cyclones, since the removal efficiency of cyclones reduces with decreasing particle size. As such, these fines are carried over along with the reactor products to the main fractionator of the FCCU and leave the fractionator with its bottom product, also referred to as slurry oil.

By removing these catalyst fines from the slurry oil, product fuel oils can be upgraded, or feedstock can be provided for production of carbon black or other products.

Dahlman designs, fabricates and assembles fully dressed FCC Slurry Oil Filtration packages, based on proven filtration technology with a continuous solids content reduction to < 50 ppm wt.



Typical FCCU Process Flow Diagram

Process Description Typically, Dahlman's FCC Slurry Oil Filter package consists of 2 or 3 filter vessels (*e.g.* 2 x 100% or 3 x 50%), a backwash receiver vessel, a gas accumulator vessel and includes all controls, valves, instruments and piping, assembled within one complete skid mounted unit.

High quality sintered porous metal filter elements are utilized as filter media and are installed in the filter vessels, in such a way that solids are retained on the inner surface of the elements. Clean filtrate passes through the solids "cake" and filter medium. Once the filter's delta P has reached its pre-set value after normal filtration mode, the package its cleaning sequence is automatically started. The feed and filtered product connections are both closed and subsequently, the valve connecting a gas accumulator will open towards the FCC Slurry Oil filter vessel. This results in pressurization of the slurry oil contained in the filter vessel. When a quick-opening valve installed below the filter vessel opens, the gas pocket, pressurizing the FCC SO from above, rapidly expands. This results in a reverse flow of the slurry oil, from the outside to the inside of the filter elements. As a consequence, the collected particles/filter cake, dislodges over the entire surface of the filter tubes. The filtered liquid is even forced further back by the expanding gas, transferring the separated solids to the backwash receiver vessel in a matter of seconds.

Dahlman's gas-assisted backwash technology eliminates channeling and incomplete cleaning. It is considered to be one of the most effective and efficient *in-situ* cleaning methods.

Operating temperature is critical for the reliability of the filtration process; *f.i.* asphaltene precipitation on the filter media may occur when operating at too low temperatures, resulting in reduced cycle times and undesirable, *ex-situ* cleaning of the filter elements.

With Dahlman's filtration technology, the sludge, disposed in the backwash receiver vessel, can be redirected to the riser, while maintaining a continuous flow rate.

Features	***Benefits***
Continuous solids reduction to < 50 ppm wt.	Upgrade of slurry oil to valuable commodity
Full process performance guarantee	Single point responsibility
Non-stop operation from TAR to TAR	High reliability and availability (no unscheduled downtime)
Advanced PLC or DCS control system	Operational cost savings
Highly effective *in-situ* element cleaning, minimizing backwash volume	Minimized utility costs
Elimination of filter plugging and consequently, *ex-situ* cleaning	Enhanced operational safety & reliability, and low OPEX
Competitive pricing	Reduced investment costs
Skid mounted package supply	Reduction of site installation costs