CoalesSense

coalescensing and separation of mechanical oil emulsions

Overview

In the production of hydrocarbons, water management has become an increasingly important area. The amount of produced water increases over time. This stresses the limits of current installations, which face a volume flow much higher than the original design capacity. Besides, the fluid composition may alter over time, leading to smaller oil droplets present in the water. Further, legislation concerning discharge is ever more tightened, and operators require efficient and clean technology. Recent developments to enhance the oil recovery, require better, more efficient and more effective separation technology.

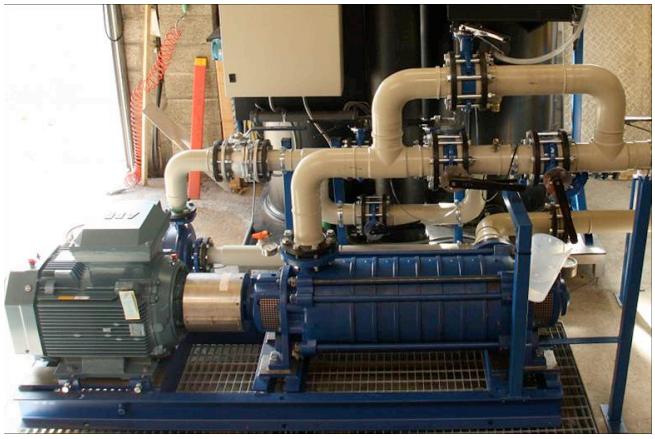

figure 1

To urge this need, *CoalesSense* has developed a rotating coalescer, capable to significantly improve the oil water separation. The use of coalescers is a simple and effective way to improve current installed separation installations, and is hardly inevitable when designing new installations.

The Dynamic Centrifugal Coalescer uses proven coalescing technology, combined with novel innovations, to further enhance produced water treatment.

Technology

The Dynamic Centrifugal Coalescer (DCC) uses the principles of centrifugation to enhance the separation of micron-sized phases from a carrier liquid. In particular, the DCC is used to increase the droplet size of oil in produced water. The difference in density between the fluids is the driving force in this process.
The core component of the DCC is a rotating element, as seen in figure 2.

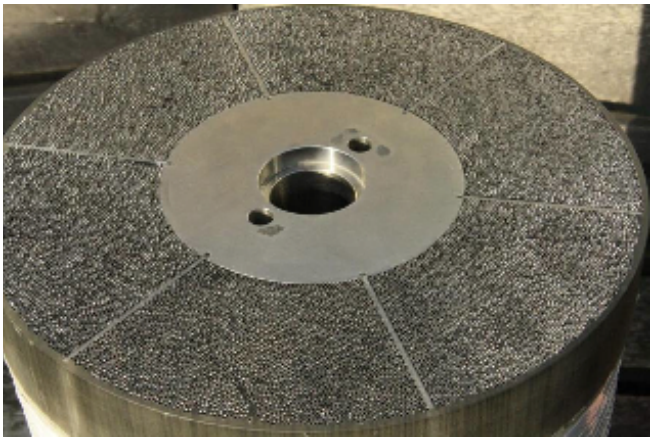

figure 2

The element consists of many thousands of small channels, rotating at high velocity. In these channels, high G-forces drive micron-sized oil droplets to the channel wall, where they coalesce and form an oil film. This film builds up and, at the end of the channel, breaks up into large droplets. These large droplets, together with the rest of the fluids, are now available for separation downstream of the DCC.

A novelty of the DCC is that the element is integrated in a multistage centrifugal pump housing (see figure 3.), therefore combining fully proven pump technology with state of the art coalescing techniques.

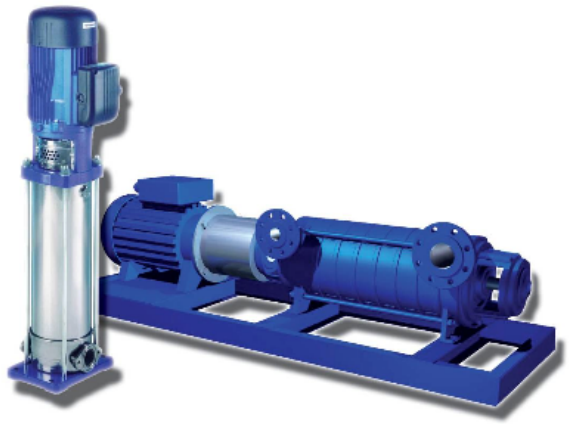

figure 3

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Testloop results @ Cameron

The tests showed a reproducible performance improvement of the hydrocyclone of over 50 percent.

Typically, the resulting oil concentration in the underflow was over 50 percent lower when the DCC was installed upstream. We are confident that the next generation Coalescer, which includes a separation step, is capable to decrease the oil concentration with > 90%.

In figure 4, a droplet size distribution from the Mastersizer (corresponding with run 3) is given. The mean oil droplet size in the inlet over the hydrocyclone was increased from 25 micron without the DCC, to 70 micron with the DCC. Thus, when the inlet oil distribution (solid line) is presented to the hydrocyclone, it removes 39% of the oil. When the DCC is used, the distribution is changed to the dashed curve, and the hydrocyclone as a result collects 72% of the oil.

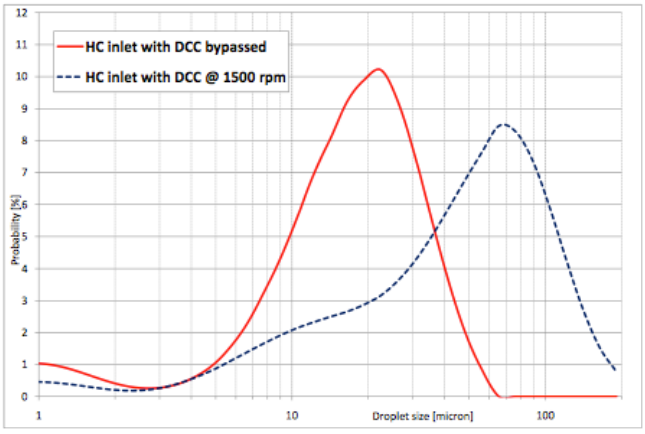

figure 3

Testloop results @ FMC

The tests showed a reproducible change in droplet size distribution. Water with API22 oil was sheared to such an extend that a HC had a separation efficiency of less than 10% (size between 2-40 micron). When sending this emulsion over the CLSR we found a consistent separation omprovement of some 50%. (see figure 5.)

Separation technologies with a lower cut-off would obviously result in much better effluent qualities

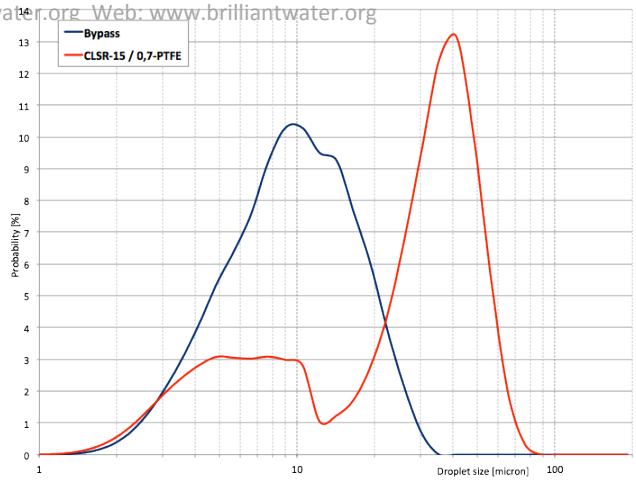

figure 5

Advantages

- A low energy (<0,01 kW/bbl), continuous flow process.
- A small footprint compared with other waste water treatment systems
- ATEX compliant
- non Plugging (PTFE internals)
- boost performance of existing treatment system (easy retrofitting)

Applications

Applications for CoalesSense include

- Produced Water retro-fitting
- Polymer flooding.
- Alkali Surfactant Polymer flooding

Product

Coalessense and its partners can supply CLSR units as turn-key systems. Our largest CLSR handles some 18.000 bbld.

Specifications	CLSR-30	CLSR-50
Capacites range	10-40 m^3/hr 1.500-6.000 BWPD	80-120 m^3/hr 12.000-18.000 BWPD
Footprint	< 2 m^2 22 sq.ft.	< 3 m^2 33 sq.ft.
Operational weight	< 1000 kg 2220 lbs	< 2000 kg 4400 lbs
Energy requirement per m^3	< 0,1 kW	< 0,1 kW
Horizontal configuration, outer bearings and mechanical seals	X	X
ATEX zone II electric motor	X	X
Maximum operating temperature	90 °C 195 F	90 °C 195 F
Maximum operating pressure	30 barg 435 psi	30 barg 435 psi

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