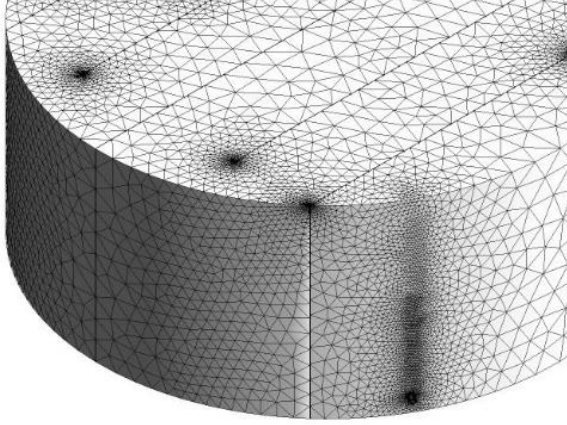
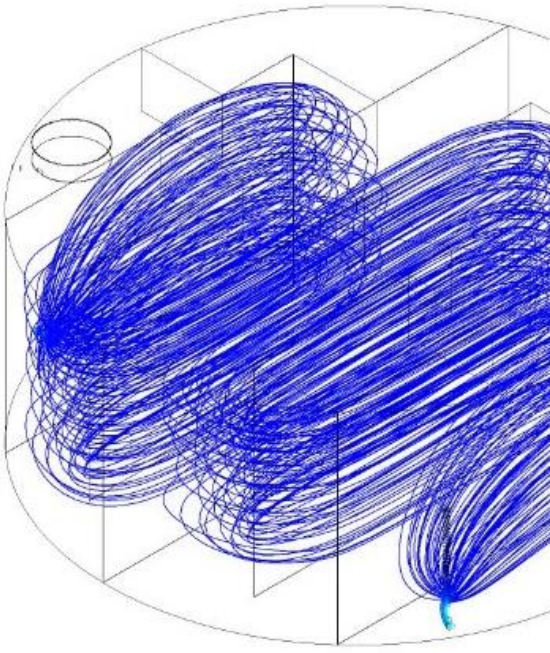
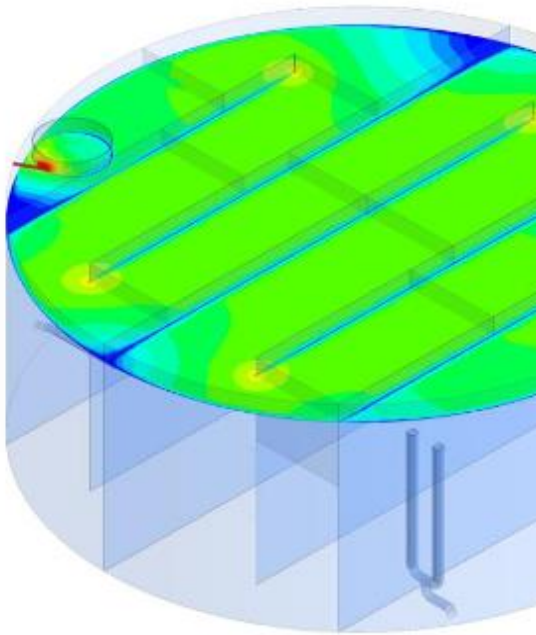
Optimization of Crude Oil Treatment Equipment using CFD

Success Story







PROCTEK Process Control Technologies® | PIL Proctek Group Company

Advanced Engineering

Location

Barrancabermeja, Colombia

The Problem

Our client, a major Multinational in the Oil & Gas Sector, with operations in the Magdalena Medio Basin in Colombia, develops the current process for treating crude oil using a Gun Barrel type dehydration equipment, where the crude oil is received directly from the wells, and much of the Crudo-Agua separation process is carried out.

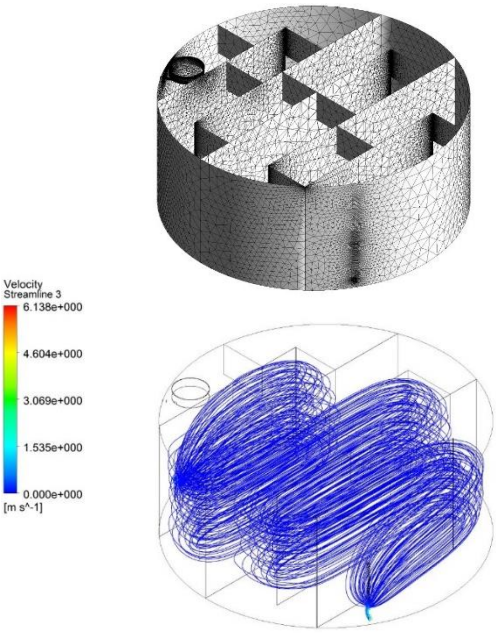
The client requires that the percentage of water cut (BSW) at the outlet of the gun barrel is a maximum of 2%, so that it can then reach the quality of the required sale of 0.5% in a heat treatment equipment.

However, it is not precisely known what the maximum total flow rate the Gun Barrel can handle to meet this condition.

Additionally, according to the equipment design conditions, the equipment's total flow rate is 44,000 Barrels of Fluid per Day (BFPD); however, in the process, only 25,909 BFPD are being treated.

PROCTEK® Process Control Technologies | PIL Proctek Group Company

The Diagnosis



A simulation is performed using CFD (Computational Fluid Dynamics) to diagnose the equipment's operating conditions, obtaining the following results:

- The inlet distributor design was not adequate since it does not allow the homogeneous distribution of the fluid.
- The equipment is operating at a lower flow than the design flow.
- The equipment's perforated plates are not contributing much to the separation process.
- Based on the theoretical and effective residence time of the fluid in the equipment, the use percentage of the equipment under current operating conditions is 48.02% for the crude phase and 78.32% for the water phase.

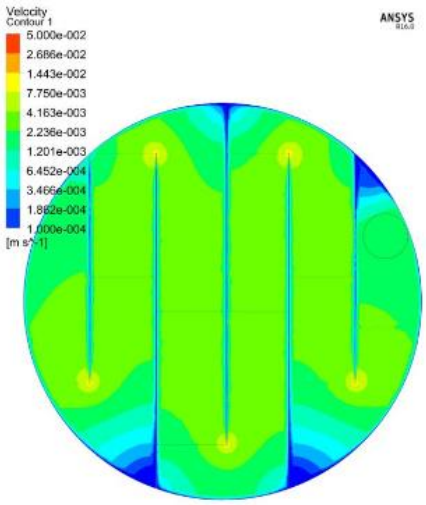
The Solution

Our advanced engineering team develops an equipment optimization process, making small changes to Gun Barrel's internal components:

- Changes in the geometry of the inlet manifold
- Design of a water collector to decrease preferential flows.
- Modification and reconfiguration of Perforated Plates.

Once the modifications to the equipment were made, the following results were obtained:

- Increase in the utilization percentage from 48% to 77% for the crude phase, and from 78% to 85% for the water phase.
- Improvement of the residence time of the crude phase, from 11.1 h to 17.89 h and for the water phase from 9.3 h to 10.14 h.
- It went from having a BSW of 1.43% to 0.88% after the implementation of the improvements
- Increase of up to 30% of the workflow, taking the design conditions as a reference..



Proctek USA - Texas
10810 Hwy 191, Ste 2
Midland, TX 79707
Tel: Phone: +1 281 9449632
E-mail: sales.tx@proctek.com
www.proctek.com

Proctek USA - California
5100 California Ave. 125,
Bakersfield, CA 93309
Tel: Phone: +1 661 310 25 99
E-mail: sales.tx@proctek.com
www.proctek.com

Proctek S.A.S Colombia
Carrera 50 No. 134-66
Bogotá D.C - Colombia
Tel: +571 4738828
E-mail: comercial@proctek.com
www.proctek.com

PIL Ecuador
Av. Shyris N41-151 e Isla
Floreana, Edf. Axios PB
Quito - Ecuador
Tel: +593 2 394 4560
E-mail: quito@pilcorp.com
www.pilautomatioon.com.ec

PIL Perú
Av Miro Quesada No. 425
Prisma Business Tower, Of 903
Lima - Perú
Tel: +51 1 222 9275
E-mail: lima@pilcorp.com
www.pil.com.pe

Proctek and PIL are companies of PROCTEK GROUP