REFINERY TREATMENT CASE STUDY

CRUDE MANAGEMENT PROGRAM (CMP®)

SYSTEMATIC APPROACH
OVERCOMES EXCEPTIONAL CHALLENGES

A 700 KBPSD refinery regularly processes condensates and marginal crudes, many of which are very heavy, high in sulfur or calcium, viscous and otherwise difficult to manage.

- Merey-16, Leona-22 and Maya heavy crudes
- Dolphin and Khuff condensates
- Eocene and Ratawi high-sulfur crudes
- Dar Blend and Mandji high-pour-point crudes
- Maya and Soroosh asphaltenic crudes
- CFD and Doba high-calcium, naphthenic crudes
- Alba, Lokele and Kuito high-TAN crudes
- Rancadar Heavy and Castilla viscous crudes

The refinery changes the blend every 30 hours or so, complicating the treatment challenge. Typical blend API ranges from 24 to 28, with TAN as high as 1mg KOH/g.

TABLE 1 - Typical Crude Feed Characteristics

PARAMETER	AVG	MAX	MIN
Density, API	26.0	31.0	24.0
Throughput, BBL/hr	13756	14706	10391
TAN, mg KOH/g	0.8	1.3	0.3
Salt, ptb	27.6	55.5	7.0
Filterable solids, ptb	87.4	180.0	34.7
Metals (Ni and V), ppm	96.4	166.9	43
Asphaltenes, wt%	3.8	6.5	1.3

Dorf Ketal recommended its proprietary CMP® (Crude Management Program), a chemical treatment system optimized for the refinery desalter, overhead and crude preheat. The program included a high-performance crude preheat antifoulant, along with a desalter wetting agent to manage downstream fouling.

Technical support included Oil Compatibility Modeling with Dorf Ketal's proprietary OCM® software and global crude database, which contains a wealth of information about the world's crudes, along with asphaltene compatibility data developed in Dorf Ketal labs. The database is updated continuously using hot liquid process simulation to assess fouling tendencies as new crudes are encountered.

The results substantially exceeded the refiner's expectations. FIT declined just 3.1 °C (5.6 °F) in 8 months, a rate of just 0.39 °C (0.7 °F) per month.

TABLE 2 – Program Performance Summary

PARAMETER	SOR	EOR
Date	12-Jan	19-Sep
Crude throughput (BBL/hr)	14660	14621
Furnance inlet temperature (FIT), °C (°F)	254.6 (490.3)	251.5 (484.7)
Flash drum temperature (FDT), °C (°F)	168.2 (334.8)	170.9 (339.6)
Desalter temperature, °C (°F)	135.0 (275.0)	138.0 (280.4)
Heat gain in hot preheat, FIT - FDT = °C (°F)	86.4 (155.5)	80.6 (145.1)

Bottom Line:
Based on energy savings alone, refinery return on treatment program investment exceeded 300 percent.

Performance Observation:
Dorf Ketal's Crude Management Program is a powerful tool that allows refiners to process the most challenging crude blends without unacceptable FIT declines, reducing heating loads and fuel costs.

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