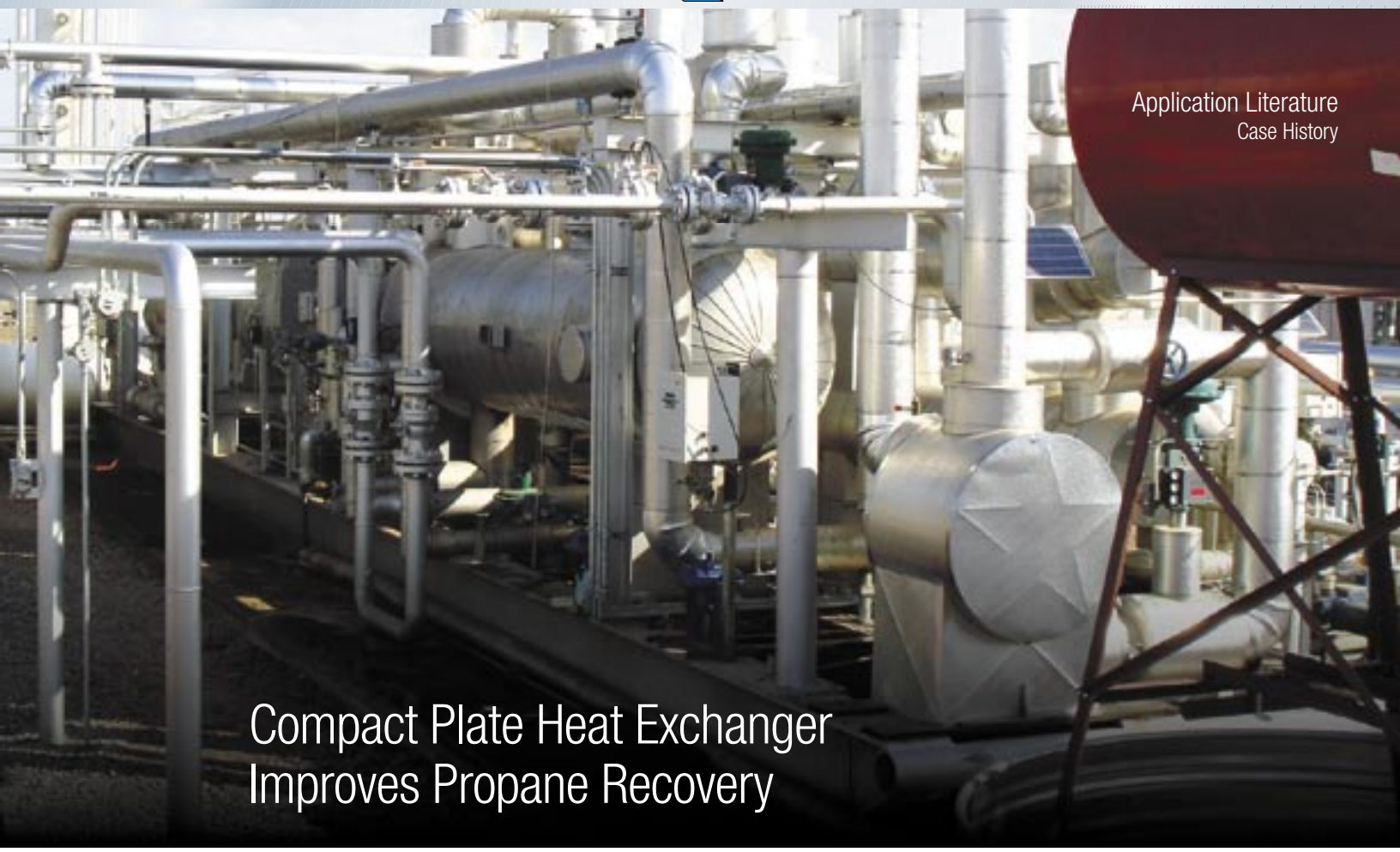


Application Literature
Case History

Compact Plate Heat Exchanger Improves Propane Recovery

Skid-mounted SUPERMAX® Shell & Plate Heat Exchanger helps achieve increased propane recovery and reduce sales gas gross heating value.

An Oklahoma-based pipeline company processes gas from a rich gas field to recover propane and heavier components. The process used also reduces the gross heating value (GHV) of the sales gas to a contractual maximum. As a result of increasing inlet gas production and also assays showing higher propane and longer chain hydrocarbon concentrations, it became necessary to reduce the chilling temperature to condense more of the propane and heavier components from the gas. With the existing refrigeration system and process equipment, however, the pipeline operator could not achieve the lower temperature without changing the refrigeration compression and equipment to operate in the vacuum, which was extremely costly and not practical. A more cost-efficient approach was sought.

Avoiding chiller upgrades

Modeling performed by the engineering department suggested that by adding another exchanger downstream of the chiller, the gas temperature could be reduced sufficiently to improve the propane recovery and lower the GHV of the sales gas.

The model predicted that propane recovery would improve from 3 to 5%, depending on the refrigeration chiller load, for flow rates of 184–240 MMscmd (6,500–8,500 MMscfd).

The SUPERMAX® offers high efficiency in a small footprint, making it ideal for retrofitting to preexisting skids. In this case, the retrofit was accomplished in only 0.5 m² (5 ft²).

Fits on skid

Sizing calculations showed that a shell & tube exchanger for the application would be approximately 254 mm (10 in.) in diameter by 4.6 m (15 ft) long. Installing this exchanger would require a major reconstruction of the original skid because of space limitations. The S&T exchanger would have to be installed on a separate foundation beside the current skid. The engineering department looked for alternate HE technologies to avoid the extra cost of foundation work and skid modifications.

The existing skid had an open area of approximately 1 m^2 (10 ft^2). The engineering team found that a Tranter SUPERMAX® Shell & Plate Heat Exchanger would meet the application specifications in a footprint of only 0.5 m^2 (5 ft^2).

Exchanger exceeds performance model

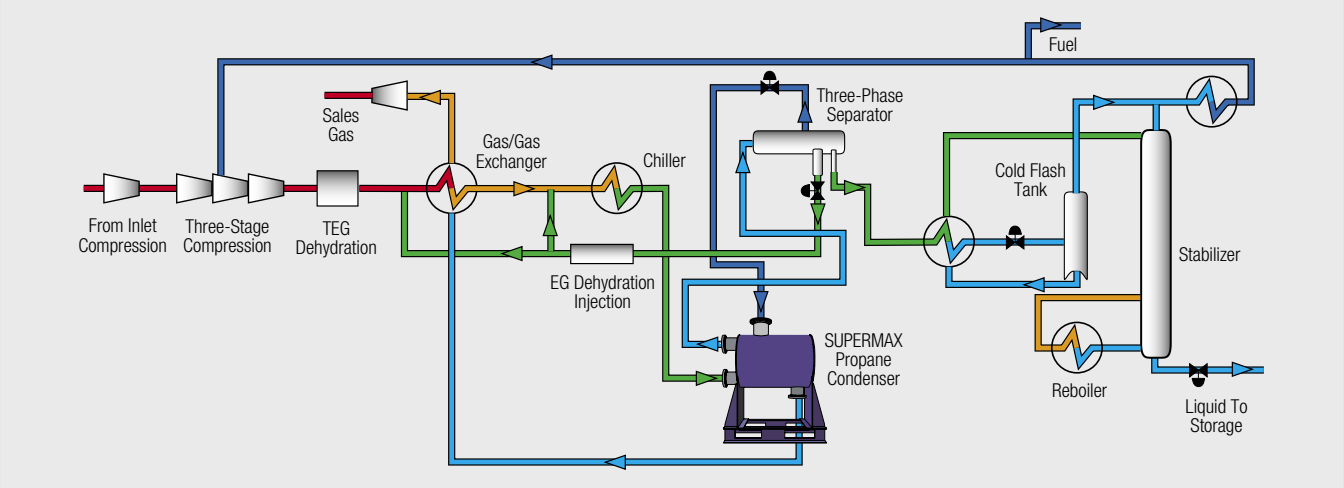
After installation, the SUPERMAX exchanger operated as expected, exceeding the performance criteria. The SUPERMAX produced a colder temperature in the cold separator, -37°C (-35°F) vs. -30°C (-21°F) without the exchanger. Propane recovery improved by 13%, resulting in a reduction of the sales gas GHV by 2%, to contractual levels.

Process Conditions

Inlet Flow, Mscmd (Mscfd)	206 (7284)
Inlet Gas Gross Heating Value, kJ/m^3 (Btu/ft^3)	49,310 (1324)
Inlet Temperature, °C (°F)	37 (99)
Inlet Pressure, barg (psig)	43 (620)
Gas Pipe Line Pressure, barg (psig)	43 (620)
SUPERMAX Exchanger After Chiller:	
Duty, MJ/HR (MBtu/hr)	299 (284)
Feed In, °C (°F)	-30 (-21)
Feed Out, °C (°F)	-37 (-35)
Residue In, °C (°F)	-57 (-70)
Out, °C (°F)	-36 (-33)

SUPERMAX Propane Recovery Performance

	Off Line	On Line
Sales Gas Flow, Mscmd (Mscfd)	177 (6264)	173 (6108)
Sales Gas Gross Heating Value, kJ/m^3 (Btu/ft^3)	41,378 (1111)	40,558 (1089)
Liquid Product, litres/day (GPD)	112,809 (29,801)	128,143 (33,852)
Cold Separator Temp., °C (°F)	-30 (-21)	-37 (-35)
Percent Recovery, Mole:		
Ethane	33.2	42.63
Propane	68.23	76.85
Isobutane	84.62	89.7
n-Butane	88.88	92.72
Pentane and higher	99+	99+



A SUPERMAX® Shell & Plate Heat Exchanger installed downstream of the chiller improves recovery of propane and higher hydrocarbons, successfully reducing the GHV of the sales gas.

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