

ADVANCED NATURAL GAS LIQUIDS EXTRACTION

Ortloff's Advanced Natural Gas Liquids Extraction (ANGLE) technology is a family of processes that integrate some of Ortloff's most effective and efficient NGL/LPG recovery process designs into any commercially available LNG liquefaction process. By combining hydrocarbon recovery with the liquefaction process, operators remove valuable liquids from the natural gas stream before liquefaction in the most efficient manner, one which integrates refrigeration available in the liquefaction process with refrigeration in the liquids removal step. By integrating Ortloff's liquids removal technology into the liquefaction unit, recompression of the gas stream is not required before the liquefaction step. Additionally, the valuable heavier liquids removed from the natural gas stream as an NGL or LPG product stream can be sold to generate significant revenue.

Although heavy hydrocarbon removal is included in all commercially available LNG liquefaction process designs, it is only intended to be a "rough cut", and is not designed for high recovery. The inclusion of Ortloff's ANGLE liquids removal technology into the process design results in highly efficient recovery of valuable NGL or LPG liquids from the natural gas

stream feeding the LNG plant. In addition to the higher value of the liquid NGL / LPG product stream, the overall efficiency of the liquefaction process is improved by 10% to 20%, resulting in a design that can liquefy additional gas without increasing the power used in the LNG process.



APPLICATIONS

The ANGLE technology is extremely flexible, and can operate as an ethane recovery, a propane recovery, or even a butane recovery process as required by the



operator. This flexibility allows the operator to maximize plant profits based on parameters such as feedstock cost, fuel gas cost, and liquids product economics while still meeting the LNG heating value specification.

Typical applications for the ANGLE technology include:

- High to ultra-high ethane recovery from natural gas streams prior to the liquefaction process, providing essentially complete recovery of ethane and heavier components with no increase in refrigeration power.
- High to ultra-high propane recovery from natural gas streams prior to the liquefaction process, without removing ethane, to meet liquid product specifications or LNG heating value specifications.
- High to ultra-high butanes recovery from natural gas streams prior to the liquefaction process, without removing ethane or propane, to meet liquid product specifications or LNG heating value specifications.
- Providing ethane or LPG to a local market where those liquids have higher value than they would have at the receiving terminal.

FEEDSTOCK AND PRODUCTS

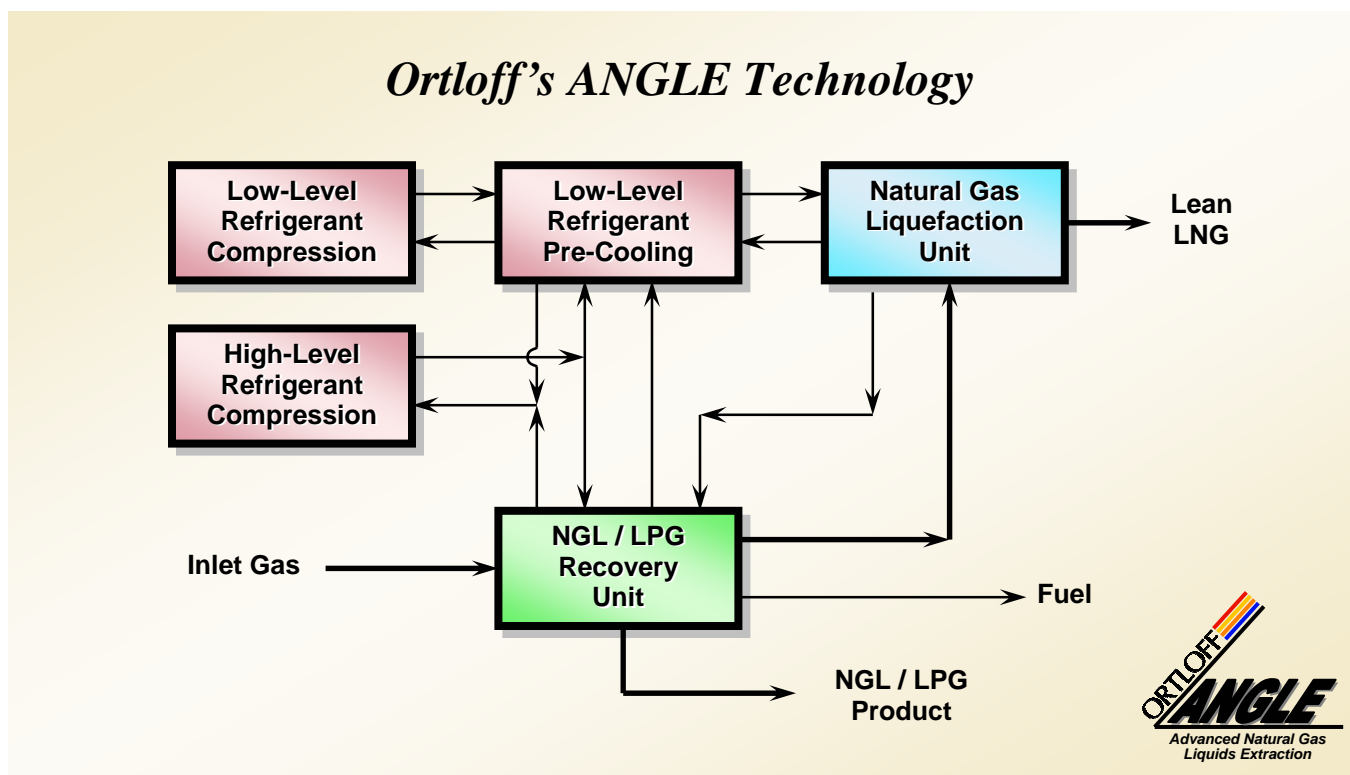
The ANGLE technology can accommodate all natural gas compositions. Because it is integrated with the LNG liquefaction process, all treating and dehydration occurs upstream, and no additional treating or dehydration is necessary. Ortloff has designed the ANGLE processes to take advantage of the inherent refrigeration available in the LNG liquefaction process such that no additional external refrigeration is required. This results in an overall plant process design that is 10% to 20% more efficient than conventional LNG plants.

In ethane recovery mode, the ANGLE processes produce a mixed NGL product stream, capable of

meeting a maximum methane in ethane liquid product specification. In propane recovery mode, a mixed LPG product stream is produced, capable of meeting a maximum ethane in propane liquid product specification. Similarly, in the butane recovery mode, a mixed product stream is produced, capable of meeting a maximum ethane and propane in butane product specification.

EXPERIENCE

Ortloff's ANGLE technology utilizes proven Ortloff NGL / LPG recovery technology that is incorporated in well over 200 plants worldwide.



FOR MORE INFORMATION


For more information about this or any other Ortloff process, contact Ortloff Engineers, Ltd. at:

Phone: +1 (432) 685-0277
Fax: +1 (432) 685-0258
E-mail: oel@ortloff.com
Web: <http://www.ortloff.com>

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ORTLOFF
ENGINEERS, LTD.
415 W. Wall St., Suite 2000
Midland, Texas 79701-4438
USA