COMPRESSOR REBUNDLE TO INCREASE LNG PRODUCTION

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Rebundle
Compressor performances:

In many cases, the compressor rebundle is the best cost-effective solution to increase the LNG production with minimal CAPEX impacts.

Key replacements and improvements to increase LNG production:
- New state of art impeller design, with higher efficiency, broader operating range, reduced external diameter
- New diffusers, with varied or high diffuser ratio vanes with higher efficiency
- Redesigned volutes, from constant to variable, including guided vanes, to increase performances
- Side streams, from constant to variable with increased performances
- Seals with reduced clearance reduction for higher efficiency
- Gas Turbine upgrade to get more power

Seals
New thermoplastic seals allow the contact between stator and rotor without deformation.
The clearance can be reduced to increase the stage and the overall compressor efficiency from 0.5 to 2 points depending from flow coefficient.
Geometry is the same, so the thermoplastic seals can easily replace existing aluminum seals during compressor maintenance.

Digital simulation to minimize outage duration
- Virtual reality reviews conducted to simulate key outage phases, minimizing risks
  (Based on site assessment with plant laser scanning, to have the as-is situation)
- Plant 3D modeling from cloud points
  3D Virtual reality simulations improve:
  - HSE
  - Quality
  - On time delivery
  - Logistic
  - Training
  - Risk Analysis

C3MR LNG project upgrade
Real cases:

Compressor real operating conditions

i) Propane Compressor
Compressor new bundle featured:
- Lower impeller diameter
- Higher flow coefficient
- Higher diffuser ratio
Revamping the existing compressor using the referenced bundle allows an expected power saving of 6.4 MW (about 9.3%) versus original design.

ii) MP/HP Mixed refrigerant
The new bundle offers the same flow with better efficiency and an average power savings of about 4% per year.

iii) LPMR Compressor
The new bundle offers:
- +10% design flow
- +12% max flow ISV + more conservative operation... beneficial for ISV life
- Higher efficiency for same operation (+3 efficiency points)

iv) LNG Train

Including all upgrades:
- 3.7% MR train power saving
- 9.4% PR train power saving

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