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All aboard the train
Compressor training options ramp up across industry
The case for large power block gas turbine trains

To remedy North America’s shortage of gathering, transmission and pipeline capacity, pipeline operators should consider compression station design approach with the lowest cost of ownership, which can be achieved by using large power block gas turbines in their compressor trains. This model can help them deploy new infrastructure much faster and more cost-effectively than using small power block turbines. This can also dramatically lower the capital expenditure (CAPEX), maintenance expenditure (MAINTAINEX) and operational expenditure (OPEX) of their new pipeline assets—enhancing investment returns, while also reducing emissions.

Traditional station designs feature a large number of compressor trains using smaller power blocks. When compression stations were built years or decades ago, those designs made sense for their flexibility, availability and efficiency. But today’s advanced turbine technology now makes a case for deploying large power block gas turbines instead. A comparative study of the two approaches by a major, Houston-based midstream Engineering, Procurement and Construction (EPC) contractor found that a single, large turbine-driven compressor package is more cost-effective than using two smaller packages. It also reduces the operating footprint and environmental impact of a station’s compression function. A summary of the findings in favor of a large power block approach follows:

- **CAPEX**: 30% less
- **OPEX**: 11% less
- **Footprint**: 15% less
- **Emissions**: 27% less

**Shared assumptions to level-set comparisons**

The study compared a single compressor station (1 X 100%) with a dual train (2 X 50%) compressor station, each having the same available horsepower for compressor pipeline-quality gas. Respective plot plans and equipment lists were developed for a single compressor station using a Siemens SGT-750 turbine capable of nearly 55,000 hp (41,013 kW) to drive an RB8036 compressor, and the dual compressor train station using two smaller turbines, each capable of nearly 30,000 hp (22,371 kW) to drive an appropriately sized pipeline compressor.

Schedules were also developed to compare construction CAPEX and operational information for OPEX. Operating assumptions were:

- **Pipeline flow rate**: 1778 MMcfd
- **Gas specific gravity**: 0.61
- **Discharge pressure**: 1440 psig (99.3 barg)
- **Suction pressure**: 800 psig (56.2 barg)
- **Emissions**: 27% less

**Reduced emissions**

The study calculated that both models generate NOX emissions of 1.15 ppm, the total exhaust-gas emissions of the large-block, single compressor model is 27% less than the small-block, dual-compressor (i.e., 2 X 50% hp) model. 59 tons per year vs 75 tons per year, respectively.

**Reduced OPEX via maintenance costs and sparing**

- With modern sparing concepts for gas turbines and centrifugal compressors, operators can use them without the capital cost and operating expense of standby spare units. That’s because remote diagnostics and fast-turnaround remediation capabilities can mitigate and remediate performance issues before disruptions and outages can occur. Of course, if one unit of a dual-compressor train model goes down, the impact on the entire pipeline system will be less compared to the downtime of a single-compressor train model. However, having capital spares can mitigate downtime issues if one unit requires maintenance. Another factor to consider is Average Capacity.

**Conclusion**

The business case for using compressor trains driven by large power block gas turbines vs smaller turbines can be compelling. According to the study, when there are enough small amounts of lamdowen are not required, and in a transmission system where there are several compressor stations, it clearly makes sense to install a single, large compressor over four small compressors, for example, the large compressors clearly become a superior choice. “

**CT2**

A study from an EPC compared a single compressor station (1 X 100%) with a dual train (2 X 50%) compressor station to determine which of the two options was most cost-effective.

[Image: Three Siemens SGT-750 trains in pipeline service.]

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