

Rapid Engineering of Turboexpanders

An essential component of an air separation plant, which has, over the past 50 years, placed in operation over 100,000 turboexpanders, separates process fluids into pure gases or pure liquids. Turboexpanders utilize many standard components such as inlet and outlet vanes, shafts, bearings, and expander variable-area vaned-nozzles; located on two ends of a rotating shaft, housings, differentiated frame sizes in order to match customer skid, subsystems to deliver seal gas and oil into the vicinity of the rotating assembly, interfaces with plant cold boxes, and junction outlets to interface with customer utilities. The rotating assembly, together with its surrounding stationary housing, is called the cartridge as shown in Figure 1.

The rotating assembly is engineered using in-house test performance data, and achieving high expander and compressor

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Industrial gas producers have changing thermal process conditions and varying plant output capacity. Therefore, suppliers of expanders are expected to satisfy needs which include low cost, high performance, high reliability, continuous operation over long periods of time, simplicity of installation, and ease of replacement and maintenance in order not to interrupt plant production.

The customer has full control over turboexpander function and output capacity because, due to electronic communication channels between plant and machine, the turboexpander function self-adjusts to match plant cold production needs. Also, because plant continuous operation is essential, ease of assembly and disassembly is required and, therefore, the cartridge is designed as an integrated unit separate from the expander and compressor housings. This allows for simple and fast cartridge replacement and/or repair, without hindering the entire plant cold production capacity for long.

