



# Simulation Methods for Piston Compressors

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## **Abstract:**

Minimizing the energy consumption of compressor units to decrease the operating costs and to protect the environment is a typical engineering task of today's compressor development. A high volumetric efficiency and a compression process with high efficiency are two aspects to fulfill these requirements. To obtain such an optimized compression process a detailed analysis is necessary.

1-D gas exchange and CFD calculations are state of the art in the design product development of an internal combustion engine. These tools can even be used to simulate and to optimize a compressor station.

This paper reports the simulation results of a three stage compressor. It shows how the gas dynamic prediction helps to detect and avoid critical pressure pulsations and the improvement potential of a gas dynamic optimization. Furthermore different mass flow control strategies are implemented in the compressor model. A high efficient speed variation is discussed as well as intake pipe throttling and compression ratio variations with lower performance potential.