

INTISARI

UPAYA MENJAGA *WET GAS COMPRESSOR* DARI FENOMENA *SURGE* DENGAN SIMULASI ASPEN HYSYS

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Kompresor memiliki peran penting di berbagai industri, termasuk industri minyak dan gas alam. Kompresor berfungsi untuk meningkatkan tekanan fluida yang dimampatkan seperti gas. Salah satu jenis yang sering digunakan adalah kompresor sentrifugal. Namun, kompresor sentrifugal rentan terhadap fenomena *surge*, yang dapat merusak kompresor. *Surge* terjadi karena ketidakstabilan aliran dan tekanan, menyebabkan getaran dan potensi *shutdown* otomatis. Dalam mencegah *surge*, digunakan sistem *antisurge control* (ASC) yang memantau parameter seperti aliran, tekanan, dan suhu. ASC bekerja dengan mengatur *antisurge valve* untuk menjaga kestabilan operasi kompresor. Penelitian ini bertujuan untuk merancang dan mensimulasikan ASC dengan menggunakan perangkat lunak Aspen HYSYS untuk menjaga kompresor dari fenomena *surge*.

Sistem ASC berhasil disimulasikan menggunakan perangkat lunak Aspen HYSYS, dan pengendali PI digunakan untuk menjaga *operating point* kompresor tetap aman. *Tuning* PI menggunakan Ziegler-Nichols metode *open loop*. Parameter *surge controller* diperoleh secara otomatis pada Aspen HYSYS. Pengendali PI mampu menjaga kestabilan operasi kompresor, sementara PID cenderung lebih sensitif dan tidak stabil. Saat diberikan gangguan berupa penurunan *molar flow*, suhu, dan tekanan, ASC mampu menjaga *operating point* agar tidak menyentuh *surge line* dengan membuka *antisurge valve* sehingga operasi kompresor tetap aman.

Kata kunci : *Antisurge control*, *Surge*, Kompresor sentrifugal, Aspen HYSYS

ABSTRACT

EFFORTS TO PREVENT SURGE PHENOMENON IN WET GAS COMPRESSOR USING ASPEN HYSYS SIMULATION.

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Compressors play an important role in various industries, including the oil and gas industry. Compressors function to increase the pressure of compressed fluids such as gas. One type that is often used is the centrifugal compressor. However, centrifugal compressors are prone to the surge phenomenon, which can damage the compressor. Surge occurs due to instability in flow and pressure, causing vibrations and the potential for automatic shutdown. To prevent surge, an antisurge control (ASC) system is used, which monitors parameters such as flow, pressure, and temperature. ASC works by adjusting the antisurge valve to maintain the stability of the compressor's operation. This study aims to design and simulate ASC using Aspen HYSYS software to protect the compressor from the surge phenomenon.

The ASC system was successfully simulated using Aspen HYSYS software, and a PI controller was used to keep the compressor's operating point safe. PI tuning was done using the Ziegler-Nichols open-loop method. The surge controller parameters were automatically obtained in Aspen HYSYS. The PI controller was able to maintain the stability of the compressor's operation, while the PID controller tended to be more sensitive and unstable. When disturbances were applied in the form of reduced molar flow, temperature, and pressure, ASC was able to keep the operating point from reaching the surge line by opening the antisurge valve, ensuring the compressor's operation remained safe.

Keyword : Antisurge control, Surge, Centrifugal compressors, Aspen HYSYS