ACE Industrial Shock Absorbers Improve Oil Refinery Safety Valves

Overpressure in refinery pipes can be catastrophic—which is why safety valves need to be able to open in a fraction of a second. But when it comes to controlling these valves, pneumatic drives tend to be too slow. Electric drives and brakes are also out of the question, as even the smallest spark can trigger an explosion.

Doedijns Group International (DGI), a company that develops hydraulic power and motion control solutions for a range of demanding industries, recently designed a custom actuator that can open its 24-inch safety valve within half a second. In order to absorb the shock of the piston when this happens, DGI integrated industrial shock absorbers from ACE Controls.

Here's how these components met the demands of the actuator—and improved the overall safety of the oil refinery:

Special Safety Valves Open 50 Times Faster.

The oil refinery, located in the port city of Yanbu, condenses and liquefies natural gas for transport using explosion-proof compressors, which regulate the pressure in the pipes. If the pressure dips too low, the compressors switch on. If the pressure gets too high, they switch off. To ensure these compressors maintain the right working pressure while simultaneously avoiding overpressure, DGI developed pneumatic actuators, which the company manufactures in its own facility and supplies to oil

ACE industrial shock absorbers stop the piston rods inside the actuator's built-in pneumatic cylinder, which opens up the safety valves.

MAGNUM shock absorbers from ACE come in different sizes and strokes ranging from 25 to 150 mm.

refineries around the world. These actuators are designed to create additional volume within the compressors, boosting the safety of the overall system.

Additionally, in the unlikely event of overpressure, the actuator's built-in pneumatic cylinder opens the safety valve. Normally, throttle valves open at a speed of one second per inch. But because the Yanbu plant utilizes large 24-inch valves, roughly 24 seconds would elapse before they fully opened—far too slow in an emergency situation. When constructing its actuators, DGI designed special valves that could open 50 times faster.

DGI's custom actuators feature ACE industrial shock absorbers for use in a natural gas refinery.

At the same time, DGI needed a way to safely absorb the energy generated by the valves as they opened. The company teamed up with ACE Controls to incorporate hydraulic shock absorbers that could emergency-stop the piston rods on the pneumatic cylinders. "Of course, this would only happen in the event of overpressure," says Christian Junghans, ACE product manager. "This kind of emergency hardly ever happens, but even so—one single incident could be catastrophic."

MAGNUM Shock Absorbers: The Last Line Of Defense. Due to the compactness of the actuators, its safety valves and the pneumatic drive, ACE engineers selected their compact, yet powerful MAGNUM industrial shock absorbers (type MA3325). When the valves open, the rod makes contact with the shock absorbers, which engineers positioned in the front and rear of the cylinder. The dampers then fully stop and control the piston rod as it moves horizontally at full force. Despite their compact

In the event of overpressure, the actuator has to open the large, 24-inch safety valve within half a second.

form, MAGNUM dampers can absorb a large amount of energy and are built for loads between 3 and 63,700 kg. With a weight of only 0.45 to 5.1 kg, they can easily be integrated into new or existing systems in industrial, automation and machine engineering applications, including gantries, linear carriages and pivoting units.

Without the absorbers in place as the system's final safety measure, a number of devastating things could happen. For one, the cylinder, actuator and compressor could experience irrevocable damage. Toxic gas could also leak out and potentially trigger an explosion—endangering personnel, the environment and other nearby facilities. "We are happy our shock absorbers are part of the Yanbu success story," Junghans says. "With their excellent sealing technology, compact design and powerful damping capabilities, the absorbers have improved the overall safety of the plant."

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