



CASE STUDY

HOW ACME SCREWS AUTOMATE HVAC PERFORMANCE

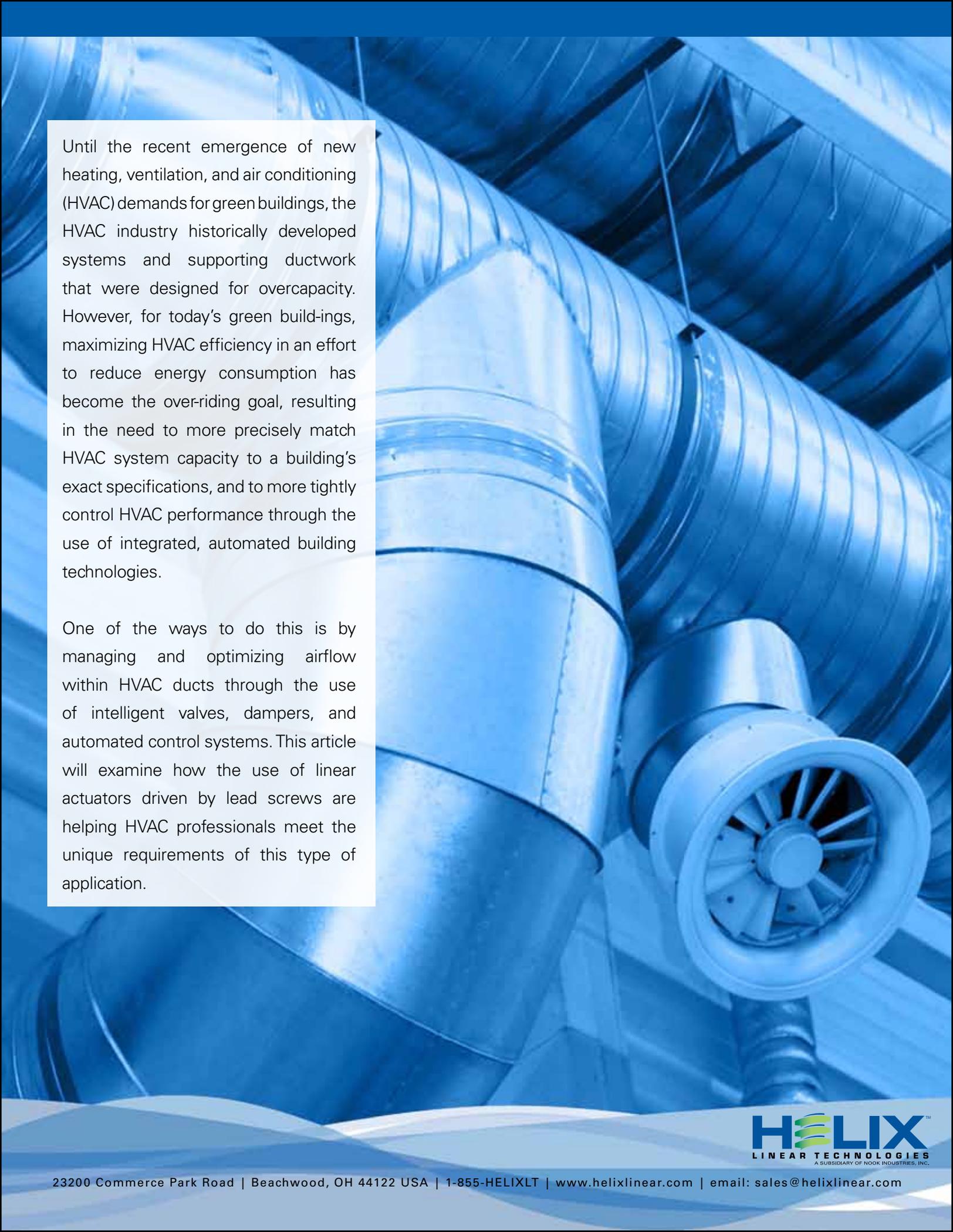


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Until the recent emergence of new heating, ventilation, and air conditioning (HVAC) demands for green buildings, the HVAC industry historically developed systems and supporting ductwork that were designed for overcapacity. However, for today's green buildings, maximizing HVAC efficiency in an effort to reduce energy consumption has become the over-riding goal, resulting in the need to more precisely match HVAC system capacity to a building's exact specifications, and to more tightly control HVAC performance through the use of integrated, automated building technologies.

One of the ways to do this is by managing and optimizing airflow within HVAC ducts through the use of intelligent valves, dampers, and automated control systems. This article will examine how the use of linear actuators driven by lead screws are helping HVAC professionals meet the unique requirements of this type of application.

Controlling HVAC Duct Valves With Lead Screws

With linear actuators using lead screws, HVAC systems can automatically, dynamically, and efficiently control duct valves and dampers through programmable thermostats, maximizing HVAC efficiency in the process.

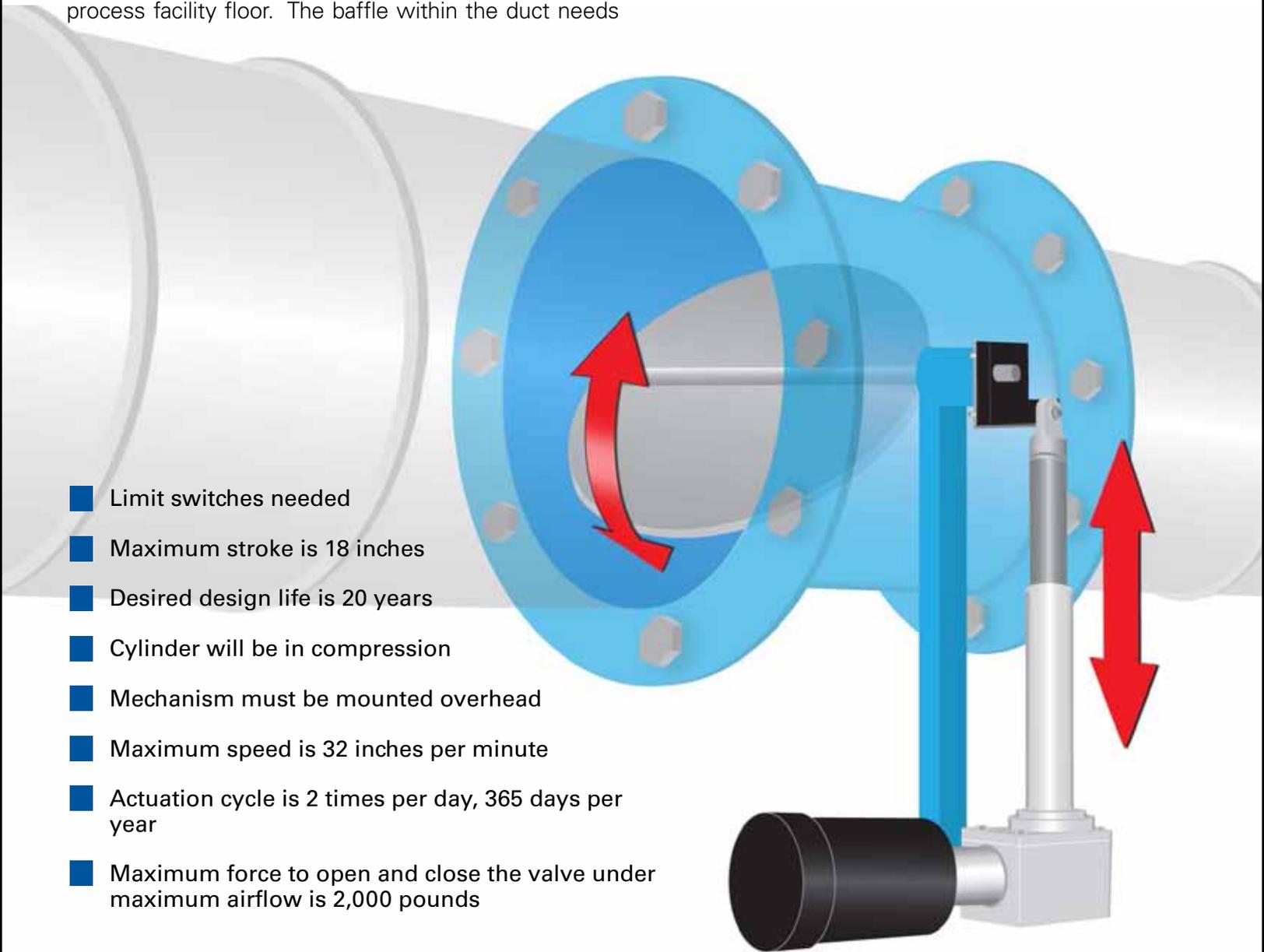
Consider the example of a six-foot-by-six-foot duct valve that is located 30 feet above a manufacturing process facility floor. The baffle within the duct needs

to be adjusted periodically to maintain proper airflow throughout the building. To configure the most suitable lead screw linear actuator to open and close the duct valve, you need to know the loads, duty cycle, and other operational details—such as the presence of absence of accumulating dust or particulates. Other application specifications might look something like this:

- Limit switches needed
- Maximum stroke is 18 inches
- Desired design life is 20 years
- Cylinder will be in compression
- Mechanism must be mounted overhead
- Maximum speed is 32 inches per minute
- Actuation cycle is 2 times per day, 365 days per year
- Maximum force to open and close the valve under maximum airflow is 2,000 pounds

With this type of information in hand, you can configure the most suitable lead screw linear actuator to make adjustments to the duct valve with a high degree of precision and reliability. In this application, the lead screw is connected to the damper blade inside the HVAC duct

valve and pivots on the nut to either open or close. This can be achieved either through the use of an adjustable, manual weight, which will open or close the valve in response to the pressure within the duct, or as part of an automated, computer-controlled system.



Replacing or Retrofitting Duct Valves with Intelligent Actuators

Intelligently controlled lead screw linear actuators can also be used to replace or retrofit existing duct valves. Lead screw linear actuators are typically available with either analog or digital controls for this purpose, enabling easy connection and integration with existing HVAC systems.

Motion control options include:

- **Open/Close or On/Off** – The lead screw linear actuator can be driven to either its fully extended or fully retracted position to open or close a valve or turn a system control on or off.
- **Proportional Controls** – The actuator drives the lead screw in proportion to its control input and/or modulates throughout its angle of rotation.
- **Pulse Width Modulation** – The lead screw linear actuator can be driven to a specific position based on the duration of the pulse, which is sent from a dry contact closure, a triac sink, or a source controller.
- **Phasecut** – The actuator drives the lead screw proportionally in accordance with the power of the remaining wave after its amplitude is cut by a control signal.

HVAC Linear Actuator Systems

Linear actuators driven by precision lead screws can help improve the efficiency and performance of HVAC systems. Lead screws provide the smooth performance and quiet operation required to control ductwork dampers and valves, enabling you to optimize HVAC performance and reduce energy usage in today's new generation of green buildings.

To learn more about how linear actuators driven by Helix lead screws can help you improve HVAC performance, download a copy of the newest Helix catalog.



Acme Screw Assembly