LinMot®

Electric linear motion
Superior to pneumatic cylinders in many applications.

Electricity instead of air

Energy and cost savings - Unique Advantages of electric linear motion technology

Machine design engineers have found numerous situations where linear direct drives provide distinct advantages over pneumatic actuators. These include: If more than two end positions are needed, if the positions are to be changed by software, if running synchronously with a main drive is required or the dynamics / life of a pneumatic cylinder is simply no longer sufficient.

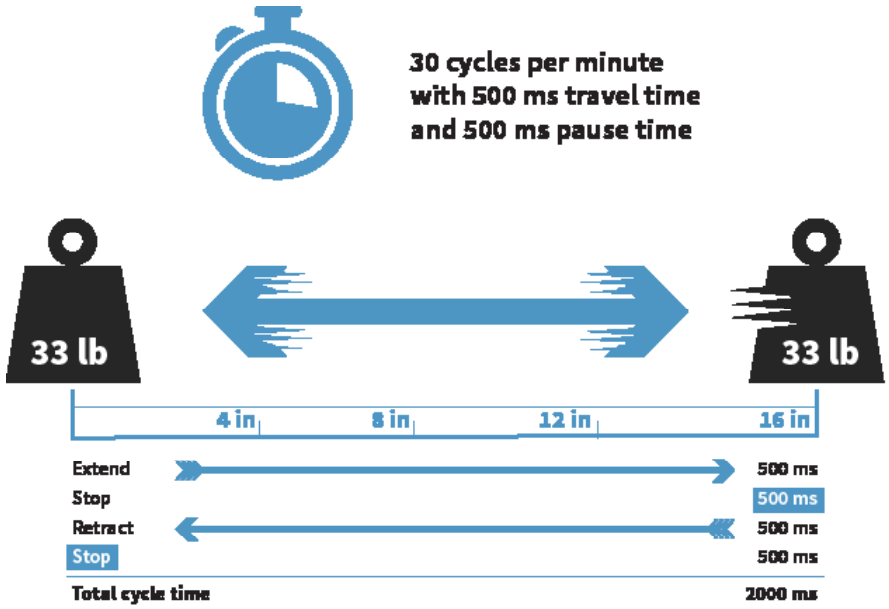
Due to the high operating costs of pneumatic cylinders, linear motors may also prove to be a cost efficient alternative in simple point to point motions even with only two end positions.

This is especially true when the motions are in a cyclic operation and carried out regularly. Many times pneumatic cylinders must be oversized due to the speed and load conditions. In many cases the pneumatic cylinder energy and maintenance costs exceed the investment costs within a few weeks.

A typical cost comparison shows the impressive cost savings with LinMot linear motors.

Cost comparison example

Application



Parameter

Stroke:	15.80 in
Positioning time:	500 ms
Required acceleration:	33 f/s²
Required speed:	39 in/s
Expected period of operation:	8000 h

Comparison of technology

Linear Motors

- Acceleration work is performed only during 100 ms.
- At standstill, no energy is expended.
- At a constant speed, only energy to overcome the friction is used.
- Kinetic energy is stored in the DC link capacitor of the servo drives.
- **The measured power consumption for this application is 92 W on average.**

Pneumatic cylinder

- For the required mass and velocity a piston diameter of 2 in is required.
- During the entire moving time, compressed air power is required.
- Dampers absorb the energy during braking. The energy cannot be stored.
- Due to the cylinder diameter, the stroke and the cycle time the annual air requirement equals 848,000 ft³ per year.
- Pneumatic manufacturers list production costs for compressed air at 0.0054 $/ft³.

Energy costs

- At a current price of $ 0.17 / kWh and 8000 hours of operation, **the annual energy cost is $ 144.**
- With production costs of $ 0.0054 / ft3 and an air consumption of 150.000 Nm³.
- **The annual compressed air costs are $ 4,579.**

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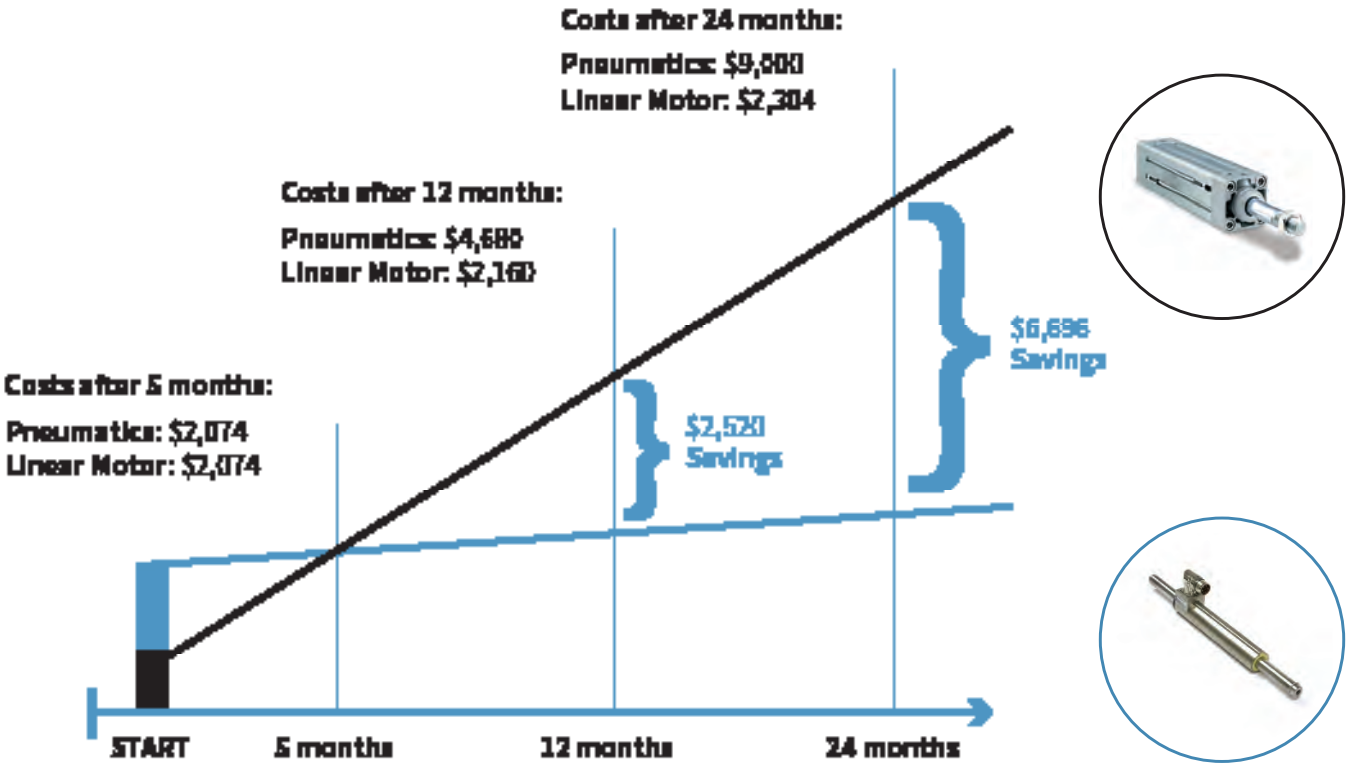
Total cost comparison and CO_2 emissions



The initial costs of a linear direct drive system including all components (cables, converters, etc.) required for the operation are higher than the initial costs for a pneumatic actuator system (incl. valves, hoses, etc.). But by accounting for the significantly lower energy costs of linear motors, these initial costs are recovered in less than half a year. After this time, the cost savings are realized as lower operating costs and increased profit margins. The operating energy costs of pneumatics exceed their initial investment costs after only three months.

CO_2 emissions can be drastically reduced by switching to an electric linear drive providing another huge benefit. The energy of 24,000 kWh, which is additionally required by the pneumatic cylinder in this sample calculation, results in an annual output of 12 tons CO_2. This calculation takes into account the German energy mix of 1.1 lb CO_2 / kWh.

Thus, the CO_2 record speaks clearly: A change to electric direct drives!