
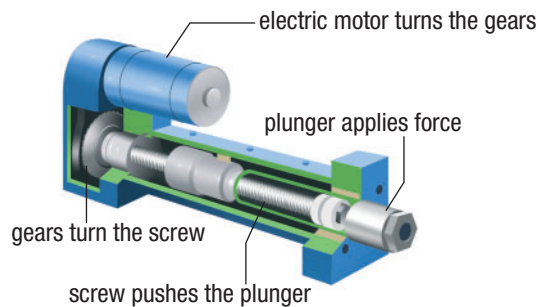


## Linear Actuators

A growing trend in dynamics is the field of ergonomics. Ergonomics is the study of the design and efficiency of different working environments, particularly how the working environment affects the health and safety of workers. A **linear actuator** is a device that converts energy into linear motion. Linear actuators can be used in many different working environments to prevent injuries in muscles, joints, and nerves resulting from repetitive motion and strain. They can also be used in rehabilitation centres to help everyone from infants to the elderly.  CAREER LINK

Simply put, linear actuators convert energy into motion to turn a gear, which turns a screw, which pushes on a plunger (**Figure 1**). The plunger then applies a linear (constant) force. This force may lower the counter for a cashier, open or close power windows in cars, raise a workstation for an extremely tall worker, lift a patient into a harness and onto a stretcher for transportation, or tighten the screws fastening the dashboard to a vehicle in an automobile assembly line. Linear actuators consistently apply the same force every time. Due to this reliability, more and more industries and businesses are discovering new applications for this innovative technology.



**Figure 1** The linear actuator shown here uses an electric motor to turn a gear to push a plunger.

Linear actuators are classified by type; the total distance the plunger can move—called the stroke; the power of the motor; and speed. Different types of actuators use different types of energy, such as mechanical energy, electrical energy, and potential energy stored in compressed liquids or gases.

Actuators are also classified based on their energy source: electromechanical, mechanical, hydraulic (potential energy in compressed liquid, **Figure 2**), and pneumatic (potential energy in compressed gas). Each type has advantages and disadvantages.



**Figure 2** Hydraulic actuators are used in lifts like the one shown here. Hydraulic actuators can exert large forces to lift heavy objects.

### SKILLS MENU

- Researching
- Performing
- Observing
- Analyzing
- Evaluating
- Communicating
- Identifying Alternatives

**linear actuator** a device that converts energy into linear motion

Mechanical actuators are typically inexpensive and do not require an external power source. That means, however, that they are not automated at all and are only manually operated. Electromechanical actuators are also typically inexpensive and can be automated. However, they have many moving parts that can wear out. Hydraulic and pneumatic actuators are useful for exerting large forces, but they are not as precise and repeatable as mechanical and electromechanical actuators.

## The Application

You are considering getting a co-op placement. The co-op placement could be at any number of locations, such as a warehouse, a manufacturing facility, a rehabilitation centre, or an engineering department. However, each placement requires a working knowledge of linear actuators. You want to learn more about linear actuators and how they are used so you can make a good impression in the interview.


## Your Goal

To learn how a specific linear actuator works, how it is used to make a task easier and safer for workers or patients, and how it affects society and the environment

## Research



Research the different types of linear actuators and how they are used. Then pick one type of linear actuator with a specific application. Once you have chosen an application, use the following points to guide your research:

- the application and how it works
- the advantages of the device to the job and to society
- any disadvantages of the device to society and the environment
- any new tasks on the horizon for the device  [WEB LINK](#)

## Summarize

Summarize your research and conclusions. Use the following questions as a guide:

- What type of linear actuator did you choose?
- How does the linear actuator work?
- What task does the linear actuator perform?
- What advantages does the device have in performing the task over other methods, such as manual labour?
- How does the device make the work environment more ergonomic?
- Does the device help reduce workdays lost to strain and injury?
- Are there disadvantages to the application?
- Summarize how the linear actuator compares with other methods of doing a task.
- Assess the impact of the device on society and the environment.

## Communicate

Summarize your research in a format that you can review for your co-op interview:

- web page
- blog
- email to a friend
- electronic slide presentation
- written consumer report
- poster
- video
- oral presentation
- other format of your choosing