

# FACTFILE: GCE TECHNOLOGY & DESIGN

## 1.19 SAFETY



### Safety

#### Learning outcomes

Students should be able to:

- Demonstrate knowledge and understanding of the safety issues and procedures used for mechanical and pneumatic control systems.

#### Course content

##### Mechanisms Safety

Mechanical systems operate using motion and force, which can sometimes lead to accidents and injuries through users not adhering to procedures and safety rules. All machines that have mechanisms incorporated inside them require continual maintenance and lubrication. Over time machines become worn due to surfaces rubbing together creating friction which can cause damage. The best way to counteract this is to ensure that all contacting surfaces are well lubricated. General maintenance is necessary to ensure that the mechanism/machine operates efficiently and safely. It is important when operating a machine that the user does not come into contact with a moving mechanism.

All maintenance should be carried out by a trained engineer and only the appropriate tools should be used. It is important that all parts fitted are clean and well protected from dust, etc.

In the majority of machines that use a mechanism



the tendency is that they will be housed and out of sight. This is due to safety concerns over moving parts but also due to exposure to the elements and environment. With certain machines it is important a safety guard is in place, an example of this would be the metal lathe which has a guard that protects the user from any discarded parts. It is important that anyone using such machines wears goggles to protect their eyes from moving parts or discarded materials.

## Pneumatic Safety

There are a number of safety features related to pneumatic systems that must be adhered to. Pneumatic systems operate using compressed air, which is supplied through the use of a compressor. All compressors provide a constant source of compressed air. There are several safety functions that make up a compressor, they include:

- **Safety Valve**
  - Allows air to escape when the air pressure has reached a certain level within the tank. The motor switches off and air is allowed to be released safely.
- **Regulator Unit**
  - Compressed air is supplied at a constant pressure that is selected by the user. There is a small pressure gauge that allows the user to view what that level is and change it if required. The gauge is displayed in N/mm<sup>2</sup> or in BAR.
- **Moisture Filter and Lubricator**
  - Some compressors contain two other parts; they include the moisture filter and lubricator. The moisture filter is responsible for removing moisture which can cause parts to rust and shorten the lifespan of the components. The lubricator injects a small amount of oil into the compressed air; this lubricates the moving parts and valves.



The high air pressure powers moving parts that can lead to dangers. There are a number of precautions that can help prevent accidents. All users must follow these procedures to ensure safe and efficient use of the system.

1. Compressed air should never be directed towards any individual. If compressed air enters the blood stream this can cause serious injury and even death. All cuts should be well covered and bandaged before working with compressed air.
2. Ensure all components should be connected securely before the system is turned on. If the airline is not properly connected it will thrash about violently which can cause injury. All users must be wearing goggles to prevent eye injuries in the event of this occurring. Whenever the user turns on the system for the first time it is advisable that the air pressure is turned down and that the system is allowed to run through to check for any leaks or unsecured pipes.
3. When making alterations to the circuit, always ensure that the mains air supply is switched off. In some cases the air pressure can be too high. If this occurs the user should check the compressor unit and adjust the pressure gauge to the necessary level. There should be safety valves in place to allow for the release of high pressure.
4. All moving parts move at speed so it is important that you keep your hands away from pistons and other moving parts. All moving parts should be covered by functional guards to prevent injury and it is advised that users are briefed on safety procedures.
5. Airlines should be tidy and not cross through areas where people will walk. Due to the heavy nature of pneumatic components it is advisable that all parts are secured before use and all piping is securely positioned out of the way of pedestrian traffic.

## ? Revision Questions

**1** Safety issues need to be considered and procedures followed when using pneumatics. Outline **two** main safety issues which arise when using pneumatics. For each safety issue outline the procedure to be used in order to minimise the risk of injury to the user.

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**2** Briefly describe three safety issues associated with using mechanisms.

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**3** Briefly describe the procedures a user should follow when faced with high pressure in a pneumatic system.

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