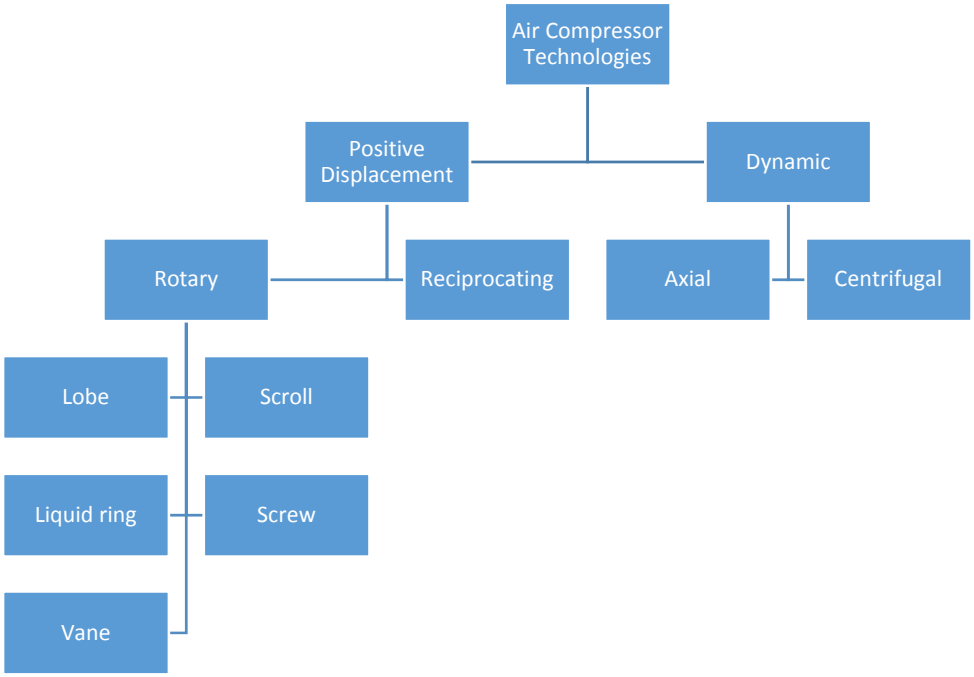
Compressed Air Technology Fact Sheet

In Australia, about 10% of all industrial electricity consumption is used in powering compressed air systems.

Widely found in manufacturing and engineering plants, a compressed air system will be responsible for powering a myriad of tools and machines, from; air guns, pneumatic hammers, and paint spray guns, to powering equipment such as printing, labelling and packaging machines.

Different applications can create different requirements for a compressed air system. As such a diverse range of compressed air technologies exist.

Types of Air Compressors



Here is a breakdown of the types of air compressor technologies commonly used in industry and their key characteristics;

Positive Displacement

By taking in quantities of air, positive displacement compressors mechanically reduce the space occupied by the air to increase pressure.

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Rotary Compressors

Air is compressed through the action of rotating elements. The most common types of rotary compressors are as follows, with Screw type being the most common in industrial applications;

Sliding Vane

- Simple construction
- Quiet
- Limited capacity range
- Oil residues in the air

Screw

- Quiet and simple operation
- Lower end temperatures
- Simple to use for heat recovery
- Compact
- Oil residues in the air

Reciprocating Compressors

Air is compressed by using a reciprocating piston.

- Low energy consumption
- Suitable for high pressures
- Easily adjustable
- Oscillating forces
- High end temperatures
- High maintenance
- Noisy

Dynamic

Dynamic compressors use a rotating impeller to impact velocity to the air. This is then converted to pressure. Centrifugal compressors are the most common type of dynamic compressors.

Centrifugal

- Low energy user for large capacities
- Quiet
- Controllable capacity
- Sensitive to dirt in air
- Relatively high cost
- Energy efficient

How a Compressed Air System Works

Each component within a typical compressed air system assists in the delivery of clean and dry compressed air, free of pressure fluctuations at point of use. If any part of a compressed air system is working inefficiently, then overall system performance can suffer and operating costs can rise.

Figure 1: Typical compressed air system layout

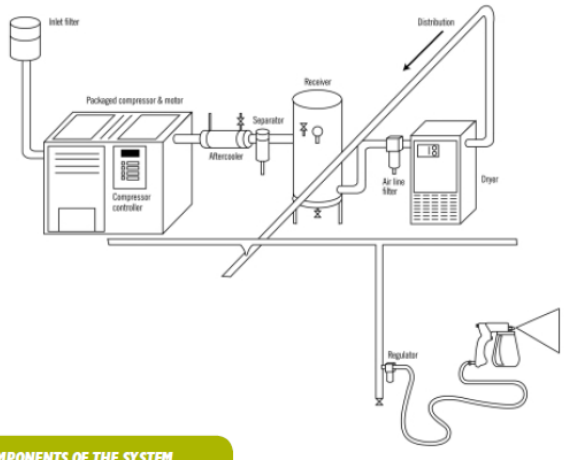

DIAGRAM COMPONENTS OF THE SYSTEM

Components of a typical compressed air system

Inlet Filter

Removes particles from the air entering the compressor.

Compressor

Compresses air to a small volume, increasing the pressure.

Motor

Drives the compressor.

Compressor Controller

Directs the compressor's output. It may be microprocessor, electromechanical or pneumatically based. Advanced controllers include machine protection and information management.

Aftercooler

Compression leaves the air hot and wet. The aftercooler lowers the temperature of the air leaving the compressor and removes water that condenses as the air cools.

Separator

Removes liquids from the compressed air.

Receiver

Stores a large reserve of compressed air to maintain a smooth flow to the plant.

Air line filter

Removes solids and liquids from the compressed air stream. Can be placed throughout the system.

Dryer

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Helps to eliminate any remaining moisture in the compressed air by using either a refrigerated condenser or a desiccant. Refrigerated condensers cool the air to condense water vapours into a liquid that is then drained from the system. Desiccants are powders or gels that remove water by absorbing it.

Condensate trap

Collects and discharges liquid that condenses out of the air stream. Integral part of aftercoolers, dryers and separators.

Distribution piping

Links the components. It distributes the air from a main header to branch lines and subheaders to drop points connected to individual tools.

Pressure regulator

Controls air pressure and flow at individual points of use.

Selecting an air compressor

The most important criteria to consider when selecting the correct compressed air station for any given application is;

- Flow: Free air Delivery (FAD)
- Required pressure
- Required air quality

As compressed air systems can be potentially complex, involving numerous components, it would be advisable to contact a compressed air equipment supplier or expert to audit your site to ascertain exactly what is required for your specific application.

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