

Compressed Air System in a Steel Plant



Compressed air systems in steel mills

Compressed air is air held under pressure at a value greater than atmospheric pressure (1.03 kg/cm²). It is a medium that carries potential energy.

Compressed air is a widely used tool in steel mills. It is an important source of air for instruments. In addition to instrument air, which is completely dry and free of contaminants, compressed air has three main uses in steel mills

Blast furnace air for blast furnaces

Oxygen, nitrogen and argon production for air separation plants

A practical gas with many uses. The most important of these is the operation of pneumatic devices.

Typically, the cold air for the blast furnace is supplied by a turbo blower or an electric blower. In air separation plants, special compressors are used to produce compressed air of the specifications required by the air separation plant for the production of oxygen, nitrogen and argon. In cases where compressed air is used as a utility gas, steel plants usually have a centralized compressed air system or/and a localized compressed air system.

Compressed air is an expensive utility when evaluated on a per unit of energy delivered basis. The advantage of using compressed air is that it can be easily stored in an air receiver and is readily available during short peak demand periods.

The conversion of electricity to compressed air is inefficient and there are line losses in the distribution of compressed air. Although the total energy consumption of such systems is usually small, compressed air systems are the most expensive energy source in steel plants due to their very low efficiency. A typical compressed air system has an energy efficiency of about 12 to 15 percent. A variety of measures can help compressed air systems operate at optimum effectiveness and reduce their energy consumption and costs.

Much of the production equipment in a steel mill is driven by cylinders. These include automatic feeders, chucks, clamps, presses, intermittent motion equipment (both reciprocating and rotary), and many others. This type of equipment typically has a low air consumption. Tools and equipment operated by compressed air are often referred to as pneumatic equipment. Pneumatic equipment has a high output to weight ratio. They use air motors, which are smaller and lighter than electric or hydraulic motors, providing better ergonomics for the operator. They are ideal for tough applications, especially in hot, dirty environments and areas of frequent overloads. While pneumatic devices do require regular

maintenance to maintain their maximum efficiency, they are extremely reliable and virtually indestructible under these conditions.

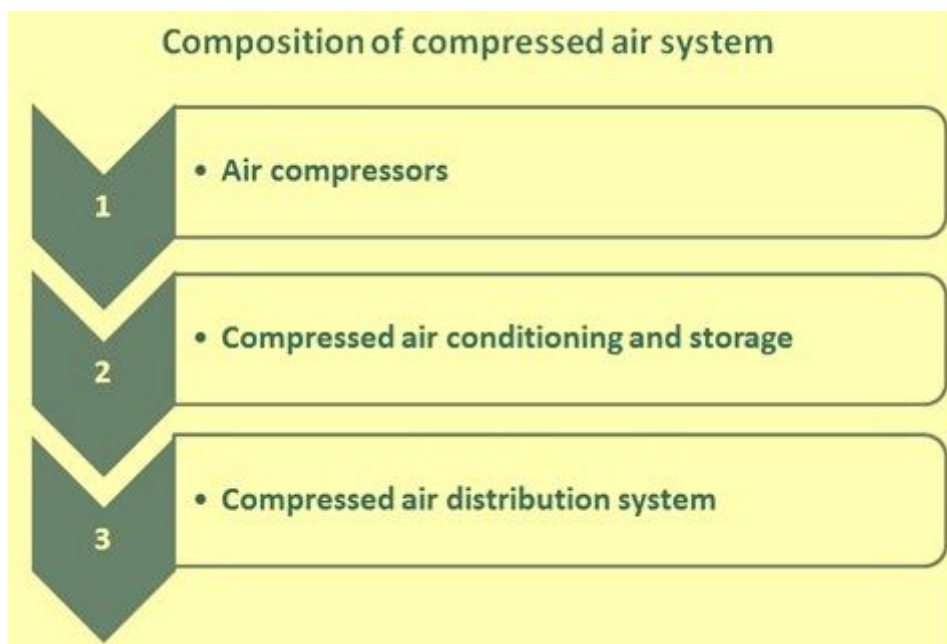
Cylinders used in pneumatic devices generally have a soft feature. Pneumatic devices simply stop working when the load exceeds the limit, whereas when electric and hydraulic drives are overloaded, they can cause both damage to the equipment and possibly injury to the operator.

The compressed air system consists of three main subsystems as follows. (Figure 1)

Compressor with drive and control, intercooling, compressor cooling, waste heat recovery, and inlet filtration

Conditioning and storage equipment, including aftercooler, receiver, separator, trap, filter, and air dryer

Compressed air distribution subsystems, including main lines, branch lines to specific users, valves, additional filters and traps, air hoses, possible supplementary compressed air conditioning equipment, connectors, and often pressure regulators and lubricators.



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