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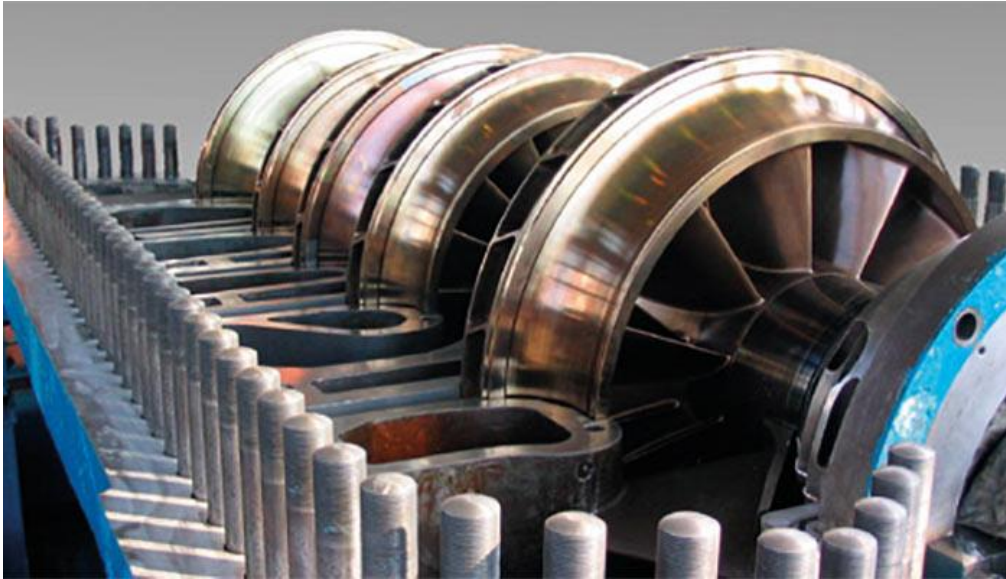
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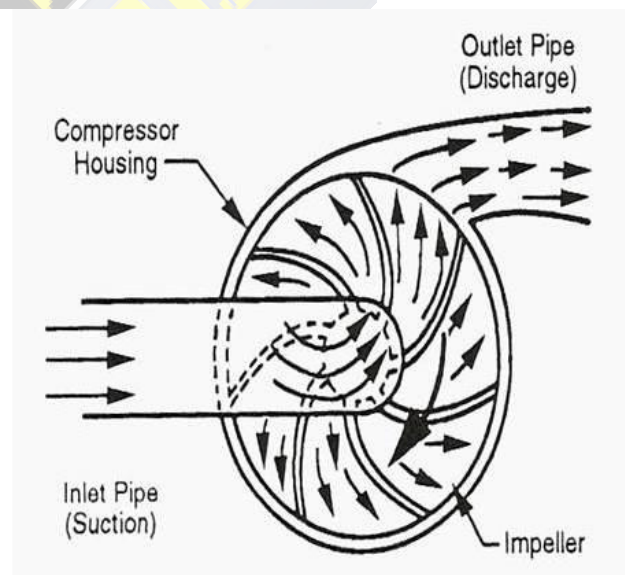
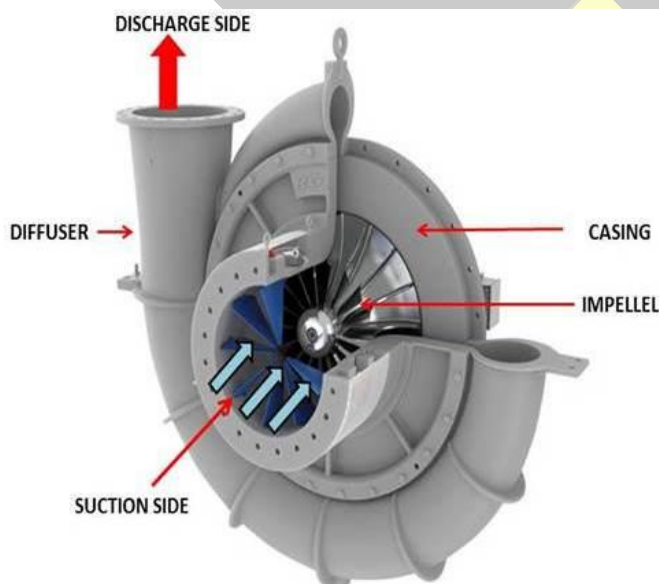
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Centrifugal Compressors



The other type of dynamic compressors is centrifugal compressors or annular compressors that depend on the transfer of energy from a rotating impeller to the air. A centrifugal compressor has a simple rotating element, mounted onto the shaft which is usually connected directly to the prime mover.



CENTRIFUGAL COMPRESSOR

They are divided into four parts; Input, centrifugal impeller, diffuser, and collector. The compressor sucks the air or the air enter through the input and then the centrifugal compressor raises the energy of working gases/air by rotating a set of blades. From here



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the velocity of the air is increased before moving to the diffuser. Diffuser converts the kinetic energy of the air into the pressure energy by gradually decreasing the air velocity. And in this way air is compressed and collects from the collector.

One of the interesting characteristics of the centrifugal compressor is that as the speed of the impeller reduces, the capacity of the compressor increases. These compressors may have single or multiple stages (up to 5 stages) and can operate at very high inlet pressures. With the development of aero engines, axial compressors have nearly replaced centrifugal compressors.

Advantages

- Reliable, low maintenance
- Low weight, easy to design and manufacture
- Suitable for continuous compressed air supply, such as the cooling unit
- High-flow rate than the positive displacement
- Oil-free in nature
- Fewer rubbing parts
- Relatively energy efficient
- Insensitive to flow disruptions
- Wide range of rotational speed
- No special foundation required

Disadvantages

- Large frontal area for a given airflow rate
- Unsuitable for very high compression, limited pressure
- Sensitive to changes in gas composition
- Sophisticated vibration mounting is needed
- The problem of surging, stalling, and choking

Applications

Centrifugal compressors are used in many industrial applications such as refineries, chemical, and petrochemical plants, natural gas processing and transmission plants, very large-scale refrigeration, and iron and steel mills.

- gas compression in oil platforms
- LPG storage and transport installations
- The turbocharger in many sports cars
- Turbochargers in diesel engines
- Small turbofan engines
- Small turbojets and turboshaft engines and as pumps on rocket engines