Mechanical Equipment - Course 430.1

FANS

Fans are devices designed to move air or, more generally, gases. No definite line exists between fans and their higher pressure counterparts - blowers and compressors. ASME (American Society of Mechanical Engineers) suggest in one of their standards that gas handling devices developing pressures below 13.8 kPa(g) (2 psig) be called fans.

The main application of fans in our plants is in ventilation and air conditioning systems. In these cases we have large flows at very low pressures, much lower than the mentioned limit of 13.8 kPa(g).

The principle of operation of fans is identical to that for centrifugal pumps or dynamic compressors. The air is accelerated by an impeller and subsequently slowed down by providing a larger cross-section in the casing or following ducting.

There are basically two types of fans:

1. Radial flow or centrifugal fans.
2. Axial flow fans.

CENTRIFUGAL FANS (Figure 1) consist of an impeller mounted on a shaft with the whole assembly rotating in a scroll-shaped housing. The housing and impeller, unlike centrifugal pumps and dynamic compressors, are welded from cut metal plates. Air enters the impeller axially, changes direction by 90° and leaves the impeller radially, entering the scroll-shaped casing where the pressure build-up is accomplished. Generally speaking, radial flow fans are used where higher pressures are involved, such as ventilation and air conditioning systems with extensive ducting grids. Examples are air conditioning systems at Pickering and Bruce NGS.

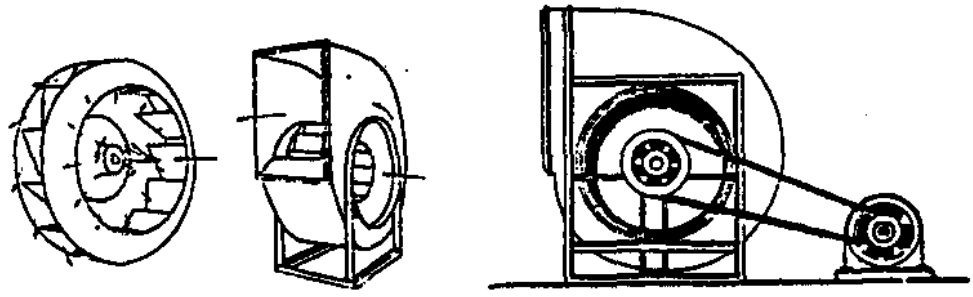

Figure 1

AXIAL FANS have two or more blades, usually air-foil blades mounted on a shaft. Air enters the impeller axially, is accelerated and leaves axially. Pressure build-up is accomplished in the discharge duct by installing in a diverging section or a diffuser.

The basic type is the PROPELLER FAN (Figure 2) whose blades spin in open atmosphere or are mounted in a plane sheet metal ring.

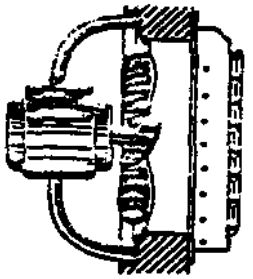

Figure 2

There is no ducting involved and this type of fan is used to move air just across the wall, in or out, or to induce air movement within the room.

The TUBEAXIAL FAN in Figure 3 has a surrounding cylinder and is used in a ducted system.

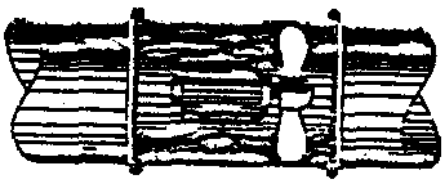

Figure 3

The VANEAXIAL FAN in Figure 4 has a set of air guide vanes mounted in a cylinder before or behind the airfoil-type impeller. They develop higher pressure than other axial fans and have begun to replace centrifugal fans in a number or services. Large fans of this type usually have variable-pitch blades which make them more versatile and economical for working under a wide range of operating conditions.

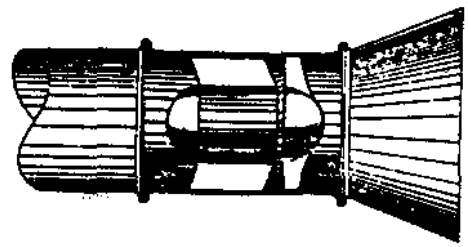

Figure 4

ASSIGNMENT

1. What are the two basic types of fans and what is the difference between them?

2. What is the difference between a centrifugal pump and a centrifugal fan?

3. What type of fan is usually found in systems with extensive grid of ducting?

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