

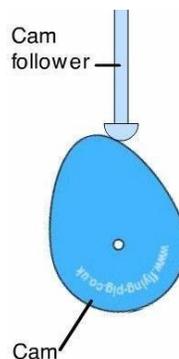
**24AG401 THEORY OF MACHINES**

**NOTES UNIT 1**

## CAM

A cam is a rotating machine element which gives reciprocating or oscillating motion to another element known as follower. The cam and the follower have a line contact and constitute a higher pair. The cams are usually rotated at uniform speed by a shaft, but the follower motion is predetermined and will be according to the shape of the cam.

The cam and follower is one of the simplest as well as one of the most important mechanisms found in modern machinery today. The cams are widely used for operating the inlet and exhaust valves of internal combustion engines, automatic attachment of machineries, paper cutting machines, spinning and weaving textile machineries, feed mechanism of automatic lathes etc. Type of cams, Type of followers, Displacement, Velocity and acceleration time curves for cam profiles, Disc cam with reciprocating follower having knife edge, roller follower, Follower motions including SHM, Uniform velocity, Uniform acceleration and retardation and Cycloidal motion.



### Types of cams

#### According to the surface in contact.

The followers, according to the surface in contact, are as follows :

- **Knife edge follower.**

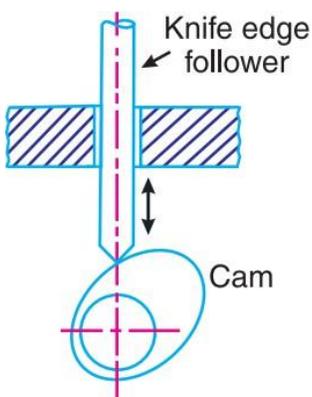
When the contacting end of the follower has a sharp knife edge, it is called a knife edge follower, as shown in Figure. The sliding motion takes place between the contacting surfaces (i.e. the knife edge and the cam surface). It is seldom used in practice because the small area of contacting surface results in excessive wear. In knife edge followers, a considerable side thrust exists between the follower and the guide.

➤ **Roller follower.**

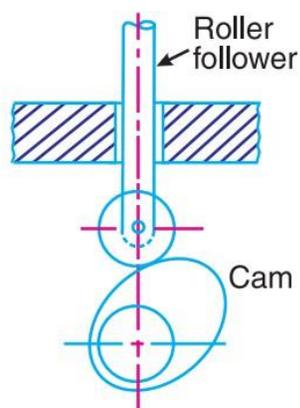
When the contacting end of the follower is a roller, it is called a roller follower, as shown in Figure. Since the rolling motion takes place between the contacting surfaces (i.e. the roller and the cam), therefore the rate of wear is greatly reduced. In roller followers also the side thrust exists between the follower and the guide. The roller followers are extensively used where more space is available such as in stationary gas and oil engines and aircraft engines.

➤ **Flat faced or mushroom follower.**

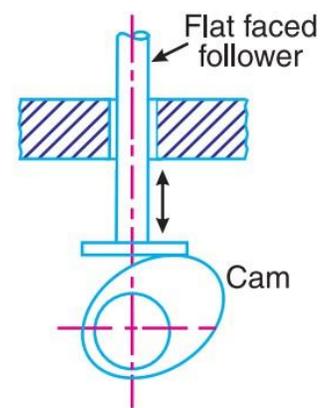
When the contacting end of the follower is a perfectly flat face, it is called a flat-faced follower, as shown in Figure. It may be noted that the side thrust between the follower and the guide is much reduced in case of flat faced followers. The only side thrust is due to friction between the contact surfaces of the follower and the cam.



Cam with knife edge follower.



Cam with roller follower.



Cam with flat faced follower.

***According to the motion of the follower.***

The followers, according to its motion, are of the following two types:

- **Reciprocating or translating follower.** When the follower reciprocates in guides as the cam rotates uniformly, it is known as reciprocating or translating follower
- **Oscillating or rotating follower.** When the uniform rotary motion of the cam is converted into predetermined oscillatory motion of the follower, it is called oscillating or rotating follower. The follower, as shown in Fig 20.1 (e), is an oscillating or rotating follower.

***According to the path of motion of the follower.***

*The followers, according to its path of motion, are of the following two types:*

- ***Radial follower.***

*When the motion of the follower is along an axis passing through the centre of the cam, it is known as radial follower. The followers, as shown in Fig. 20.1 (a) to (e), are all radial followers.*

- ***Off-set follower***

. When the motion of the follower is along an axis away from the axis of the cam centre, it is called off-set follower.