



SNS COLLEGE OF TECHNOLOGY

(AN AUTONOMOUS INSTITUTION)



Department of Mechanical Engineering

Theory of Machines

UNIT – III

KINEMATICS OF CAM MECHANISMS

TOPIC-4

CONSTRUCTION OF CAM PROFILE(CCP)



SOURCE: COMSOL

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SOURCE: COMSOL



CONSTRUCTION OF CAM PROFILE

A cam, with a minimum radius of 25 mm, rotating clockwise at a uniform speed is to be designed to give a roller follower, at the end of a valve rod, motion described below :

1. To raise the valve through 50 mm during 120° rotation of the cam ;
2. To keep the valve fully raised through next 30° ;
3. To lower the valve during next 60° ; and
4. To keep the valve closed during rest of the revolution i.e. 150° ;

The diameter of the roller is 20 mm and the diameter of the cam shaft is 25 mm. Draw the profile of the cam when (a) the line of stroke of the valve rod passes through the axis of the cam shaft, and (b) the line of the stroke is offset 15 mm from the axis of the cam shaft.



CONSTRUCTION OF CAM PROFILE

1. Draw a horizontal line $AX = 360^\circ$ to some suitable scale. On this line, mark $AS = 60^\circ$ to represent outstroke of the follower, $ST = 30^\circ$ to represent dwell, $TP = 60^\circ$ to represent return stroke and $PX = 210^\circ$ to represent dwell.
2. Draw vertical line AY equal to the stroke of the follower (i.e. 40 mm) and complete the rectangle as shown in **Figure at slide 3**.
3. Divide the angular displacement during outstroke and return stroke into any equal number of parts (say six) and draw vertical lines through each point.



CONSTRUCTION OF CAM PROFILE

4. Since the follower moves with uniform velocity during outstroke and return stroke, therefore the displacement diagram consists of straight lines. Join AG and HP.
5. The complete displacement diagram is shown by AGHPX in **Figure at slide 3.**

BOARD USAGE ALSO



CONSTRUCTION OF CAM PROFILE

(a) Profile of the cam when the axis of follower passes through the axis of cam shaft

The profile of the cam when the axis of the follower passes through the axis of the cam shaft, **as shown in Figure at slide number 11**, is drawn as discussed in the following steps :

1. Draw a base circle with radius equal to the minimum radius of the cam (i.e. 50 mm) with O as centre.
2. Since the axis of the follower passes through the axis of the cam shaft, therefore mark trace point A, **as shown in Figure at slide number 11**.



CONSTRUCTION OF CAM PROFILE

3. From OA, mark angle $AOS = 60^\circ$ to represent outstroke, angle $SOT = 30^\circ$ to represent dwell and angle $TOP = 60^\circ$ to represent return stroke.
4. Divide the angular displacements during outstroke and return stroke (i.e. angle AOS and angle TOP) into the same number of equal even parts as in displacement diagram.
5. Join the points 1, 2, 3 ...etc. and 0, 1, 2, 3, ... etc. with centre O and produce beyond the base circle **as shown in Figure at slide number 11.**
6. Now set off 1B, 2C, 3D ... etc. from the displacement diagram.
7. Join the points A, B, C,... M, N, P with a smooth curve. The curve **AGHPA** is the complete profile of the cam.



CONSTRUCTION OF CAM PROFILE

(b) Profile of the cam when the axis of the follower is offset by 20 mm from the axis of the cam shaft

1. Draw a base circle with radius equal to the minimum radius of the cam (i.e. 50 mm) with O as centre.
2. Draw the axis of the follower at a distance of 20 mm from the axis of the cam, which intersects the base circle at A.



CONSTRUCTION OF CAM PROFILE

3. Join AO and draw an offset circle of radius 20 mm with centre O.
4. From OA, mark angle $AOS = 60^\circ$ to represent outstroke, angle $SOT = 30^\circ$ to represent dwell and angle $TOP = 60^\circ$ to represent return stroke.
5. Divide the angular displacement during outstroke and return stroke (i.e. angle AOS and angle TOP) into the same number of equal even parts as in displacement diagram.

BOARD USAGE ALSO



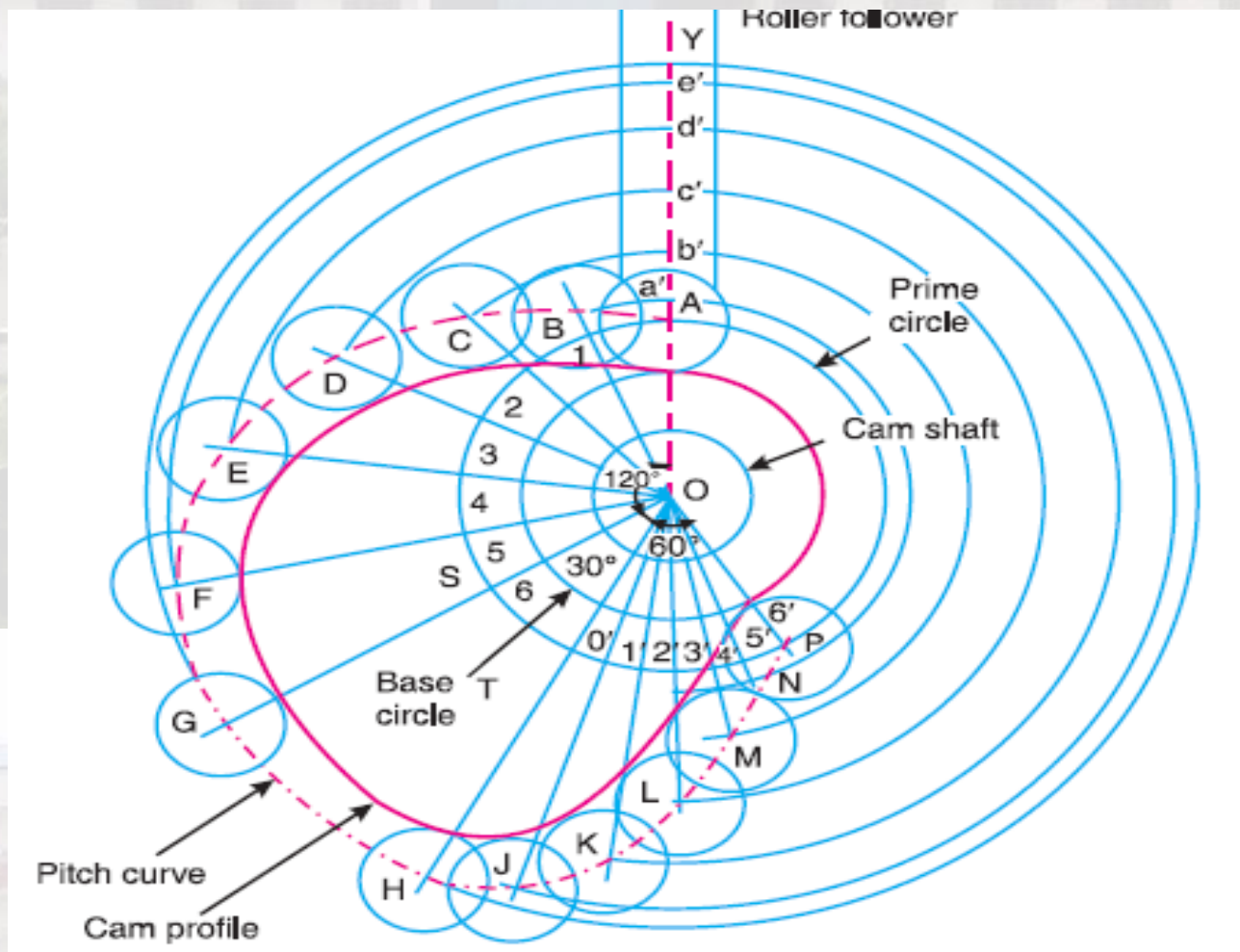
CONSTRUCTION OF CAM PROFILE

6. Now from the points 1, 2, 3 ... etc. and 0,1, 2,3 ... etc. on the base circle, draw tangents to the offset circle and produce these tangents beyond the base circle **as shown in Figure at slide number 12** .
7. Now set off 1B, 2C, 3D ... etc. from the displacement diagram.
8. Join the points A, B, C ...M, N, P with a smooth curve. The curve AGHPA is the complete profile of the cam.

BOARD USAGE ALSO



CONSTRUCTION OF CAM PROFILE



SOURCES: KHURMI R S

FIGURE: 1



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*Thank
you!*

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