SNS COLLEGE OF TECHNOLOGY

(AN AUTONOMOUS INSTITUTION)

Department of Mechanical Engineering
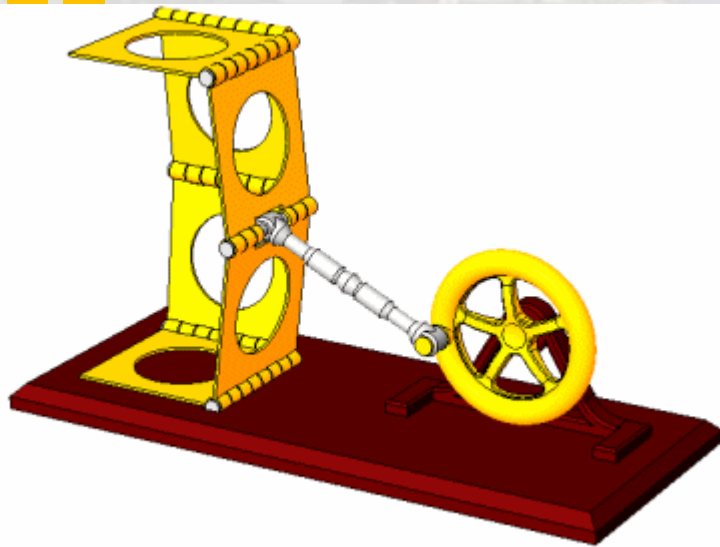
Theory of Machines

UNIT – III

KINEMATICS OF CAM MECHANISMS

TOPIC-2

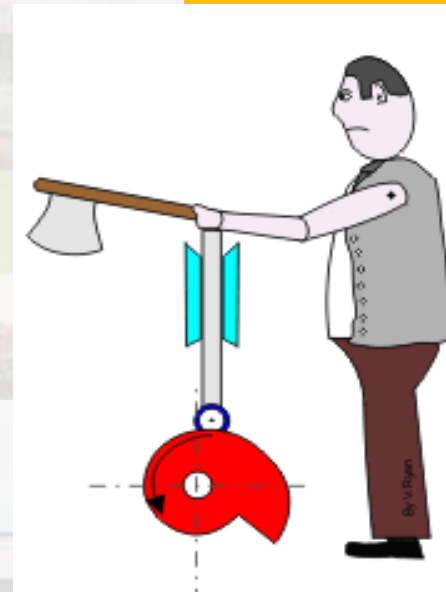# CONSTRUCTION OF CAM PROFILE(CCP)

SOURCE: COMSOL

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SOURCE: COMSOL

CONSTRUCTION OF CAM PROFILE

1. A cam is to give the following motion to a knife-edged follower :
   i. Outstroke during 60° of cam rotation ; ii. Dwell for the next 30° of cam rotation ;iii. Return stroke during next 60° of cam rotation, and iv. Dwell for the remaining 210° of cam rotation. The stroke of the follower is 40 mm and the minimum radius of the cam is 50 mm. The follower moves with uniform velocity during both the outstroke and return strokes. Draw the profile of the cam when (a) the axis of the follower passes through the axis of the cam shaft, and (b) the axis of the follower is offset by 20 mm from the axis of the cam shaft.

CONSTRUCTION OF CAM PROFILE

SOURCES:
KHURMI R S
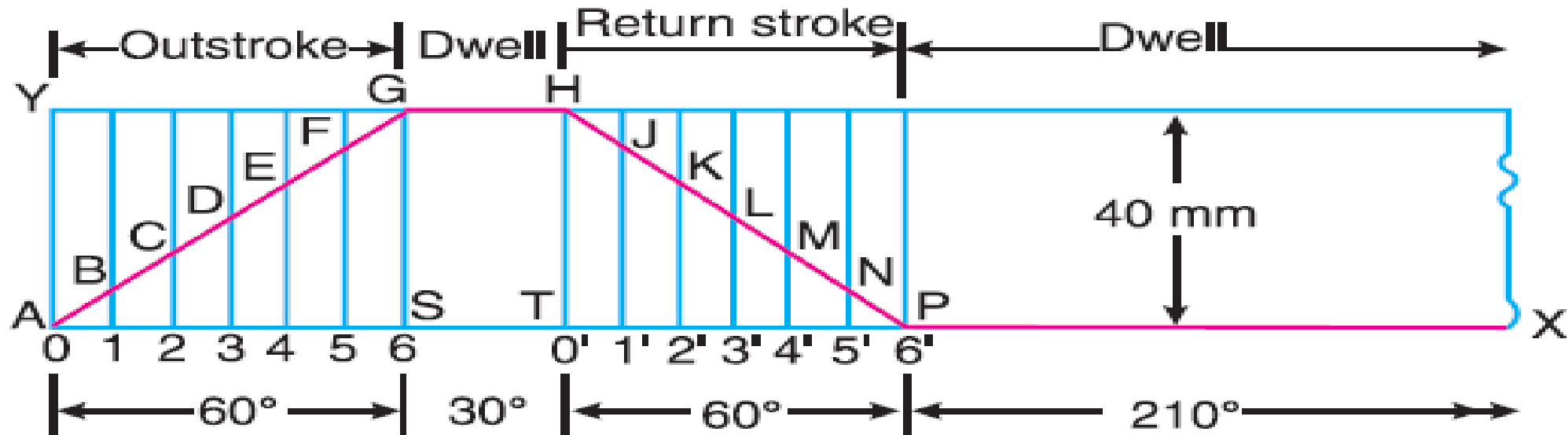
First of all, the displacement diagram, as shown in the above Figure is drawn as discussed in the following steps in the next slide.

CONSTRUCTION OF CAM PROFILE

1. Draw a horizontal line AX = 360° to some suitable scale. On this line, mark AS = 60° to represent outstroke of the follower, ST = 30° to represent dwell, TP = 60° to represent return stroke and PX = 210° 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° to represent outstroke, angle SOT = 30° to represent dwell and angle TOP = 60° 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° to represent outstroke, angle SOT = 30° to represent dwell and angle TOP = 60° 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.
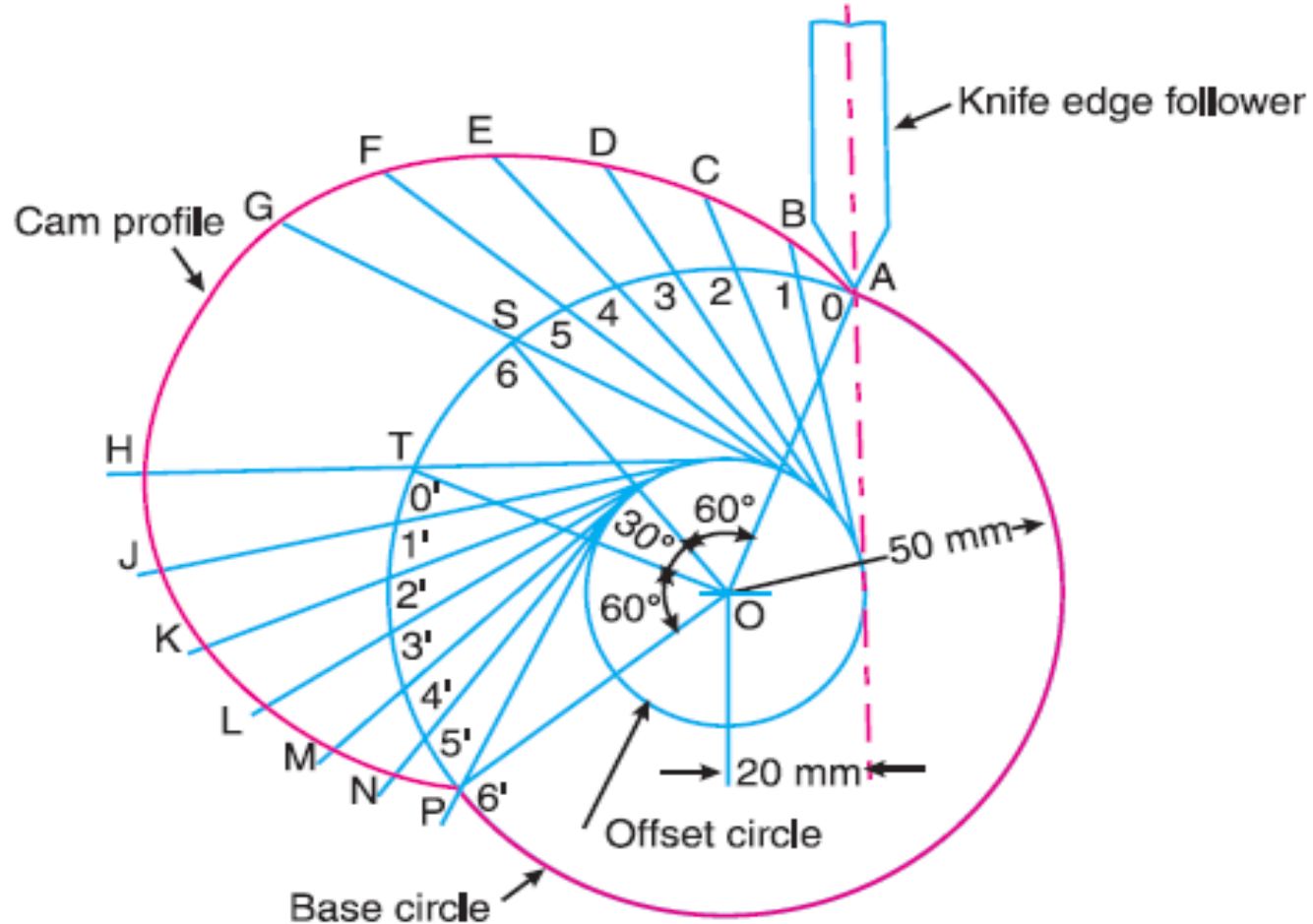
BOARD USAGE ALSO

CONSTRUCTION OF CAM PROFILE
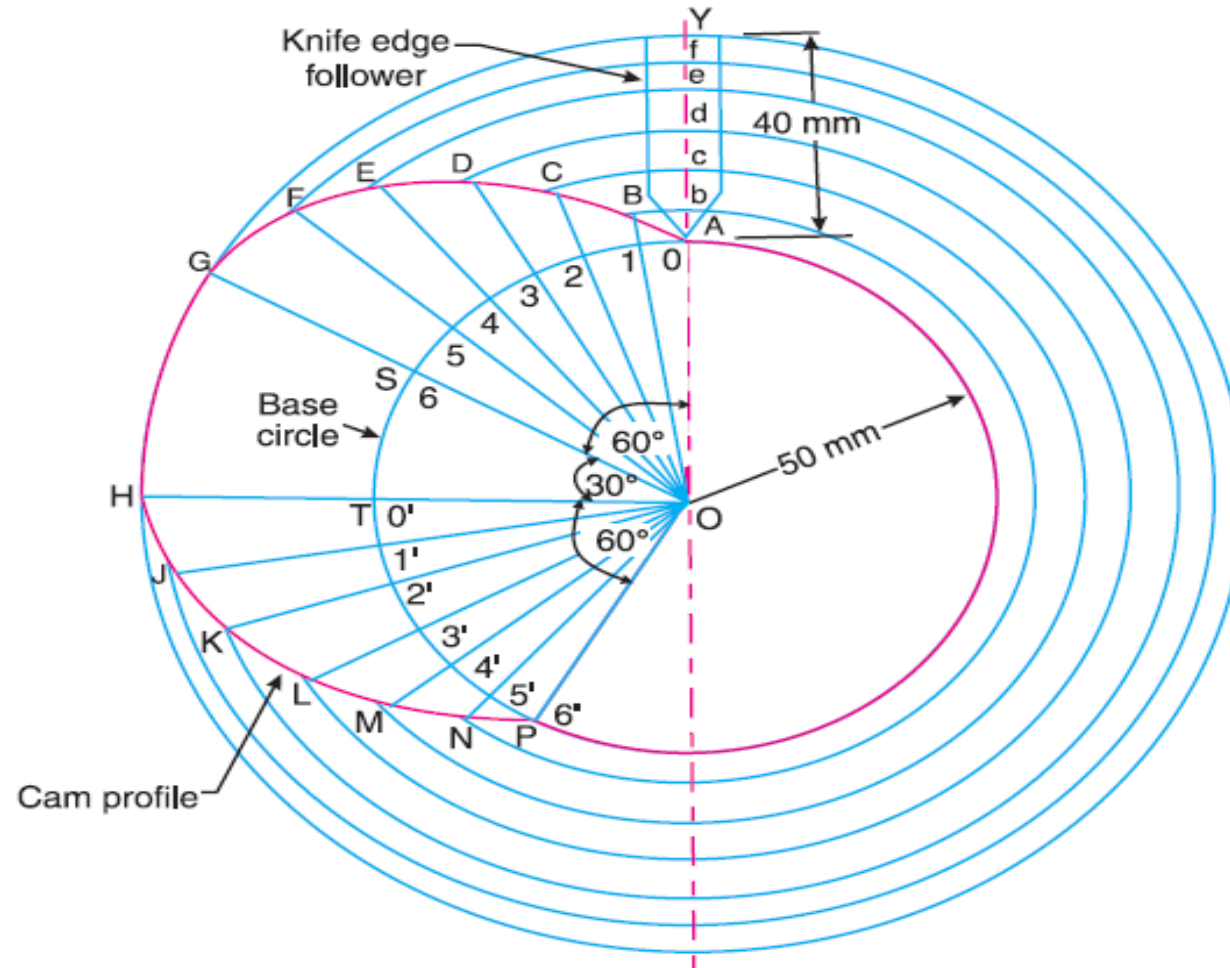
SOURCES: KHURMI R S

FIGURE: 1

CONSTRUCTION OF CAM PROFILE

SOURCE: KHURMI R S

FIGURE: 2

SEOURC: FREEPIK