Cam profile essay

{text: bookmark-start} {draw: frame} TERMPAPER of PRODUCTION TECHNOLOGY SUBMITTED By- Name- Gurpreet Singh Class- Mech.

Diploma {B-Tech 6yrs} Section- Rj0708 Roll No. – Rj0708x30 Reg. No.

– 4180070122 INRIDUCTION {text: bookmark-start} A Simple Experiment: What is a Cam? {text: bookmark-end} {draw: frame} Simple Cam experiment Take a pencil and a book to do an experiment as shown above. Make the book an inclined plane and use the pencil as a slider (use your hand as a guide). When you move the book smoothly upward, what happens to the pencil? It will be pushed up along the guide. By this method, you have transformed one motion into another motion by a very simple device. This is the basic idea of a cam. By rotating the cams in the figure below, the bars will have either translational or oscillatory motion. Task Basic Principle Graphical Layout of Cam Profiles Simulation Task The task is too determining the exact shape of the cam. Surface required to dwliver a specified follower motion, we assume here that the reqired motion has been completely determine,,,, graphically as well as analytically.

We will only address the case of plate cams. Basic principleIn constructing the cam profile, we employ the principle of kinematic inversion, imagining the cam to be stationary and allowing the follower to rotate apposite to the direction of cam rotation. Talking the cam with knife-edge follower for example, the locus generated by the trace point as the follower moves relative to the cam is identical to cam surface.

By this way cam surface can be figured out. GRAPHICAL LAYOUT OF CAM PROFILE For the case of reciprocating knife-edge follower {draw: frame} As

shown in figure the displacement diagram of follower is given s= s. onstruct the plate cam profile. For the case of reciprocating knife-edge follower {draw: frame} Step 1; divide the displacement-diagram abscissa into a number of segments. Step 2:- divide the prime circle into corresponding segments. Step 3:- transfer distances, by means of dividers, from the displacement diagram directly onto the Cam layout to locate the corresponding positions of the trace point.

For the case of reciprocating knife-edge follower {draw: frame} Step 4:- draw the smooth curve through these points. The curve is just the required cam profile. For the case of reciprocating offset roller follower {draw: frame} As shown in figure, the displacement diagram of the follower is given S= S. For the case of reciprocating offset roller follower Construct the plate cam profile. {draw: frame} Step 1:- construct the prime circle with radius ro. step 2 ;- construct the offset circle with radius equal to the amount of offset e. For the case of reciprocating offset roller follower {draw: frame} Step 3:- Divide the displacement-diagram abscissa into a number of segments. Srep4: – Divide the offset circle into corresponding segments and assign station number to the boundaries of these segments.

Step 5:- Construct lines tangent to the offset circle from these station, dividing the prime circle into corresponding segments Step 6:- Transfer distances, by mean of dividers, from the displacement diagram directoly onto the cam layout to locate the corresponding positions of the trace point, always measuring outward from the prime circle. For the reciprocating flat-face follower {draw: frame} As shown in figure, the displacement diagram of the follower is given, S= S. Construct the plate cam profile Step 1; – Divide

the displacement-diagram abscissa into a number of segments. Step 2:- Divide the prime circle into corresponding segments. Step 3:- Transfer distances from the from the displacements diagram directly onto the cam layout.

Step 4:- Construct a line representing the flat face of the follower in each position. Step 5:- construct a smooth curve tangent to all follower positions. This curve is required cam profile For the case of oscillating follower As shown in figure, the displacement diagram of the follower, radious of prime circle, and follower length are given. draw: frame} Construct the plate cam profile Step 1:- Divide the displacement-diagram abscissa into a number of segment. Seep 2:- Draw a circle about camshaft center O with radius OA. Step 3:- Divide the circle and give the station number correspond to the displacement diagram.

{draw: frame} Step 4; – Draw arcs about each of these centers, all with equal radial corresponding to the length of follower. Step 5:- Calculate the angular displacement at each station traveled by the follower. Step 6; – Measure outward along the arc from the prime circle to locate trace point at each Station. draw: frame} Step 7:- construct a smooth curve through these points. The curve is just the required cam profile.

For the case of reciprocating offset roller follower As shown in figure, the displacement diagram of the follower is given. S= S. The offset distances e, radius of prime r, are also known. Formulate the equation of plate cam profile. {draw: frame} Step 1:- Equation prime curve circle, offset circle, and the initial position of the follower. Draw prime circle, offset circle, and the

initial position of the follower. Define the Cartesian coordinate system O-xy. Rotate the follower backward arbitrary angle around the camshaft center O.

{draw: frame} Determine the coordinate (x, y) of trace point B. The synthesis results can be validated by simulation. Here is an example. The simulation is done with software ADAMS/VIEW. Example : Design a plate cam profile, as shown in below. {draw: frame} Knowing: the cam profile rotates with constant angular velocity in clockwise.

The radius prome circle ro= 30mm. the knife-edge follower rises with uniform motion, and the lift is 50mm during which the rotates 180’. Then the follower dwells during which the cam rotates 60’. With cam rotating 120’ to complete the work cycle, the follower returns to its initial position with paraboric motion. {draw: frame} Follower displacement: Solid dark line——-actual displacement Dash line————–given displacement {draw: frame} Simulation shows that the error b/w the actual follower displacement and given follower displacement varies, but the maximum absolute error is 0. 3747mm.

The error is brought by step lenth of programming and simulation and is accepatable. Therefore the the synthesis result is proved to be correct.