

Chapter - 5

**SPECIAL FEATURE
RECOGNITION (SFR)**

SPECIAL FEATURE RECOGNITION (SFR)

In previous chapter cylindrical, conical, curvature and cross hole features are described and some other features like slot, keyway, elliptical and knuckle thread are categorized as special features. These special features are described in the following sections.

5.1 FLOW CHART FOR KEYWAY FEATURE

In this section features slot, keyway, elliptical and knuckle thread features recognition procedure is explained. Slot recognition is explained through a flow chart as shown in Figure 5.1 and remaining features are explained through diagrams.

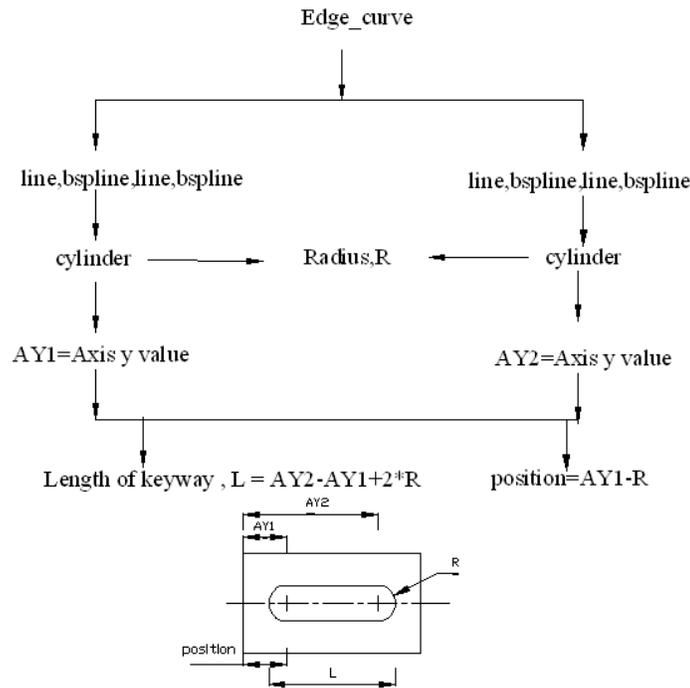


Fig. 5.1: Flow chart for keyway feature recognition

5.2 RECOGNITION OF SLOT FEATURES

As shown in Figure 5.2, EDGE_CURVE is constructed with four lines. ADVANCE_FACE consists of PLANE entity number. For a through slot there will be four planes which consist of four lines each. If the slot is a blind slot then one more plane exists with four lines. The various parameters for slot like length, width and depth is also found. The depth of the slot is calculated with maximum y coordinate of all four planes of the slot. Blind length is found with y coordinate of extra added plane of bcfg. The length and width of the slot is difference of x_1 and x_2 , z_1 and z_2 respectively. If plane z coordinate of axis is equal to external cylinder z coordinate of axis then slot is in the center of external cylinder. If not equal then difference of those values gives the offset of the slot feature from external cylinder.

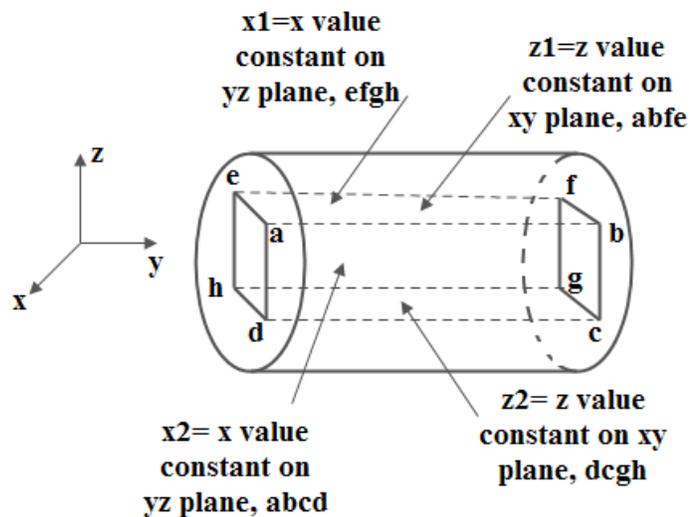


Fig. 5.2: Slot feature geometry

5.3 RECOGNITION OF KEYWAY FEATURES

As shown in Figure 5.3, if edge curve is constructed by two lines, three B-Splines then it is a keyway feature. ADVANCE_FACE consists of CYLINDRICAL_SURFACE which gives the radius of keyway. Keyway left and right semi circle axis is found with AXIS_PLACEMENT with y coordinate axis of y_1 and y_2 respectively. Keyway length is found with the difference of y_1 and y_2 . Y_1 value gives the position of keyway.

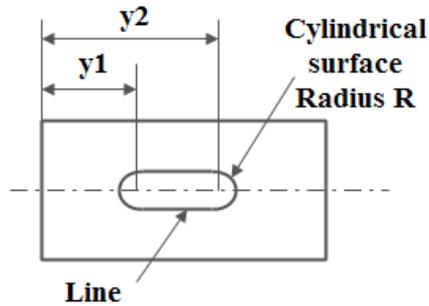


Fig. 5.3: Keyway feature geometry

5.4 RECOGNITION OF ELLIPTICAL FEATURES

Ellipse geometry is shown in Figure 5.4, in STEP file elliptical feature is recognized by a string SURFACE_OF_LINEAR_EXTRUSION and in turn connected by a string ELLIPSE. The last two numbers indicate major axis and minor axis radius respectively. If ellipse is an internal feature then edge curve in STEP file is connected to the string B_SPLINE_CURVE_WITH_KNOTS.

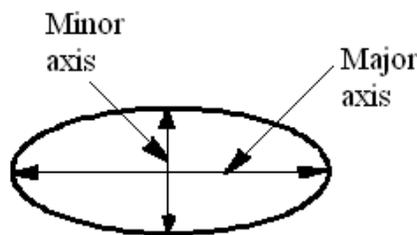


Fig. 5.4: Elliptical feature geometry

5.5 RECOGNITION OF KNUCKLE THREAD

Knuckle thread is constructed in CATIA software by using helix command. In STEP file thread is recognized with the string BOUNDED_SURFACE. Starting and ending of the thread are plane

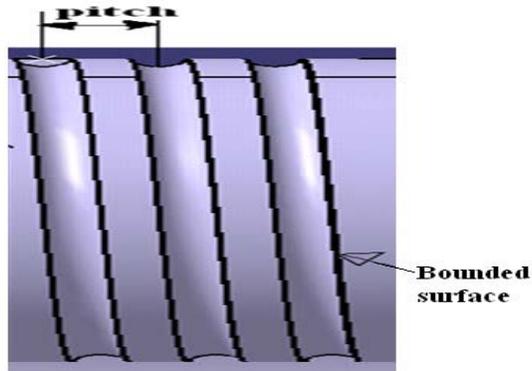


Fig. 5.5: Showing pitch and bounded surface on knuckle thread

The special features such as slot, keyway, ellipse and knuckle thread are described and presented in this chapter. Validation of the software for the extraction of geometric data and feature recognition is presented in the next chapter. Various case studies are presented and explained.