MET 237 COMPUTER NUMERICAL CONTROL

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Programming Circular Profiles - Line-Arc Profiles [Milling]

9| Profiling At Constant Feed Rate

To achieve the required surface finish we need to maintain a constant feed rate while profiling a contour.

For outside circular motion we need to maintain a constant feed rate while profiling a contour. Because, the distance traveled by the tool center is greater than that traveled by tool's edge.

Example:

A 0.5-diameter end mill is to be used to machine a radius of 1 in. As shown in Figure 10.
A constant feed rate of 5 ipm on the tool periphery is to be maintained.

$$\text{Constant feed rate} = \frac{\textit{cutter path radius}}{\textit{part radius}} \times \textit{linear feed rate}$$

$$\text{Constant feed rate} = \frac{\left(1+\frac{0.5}{2}\right)}{1} \times 5 = 6.25 \textit{ipm}$$

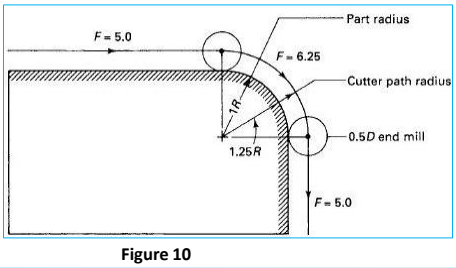
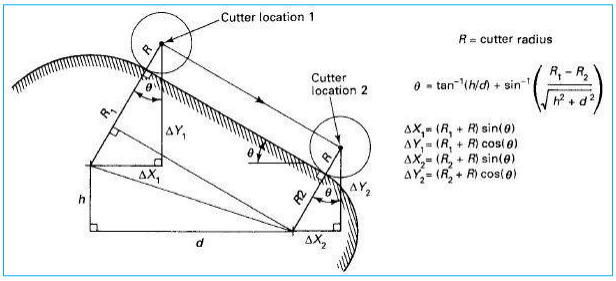


Figure 10

9.1| Determining Cutter offsets-Line-Arc Profiles

- **Common interface cases [case-1].**



$$\theta = \tan^{-1}\left(\frac{h}{d}\right) + \sin^{-1}\left(\frac{R_1 - R_2}{\sqrt{h^2 + d^2}}\right)$$

$$\Delta X_1 = (R_1 + R)\sin(\theta)$$

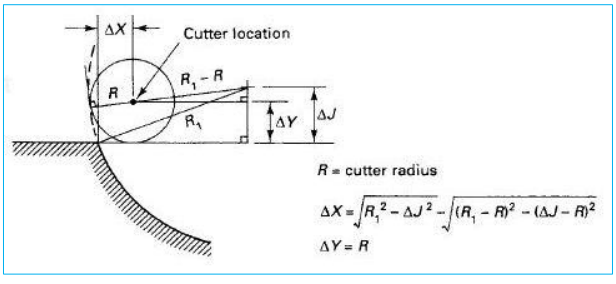
$$\Delta Y_1 = (R_1 + R)\cos(\theta)$$

$$\Delta X_2 = (R_2 + R)\sin(\theta)$$

$$\Delta Y_2 = (R_2 + R)\cos(\theta)$$

9.1| Determining Cutter offsets-Line-Arc Profiles

- **Common interface cases [case-2].**



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9.1| Determining Cutter offsets-Line-Arc Profiles

- **Common interface cases [case-3].**