

Technical Tip #123 – Common Machining Formulas

1. Common Machining Formulas

SFM (surface feet per minute) – defined as the distance in feet traveled in one minute by a point on a part surface being machined. On a lathe, it is the rate at which the surface of the stock passes the cutting tool. This takes into account the diameter of the stock. On a mill, it is the rate at which the cutter moves past the stationary stock. This takes into account the diameter of the cutter.

$$\text{sfm} = \frac{\pi \times D \times \text{rpm}}{12}$$

RPM (revolutions per minute) – defined as the number of revolutions a part or cutter will rotate in one minute.

$$\text{rpm} = \frac{12 \times \text{sfm}}{\pi \times D}$$

IPR (inches per revolution) – defined as a feed value reporting how far an insert or cutter travels in one revolution.

$$\text{ipr} = \frac{\text{ipm}}{\text{rpm}}$$

IPM (inches per minute) – defined as a feed value reporting how far an insert or cutter travels in one minute

$$\text{ipm} = \text{rpm} \times \text{ipr}$$

2. Nose Radius Selection and Surface Finish

Nose radius and feed rate have the greatest impact on surface finish. Assuming the feed rate remains the same, the larger the nose radius the better the surface finish will be. While improving the surface finish, a larger nose radius will also increase the cutting forces applied to the work piece.

