Angle of Engagement & Chip Thinning

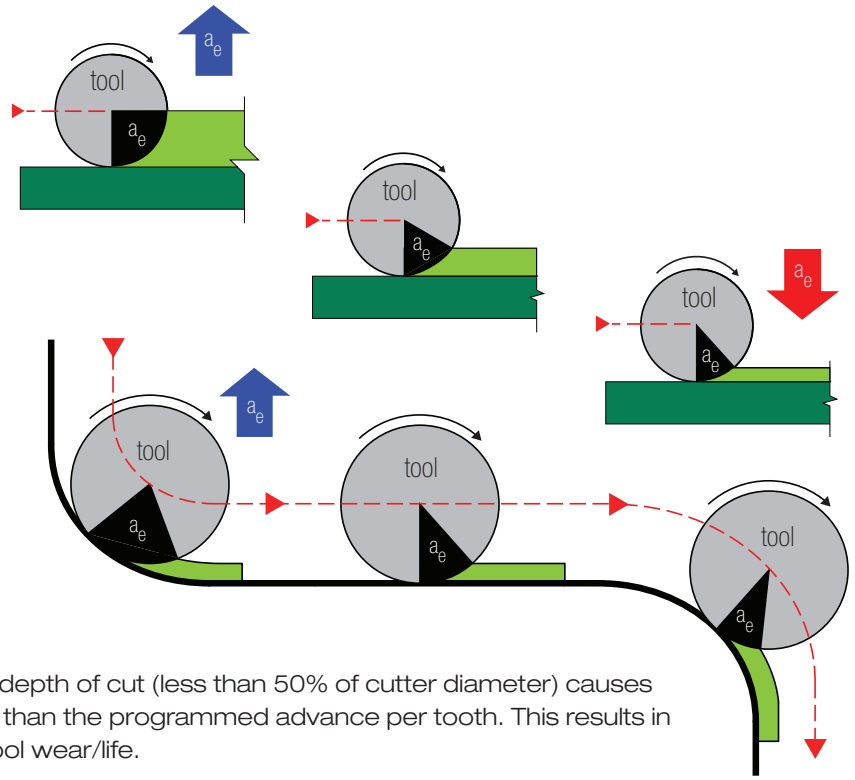
Tool Engagement Angle (a_e) - An angular measurement about the periphery of the cutter that is in contact with the material being removed and directly related to the radial chip thickness.

An **Increasing** a_e can result in:

- Higher horsepower requirement
- Increased tool deflection
- Higher spindle load (wear/tear)
- Decreased feed rates

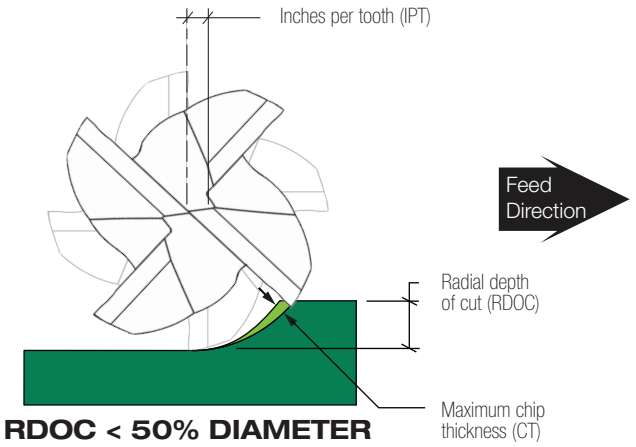
A **decreasing** a_e can result in:

- Lower horsepower requirement
- Decreased tool deflection
- Lower spindle load (wear/tear)
- Increased Feed Rates



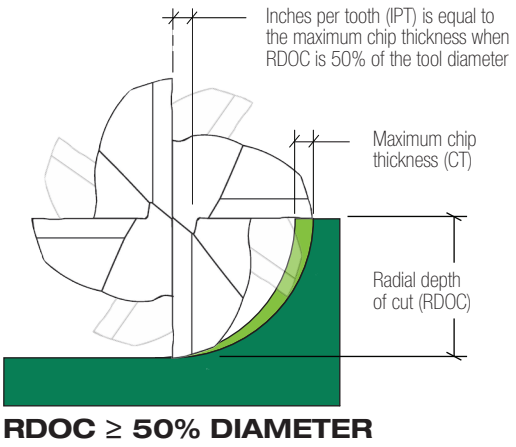
Chip Thinning - Milling with a light radial depth of cut (less than 50% of cutter diameter) causes the chip being formed to be much thinner than the programmed advance per tooth. This results in excessive tool "rubbing" and premature tool wear/life.

[Figure 1]



RDOC < 50% DIAMETER

[Figure 2]



RDOC ≥ 50% DIAMETER

When programming a radial depth of cut (RDOC) less than 1/2 the tool diameter (Figure 1), employ the chip thinning calculation (Figure 3). A chip-thinning adjustment will prolong tool life and help reduce cycle time.

This feed rate adjustment needs to consider drastic tool engagement and angle increases when milling into corners. Significant feed rate reductions in these areas still apply and will need attention.

$$IPT = \frac{CT \times D}{2 \times \sqrt{(D \times RDOC) - RDOC^2}}$$

[Figure 3]