ME361 – Manufacturing Science Technology

Boring

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The boring process

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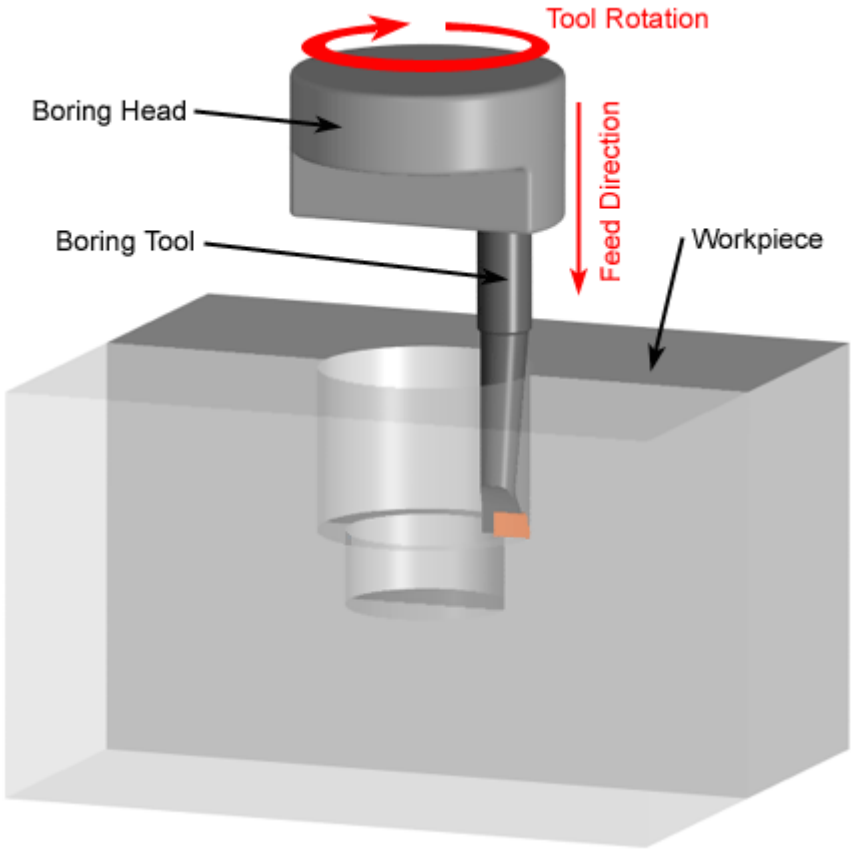

The boring process

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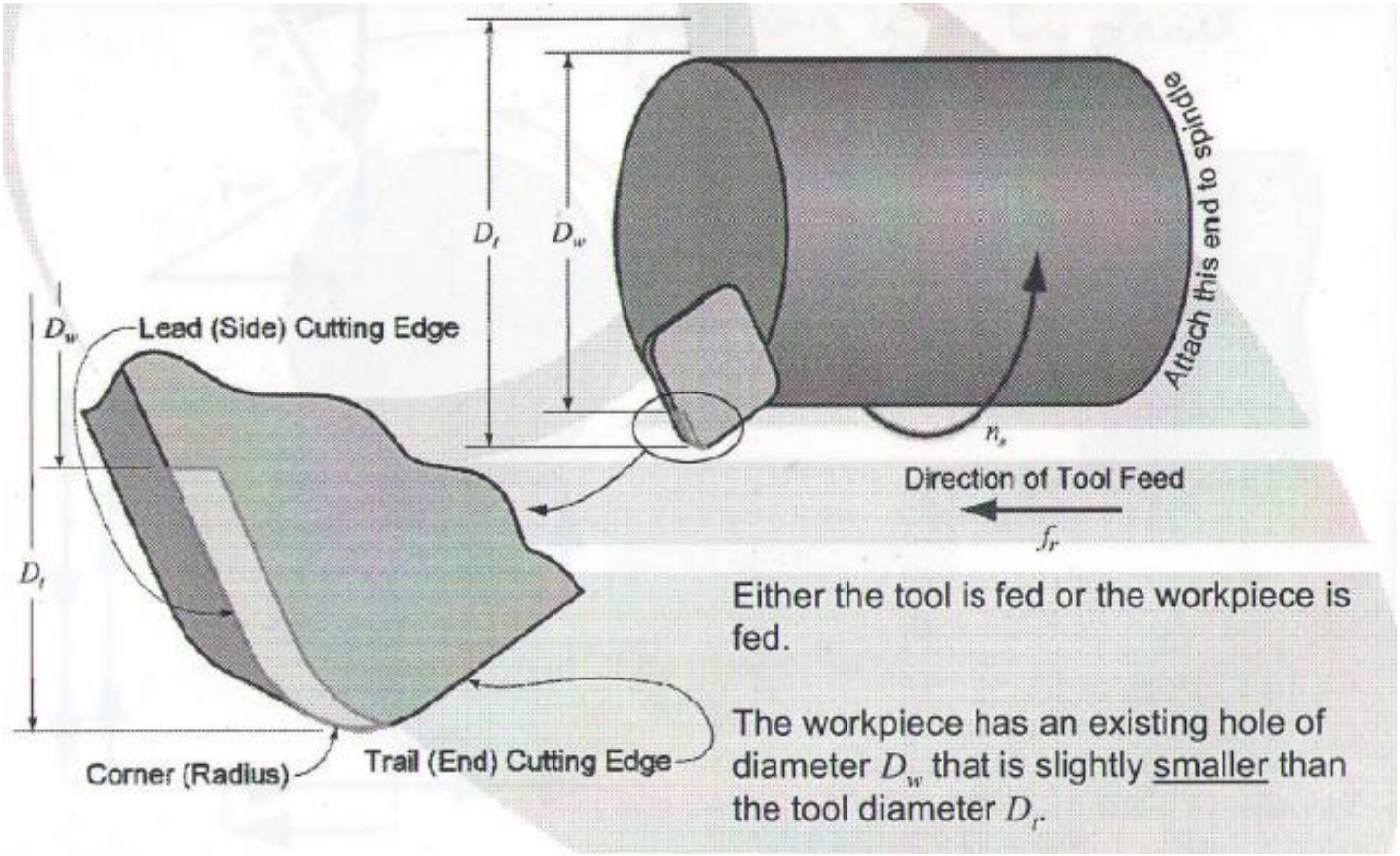


Endres, Adv. Mcing. Processes

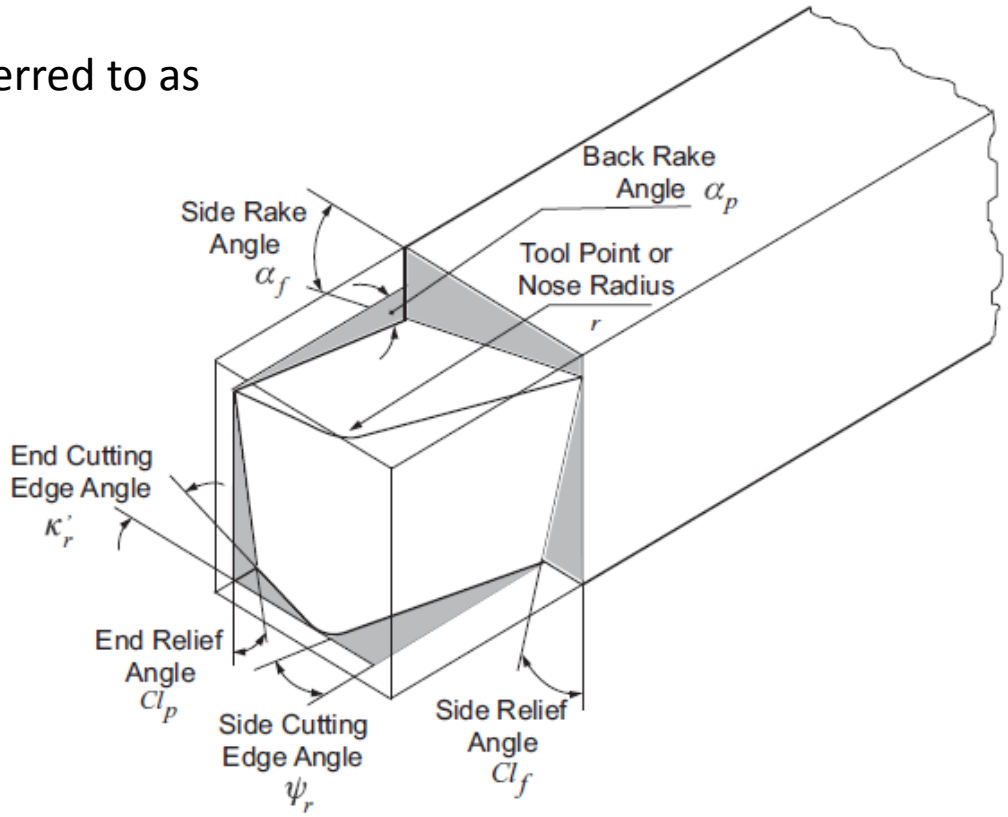
Boring cartridges and holders

Cartridges normally define the tool geometry

Boring tool geometry

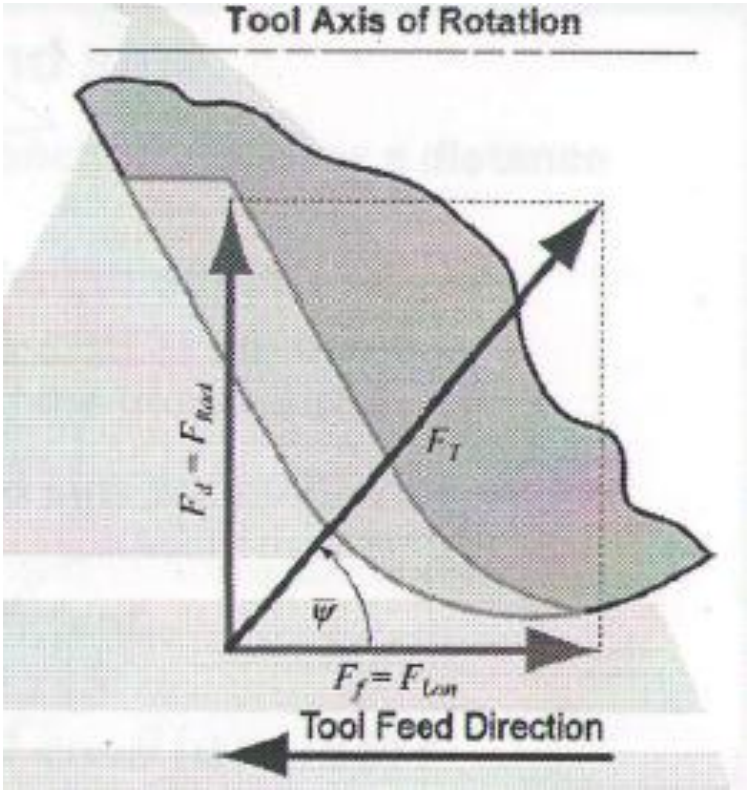
Same geometry as a turning tool:

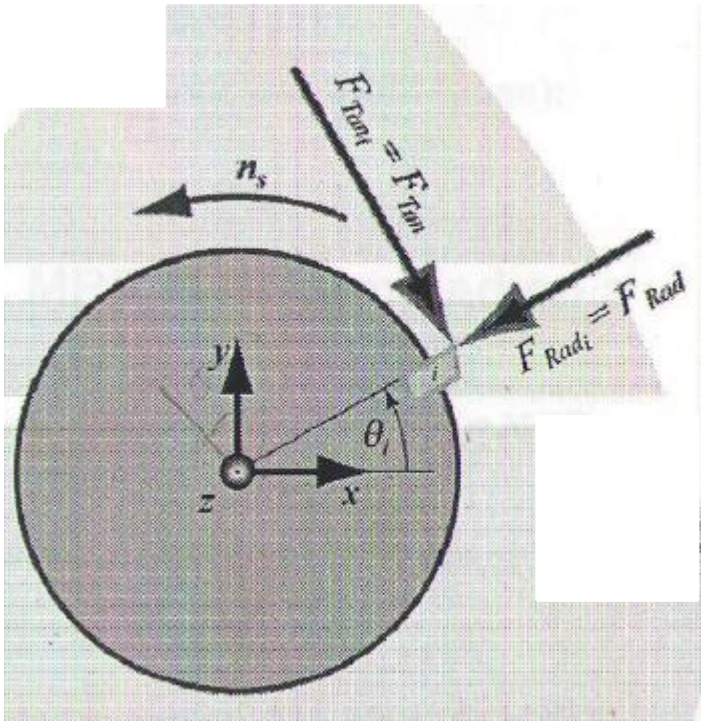
- Side rake angle is often referred to as the axial rake angle
- Back rake angle is often referred to as the radial rake angle



The boring process

Each tooth has a radial, longitudinal and tangential force acting on it





Endres, Adv. Mcing. Processes

Forces in boring

- The force components for a tooth i at angle θ_i are

$$F_{x_i} \equiv F_x(\theta_i) = F_{Tan}\sin\theta_i - F_{Rad}\cos\theta_i$$

$$F_{y_i} \equiv F_y(\theta_i) = -F_{Tan}\cos\theta_i - F_{Rad}\sin\theta_i$$

N_t - # of teeth

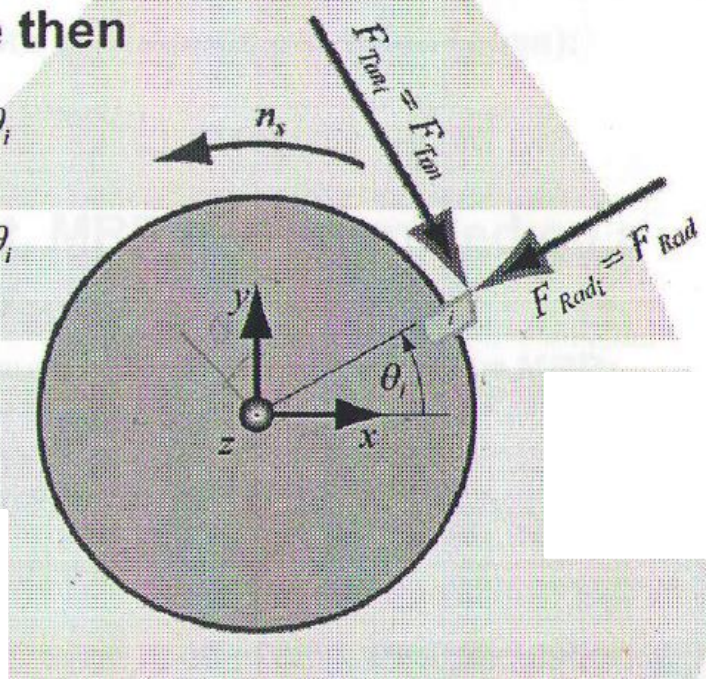
- The total force components are then

$$F_x \equiv F_x(\theta_s) = \sum_{i=1}^{N_t} F_{x_i} = F_{Tan}\sum_{i=1}^{N_t}\sin\theta_i - F_{Rad}\sum_{i=1}^{N_t}\cos\theta_i$$

$$F_y \equiv F_y(\theta_s) = \sum_{i=1}^{N_t} F_{y_i} = -F_{Tan}\sum_{i=1}^{N_t}\cos\theta_i - F_{Rad}\sum_{i=1}^{N_t}\sin\theta_i$$

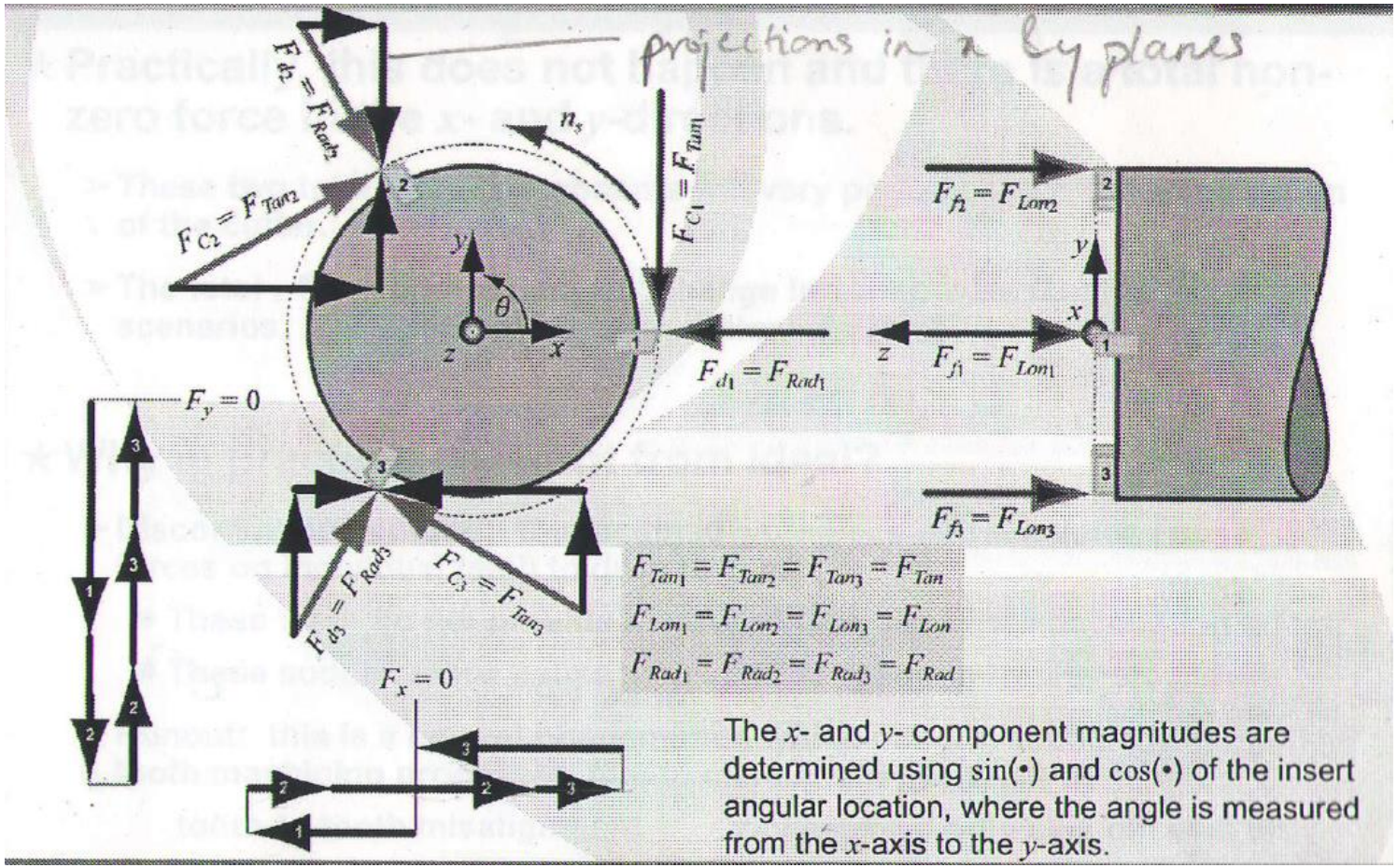
- The angle of each tooth is

$$\theta_i = \theta_s + (i-1)(360°/N_t)$$



Endres, Adv. Mcing. Processes

Multi-point boring



Endres, Adv. Mcing. Processes