Adda247

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"There is nothing impossible to they who will try."

GATE 2024

प्रचण्ड Batch

PRODUCTION

METAL CUTTING

LEC-1

Mechanical Engineering

GATE 2024

GATE

प्रचण्ड Batch

MECHANICAL ENGINEERING

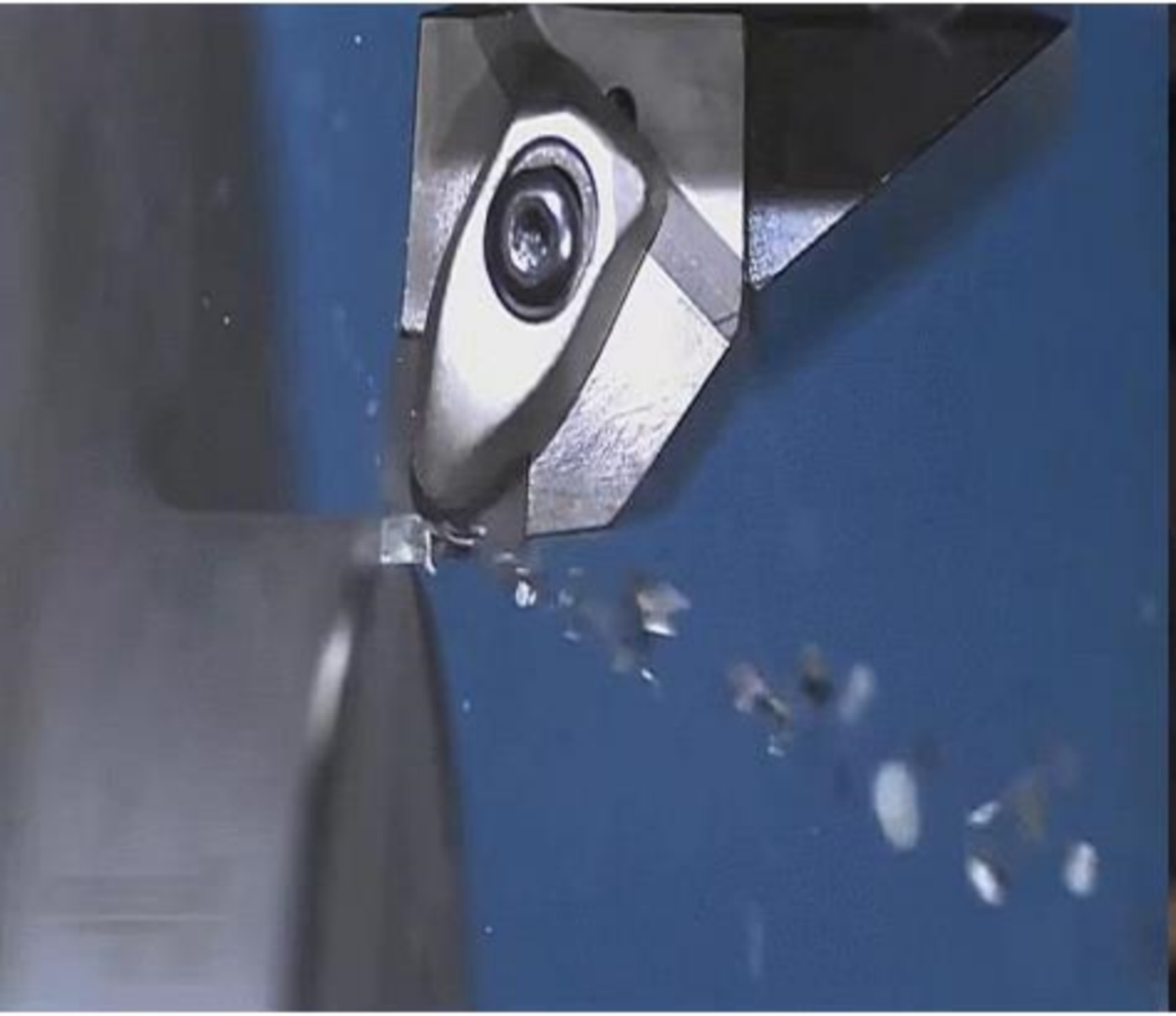
MON/ TUE/ WED- 9PM

THEORY OF MACHINE (TOM)

THUR/ FRI/ SAT- 6PM

PRODUCTION ENGINEERING

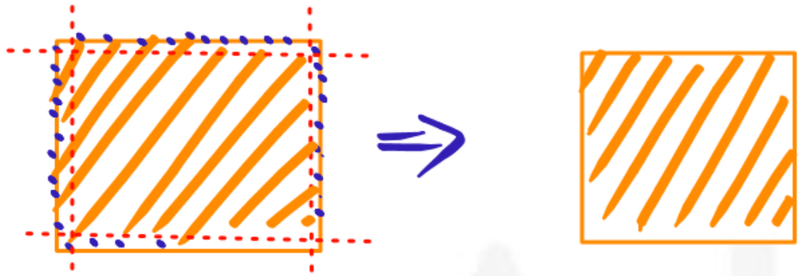
METAL CUTTING



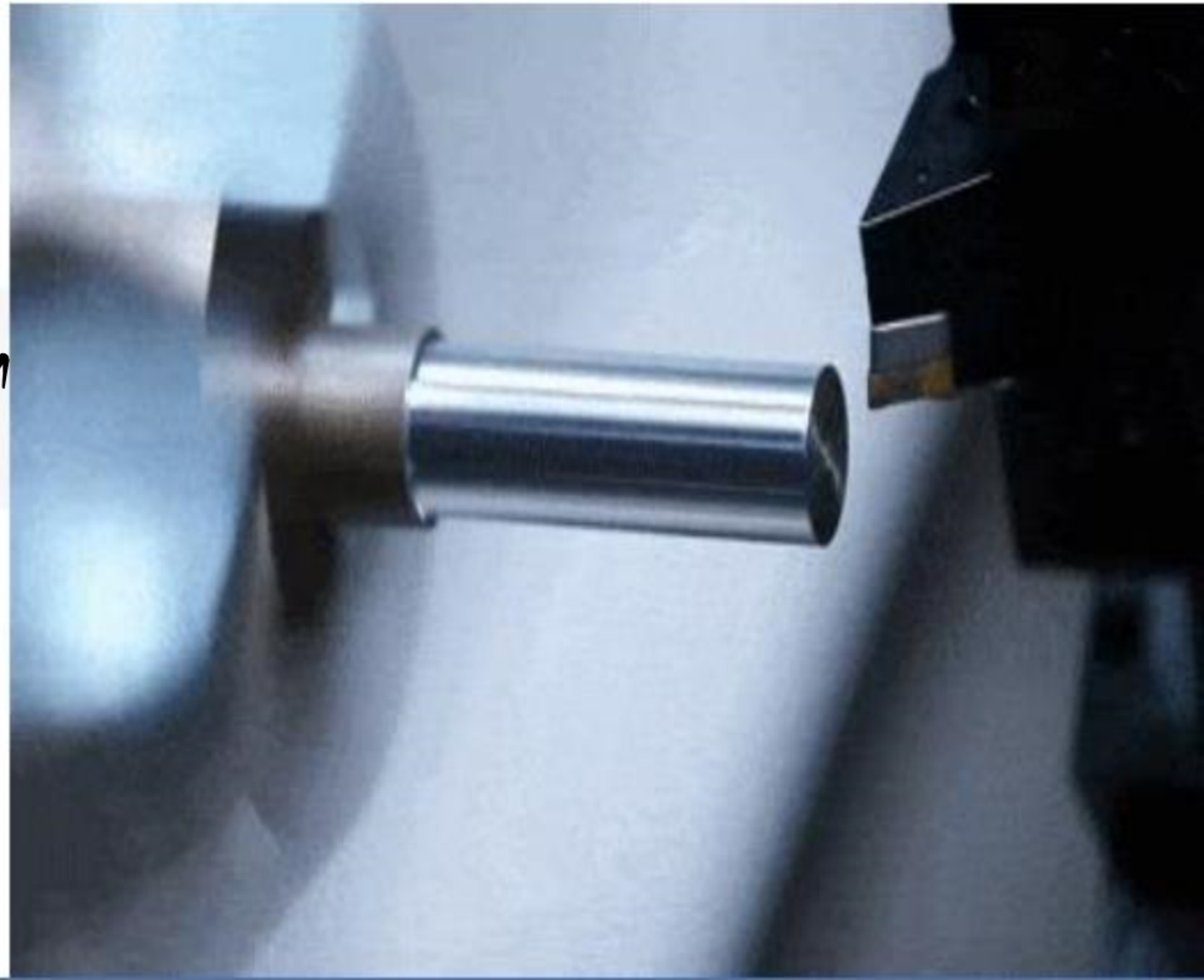
Machining operation

Orthogonal Machining

MACHINING :→ -ve Process



* Machining is Essential operation
  ⇓
  By Removing the unwanted Materail from the outer Surface of w/p
  ⇓
  In the form of chip



Aim of Machining 

* Fufill its Functional Requirement
* Improve its Performance
* Service Life Improved

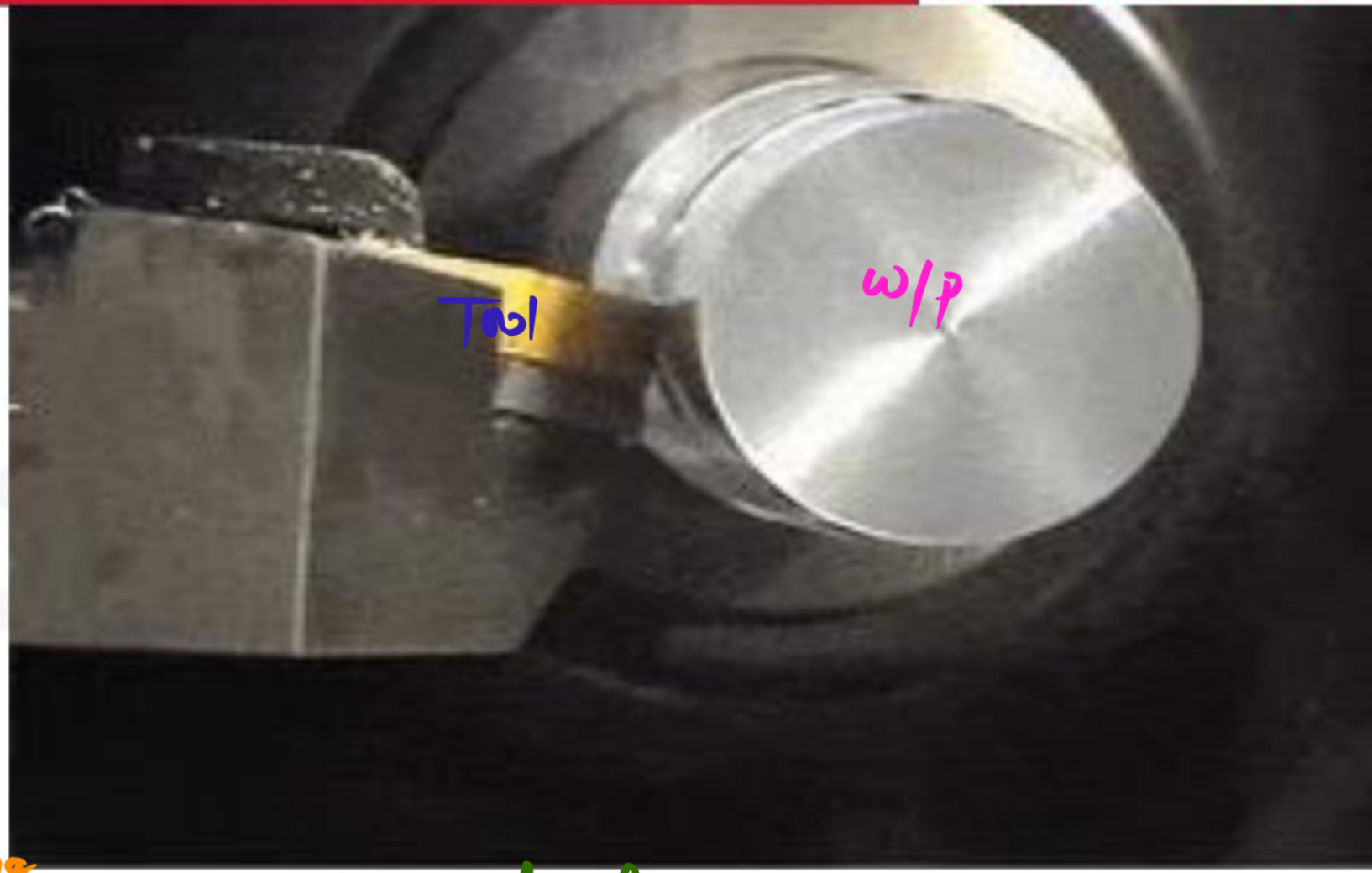
with the help of cutting tool which is move over the w/p surface.

Drawback → Loss of Material in the form of chip. 

1. Conventional Machining

* Tool comes contact with w/p.
* Tool must be 30 to 40% Harder than w/p.
* Tool wear
* Tool life Decreases

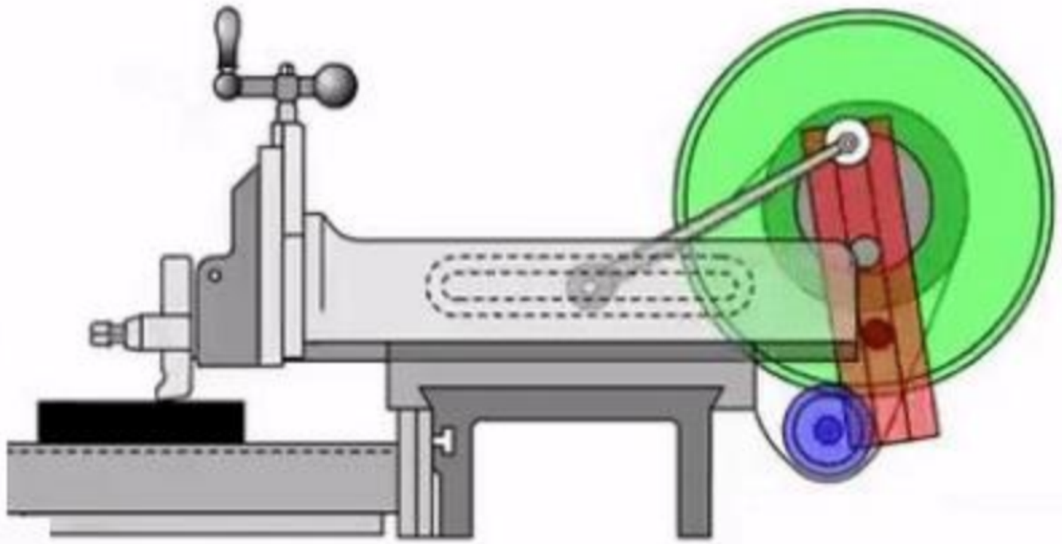
Ex:→ Turning, Drilling, Milling Shaping, Honning etc.



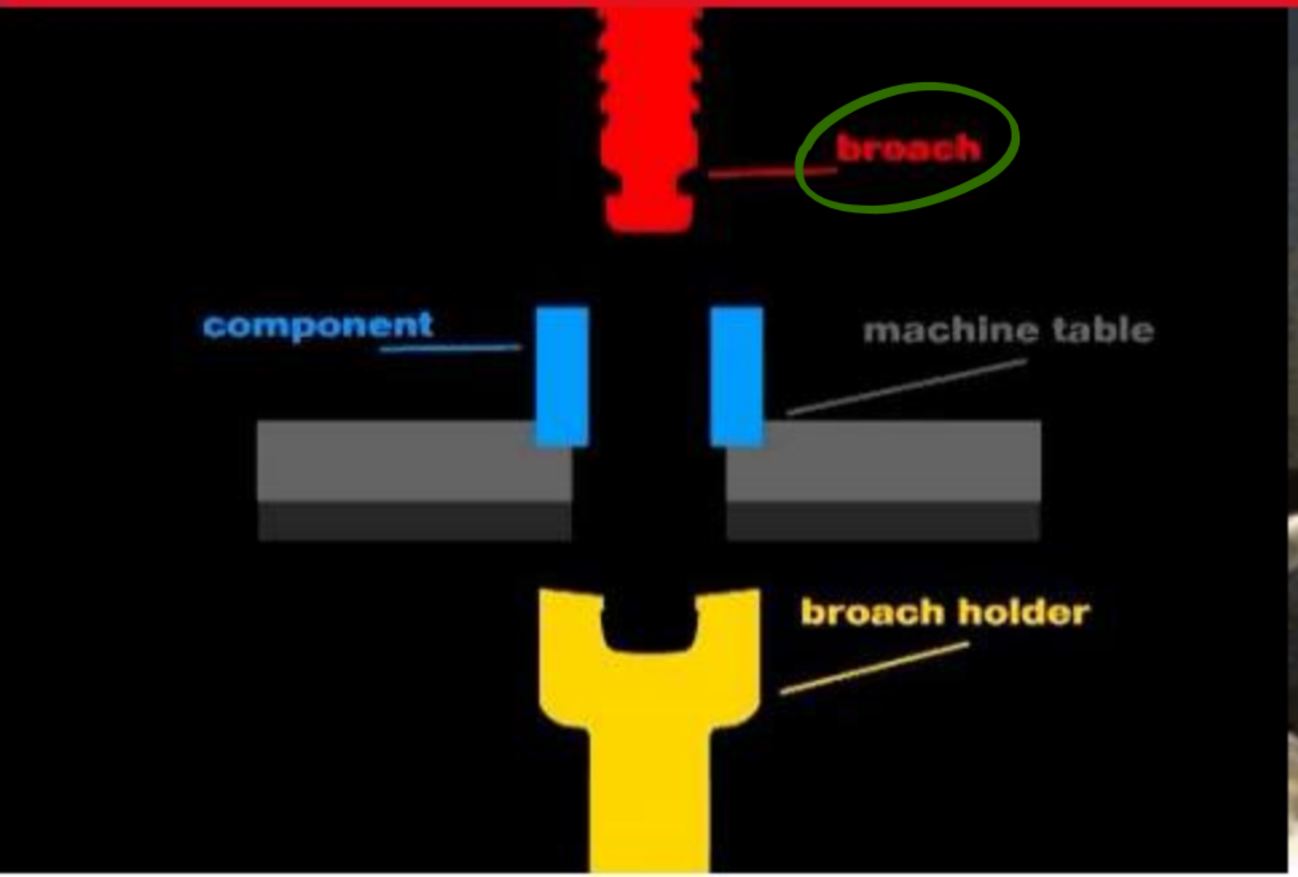
To Reduce the dia of Cylindrical w/p ⇒ (Turning)

* Rough surface finish obtained.

(Drilling)



(Shaper)



(Broaching)

⇓

Used for cutting Internal slots in fast manner.

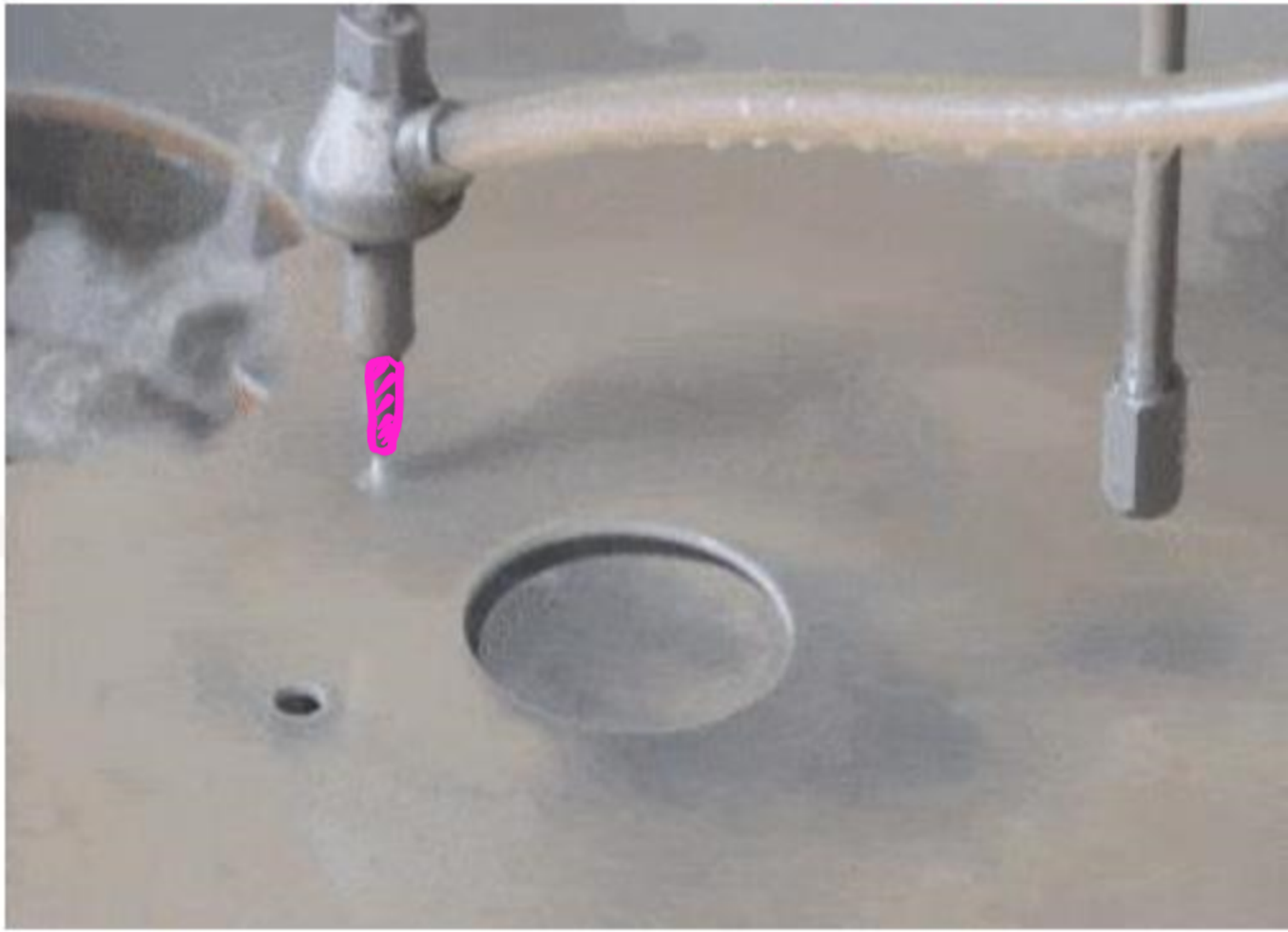
(Honning)

⇓

To finish the Internal cavity of cylindrical w/p.

2.Unconventional Machining

* w/p donot comes contact with Tool.
* There is no need for Harder of Tool then w/p.
* Tool wear Negligible
* Tool life will be Excellent
* This Machining is costly.
* Excellent Surface finish.



Ex:→ * AJM * ECM * USM * PAM * WJM * EDM * EBM

Machining

Conventional

* Turning
* Drilling/Boring/Reaming
* Milling
* Shaper/Planner/Slotter
* Honning
* Grinding

Unconventional

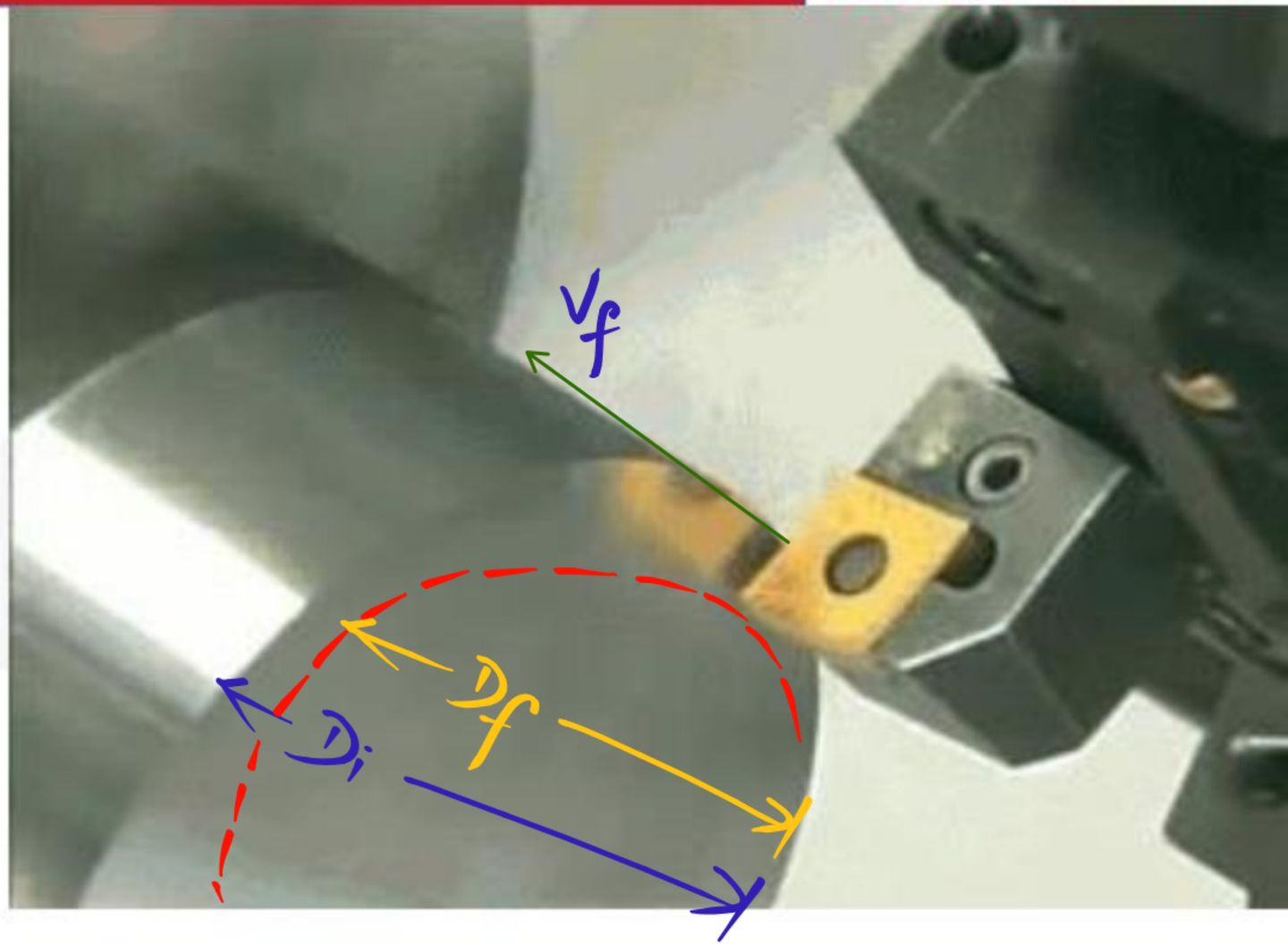
* AJM
* WJM
* ECM
* EDM
* E&M
* PAM
* USM

Turning operation

⇓

Reduce the diameter of cylindrical w/p.

* Speed
* Feed
* Depth of cut
* Cutting Time



* $D_i \rightarrow$ Initial dia before Turning
* $D_f \rightarrow$ Final dia After Turning

* $D_i > D_f$

Speed

* $V = R\omega$
* $V = \frac{D}{2} \times \frac{2\pi N}{60}$
* $V = \frac{\pi DN}{60}$ (D in m) $\quad m/s$
* $V = \pi DN$ (D in m) $\quad m/min$

* $V = \frac{\pi DN}{1000}$ (D in mm) $\quad m/min$
* $V = \frac{\pi DN}{1000 \times 60}$ (D in mm) $\quad m/sec$

Feed (f)

* f → mm/rev

Feed velocity (V_f)

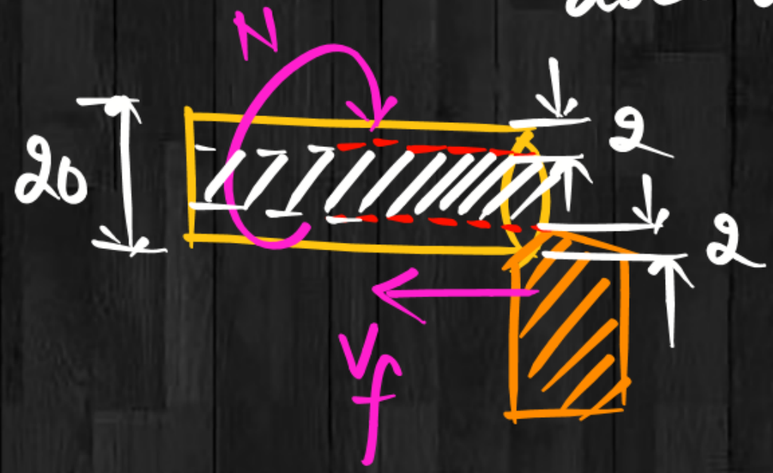
$$V_f = f \times N \quad \text{mm/min}$$

mm/rev , rev/min

* Di ⇒ 20 mm

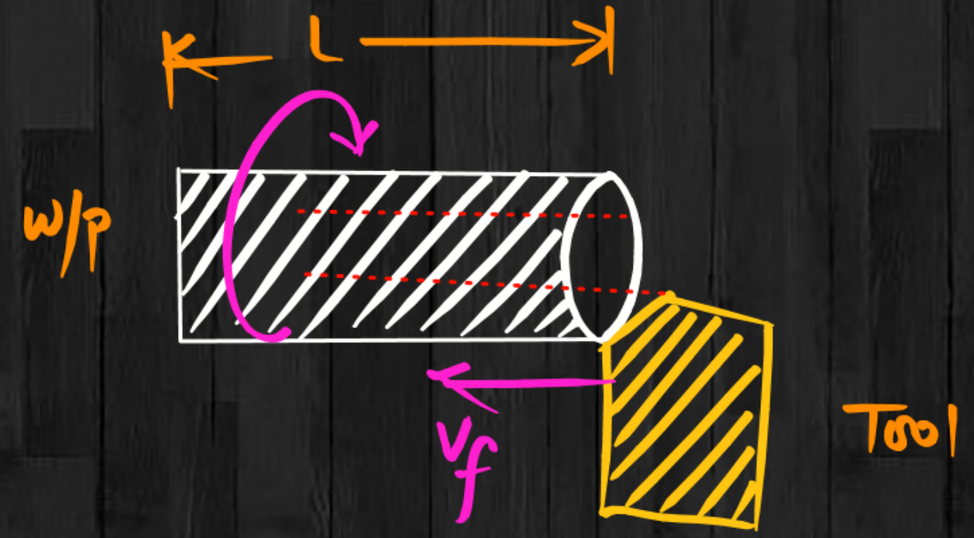
Df = 16 mm

doc = 2 mm



Depth of cut

$$* \text{DOF} = \frac{D_i - D_f}{2}$$



Cutting Time (t)

$$* t = \frac{L}{V_f}$$

L → mm

V_f → mm/min

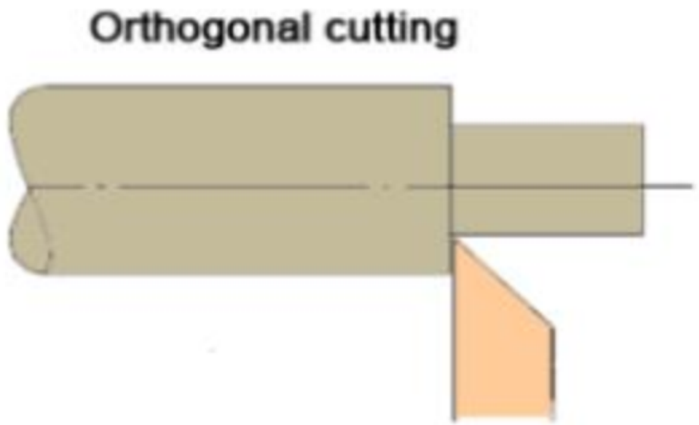
, min

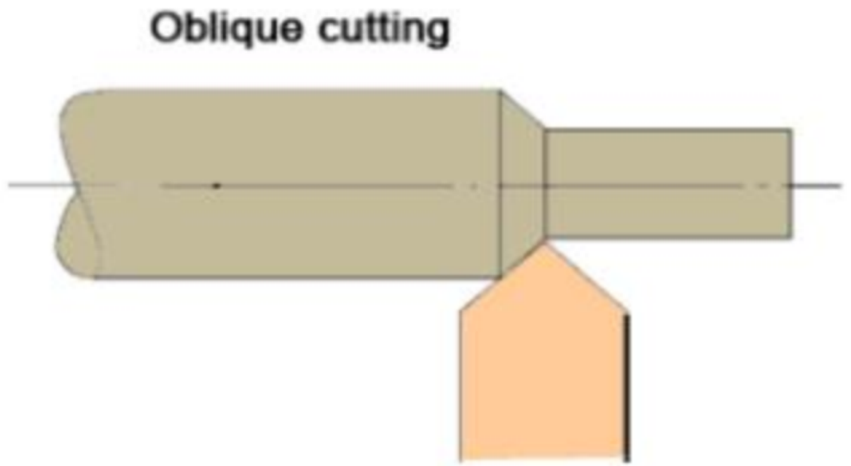
$$* t = \frac{L}{f \times N}$$

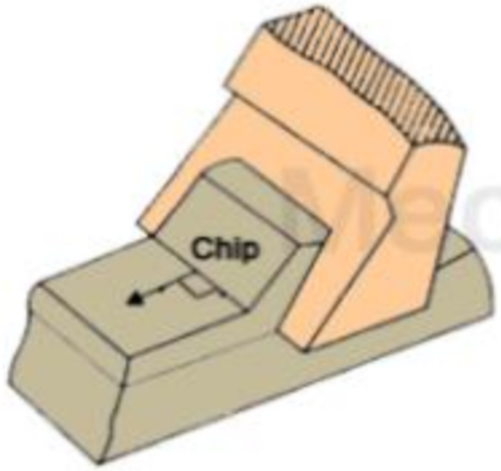
Machining

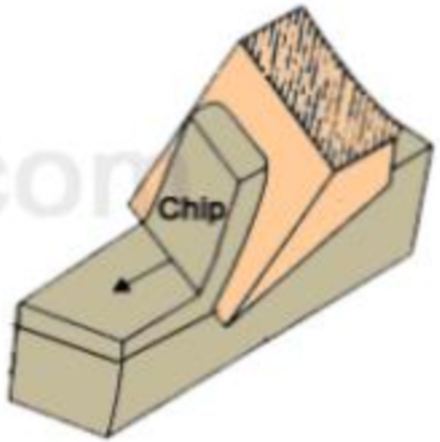
1.Ortogonal Machining

2. Oblique Machining

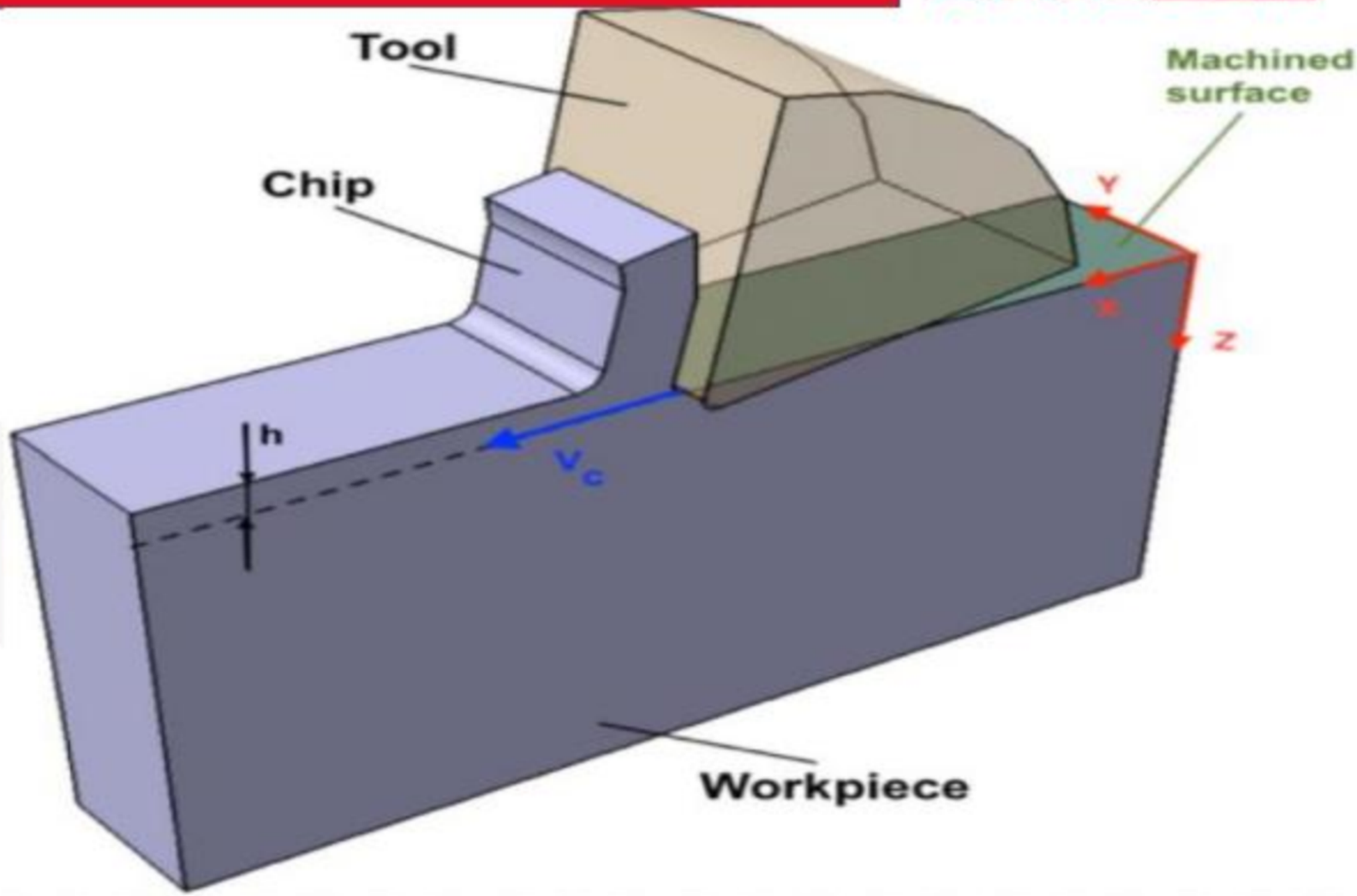


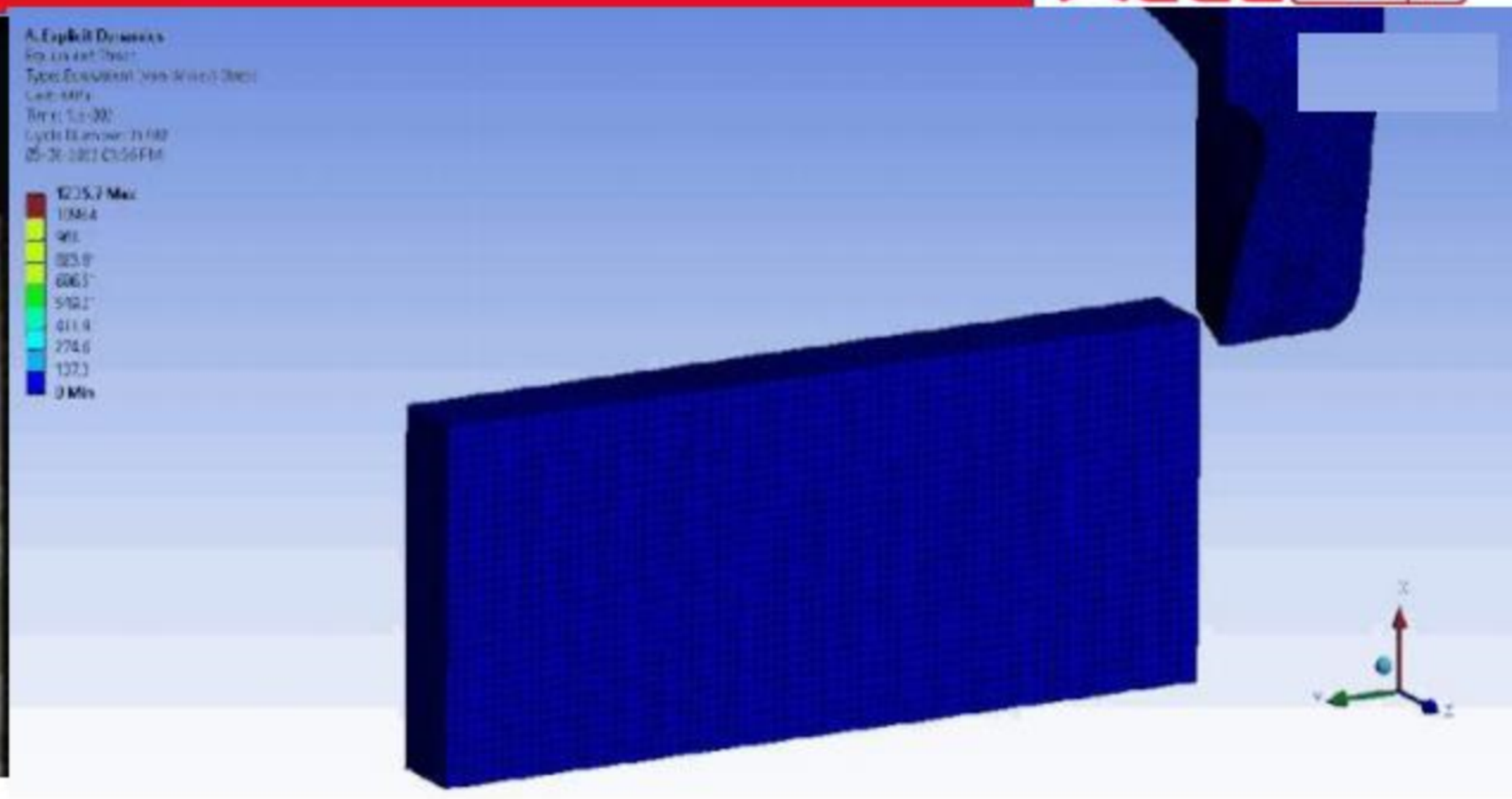


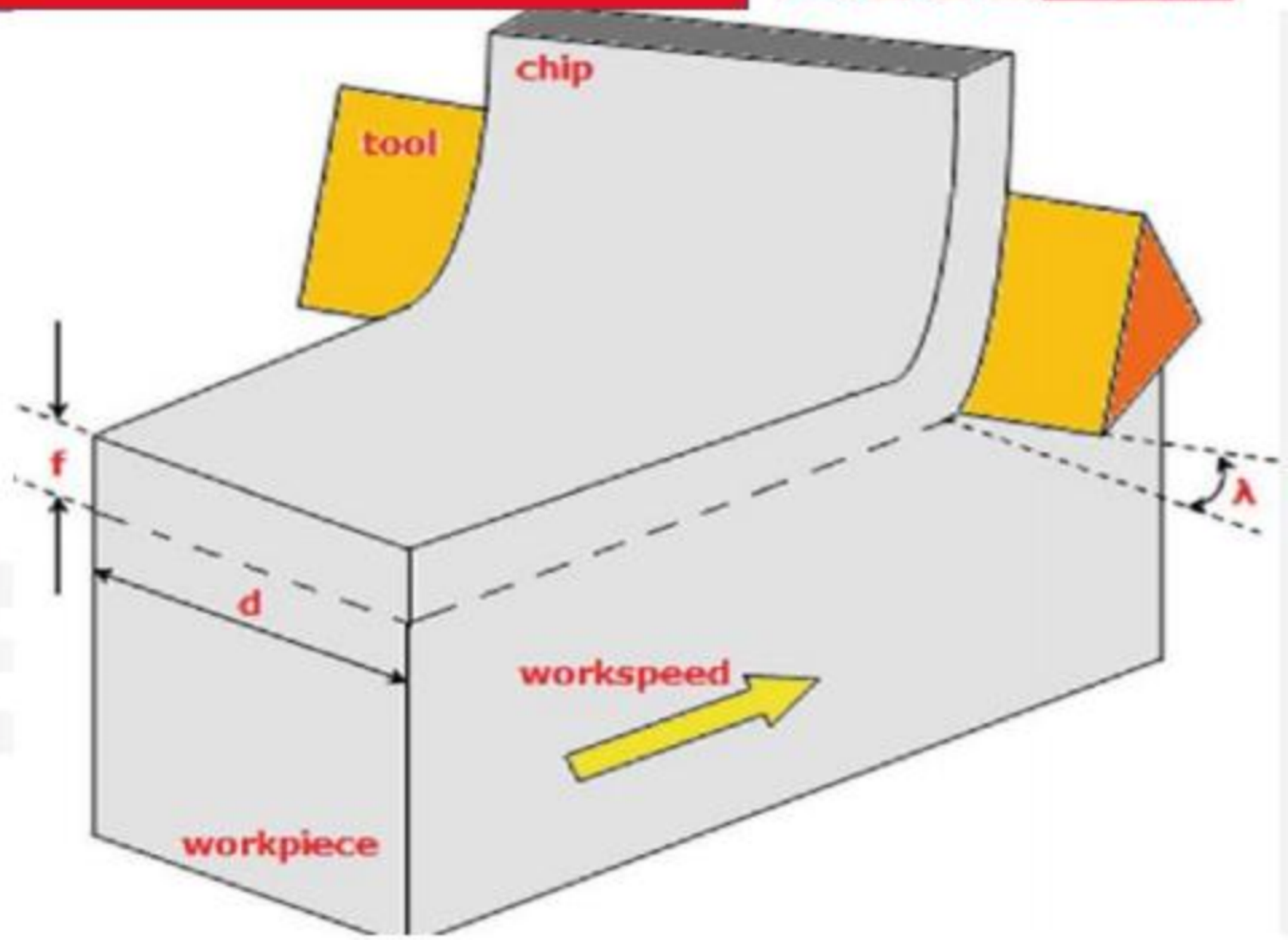




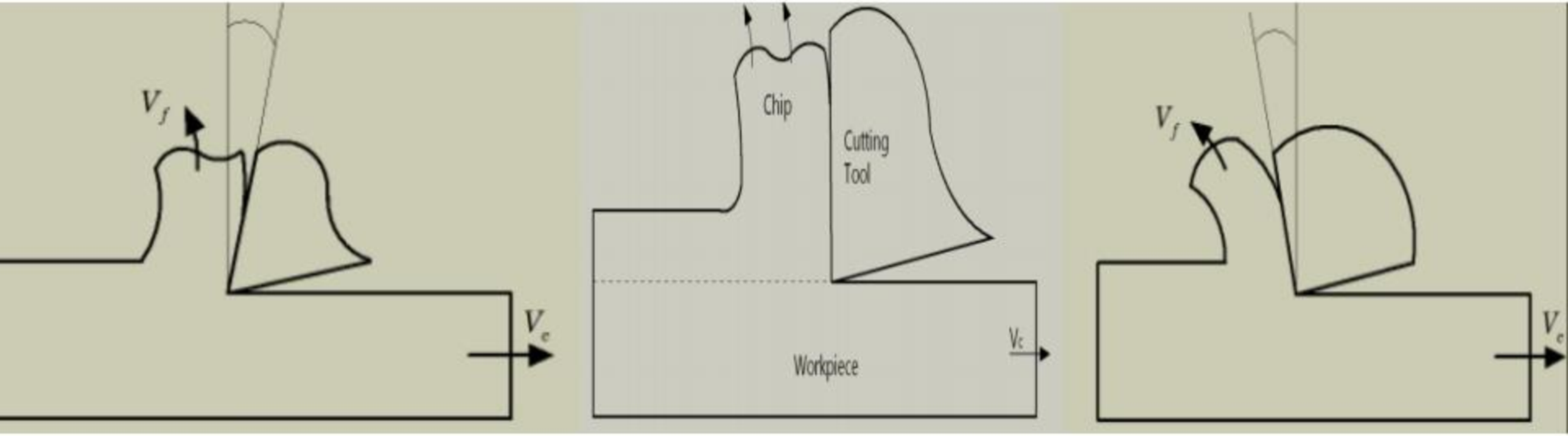
Orthogonal Machining







Discussion on Rake Angle



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