
TA202A - Manufacturing Processes II

Machining Processes and Machines

Lecture 3

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Machines and machining processes

- Machine is a mechanism or a collection of mechanisms which performs useful mechanical work. For us, that useful mechanical work would have been used to make parts used in your projects.
- Broadly, the two types on machines that concern us in this course: manual machines and CNC machines.
- This lecture will discuss manual and CNC machines and the processes possible on them.

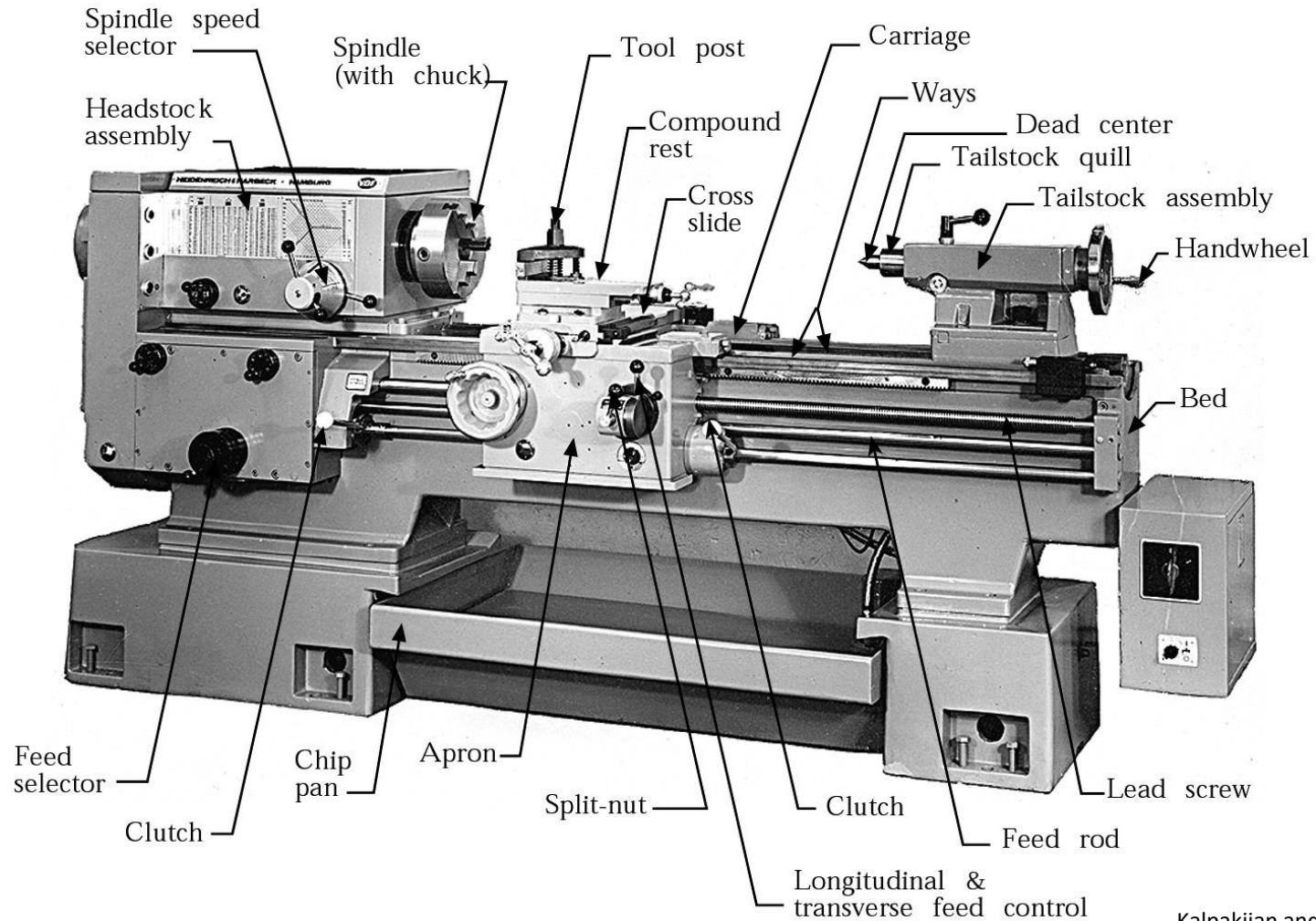


Structure of this lecture – part on manual machines

- Lathe machines
- Drilling machines
- Milling machines



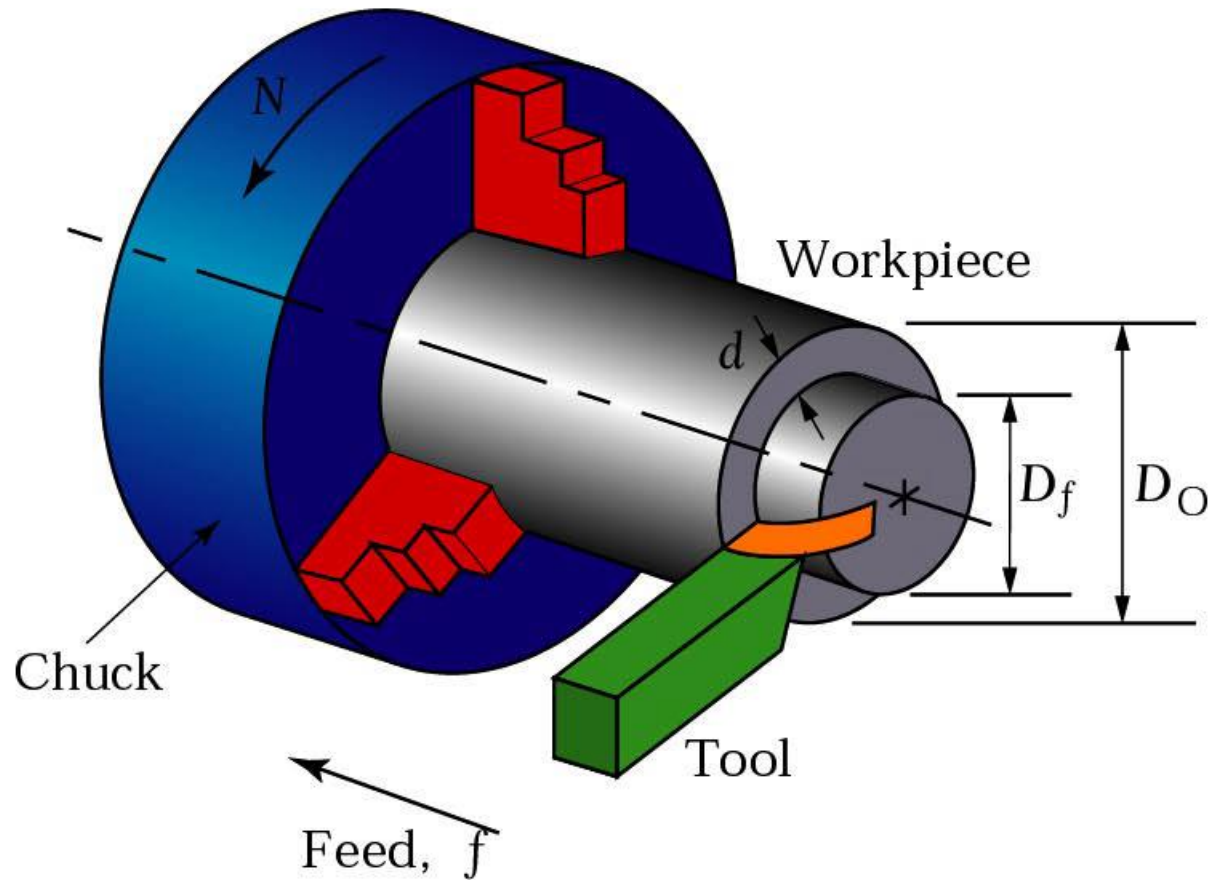
Lathe machine



Kalpakjian and Schmid's book



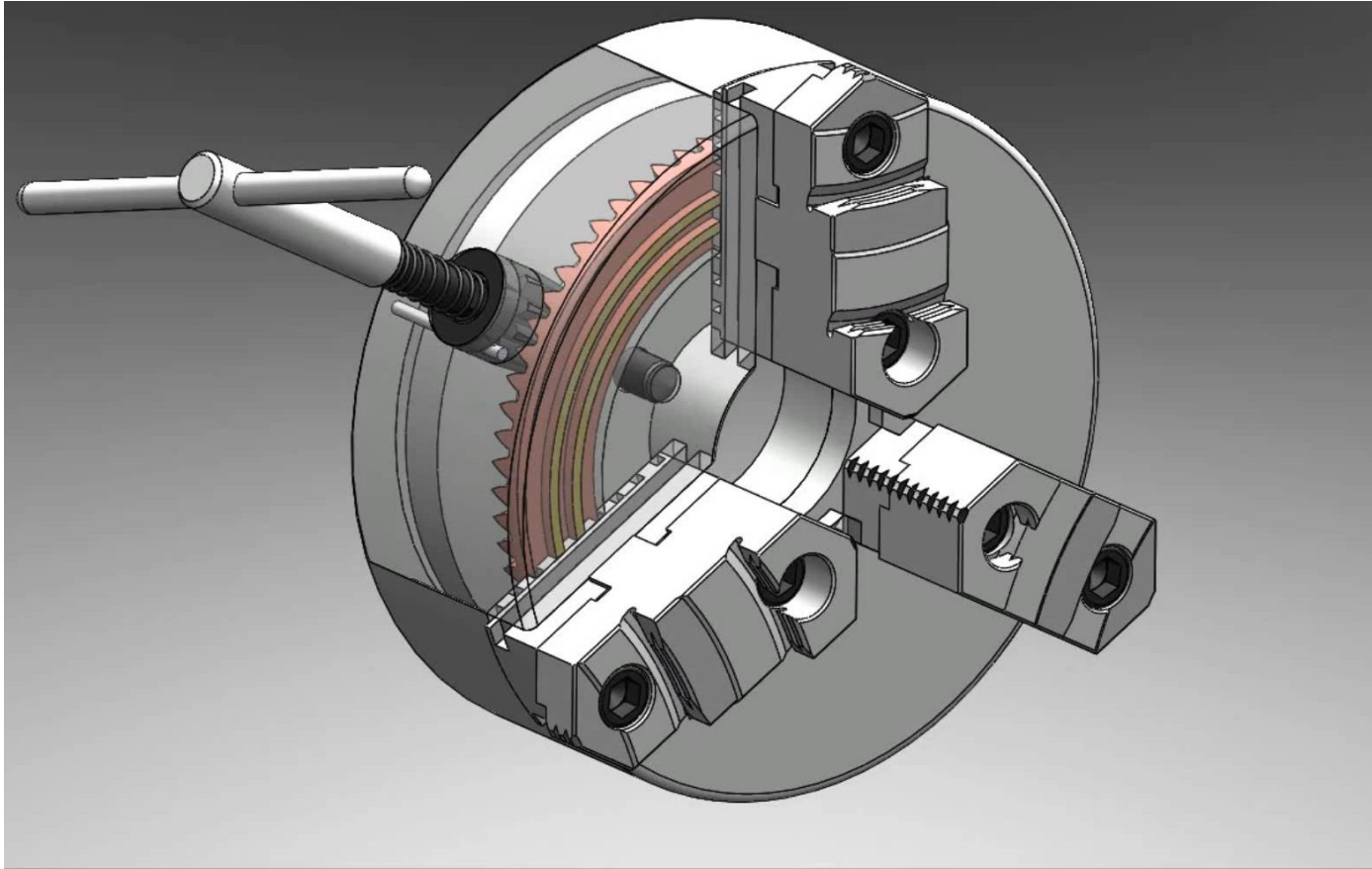
Turning on a lathe



Kalpakjian and Schmid's book



Holding the part in the lathe – three jaw chuck (self-centring)



<https://www.youtube.com/watch?v=4oWhO2z6lhs>



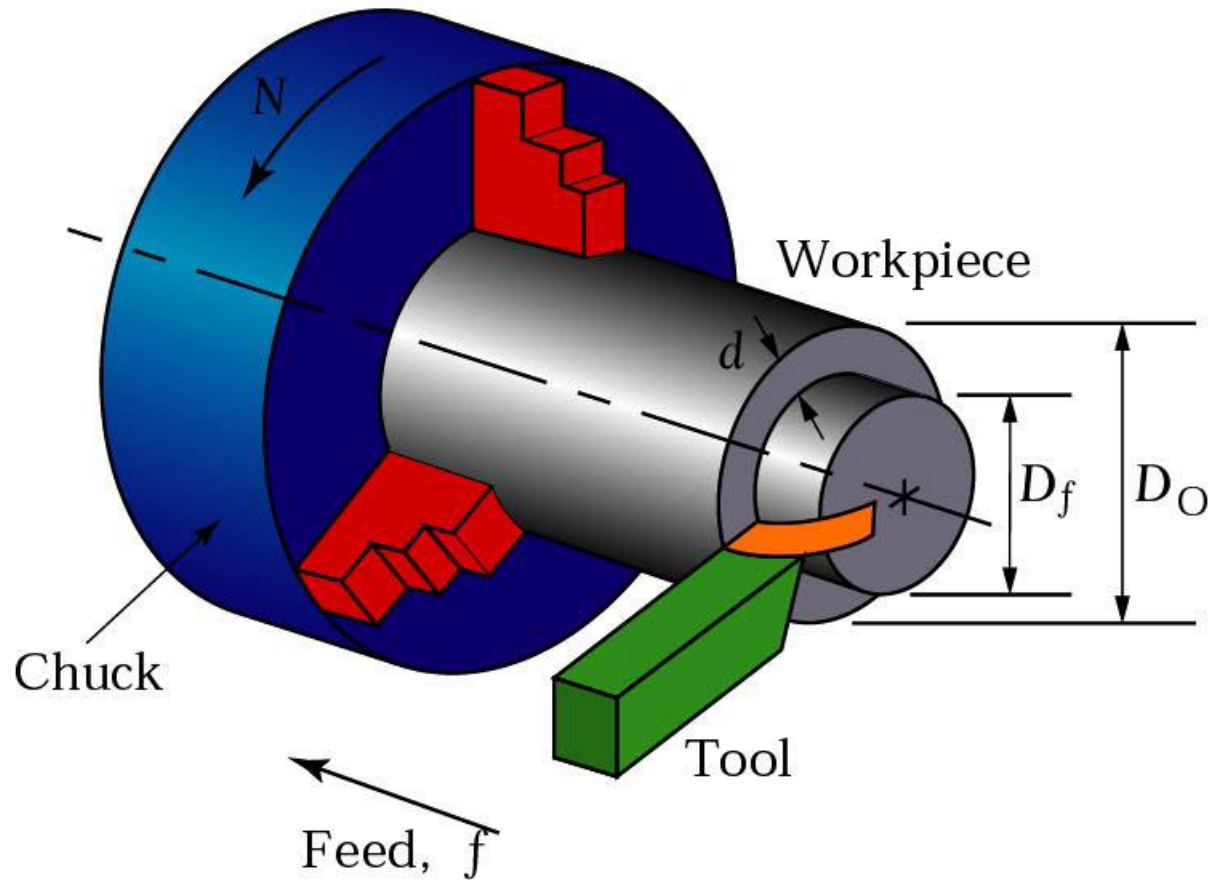
Holding the part in the lathe



https://www.youtube.com/watch?v=LmpUUq1o_v0



Turning on a lathe

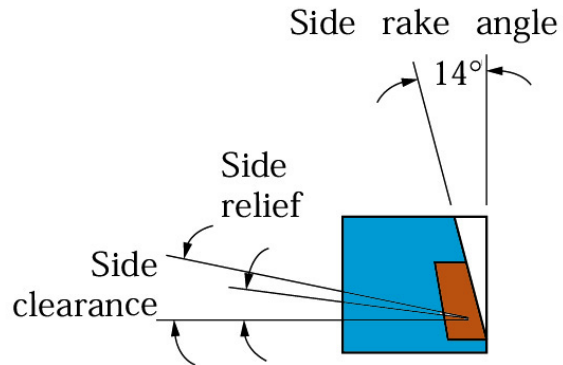


Kalpakjian and Schmid's book

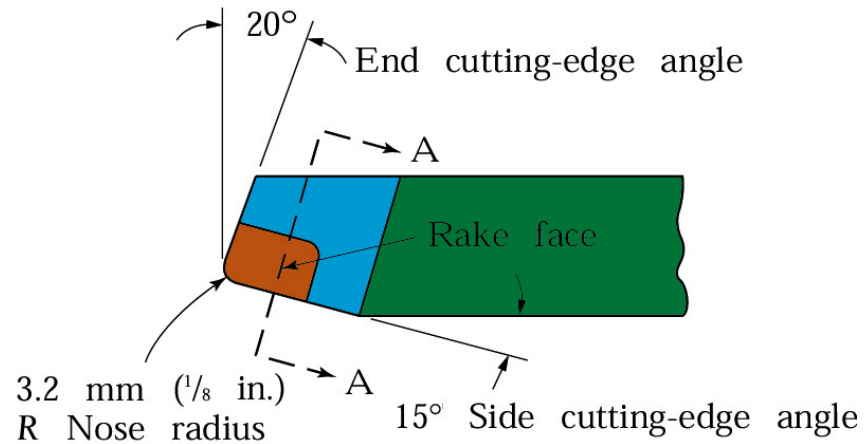


Geometry of the tool

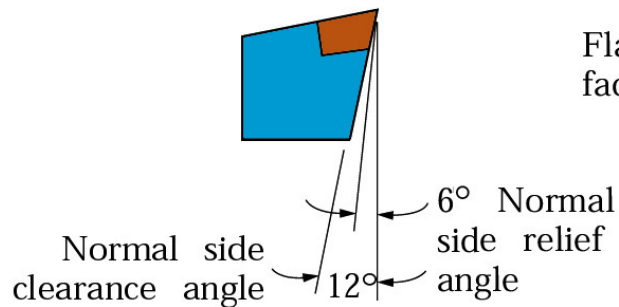
End view



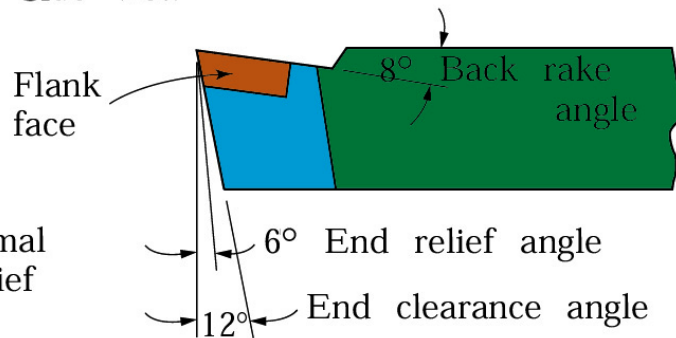
Top view



End section A-A



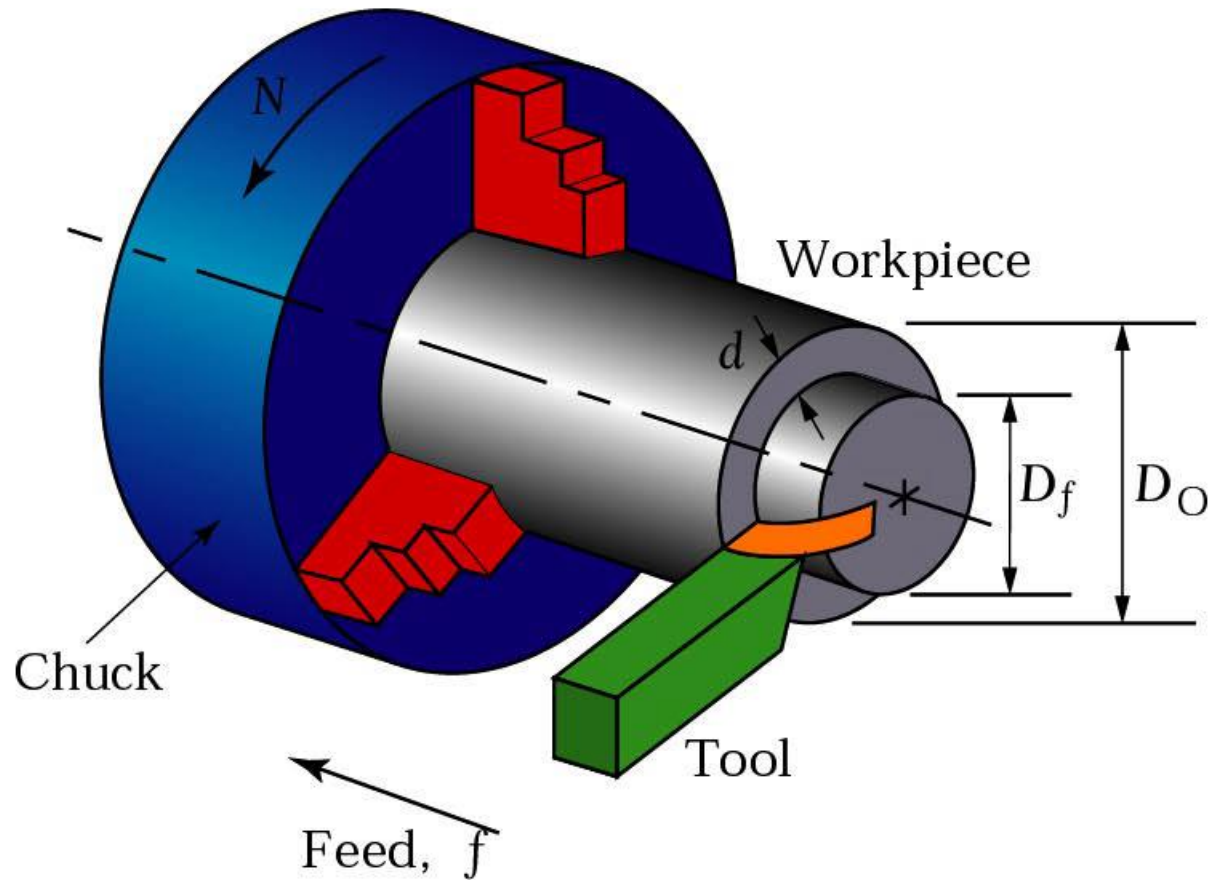
Side view



Kalpakjian and Schmid's book



Turning on a lathe

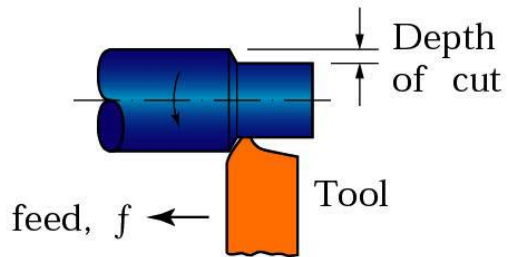


Kalpakjian and Schmid's book

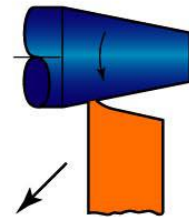


Possible operations on a lathe machine (1/2)

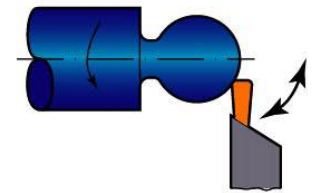
(a) Straight turning



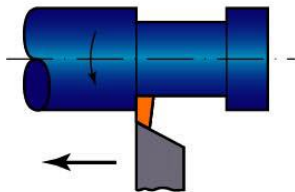
(b) Taper turning



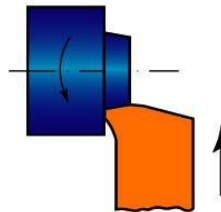
(c) Profiling



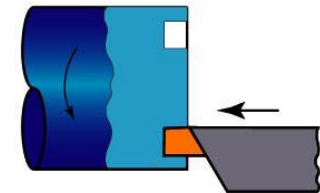
(d) Turning and external grooving



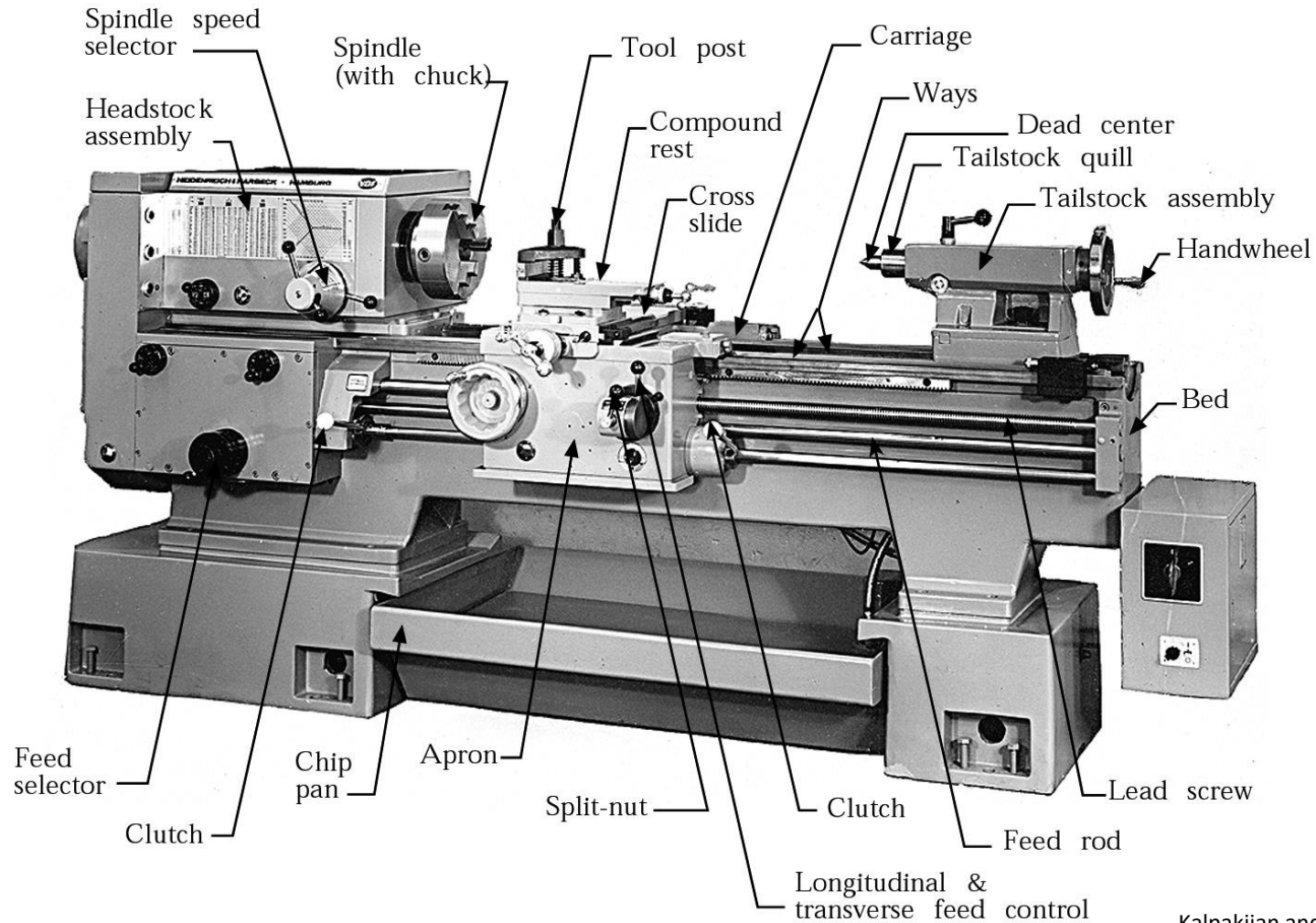
(e) Facing



(f) Face grooving



Lathe machine

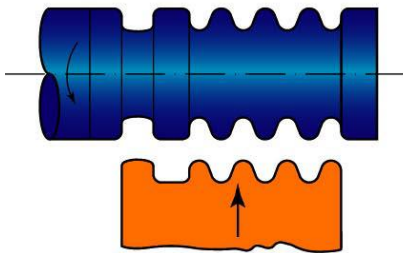


Kalpakjian and Schmid's book

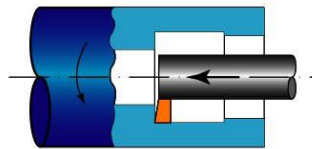


Possible operations on a lathe machine (2/2)

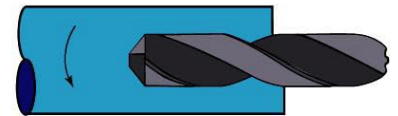
(g) Cutting with a form tool



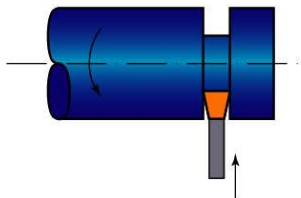
(h) Boring and internal grooving



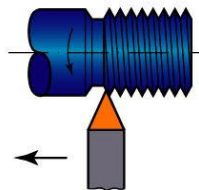
(i) Drilling



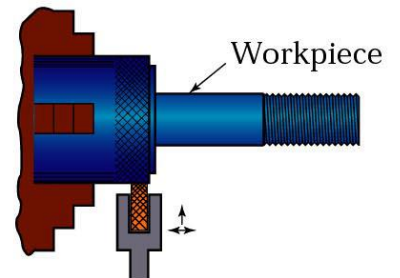
(j) Cutting off



(k) Threading



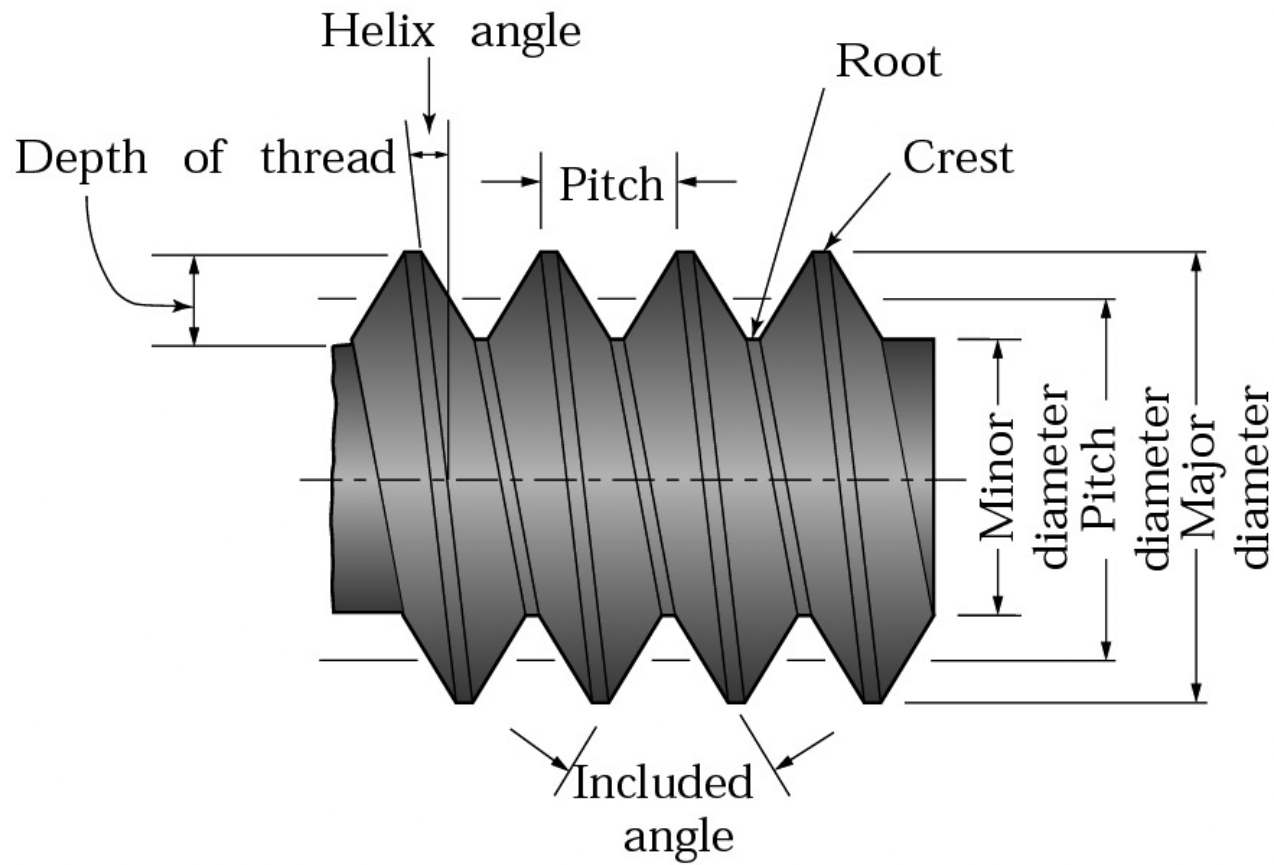
(l) Knurling



Kalpakjian and Schmid's book



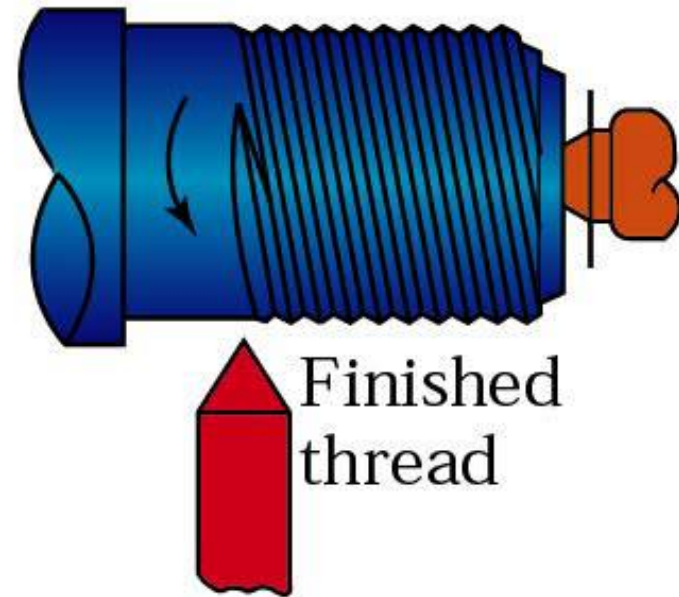
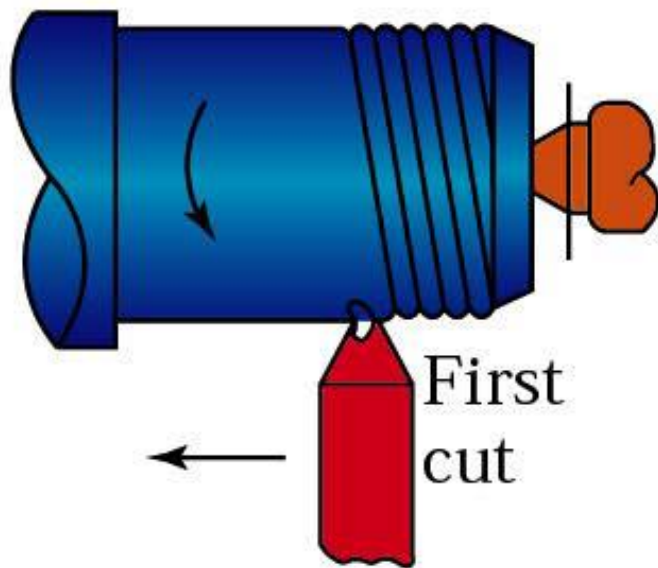
Making threads



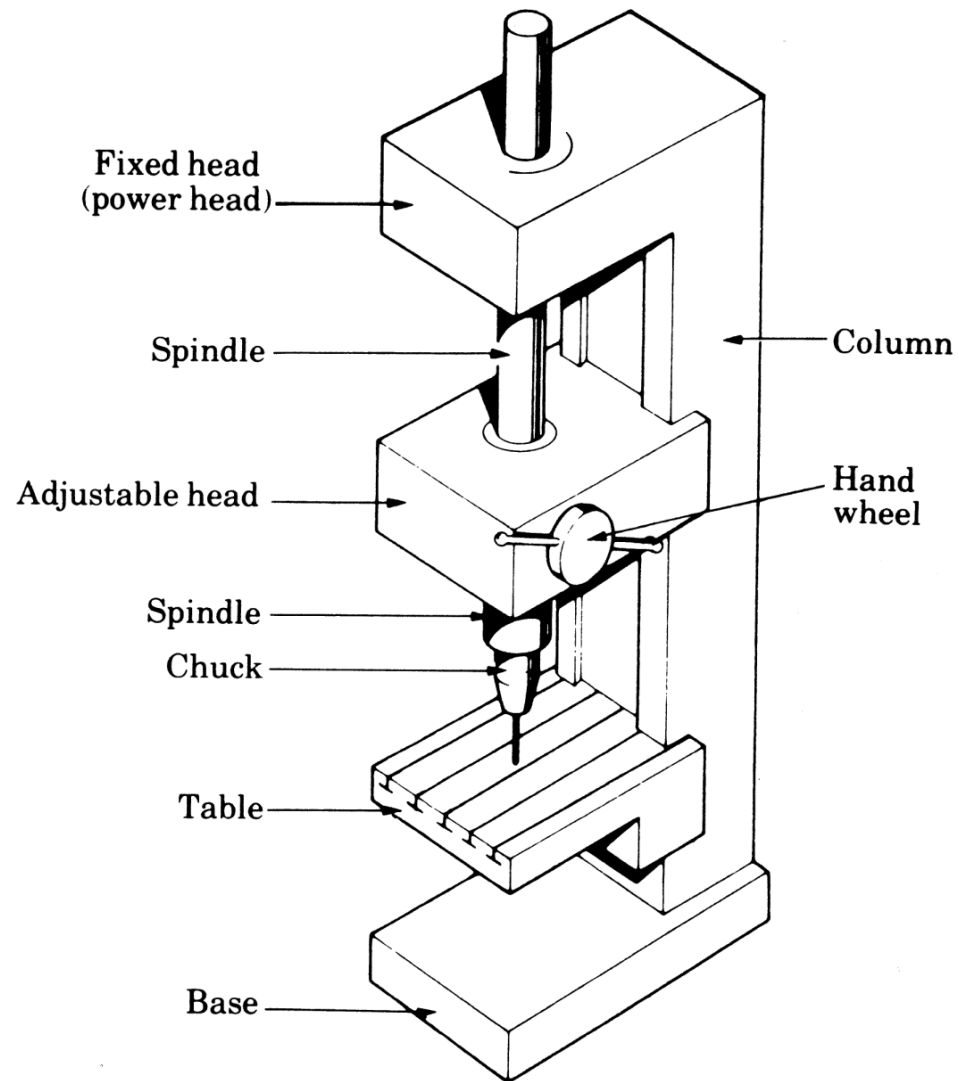
Kalpakjian and Schmid's book



Making threads



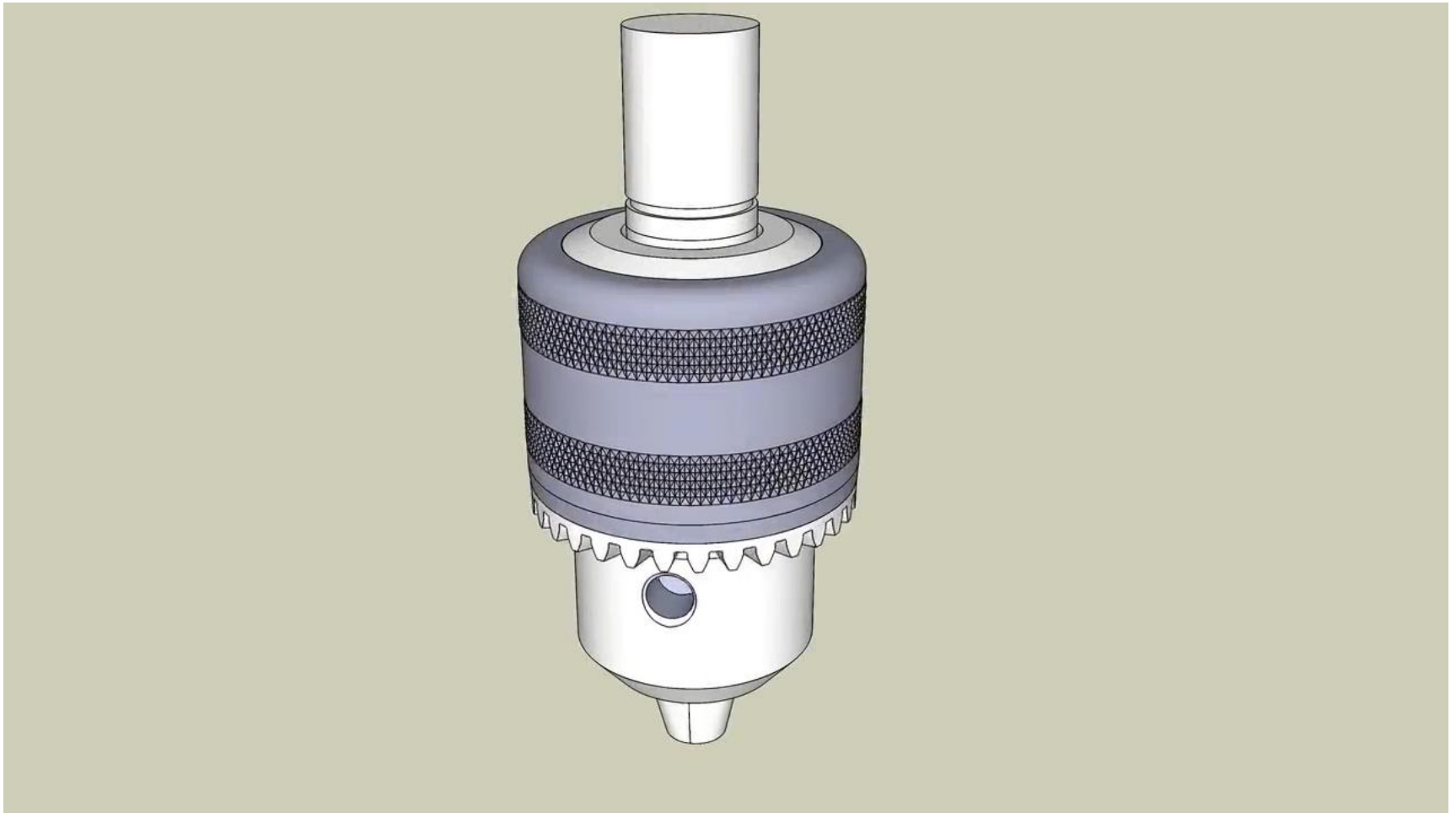
Drilling machine



Kalpakjian and Schmid's book



Holding the drill bit in chuck

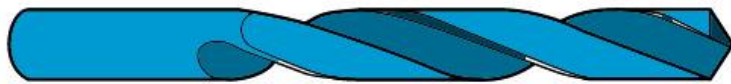


<https://www.youtube.com/watch?v=mZj059q4Wm8>



Types of drill bits

(a) Twist drill



(b) Step drill



(c) Straight-flute drill



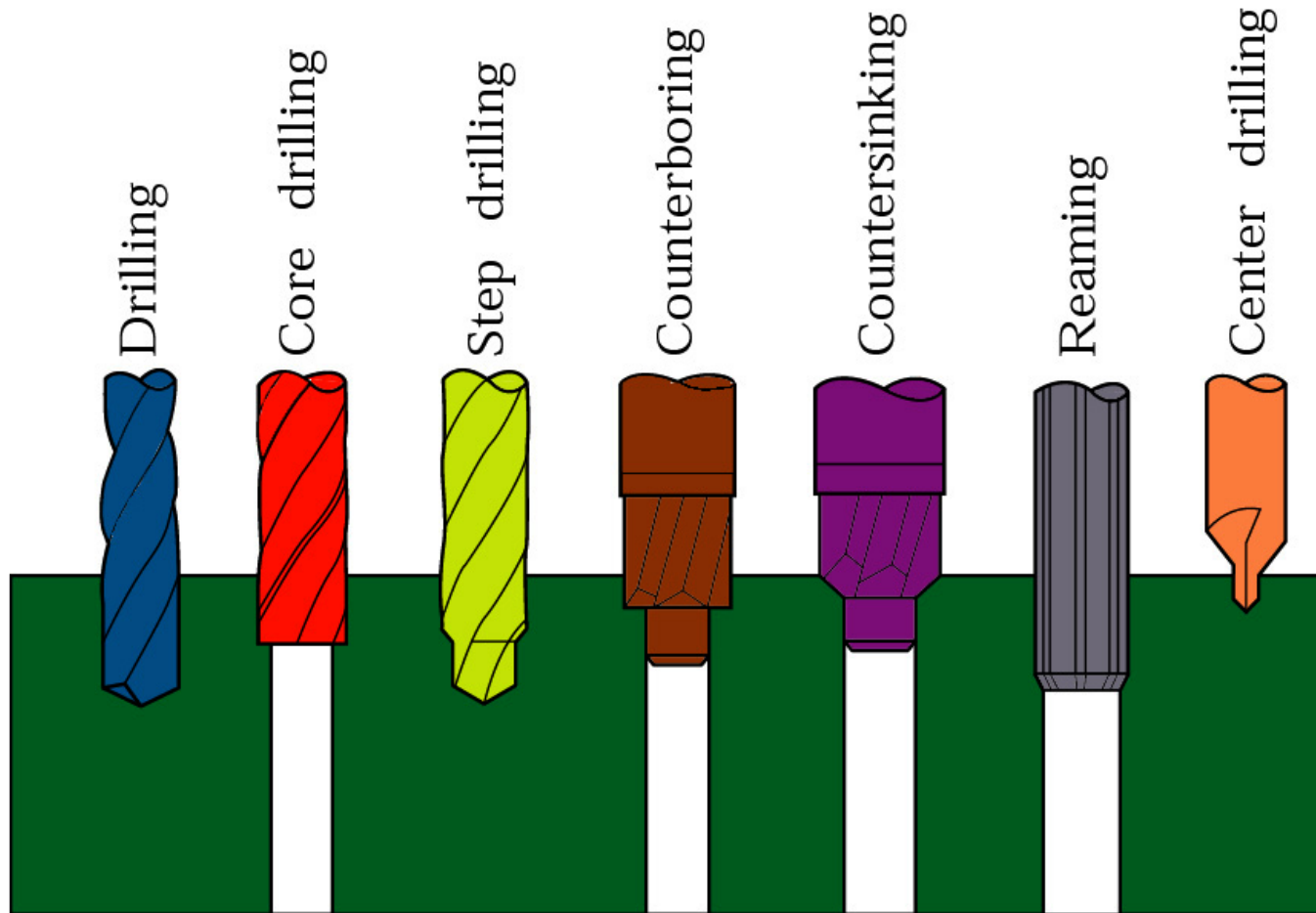
(d) Spade drill



(e) Gun drill



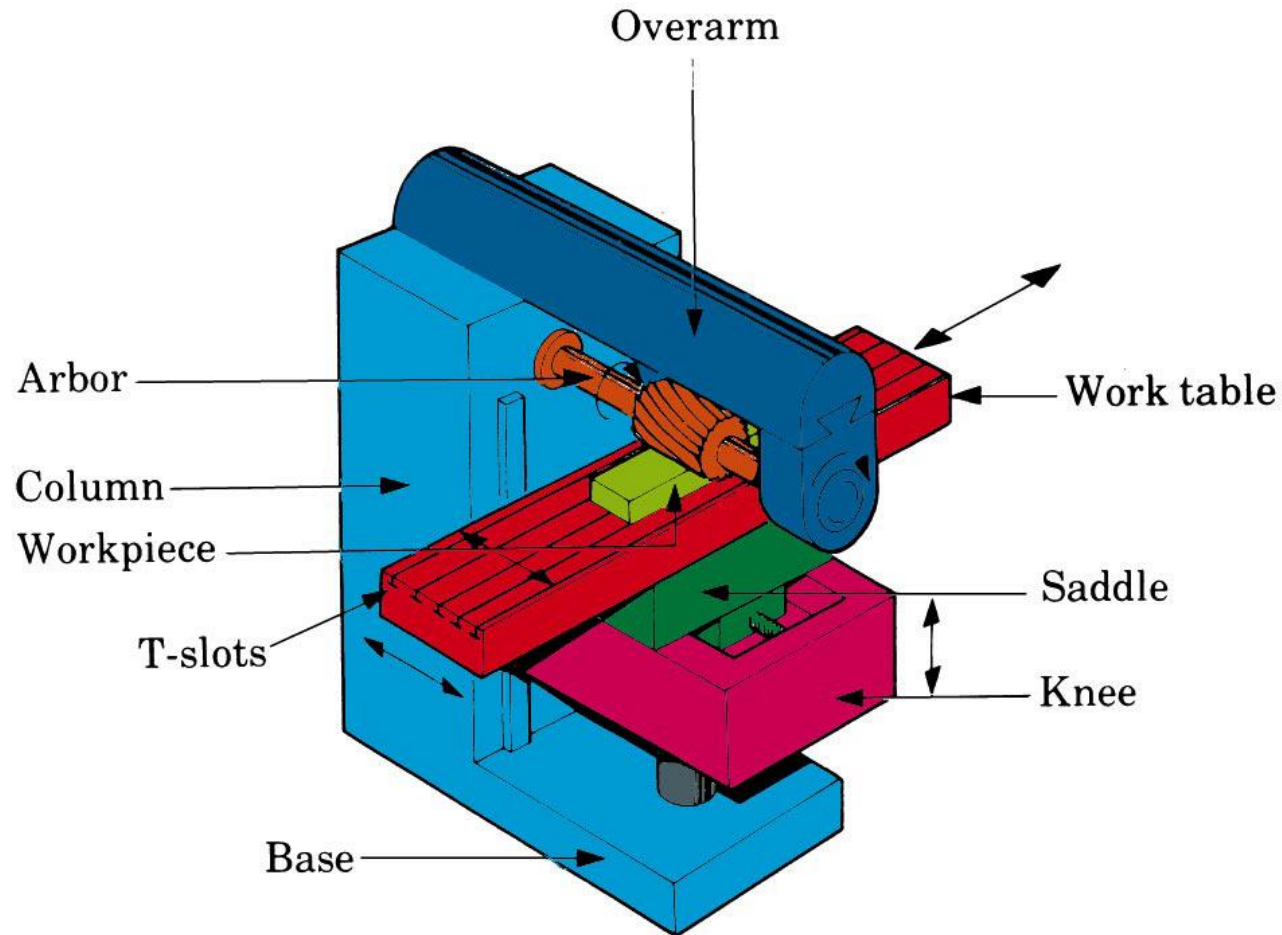
Machining operations on a drill machine



Kalpakjian and Schmid's book



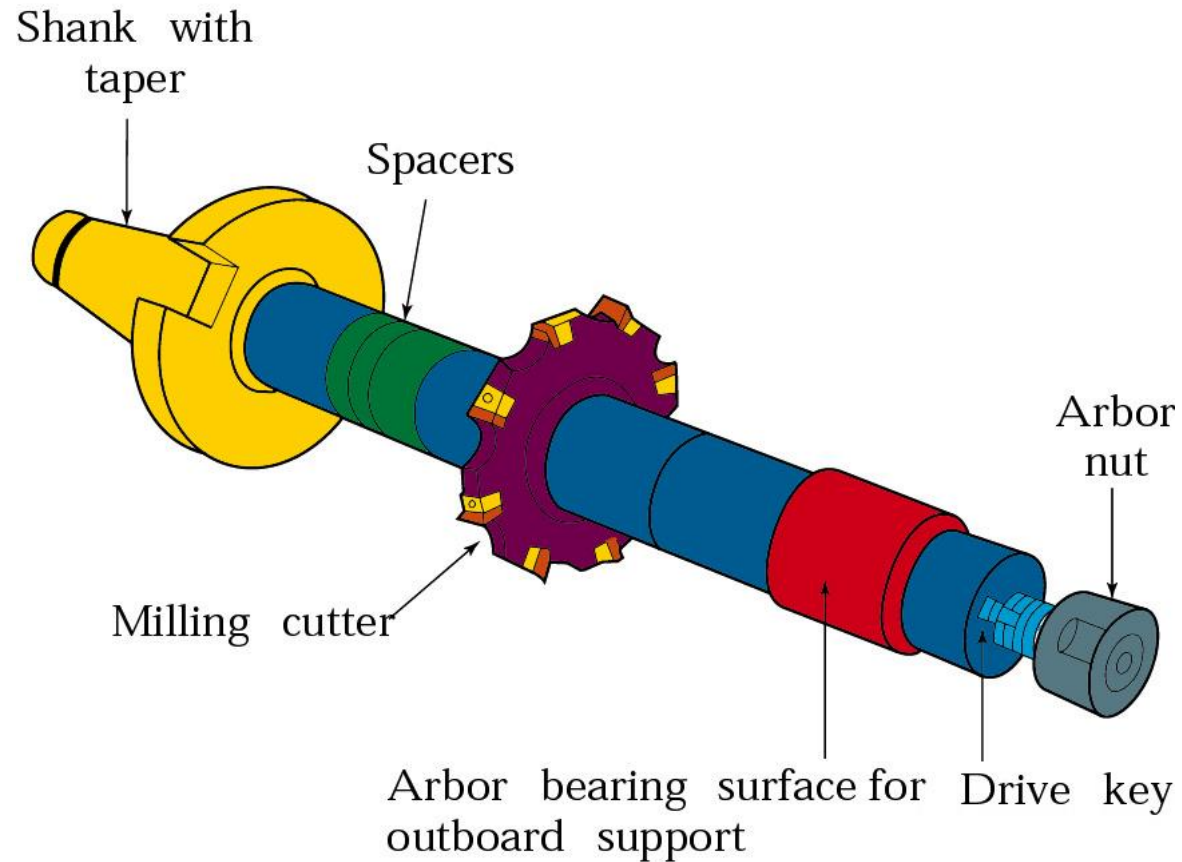
Column and knee type milling machine (horizontal)



Kalpakjian and Schmid's book



Milling arbor

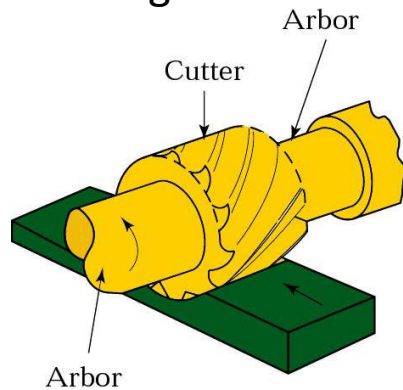


Kalpakjian and Schmid's book

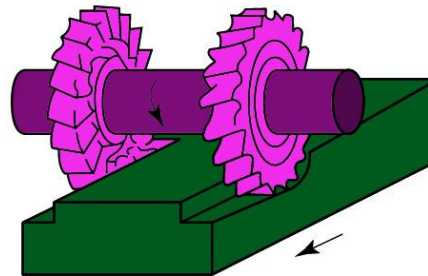


Milling operations on a horizontal mill

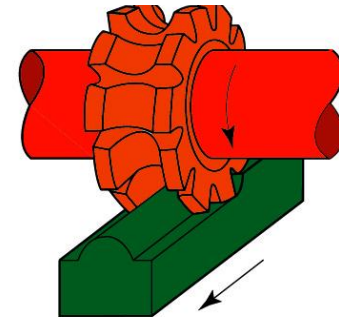
Slab milling



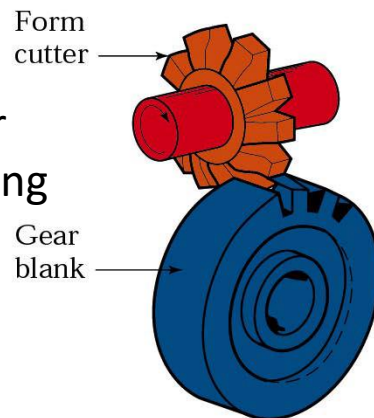
Straddle milling



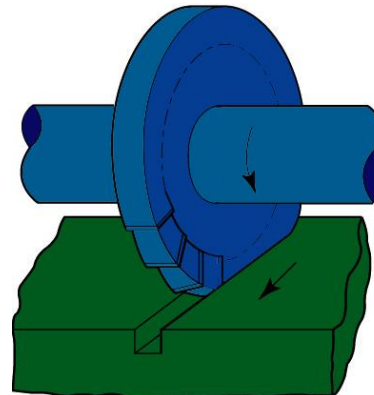
Form milling



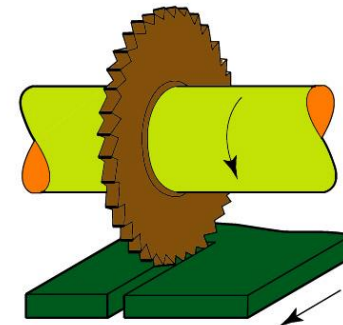
Gear cutting



Slot milling



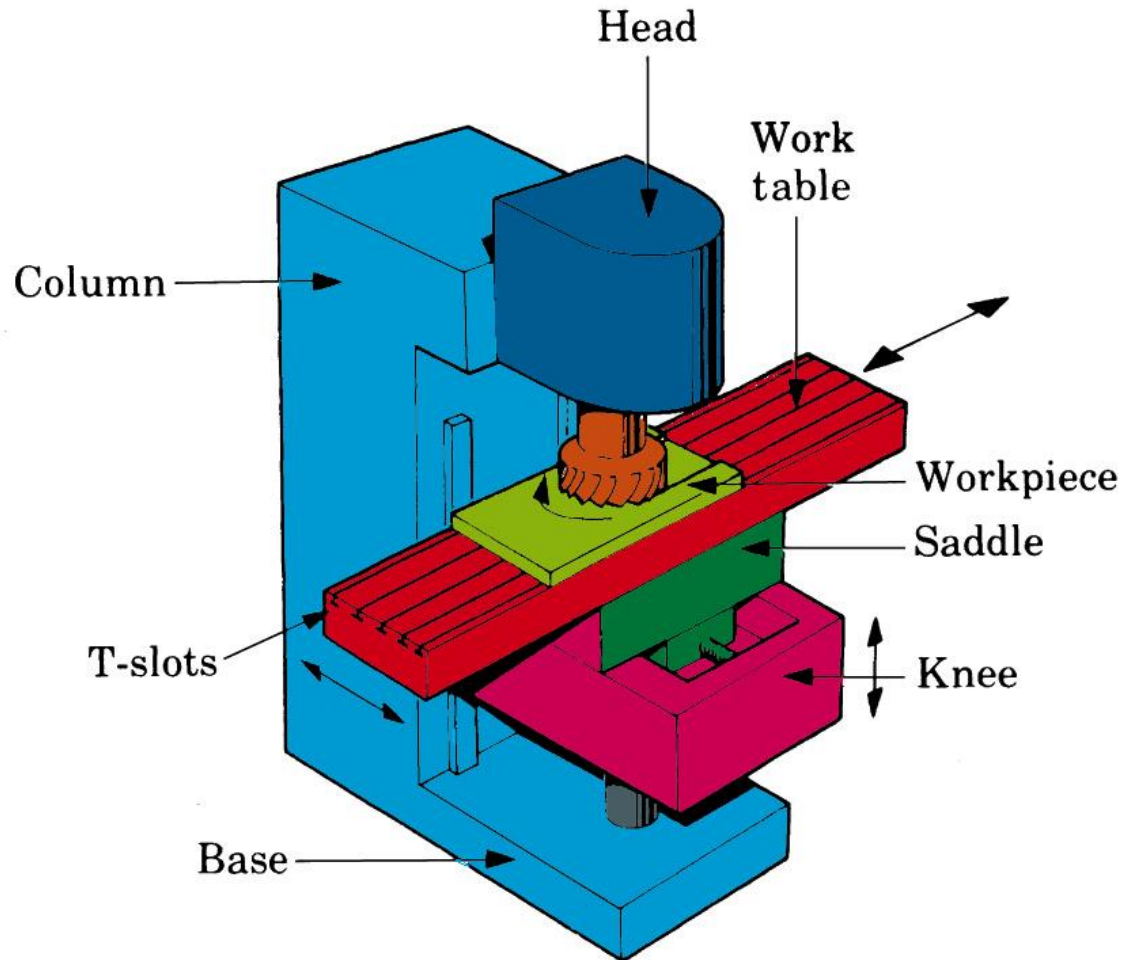
Slitting



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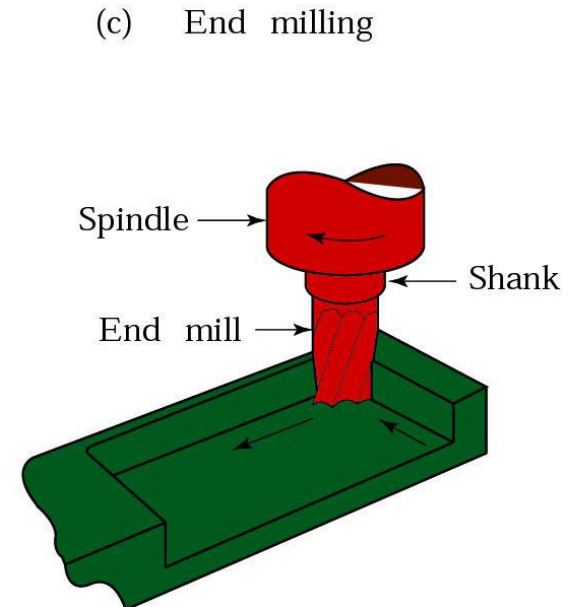
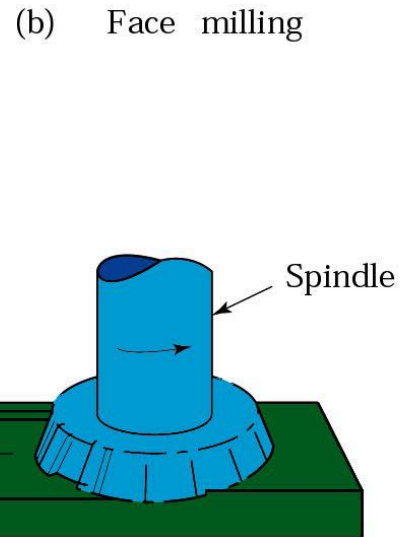
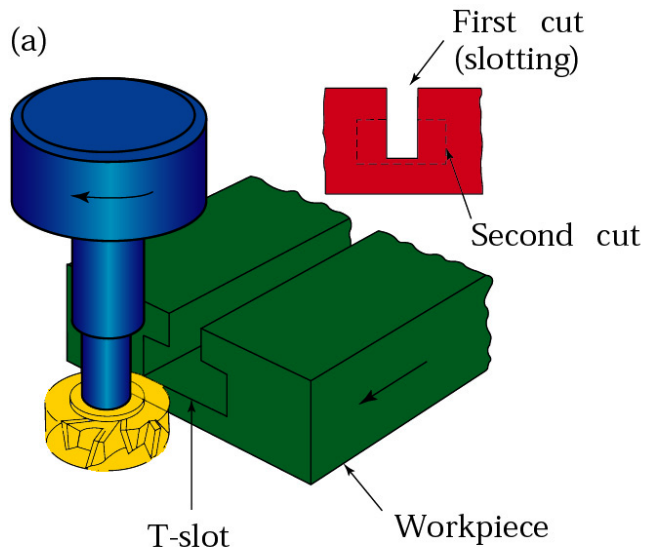
Column and knee type milling machine (vertical)



Kalpakjian and Schmid's book



Milling operations on a vertical mill



And many more ...

Kalpakjian and Schmid's book

