15-394 Intermediate Rapid Prototyping

Gears and Linkages

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Types of Gears

Spur Gears

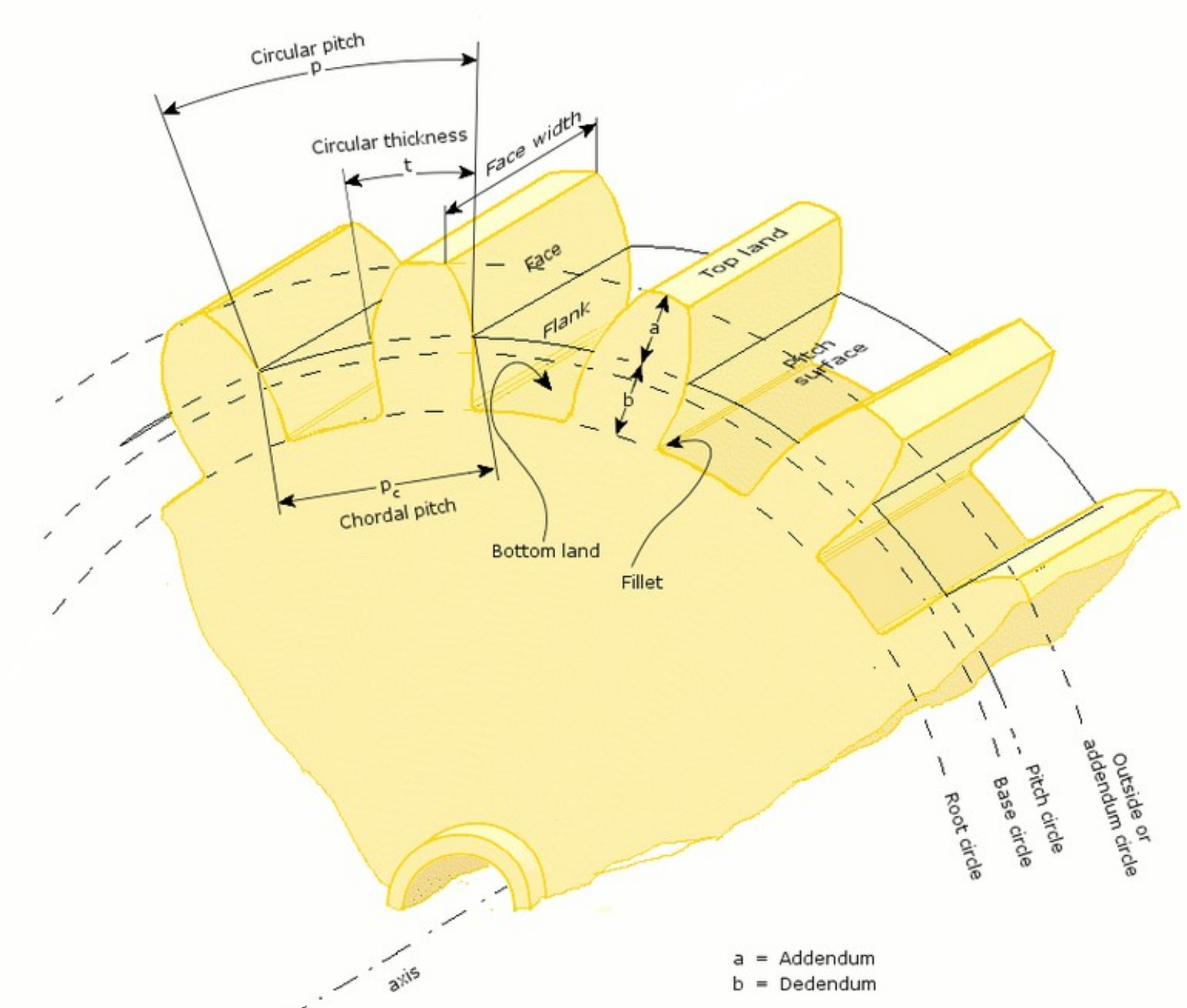
Crown Gear

Bevel Gears

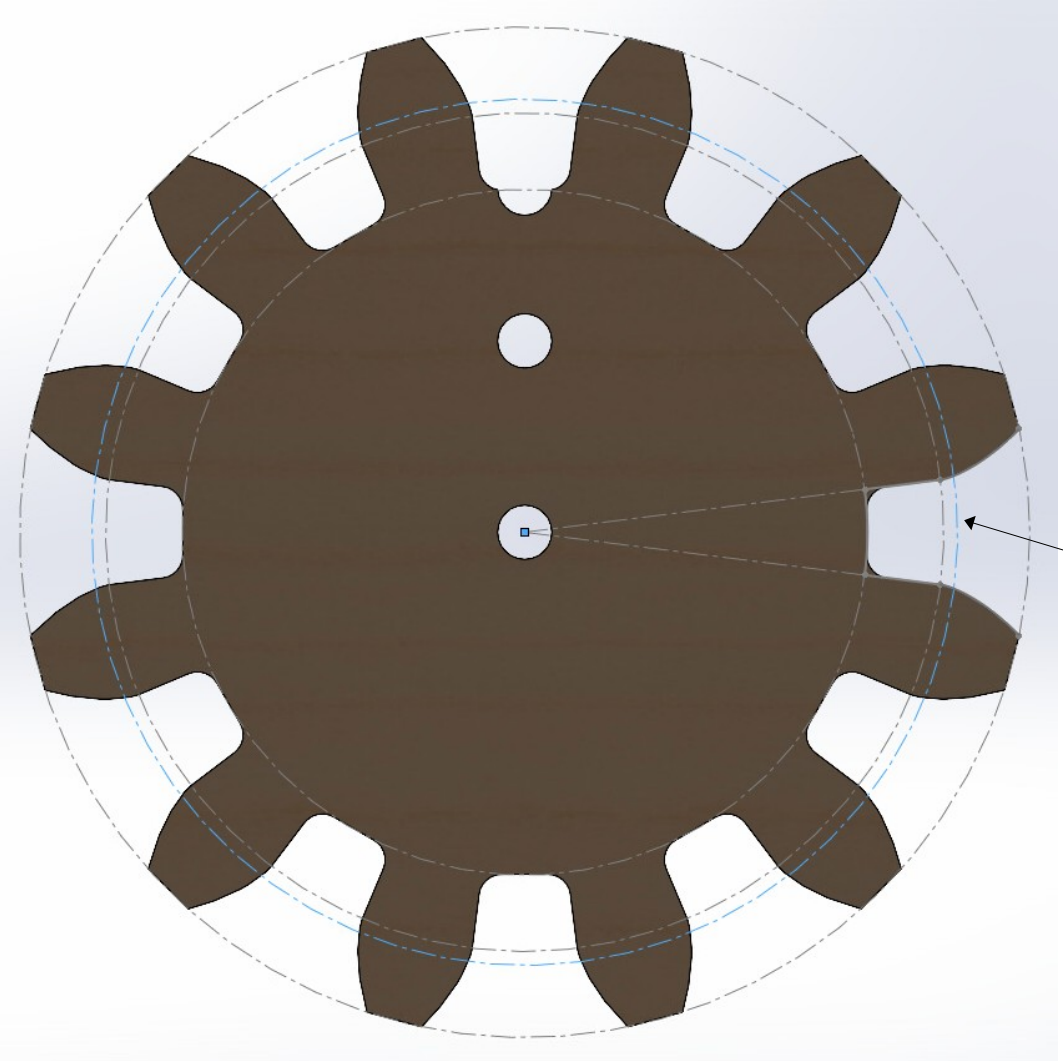
Helical Gears

Worm Gear

Spur Gear Design Parameters



Diametral Pitch: Teeth per Inch



Spur Gear 6-12:

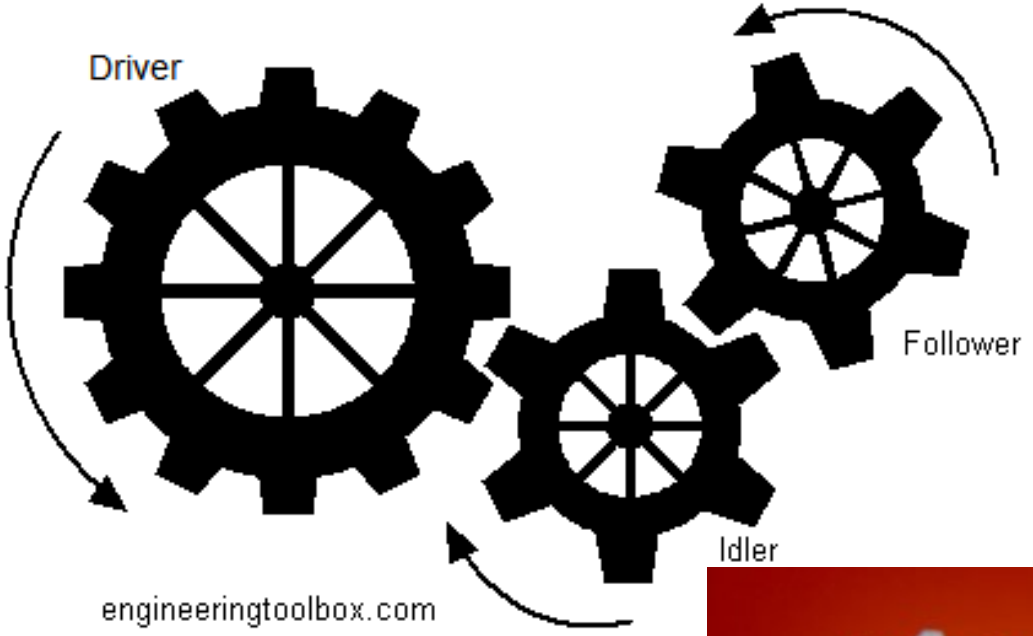
Diametral pitch P = 6 teeth per inch of diameter

Number of teeth T = 12

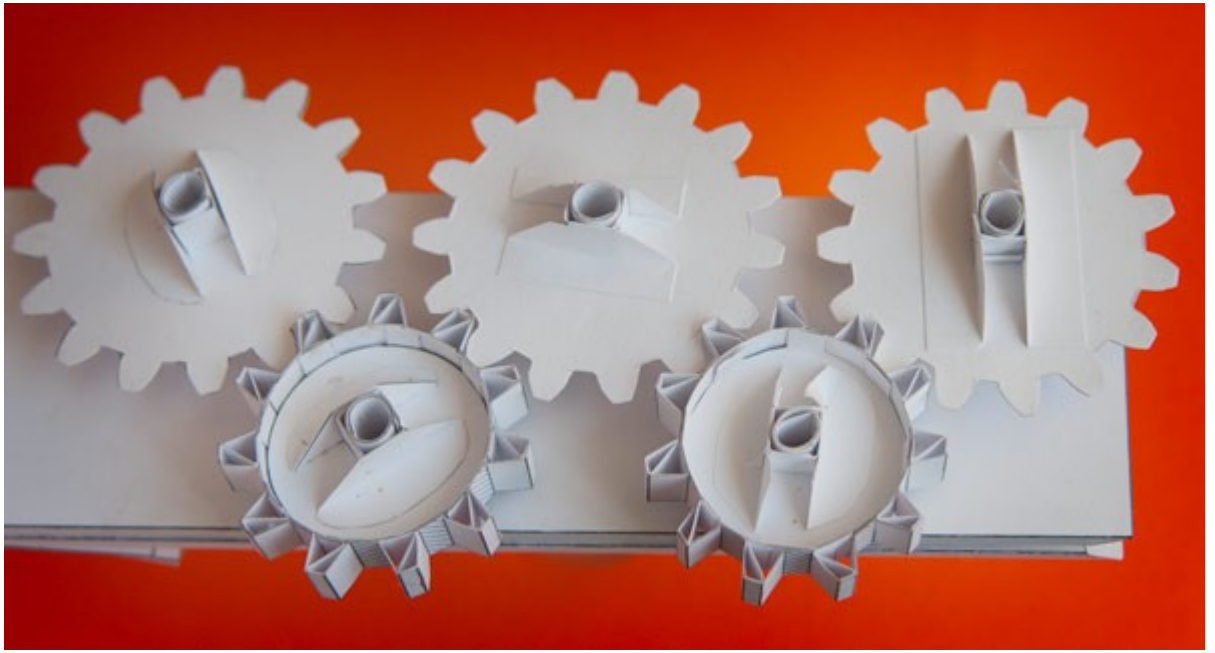
Pitch circle = T/P = 12 / 6 = 2 inch diameter

For a Spur Gear 6-20 the pitch circle would be 20 / 6 = 3.33 inches in diameter

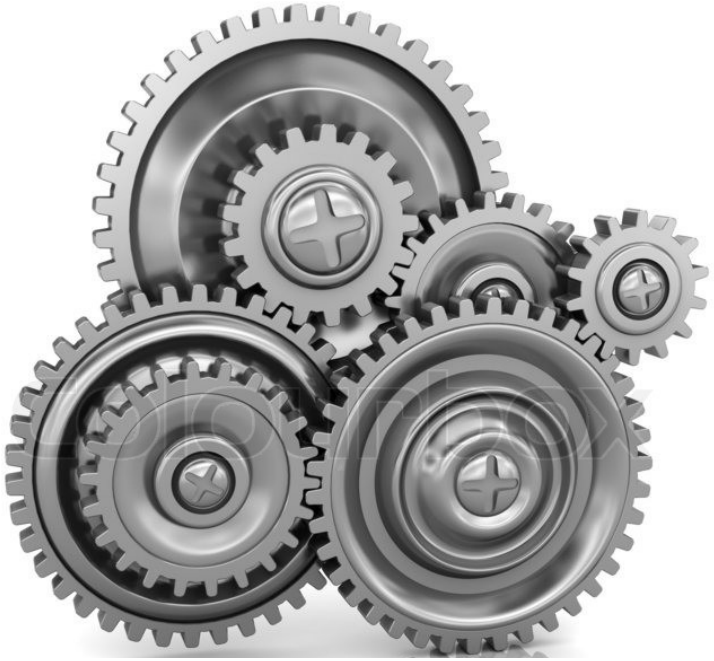
Gear Train

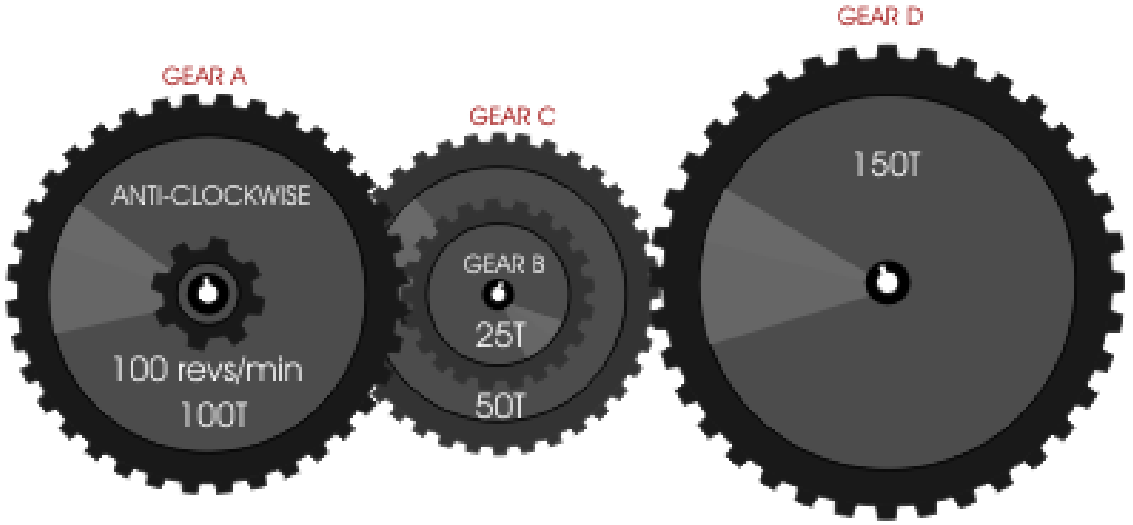


The gear ratio depends only on the number of teeth in the driver (input) and follower (output) gears.



Compound Gears

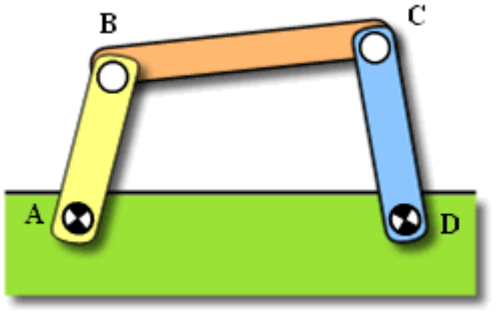


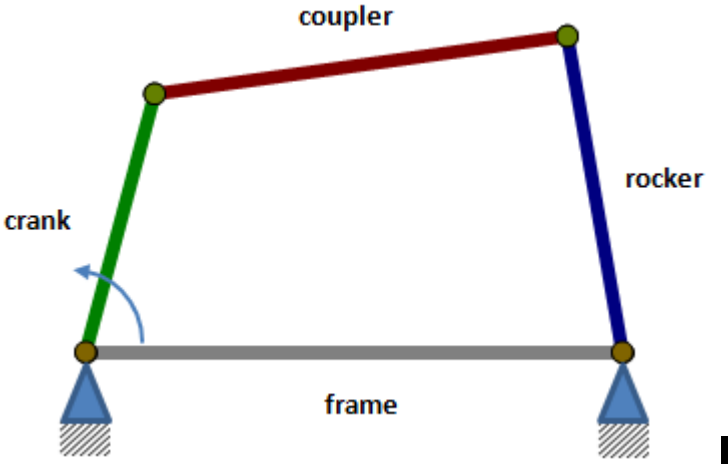


Gear ratios multiply:

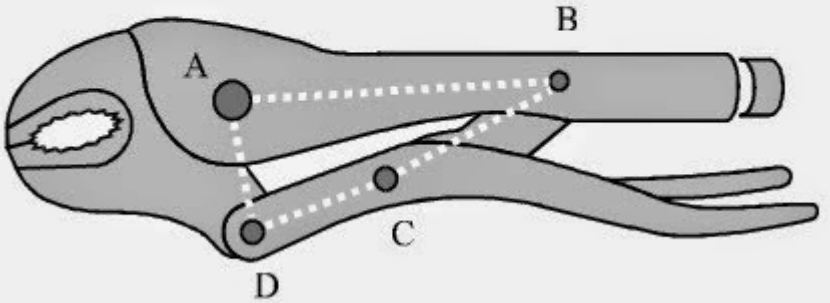
$(100:25) \times (50:150) =$
$4 \times (1/3) =$
$4/3$

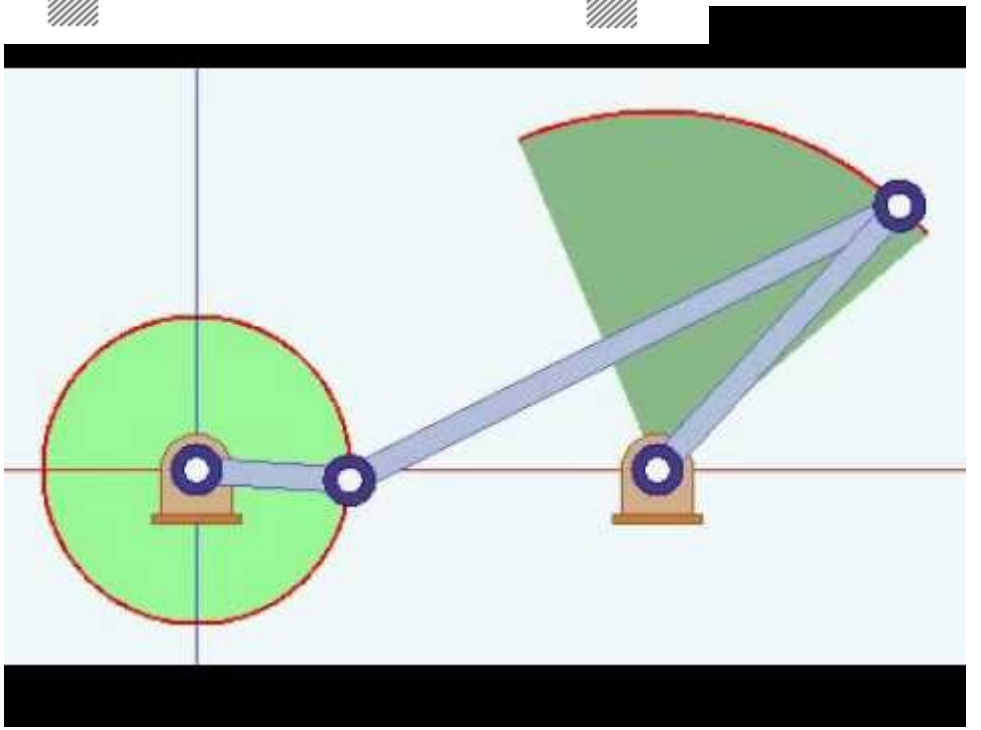
Four-Bar Linkage



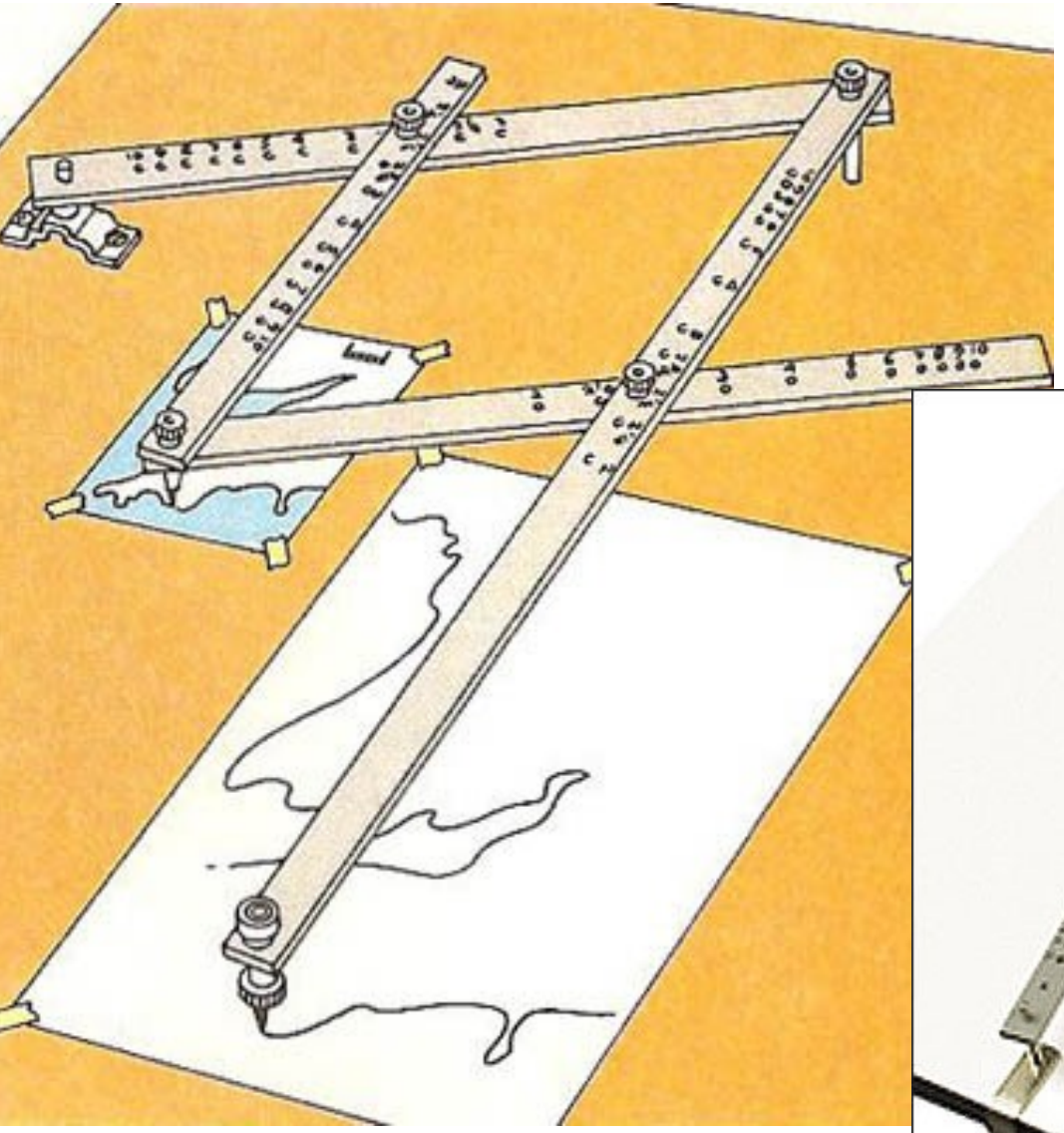


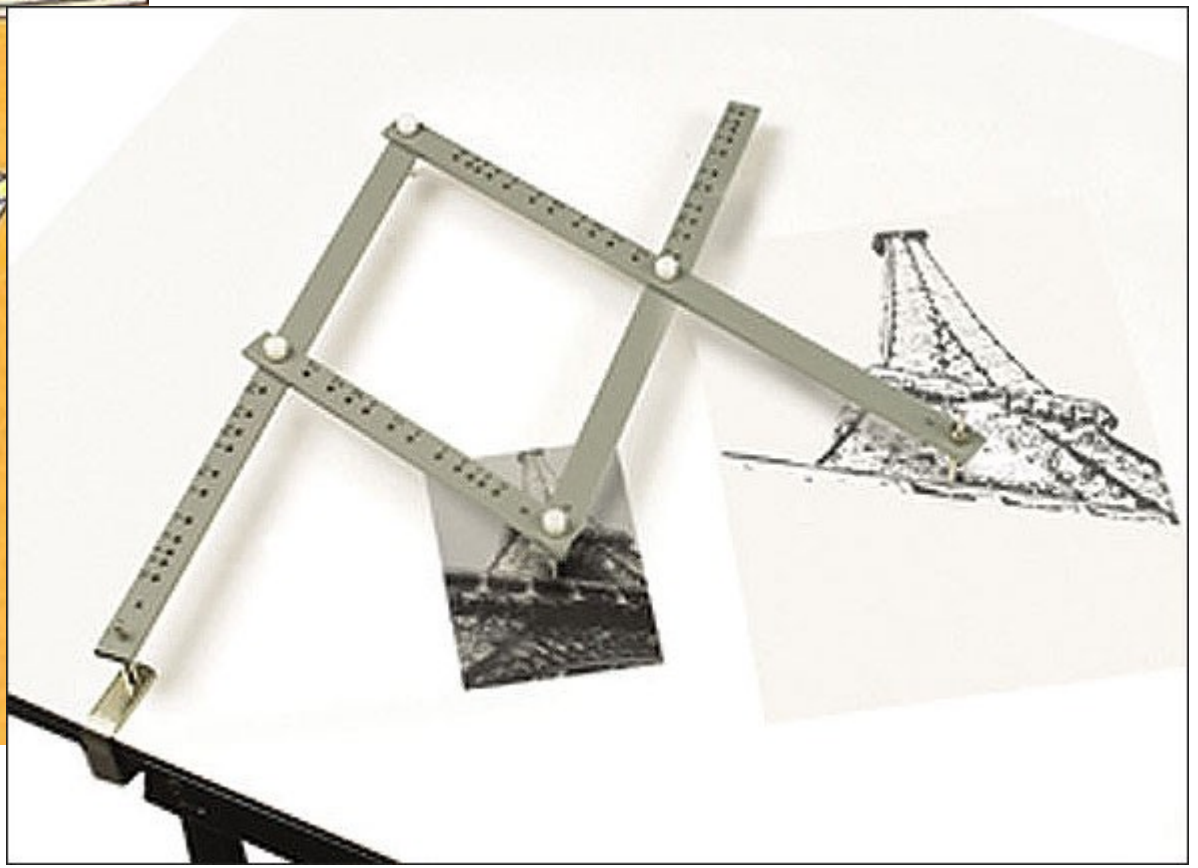
This pair of locking pliers employs a four bar mechanism. The white dashed line connecting pins A, B, C and D traces the four links in the mechanism.





Pantograph





Backhoe

Four Bar Prosthetic Knee Joint