Prototyping Physical Things

Materials: What can you build with?

Pilot (vintage suitcases + steel)
Bent Frabrication
John Knott

What *should* you build with?

Ceci n'est pas une Hammer.

What *should* you build with?

Fountain
Marcel Duchamp
1917

Sip of Conflict
Exploratorium
2007

What *should* you build with?

Random Russian Guy

What *should* you build with?

$88,000

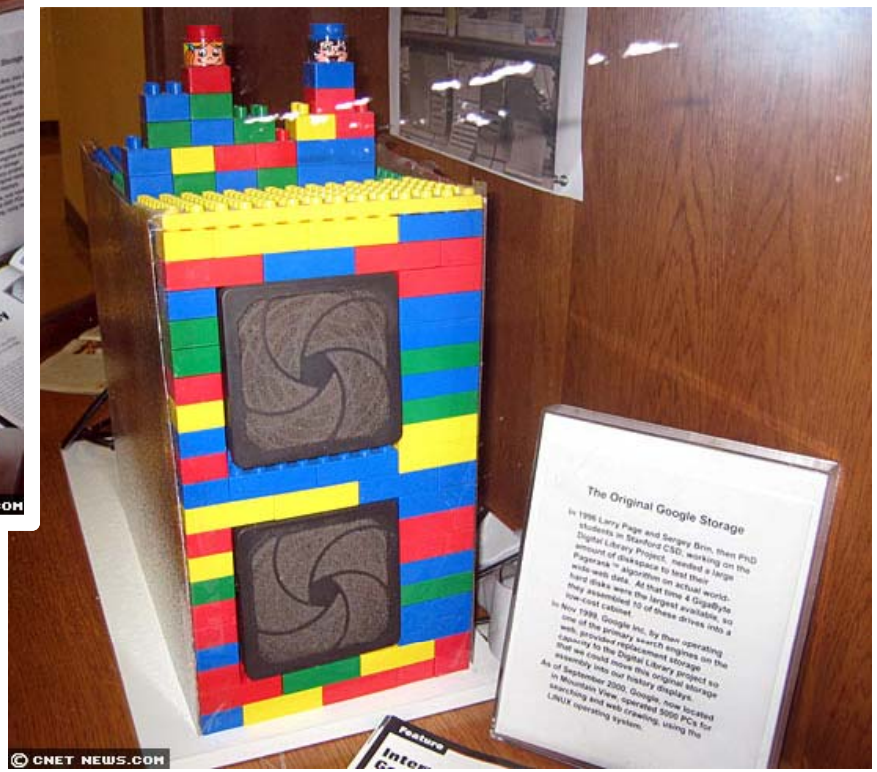
$25,030

Selecting the right materials for building prototypes is a balance of:

- What do you *need* to demonstrate?
- How fast can you build this prototype?

What do you need to demonstrate?

What do you need to demonstrate?

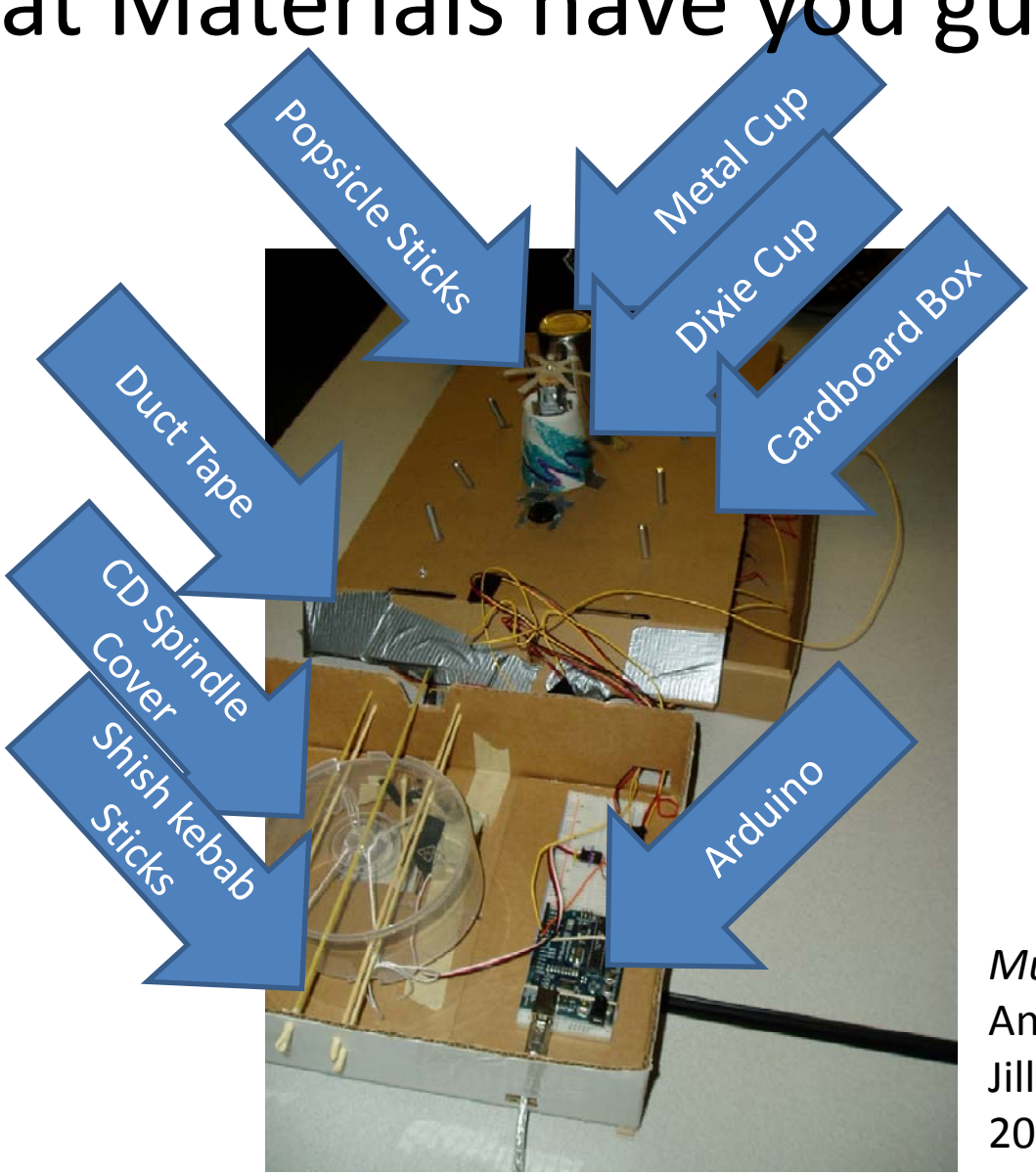


How *fast* can you get it built?

How *fast* can you get it built?

How *fast* can you get it built?

What Materials have you guys used?



Musical Mimic Game
Anirban Sen, Farley Gwazda, Jill Blue Lin, Kenghao Chang
2007

An important class of materials…

… crap laying around.

To build better things…

… keep better crap around.

Wood

Types

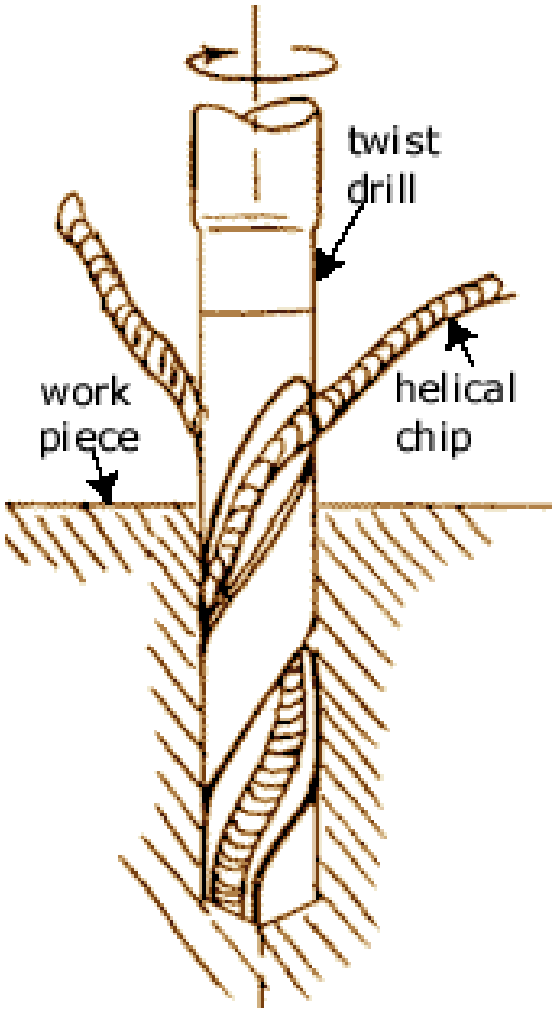
Shapes

Wood Stains/Paints

Cutting

Carving

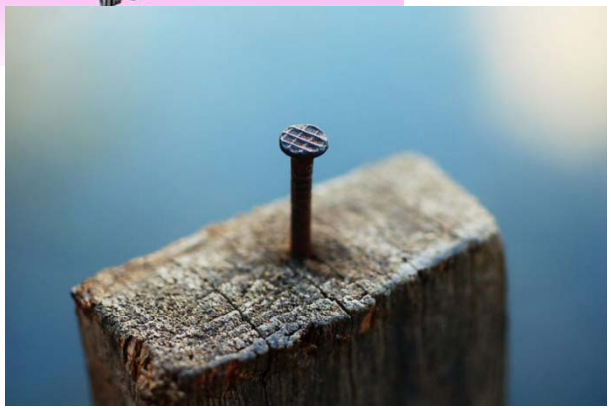
Drilling



Fastening


DEWALT


STANLEY MADE IN USA




ELMER'S
Carpenter's
Wood Glue
DARK WOODS
4 FL OZ (118 mL)

Metal: Aluminum

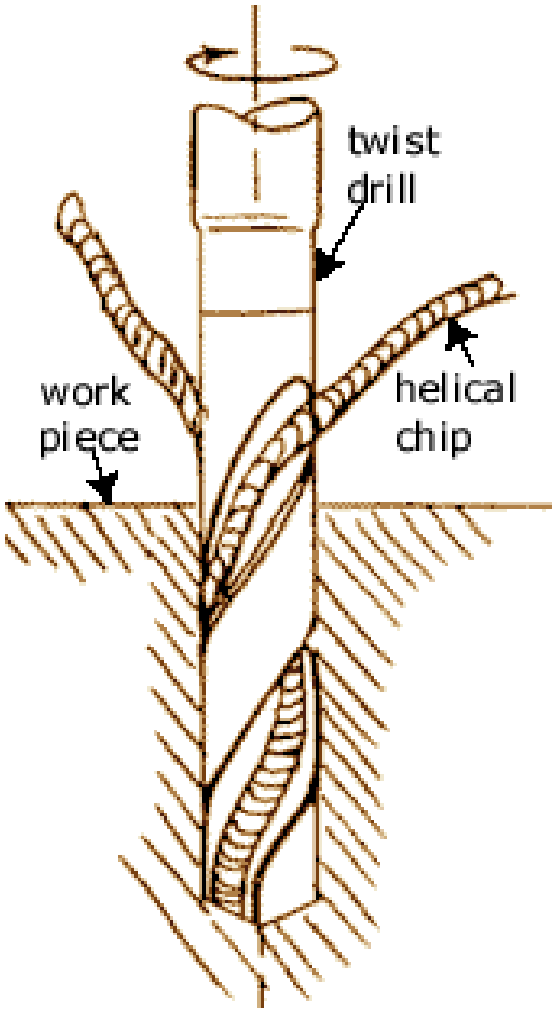
Sheets

Anodizing for Color

Rods in Many Shapes

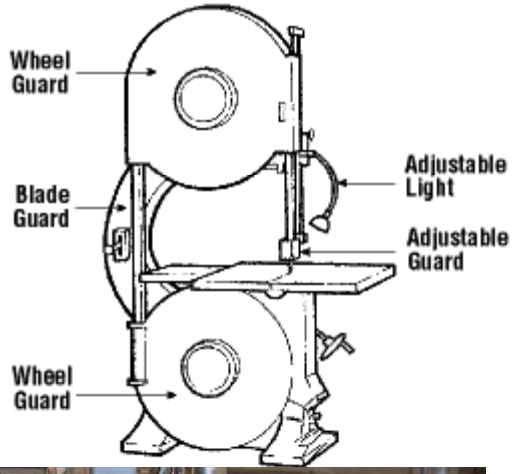
Drilling


DEWALT


twist
drill
work
piece
helical
chip

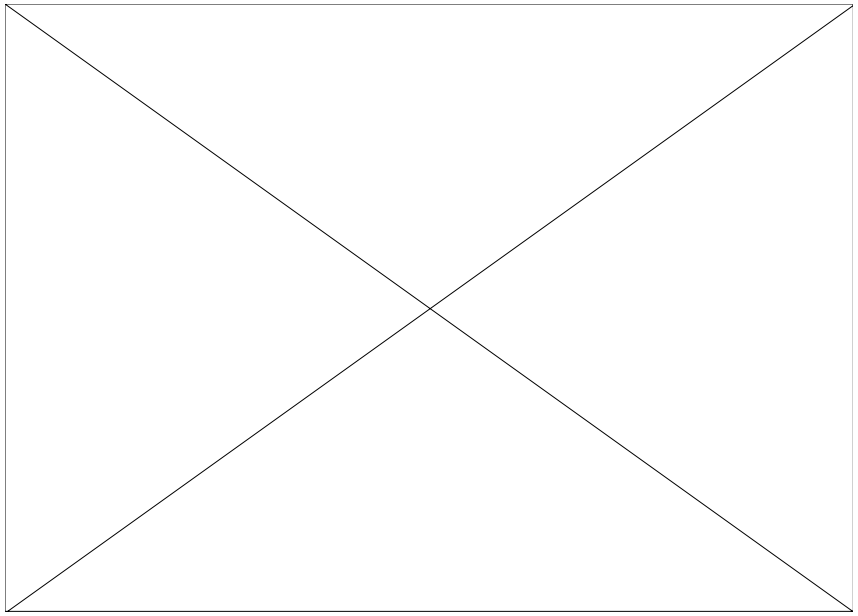

Ellis
Optional Round Table

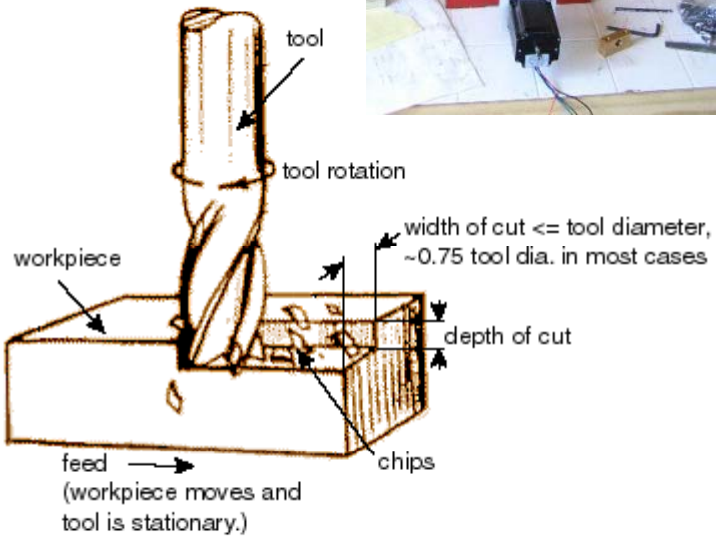
Cutting


Wheel Guard
Blade Guard
Wheel Guard
Adjustable Light
Adjustable Guard

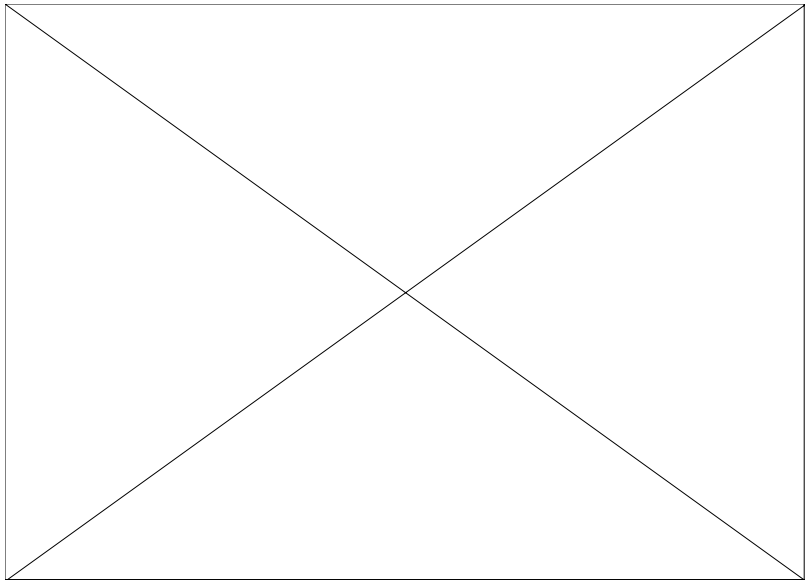
Fastening

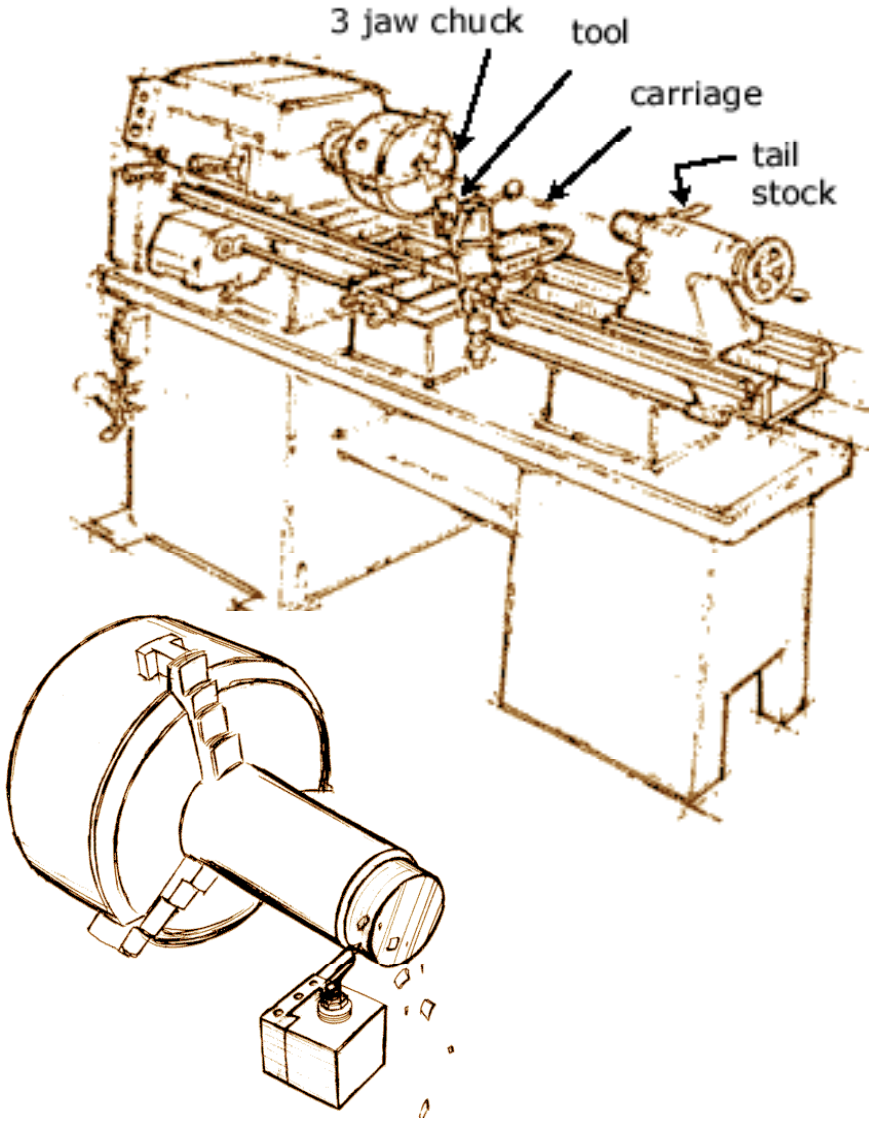
Milling




tool
tool rotation
width of cut <= tool diameter,
~0.75 tool dia. in most cases
workpiece
depth of cut
chips
feed
(workpiece moves and
tool is stationary.)

Turning (Lathe)



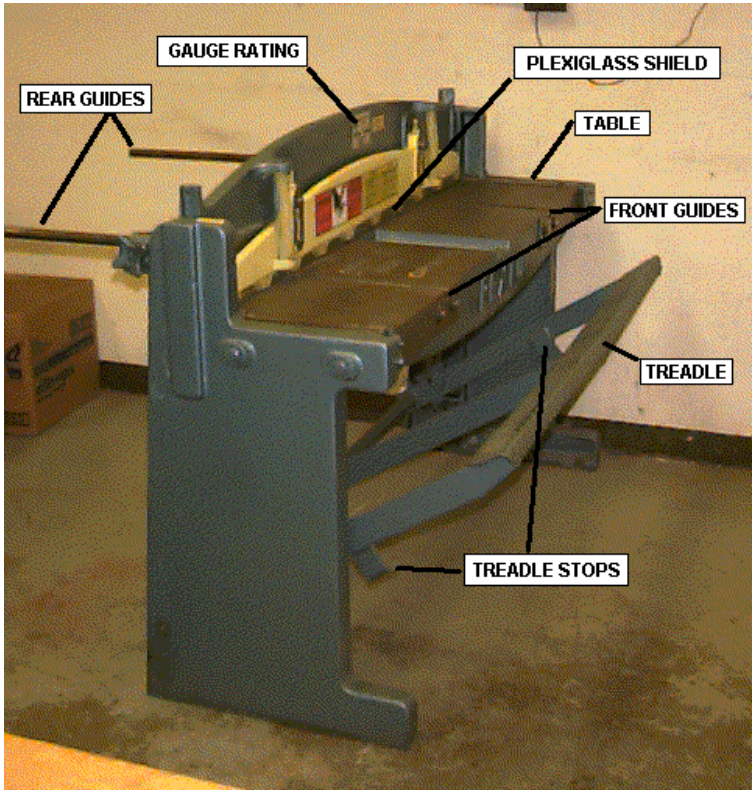


Sheet Metal

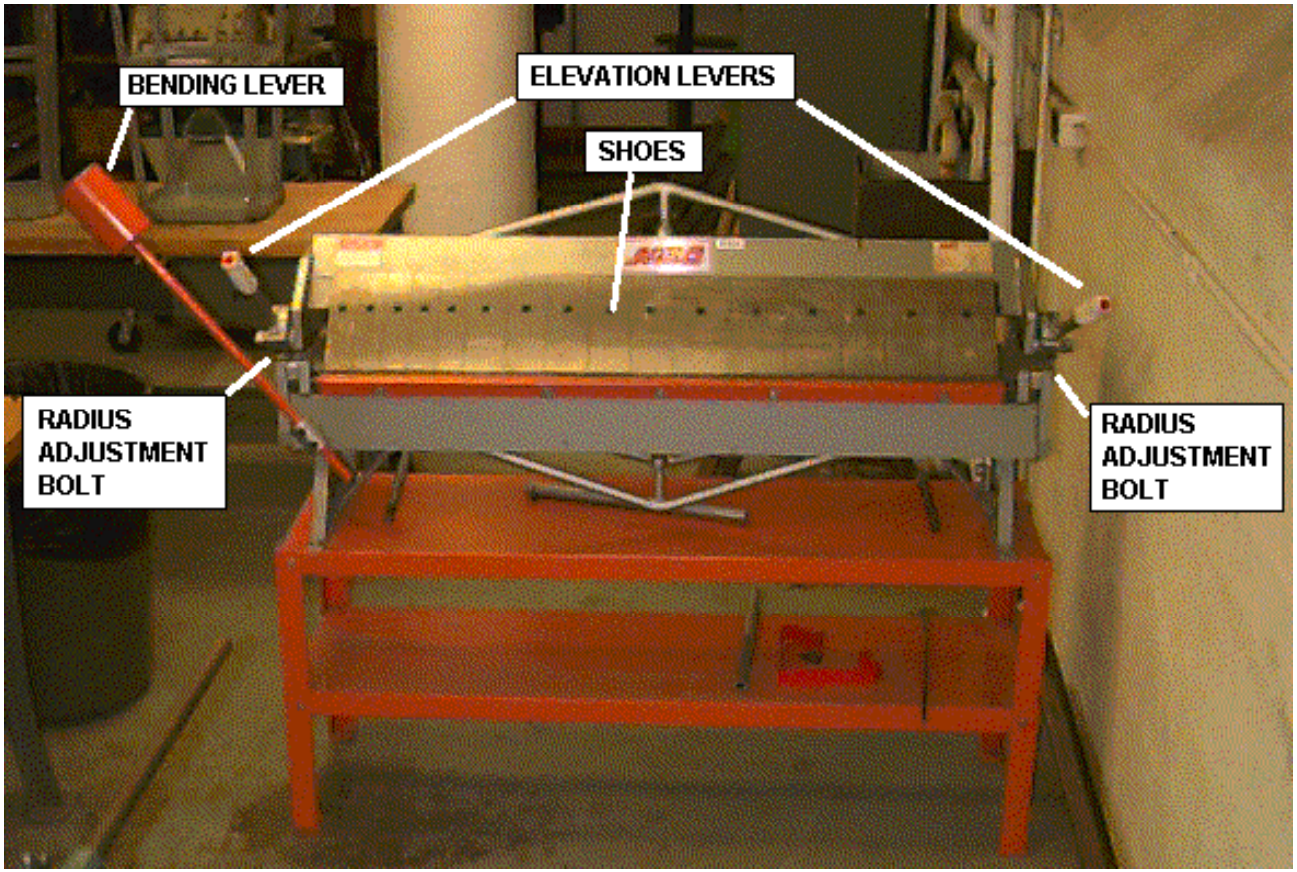
Cutting

Tin Snips

Shear

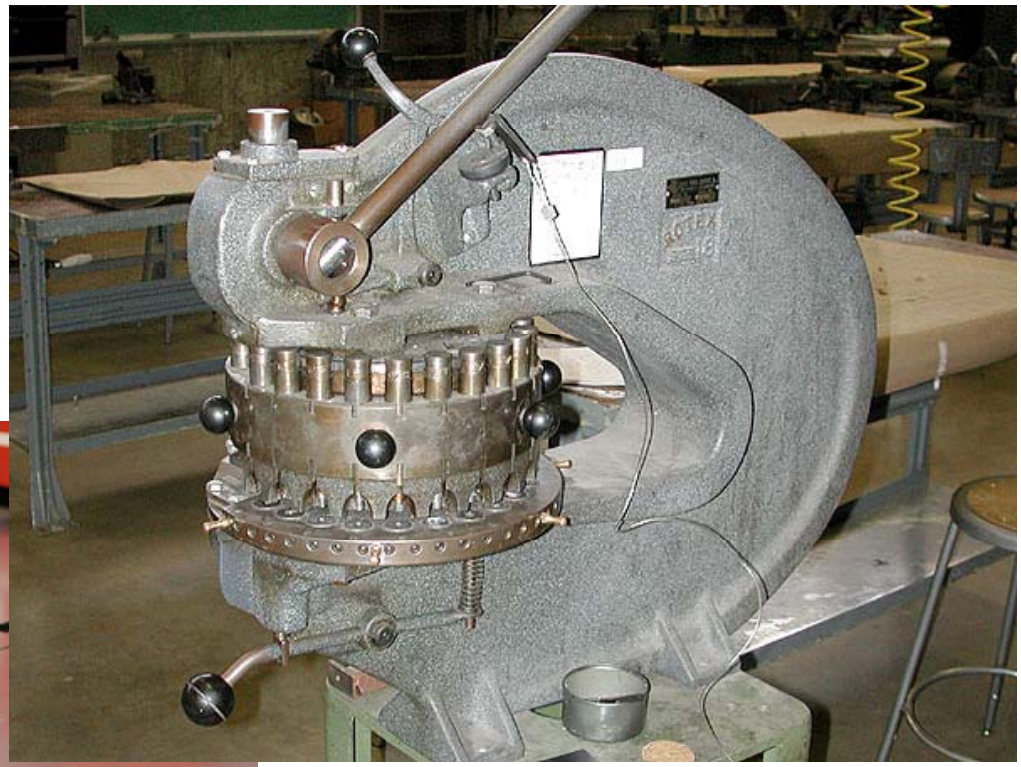


Bending Sheet Metal

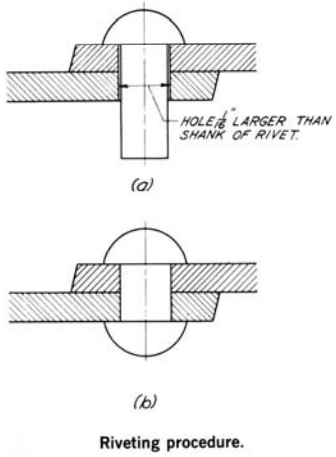


Press Brake

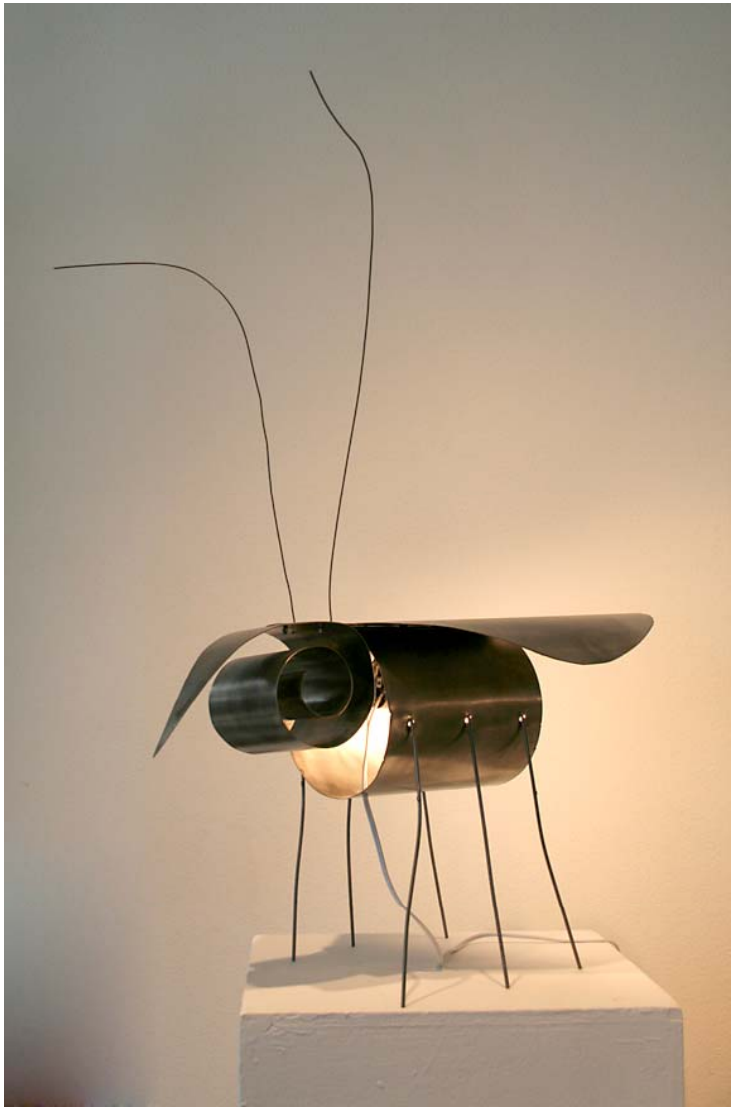
Notching/Punching



Fastening

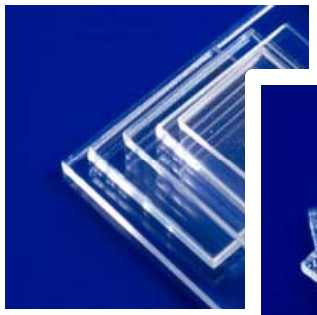


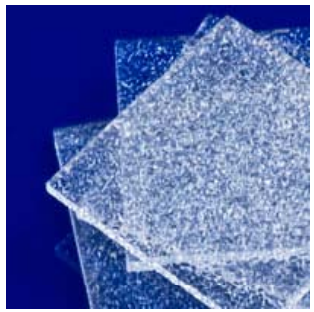
Riveting procedure.



Annoyous Persistus
Olaf Heimdahl, 2006

Plastics: Acrylics/ABS

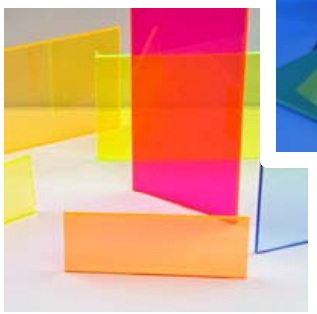




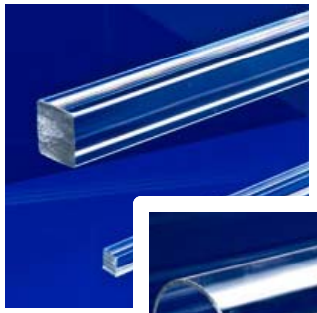
Thicknesses

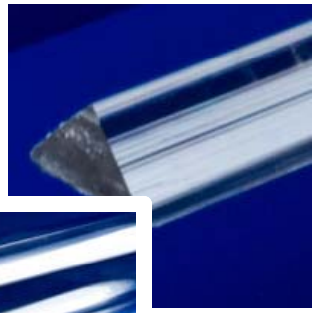
Textures

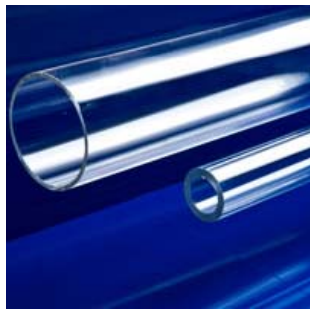
Translucency



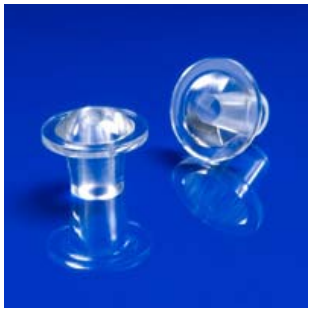
Colors

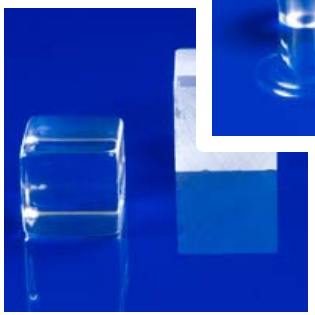






Rods

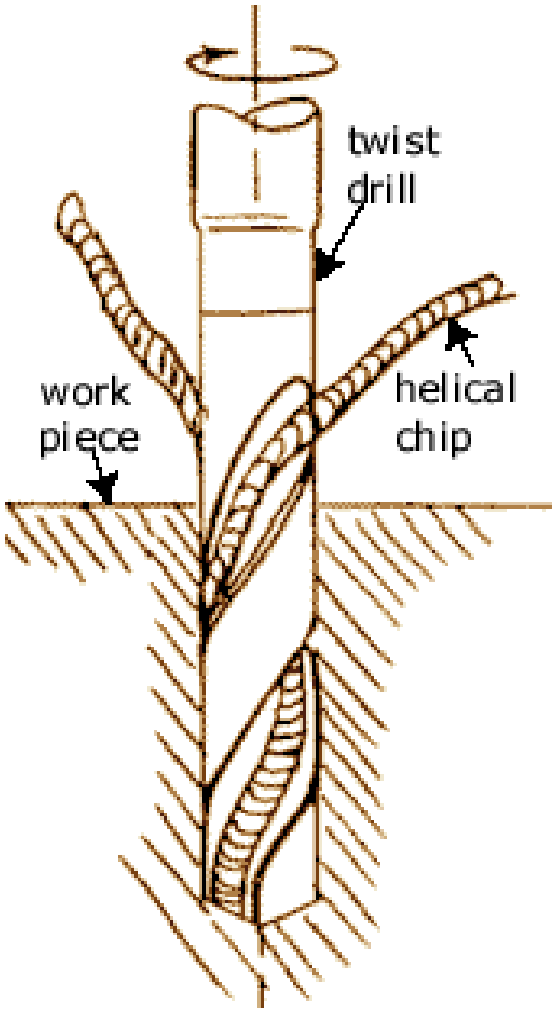




Shapes

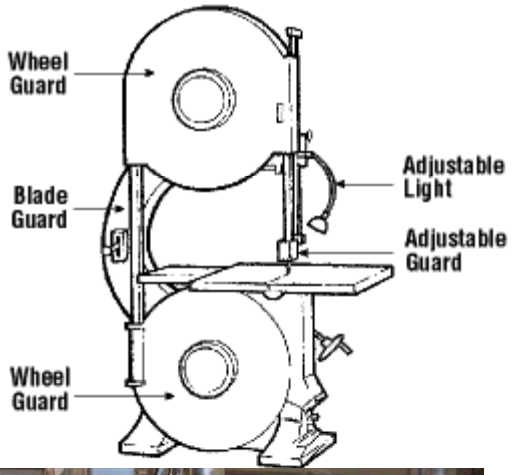
Drilling


DEWALT


twist
drill
work
piece
helical
chip

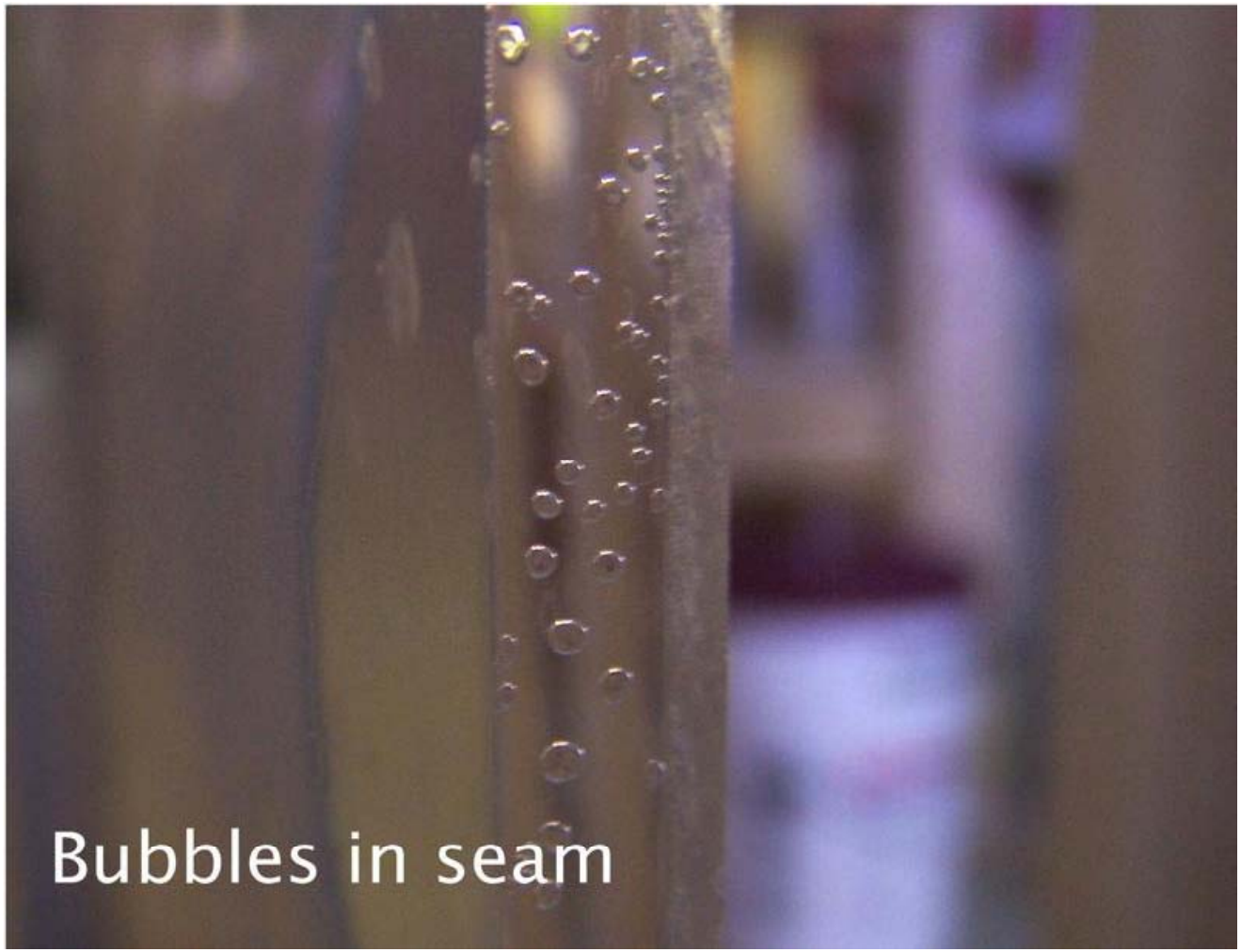

Ellis
Optional Round Table

Cutting


Wheel Guard
Blade Guard
Wheel Guard
Adjustable Light
Adjustable Guard

Fastening

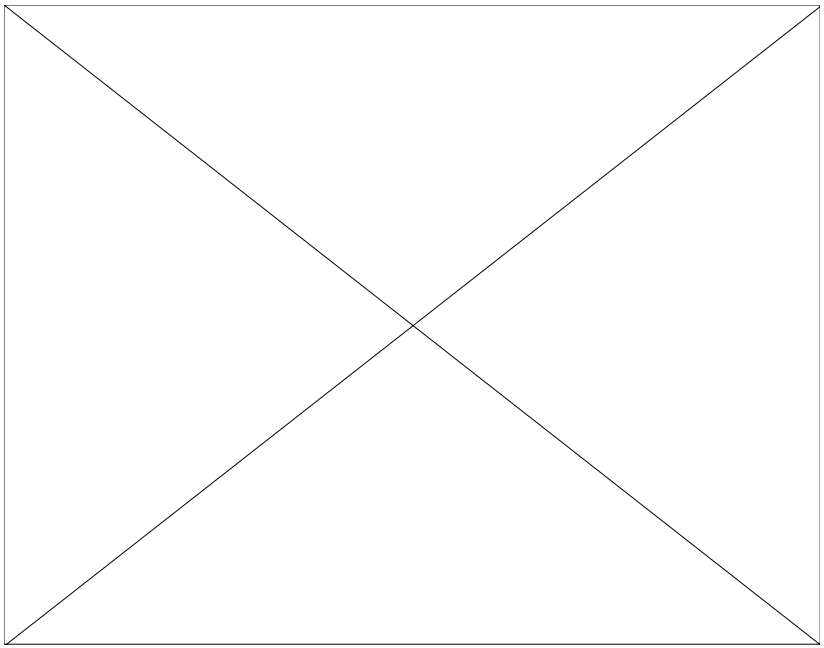
Problem with Solvent



Bending

Bending

Laser Cutting



GuitarBike
Ray Nelson
1981

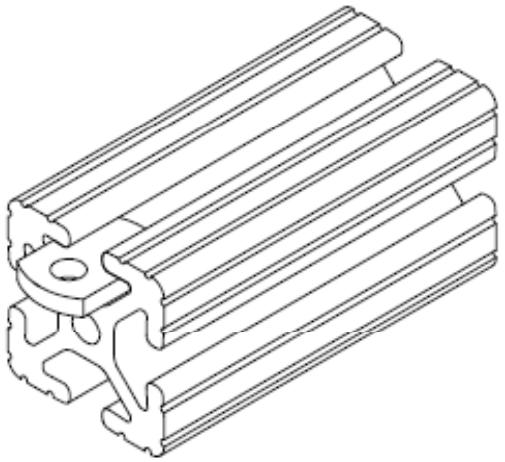
Materials/Processes

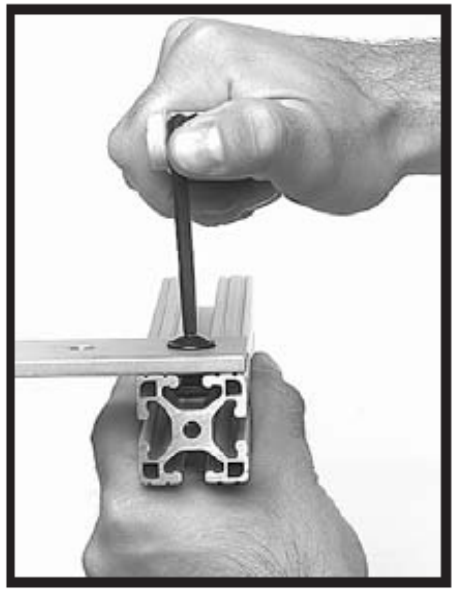
Process	Wood	Metal	Sheet Metal	Plastic
Cutting	Saws	Saws	Shears, Snips	Saws
Carving	Chisels	N/A	N/A	N/A
Holes	Drills	Drills	Punches, Notchers	Drill, Laser
Fastening	Nails, Screws	Machine Screws	Machine Screws, Riveting	Machine Screws, Solvent
Other Machining	N/A	Milling, Turning	Bending	Heat Bending

Prototyping *more* rapidly

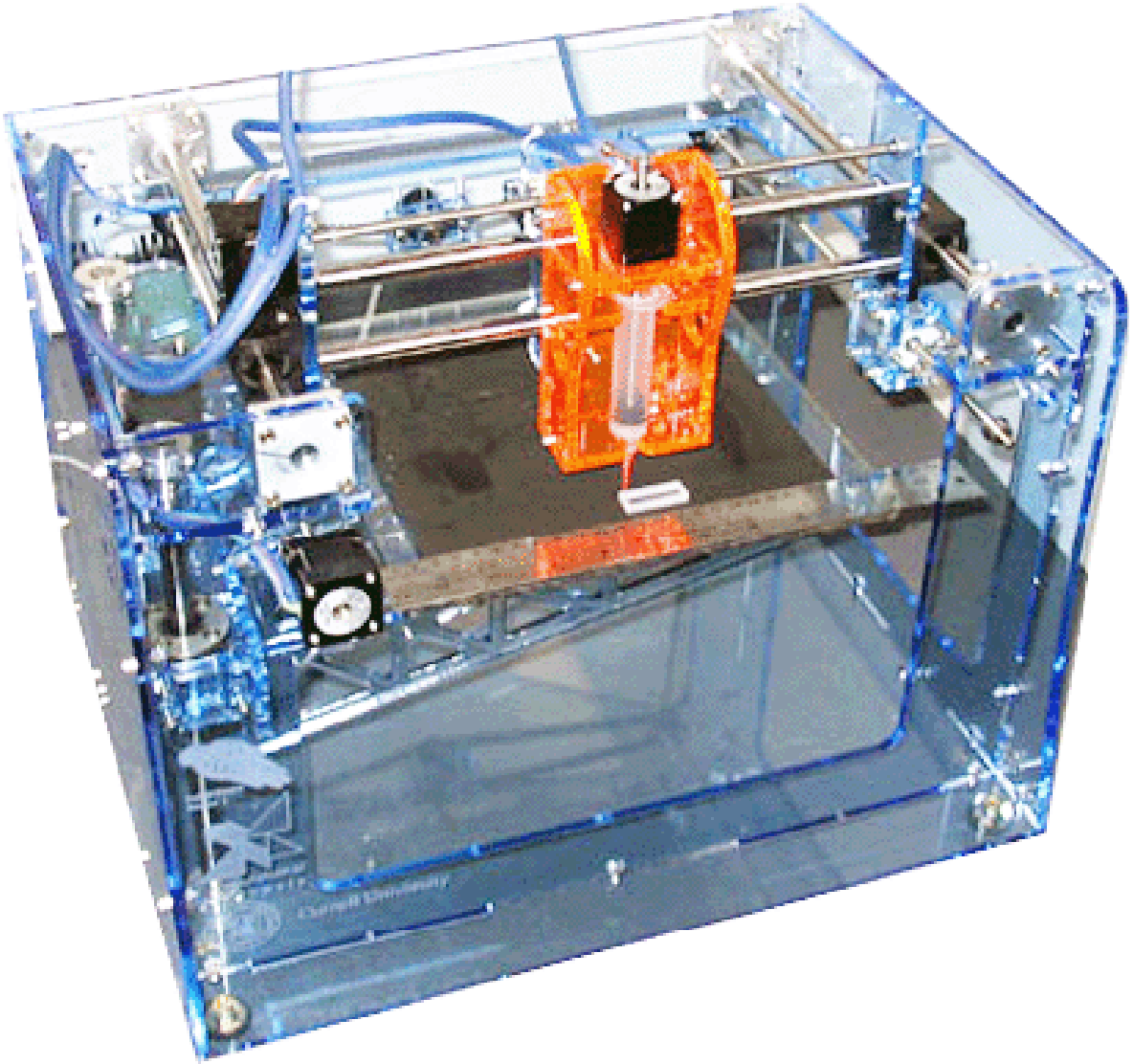
Slotted Extrusions: 80/20

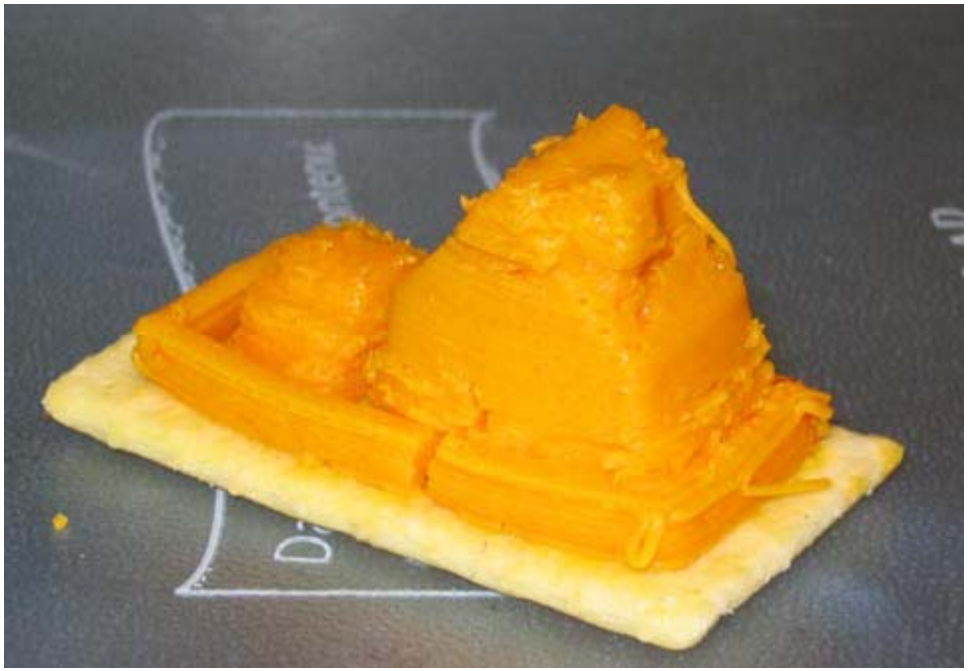
- ***10 and 15 SERIES compatible***
- ***See pages 109-111 for screw selection***

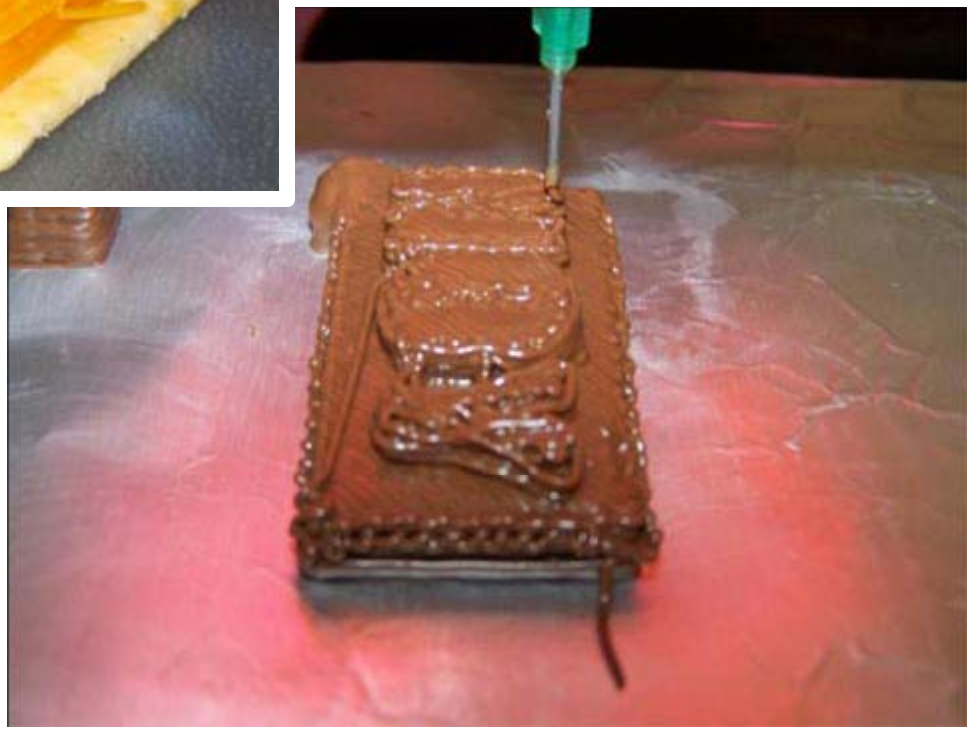




3D Printing







Materials to Spark Ideas

IDEO’s Tech Box

Summary

- Building things (prototyping) plays a critical role in elucidating aspects of your design
- Selecting the right materials can be a balance of many factors.
  - The balance will change as you go from prototyping to production phases.
- Keeping the right materials/tools around can enable rapid prototyping.
- Materials can also help you come up with new designs.