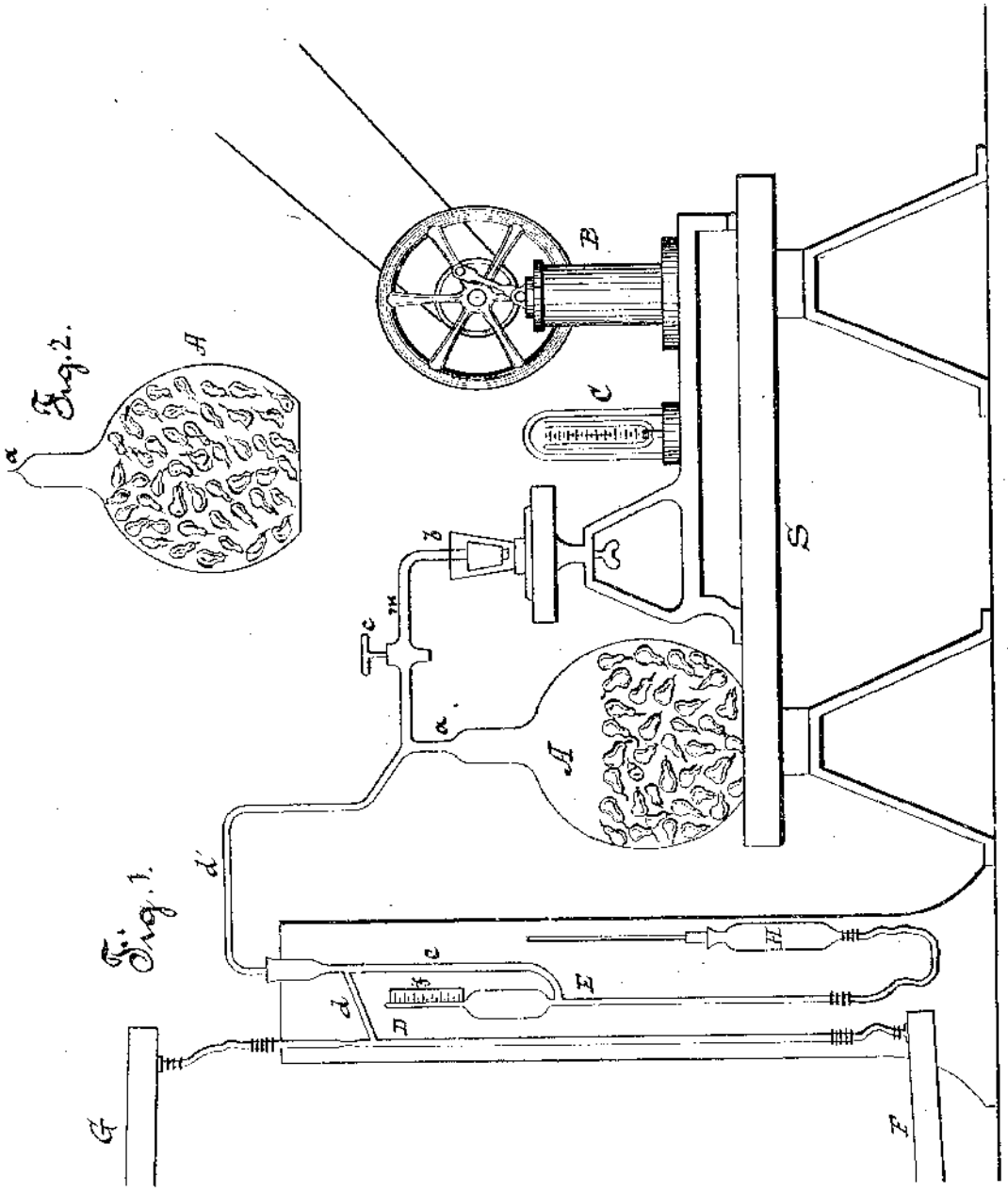
(No Model.)

T. A. EDISON.

PRESERVING FRUIT.

No. 248,431. Patented Oct. 18, 1881.



Attest:

S. D. Mott

W. H. Howard

Inventor:

Thos. A. Edison

per Sym & Miller

Attys.

UNITED STATES PATENT OFFICE.

THOMAS A. EDISON, OF MENLO PARK, NEW JERSEY.

PRESERVING FRUIT.

SPECIFICATION forming part of Letters Patent No. 248,431, dated October 18, 1881.

Application filed December 14, 1880. (No model.)

To all whom it may concern:

Be it known that I, THOMAS A. EDISON, of Menlo Park, in the county of Middlesex and State of New Jersey, have invented a new and useful Improvement in Preserving Fruit; and I do hereby declare that the following is a full and exact description of the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon.

The object I have in view is to produce an economical method of putting up fruits, vegetables, and other organic substances in their natural condition without cooking, for preservation in high vacuo, which method will insure the maintenance of such high vacuo, and consequently the preservation of the articles; and the articles will be surrounded by an envelope which cannot affect them injuriously. This I accomplish by placing the articles to be preserved, or one of them, in a properly-constructed glass vessel, which is shaped up and connected with a glass tube leading to or connected with apparatus for producing in the vessel a high degree of exhaustion; or the opening of the vessel through which the articles are placed therein may be closed by fusion, and the glass exhaust-tube attached at any other suitable point. When the desired high vacuum is obtained the glass tube is "sealed off"—that is to say, the tube is fused by the flame of a blow-pipe—at a point near the vessel, and the vessel is drawn away from the tube at the point of fusion, the result being to hermetically close the vessel and at the same time disconnect it from the glass tube. The articles are then inclosed in an envelope which is essentially a homogeneous piece of glass, and which will maintain for any length of time the high vacuum. The envelope being entirely of glass, the articles cannot be affected injuriously thereby.

My invention consists, first, in the peculiar method of putting up organic substances for preservation and transportation; and, second, in the complete vessel as a new article of manufacture, having the articles sealed in high vacuum therein by the fusion of the glass, the articles being surrounded by an envelope composed essentially of one piece of glass.

In the drawings, Figure 1 is an elevation of the apparatus employed by me for producing high vacuo, a vessel being shown as connected therewith; and Fig. 2, a view of the complete vessel.

A is the vessel, made of glass and filled, or partly filled, with the fruit, vegetables, or other organic substances to be preserved; or it may be made of proper size for holding a single article. The glass vessel is shaped up and joined with a glass tube, *a*, connected with the air-exhausting apparatus. This junction may be formed in several ways. The neck of the vessel may be fused to the glass tube, as shown in Fig. 1; or the neck of the vessel can be formed with a socket, into which a stopple on the tube *a* can be forced and the joint made light by a mercury seal above the stopple; or this arrangement can be reversed and the mercury seal dispensed with. The glass tube *a* is a branch from or is connected with a pipe, *d' m*, the portion *m* of which is connected with an air-pump, B, by means of a joint, *b*. This joint *b* is of the usual construction of joints in apparatus of similar character to this, and is composed of a stopple on the tube *m*, setting into a cup. A mercury seal may be used above the stopple.

The branch *m* is provided with cock *c*, for cutting off or turning on the connection between the pump and vessel A, and a gage, C, may be provided to indicate the degree of exhaustion produced by the pump.

The branch *d'* is connected with a mercury drop or Sprengel pump, of ordinary construction. This is shown as composed of the mercury-trough G, the receiver F, from which the mercury is raised to G, drop-tube D, tube *e*, branch *d*, tube E H, and gage *f*.

The air-pump is used as an auxiliary to commence the exhaustion, in order to save time; but if the vessel A is of small capacity and nearly filled with some substance, the mercury-drop can alone be used. The vessel A, containing the articles or article, being connected with glass tube *a*—as for example, by fusing the tube to the neck of said vessel—the cock *c* is opened and a partial vacuum produced by the air-pump. The cock *c* is then closed and the exhaustion continued by means of the Sprengel pump. When the desired high vacuum has been reached the connection with the air-pump, preferably at the juncture of the

tube *a* and neck of vessel A, is fused by a blow-pipe, and the vessel A is gradually drawn away from the tube *a*, the separation taking place at the point of fusion, and the vessel being twisted or turned around so as to hermetically close the neck of the vessel. The seal can then be made more perfect, if desired, by the further fusion and working the glass, the complete vessel having the appearance shown in Fig. 2. Another vessel A is then connected with tube *a*—for example, by the fusion of the glass tube to the neck of the vessel—and the operation just explained is repeated.

What I claim is—

1. The method of putting up organic substances for preservation and transportation, consisting in placing them in a glass vessel, producing a high vacuum therein, and then hermetically closing the vessel by sealing off the channel to the air-pump, the envelope produced being essentially a homogeneous piece of glass.

2. As a new article of manufacture, a highly-exhausted glass vessel containing an organic substance sealed therein by the fusion of the glass, the enveloping-vessel being essentially a homogeneous piece of glass, substantially as set forth.

This specification signed and witnessed this 11th day of December, 1880.

THOS. A. EDISON.

Witnesses:
H. W. SEELY,
WM. CARMAN.

[10.14 Notes PC Build]

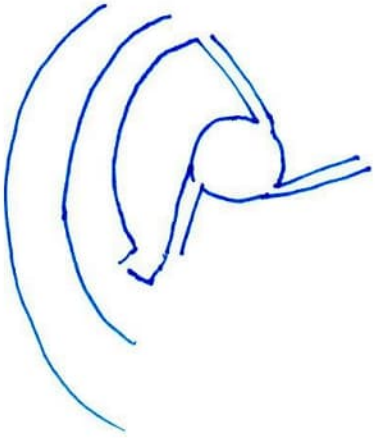
assembled by Gavin ~25yo white local, previosly pet supplies plus

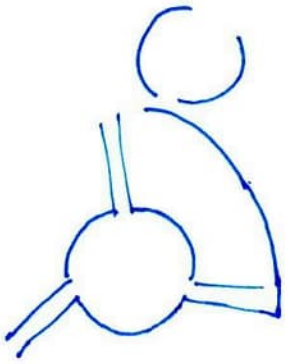
[10.17 tech]

collar/grommet/bushing

original

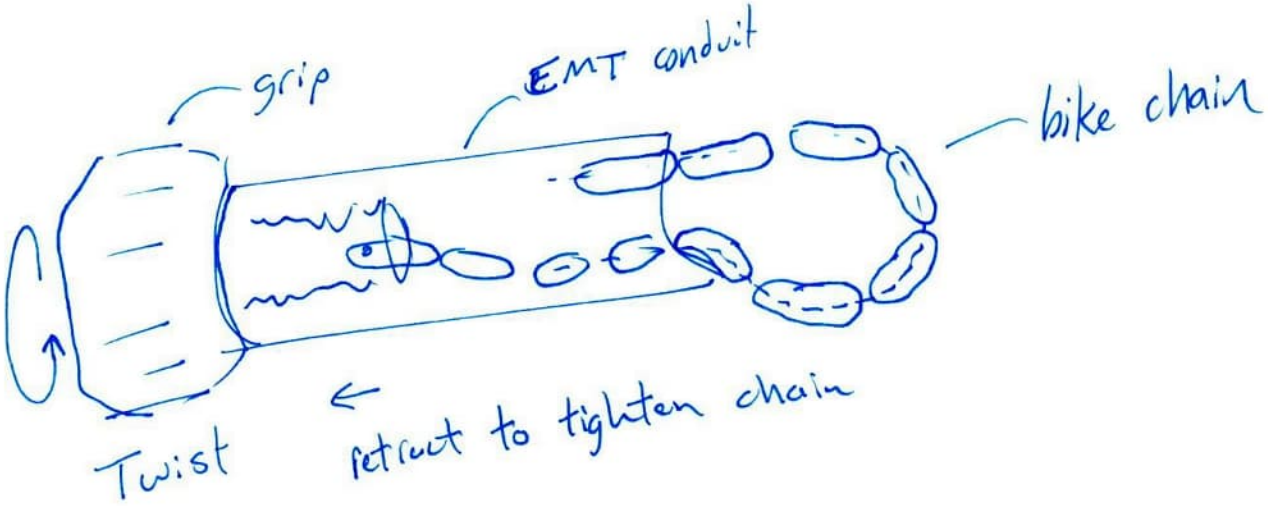
desired
(hole, no gap)



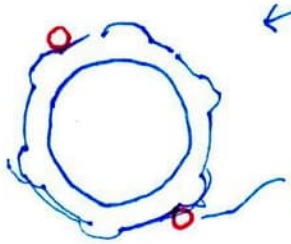


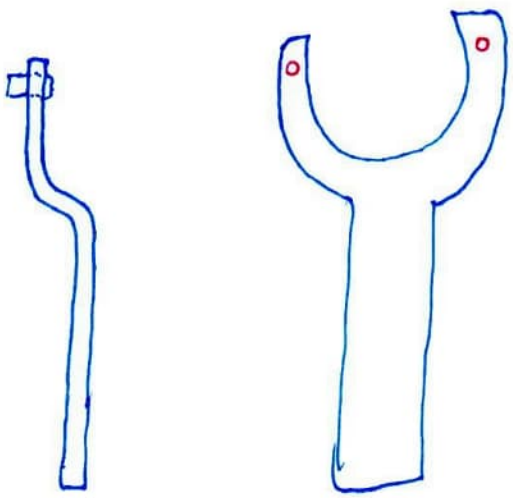
[10.16 Tech]

Invention: round grip by chain



[Custom Wrench]

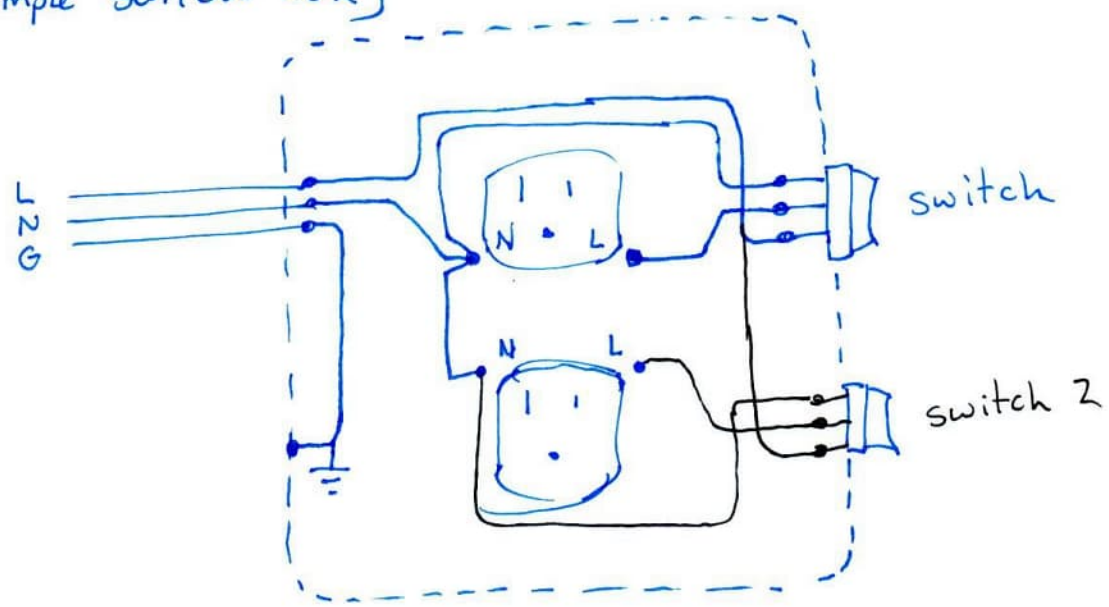




- just drill precise hole & press fit pins

[10.10 Tech]

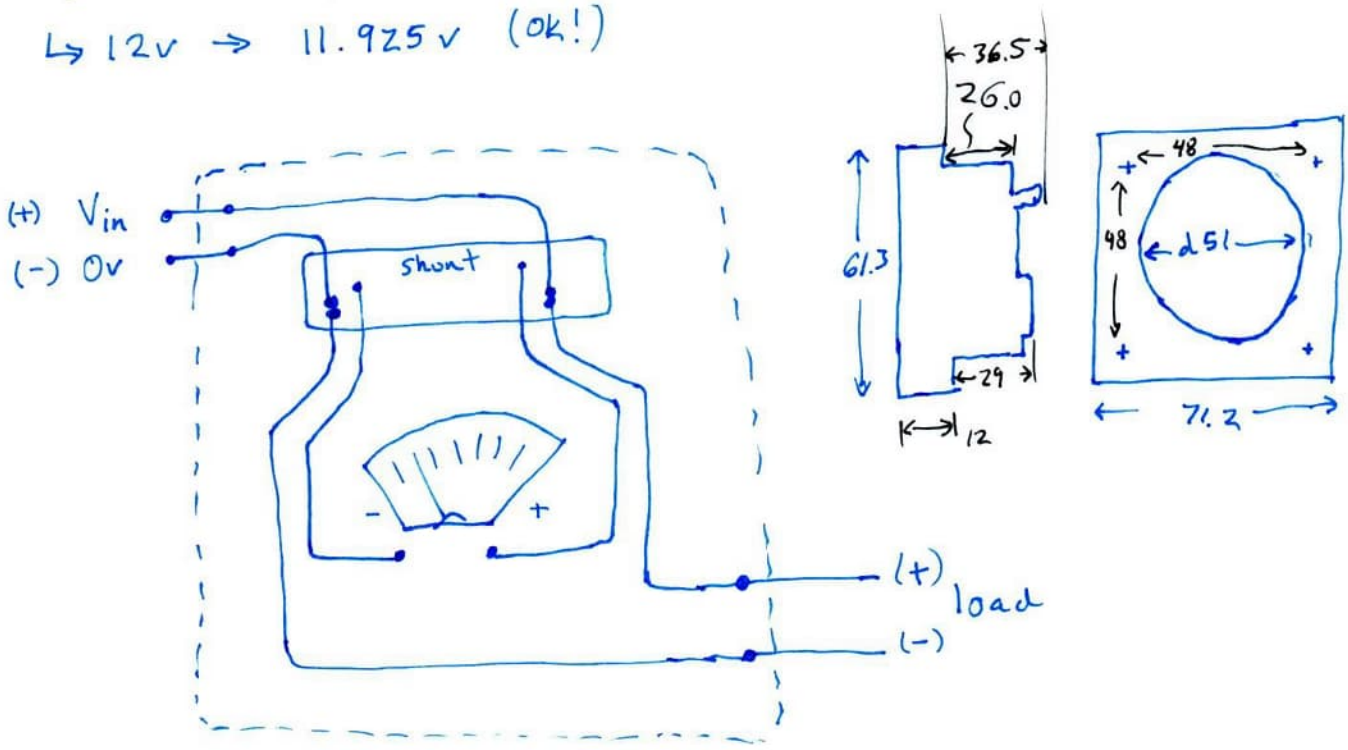
[handy simple switch box]



[handy ammeter box]

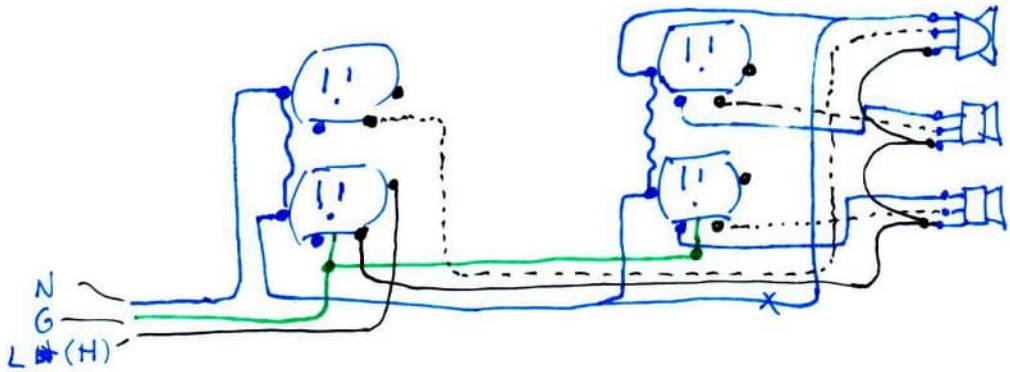
↳ 75mV voltage drop @ 30A full scale

↳ 12v → 11.925v (ok!)



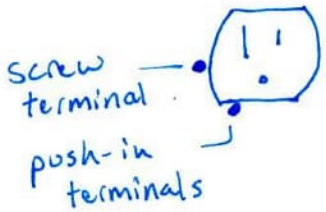
[10.06 Tech]

→ [Printer sockets rev 1]

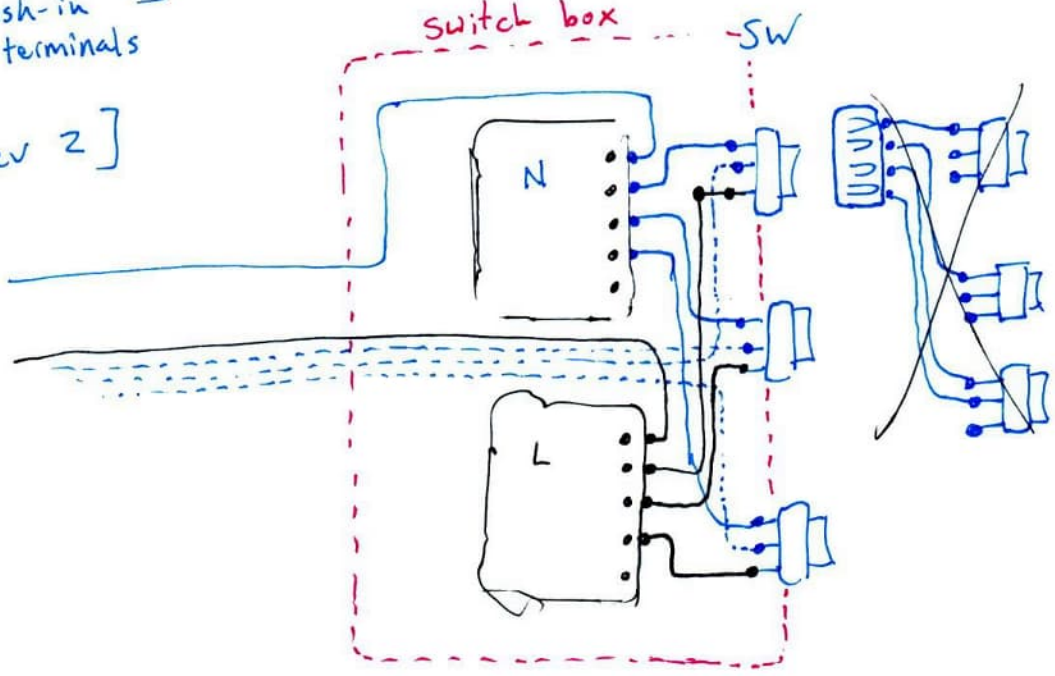


→ [Key]

Bridge in place (ordinary socket
↳ if not shown, it is clipped

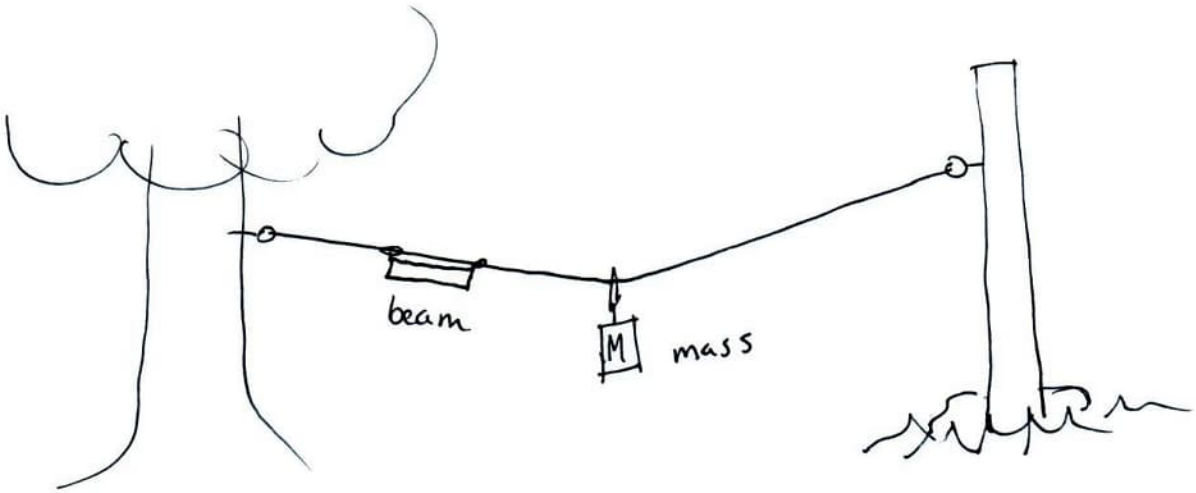


→ [Rev 2]



[10.04 Tech]

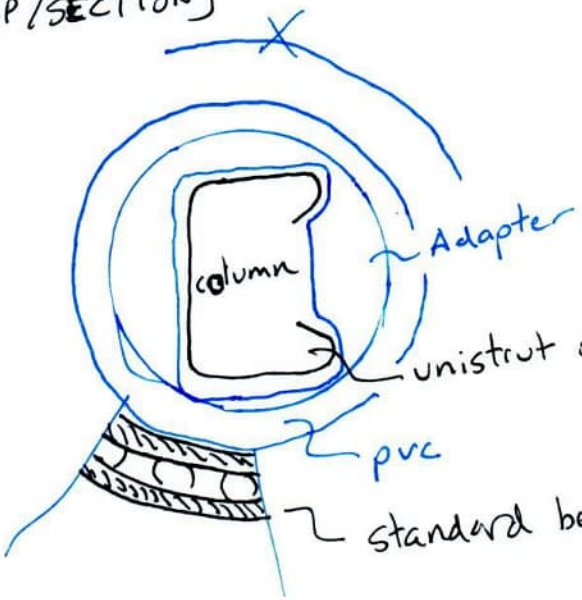
Measure Tension in cable



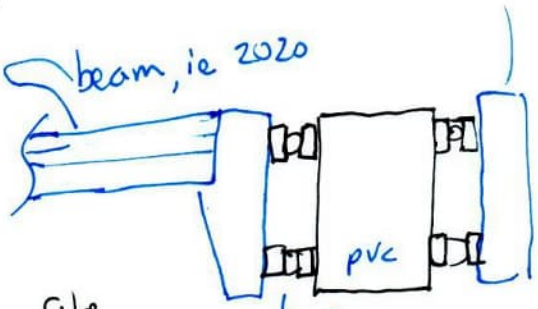
- add bubble level to beam → get angle
- include strain gauge → can be in compression

[10.04 Tech]

[TOP/SECTION]

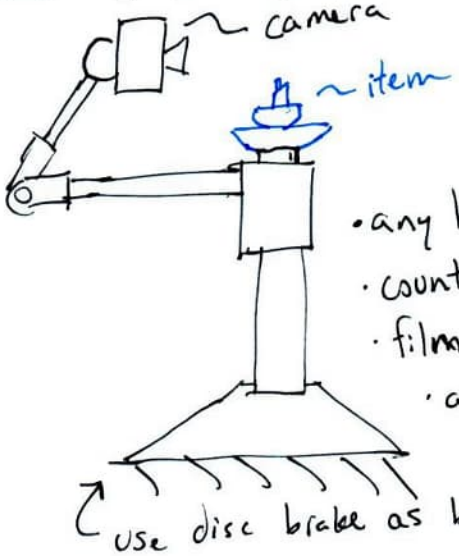


[SECTION FRONT] my round brkt



(my standard of choice)

360° swivel [FRONT]



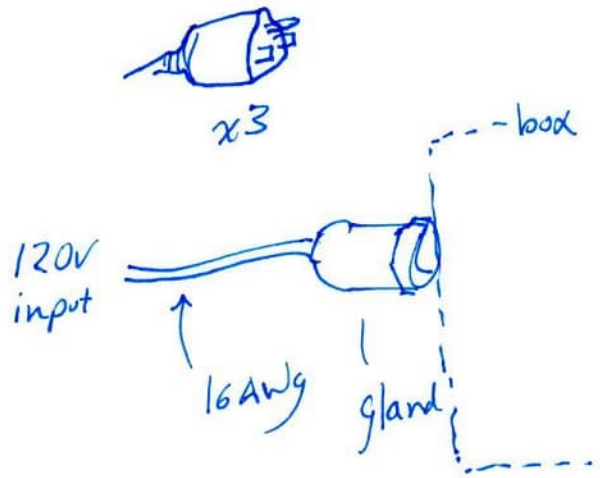
- any height
- counterbalance for smoothness
- film @ any distance
- add lighting as desired

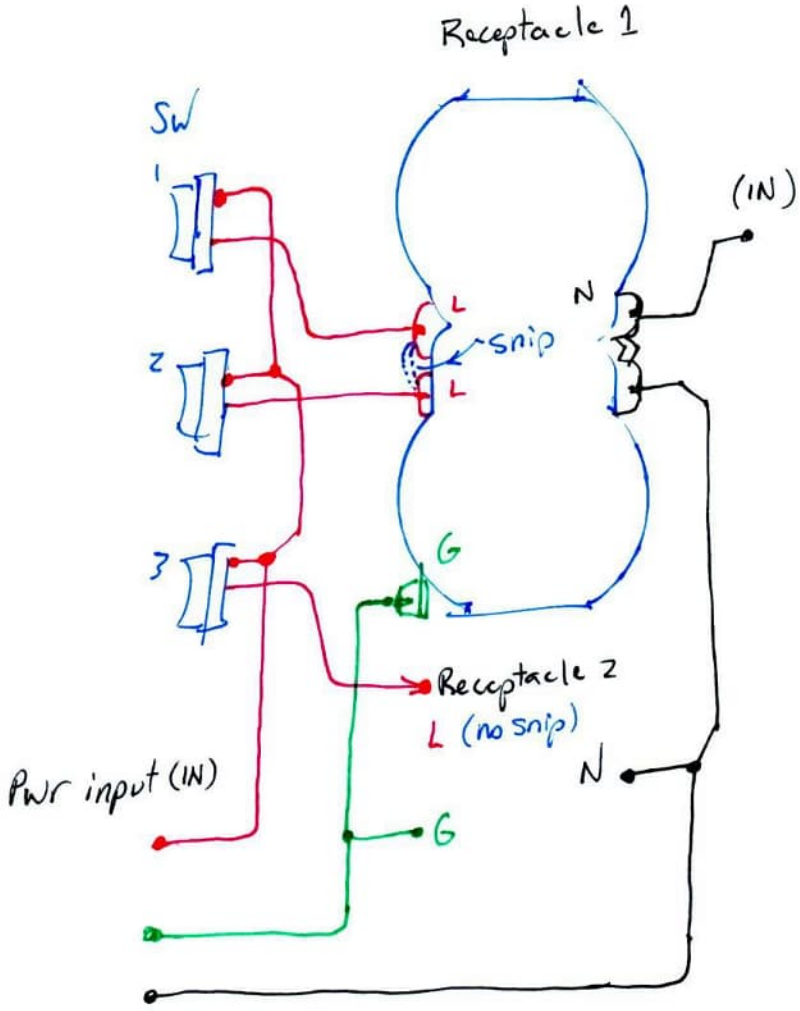
use disc brake as base?

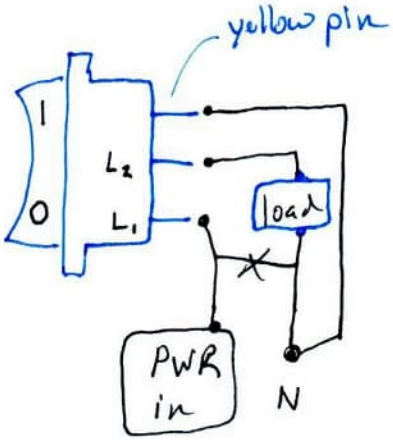
use rolling chair base?

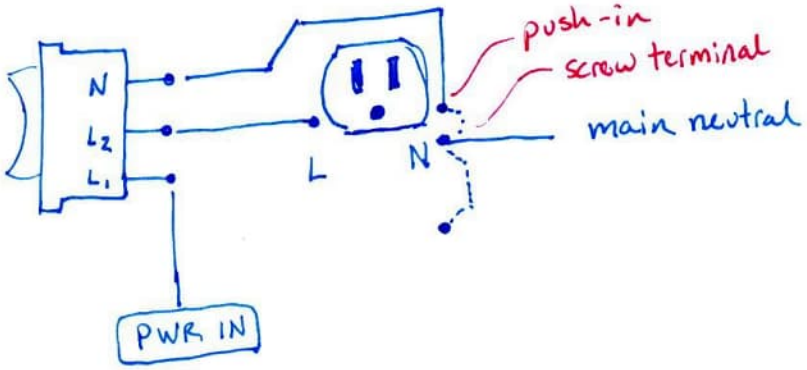
[10.03 Tech]

AC switch box





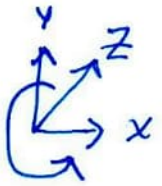


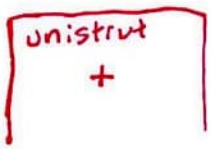


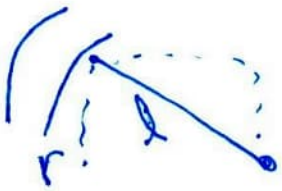
10.02 Notes, Tech

Video: fit justright in 2 dimensions

step 1:







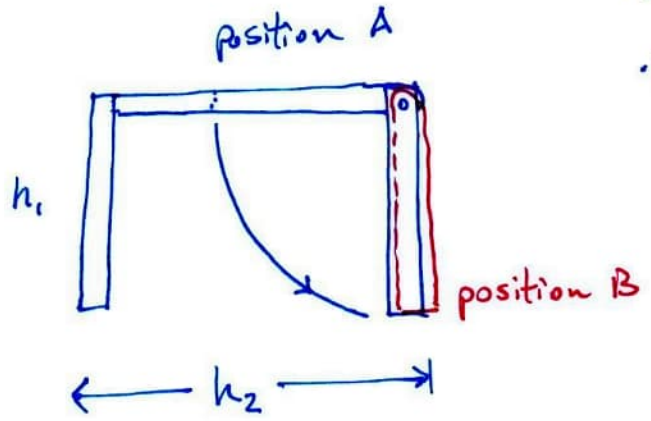
Concept series

1) Think in 2 dimensions
2) Think in 2D twice
3) Think in 3 dimensions

10.02 Tech

Table : coffee / work

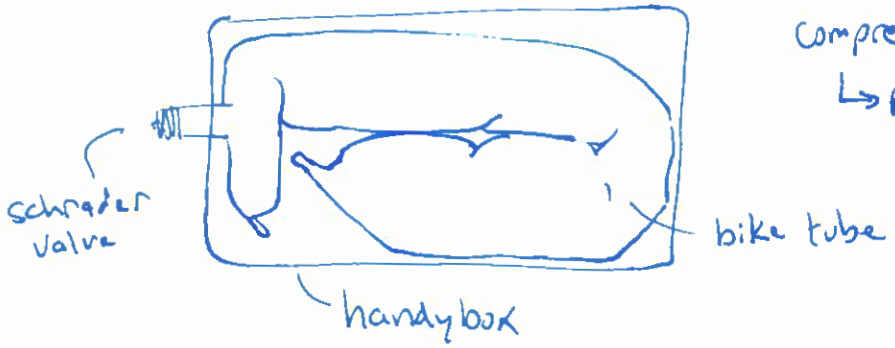
- height 1 = coffee table
- height 2 = small desk



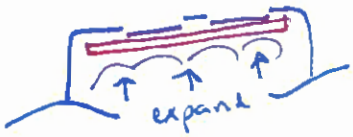
[10.01 Tech]

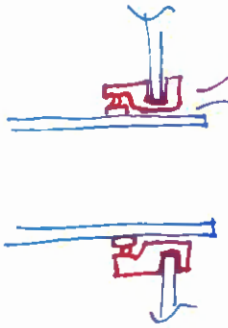
handybox display panel

- with pivot
- modular faceplate

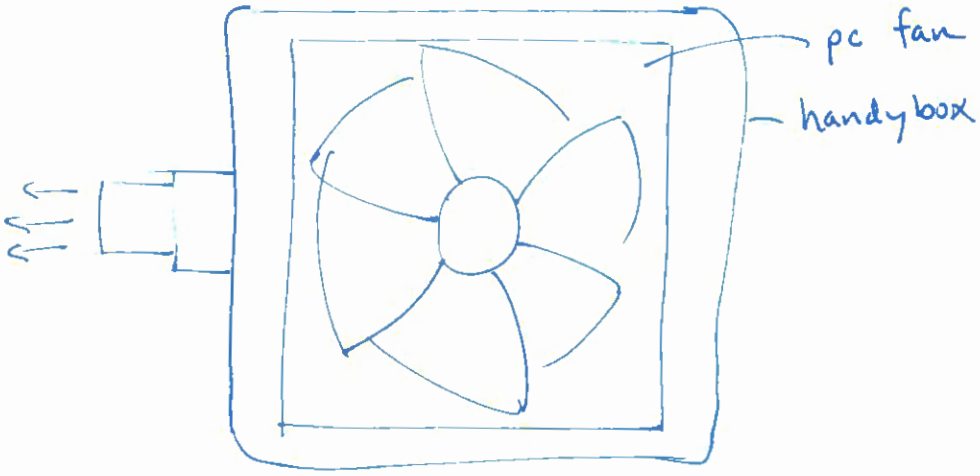


Compressed air reservoir
↳ pair w/ thin plate to form cutouts flush





Bearing 3D print
clearance for outr race
- inside race bond to EMT
- include 2 races for added strength



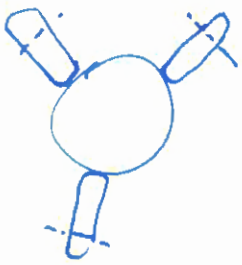
Custom blower w/directional nozzle, multiple ports

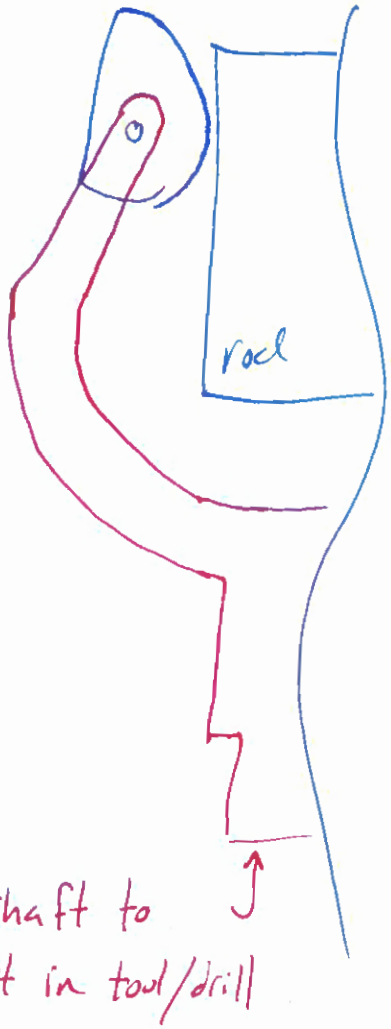
— OR —

air extractor

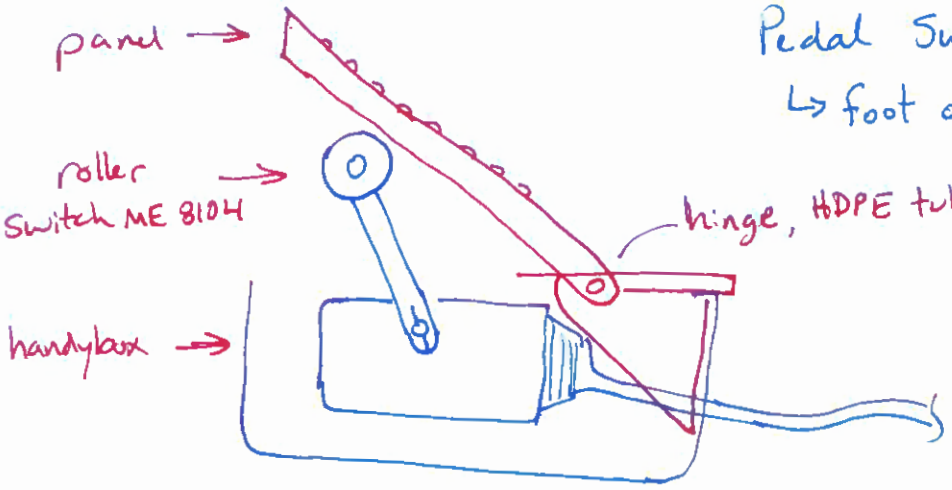
[10.01 Tech] 2

invent: cam-based grip for rods



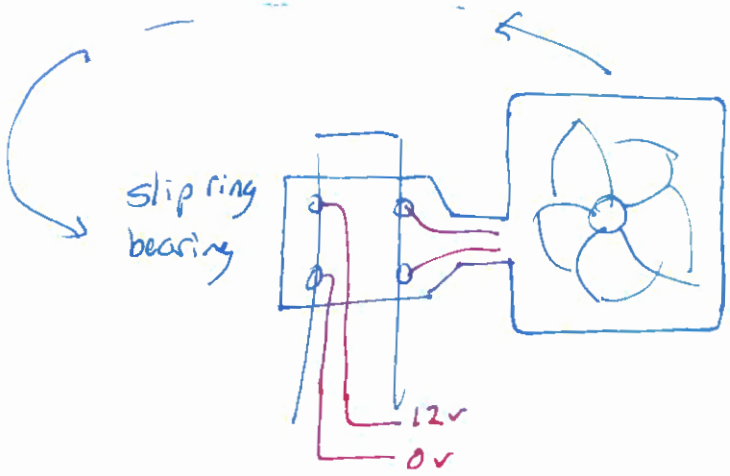


[10.01 Tech] 3

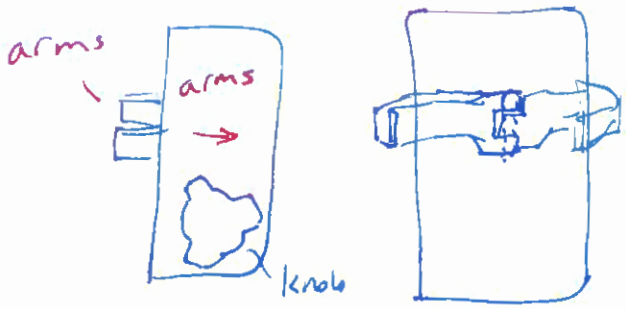


Pedal Switch
↳ foot operated

- wanted this for outdoor hand washing station
- strong box/pedal for shoes/boots/kick

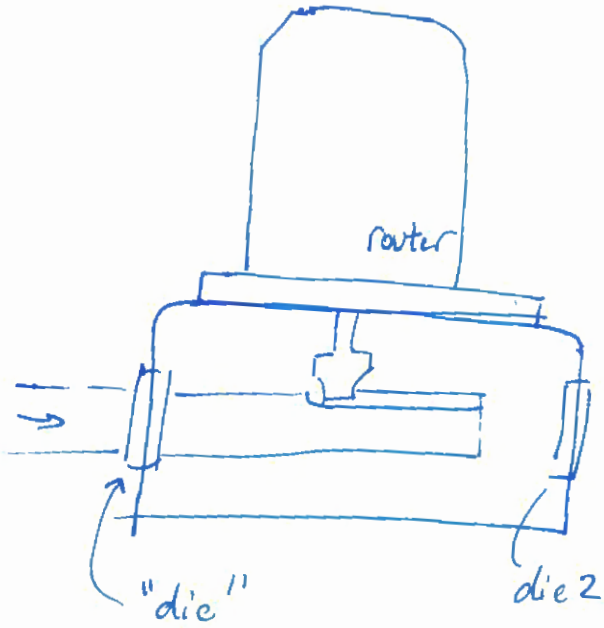


Fan spins around by it's own wind
- slip ring gives 360°∞ rotation



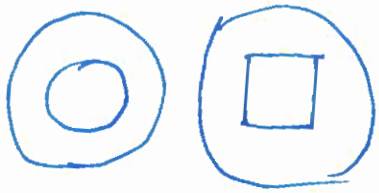
Broomstick holder
- can make knob to contract arms?
- can make it spring-return?

[10.01 Tech] 4



router machine

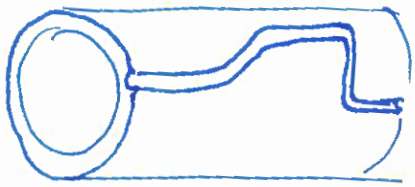
- die aligns slender material
  - ↳ ie wood dowel



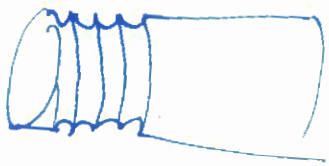
various profile inserts

- die 1 longer for entry alignment
- die 2 with final shape?

- can be used to carve paths in pvc



← looks like termite path

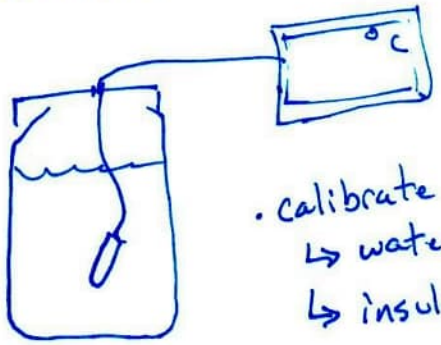


← cut "threads" for ball bearing

- can use with CARBIDE bur for steel work!

[09.29 Tech]

Weather station

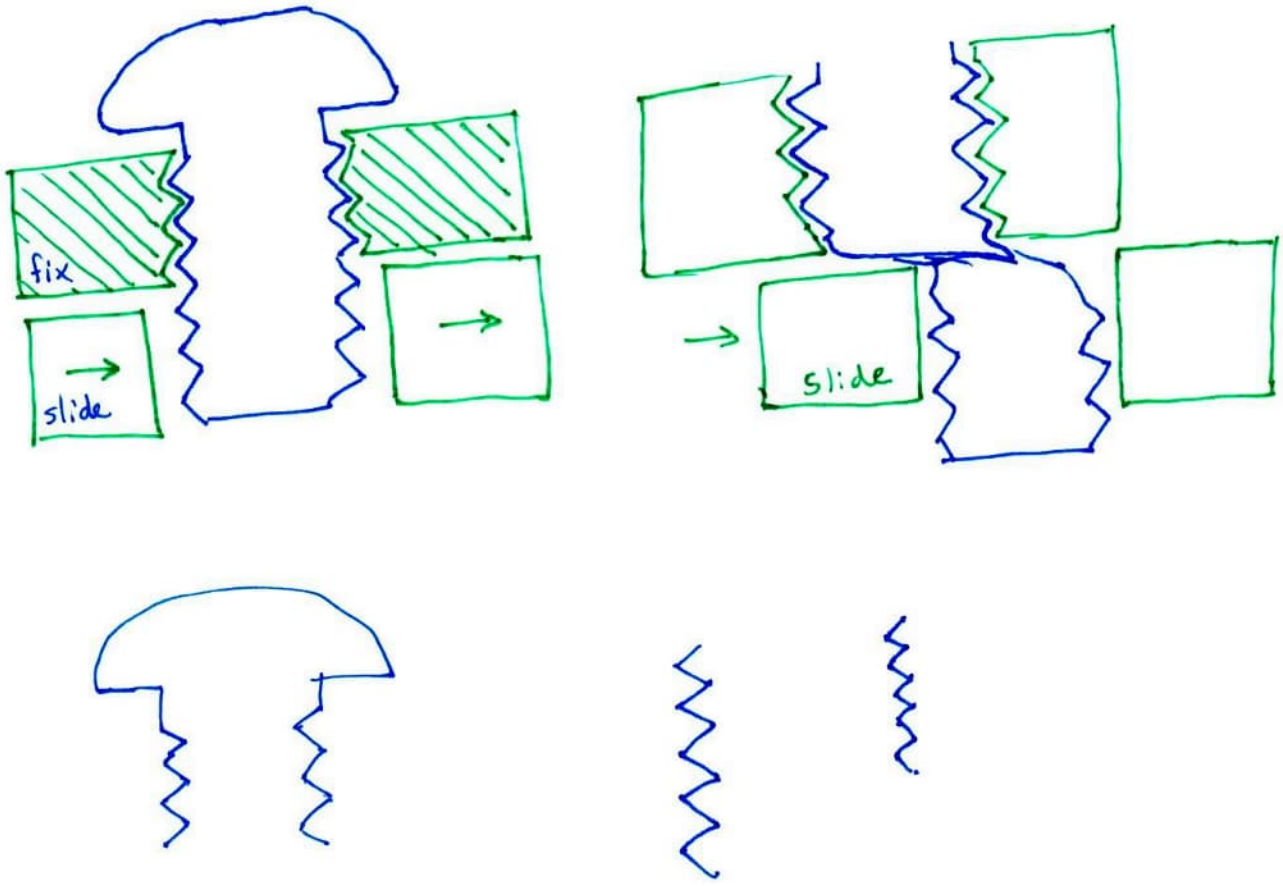


- calibrate to achieve temperature averaging
  - ↳ water: heat capacity
  - ↳ insulation: time buffer

insulation → time delay

therm mass → averaging

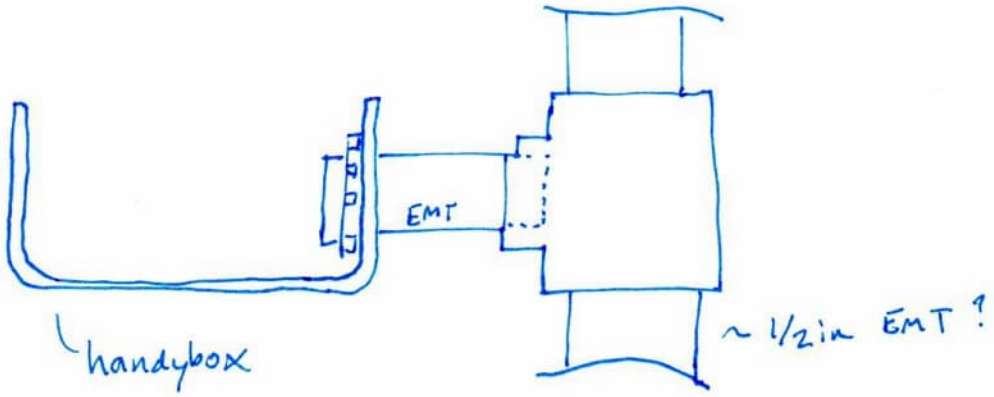
[09.29 Explain shearing a screw]



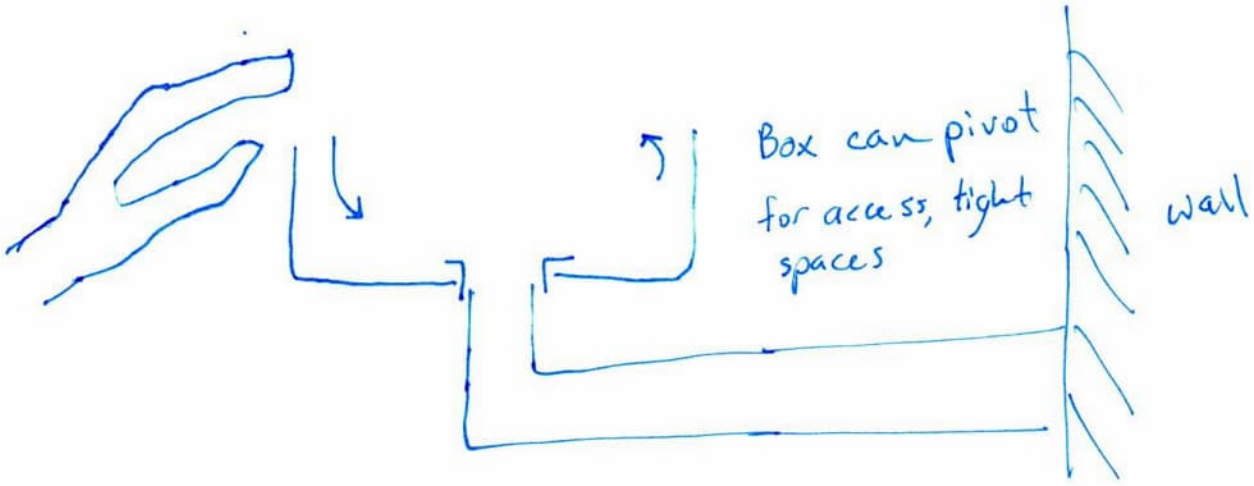
09. 29 Tech

Box rack for mount on vertical face or beam

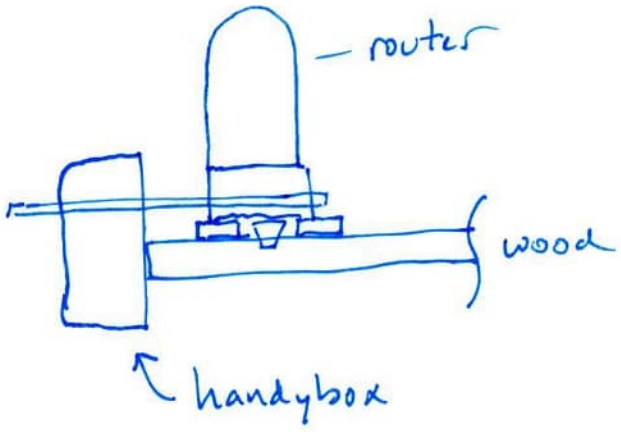
- note: a vertical beam is a column, not a beam



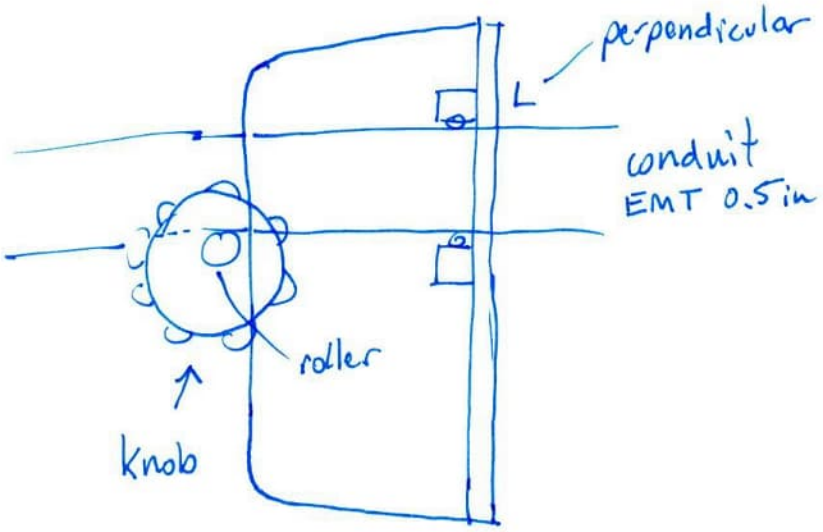
- could route USB cables & make modular phone charger



09.28 Tech 2



Fix router parallel to board & perpendicular, adjust depth from border, allow sliding



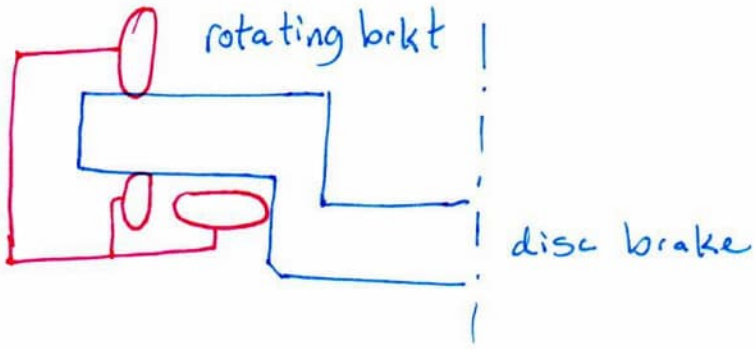
create contact roller for exterior knob to adjust position

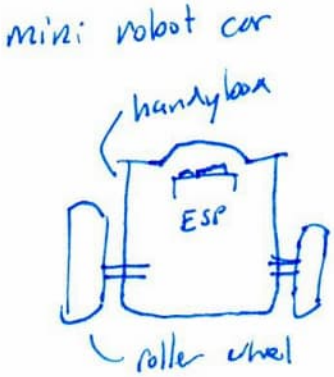
½ in EMT

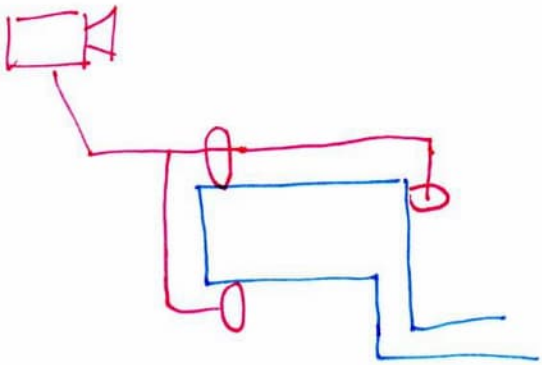
Use EMT for parametric parts.

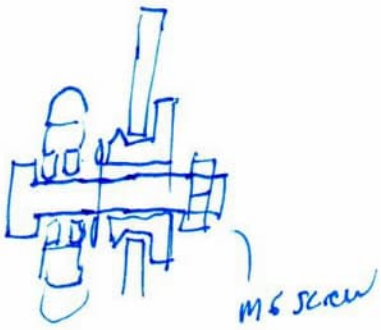
		min	max	nom	
d_1	ID	15.58	15.68	15.6	N=1 measuremt
d_2	OD	17.95	18.05	18.0	
Wall		1.11	1.18	1.15	

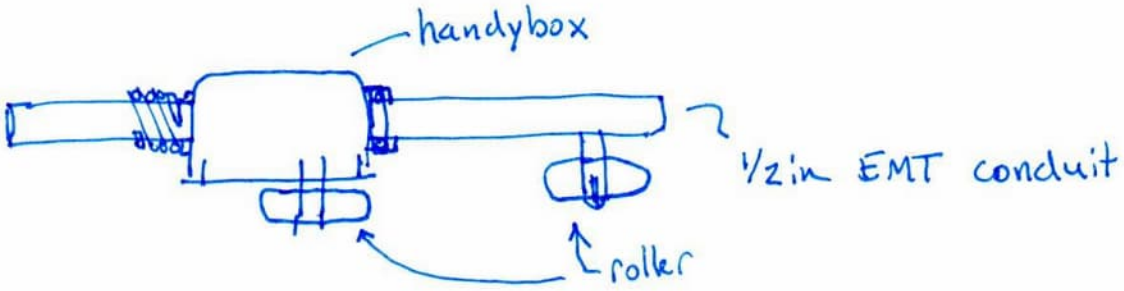
[09.28 Tech]


rotating brkt
disc brake


mini robot car
handybox
ESP
roller wheel




M6 screw


handybox
1/2in EMT conduit
roller

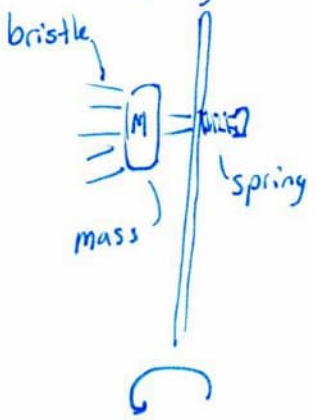
09.27 Tech Ideas

Bottle cleaning

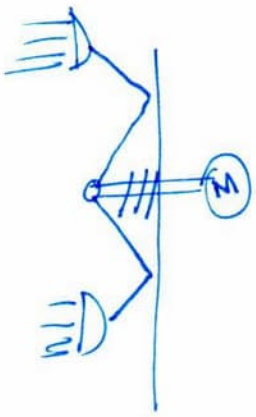
standard bottle brush

hex bit

weighted



- expand to size by weight
  - ↳ needs counterbalance



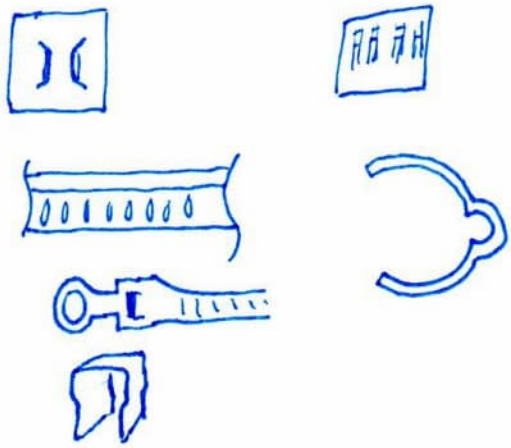
- mass on opposite side
  - ↳ give clearance
  - ↳ linkage extends brush

[09.27 Tech]

Youtube Video by David Malawey:
"how to clean up wires in electronic projects"
youtube.com/watch?v=31hwwpmNICo

Video - clean up your wires

- Parts:
  - mounting base
  - wiring duct, slotted, PVC
  - mounting cable ties
  - pin cover, dupont
  - pin housing, dupont
  - mounting features, ie Dinkle
  - cable clip, loop
  - velcro, 2-sided
  - bonded wires, paired, 18AWG
  - spiral wrap
  - ~~velcro, 2-sided~~



Dupont
↳ don't peel
↳ buy packs
↳

Strategies:
- chassis is ground
- folding method
- exposed for testing

	Goal
short term	· better than nothing
mid term	· easy to adjust
long term	· all design goals · secure · aesthetic ·

[Organizing 09.26] (Tech)

Targets:

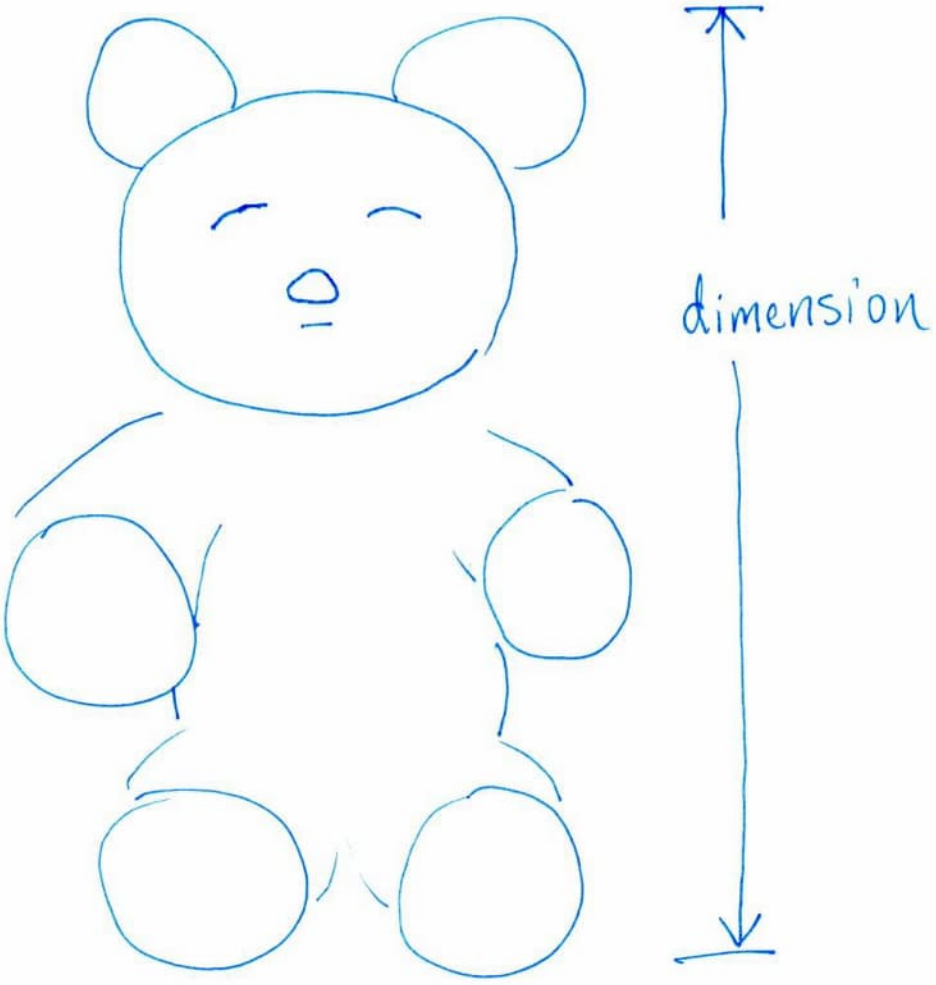
1. find it with no hands
2. refrieve it w/ 1 hand
   - ↳ no need lift other things
   - ↳ no prevent toppling/spilling
   - ↳ no moving other items to access
3. put away w/ 1 hand
   - know where to put it w/ no hands
   - decide where to put it w/ no decisions

Strategies:

- consider grocery store
  - ↳ Locating ↓↓ retrieving ↑↑
- red tag event
  - ↳ reduce & sift by usage
- real-estate method
  - ↳ my most active spots deserve most effort
  - ↳ most used items;
- add constraints
  - ↳ we start w/ infinite options
    - use existing features: ie beltclip
    - be intentional on rev1 : arbitrary choice becomes startpoint
    - add function with "I want to"
      - ↳ ie hang paintbrush w/ wet bristles
  - ↳ constraints come from knowing what you want
    - ↳ knowing your need comes from doing more of what you do
    - ↳ which in turn requires low cycle time
    - ↳ which comes from good organization

[09.26 Tech]

Original Plans



To repeat a build:

- Use original design sketch
  - ↳ eliminate errors from measuring your work
  - ↳ update sketch w/new knowledge

[09.26 Tech]

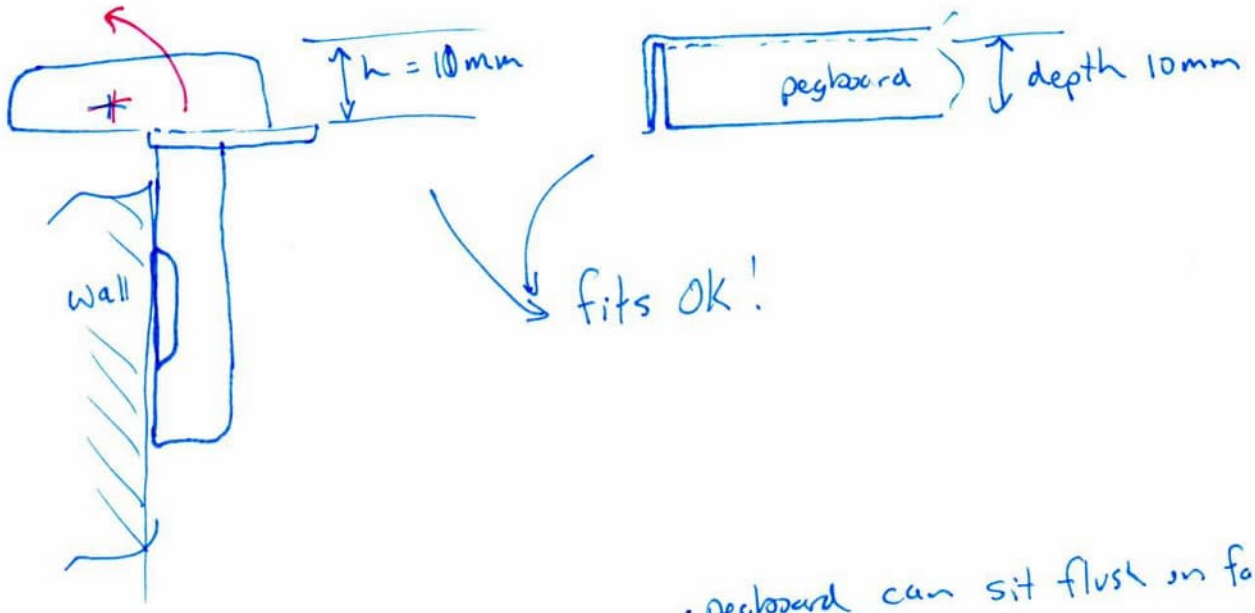
Undeniable 3D print use cases

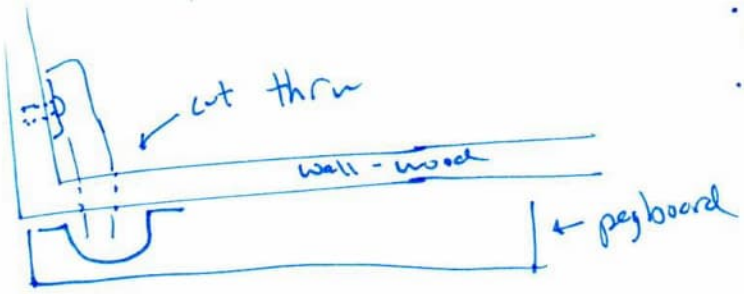
- custom cakes @ scale: DairyQueen
- custom shirts @ scale: every screenprint
- custom biz cards @ scale:
- poor example: prosthetics: too hi value
- custom vinyl car stickers: small biz

Imagine if 3D printers
↳ could only make tshirts, in one color, in 1 hour

[09.25 Tech] (3)

cabinet hinge - H042, H45, 4C65-01 markings

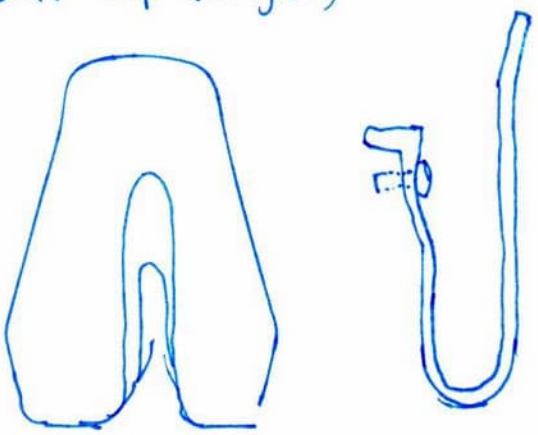




- pegboard can sit flush on face
- hinge ctr of rotation gives clearance
- fixed hinge brkt = 2-piece
  - ↳ easy hole drill
- rotating hinge brkt rest inside pegb.
  - ↳ bolt from inside

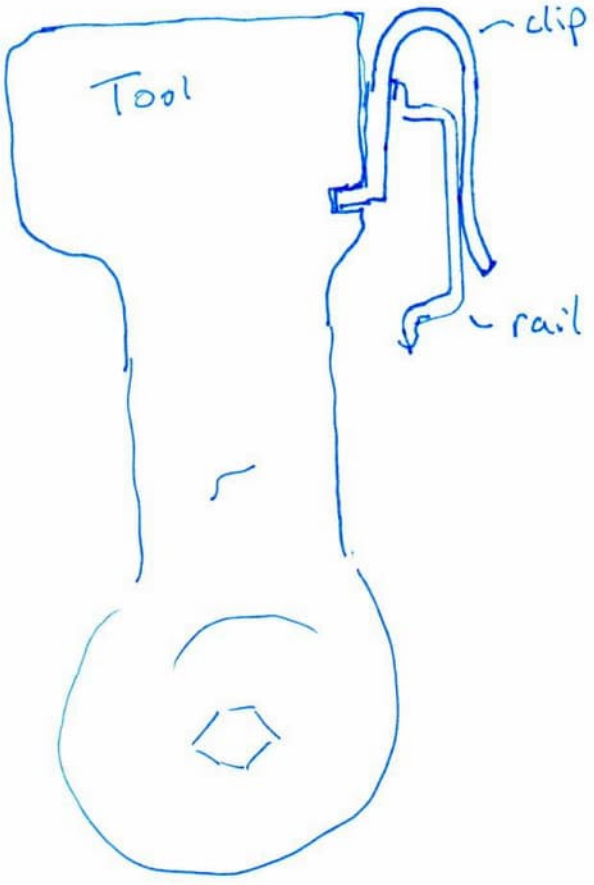
[09.25 Tech (2)]

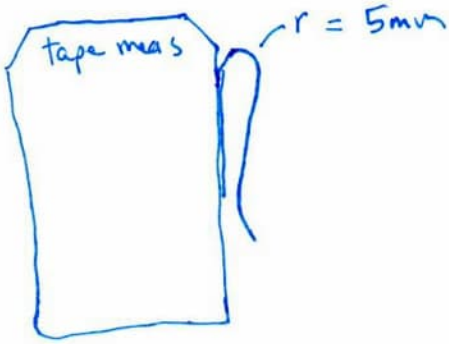
Belt clip (ridgid)



DIN Rail

Belt clips fit snug on DIN rail

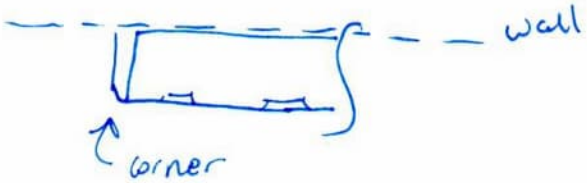


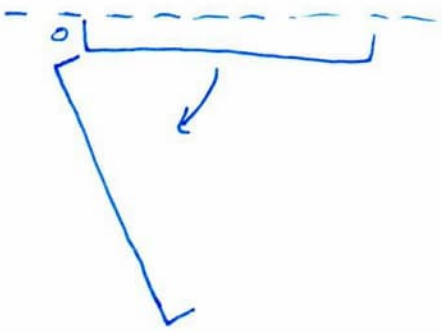


tape meas clip too small
↳ can be forced

[09.25 tech]

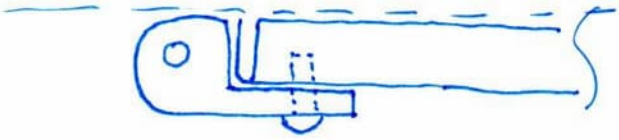
Pegboard panel – can make blind hinge?
↳ get access to back side for using fasteners

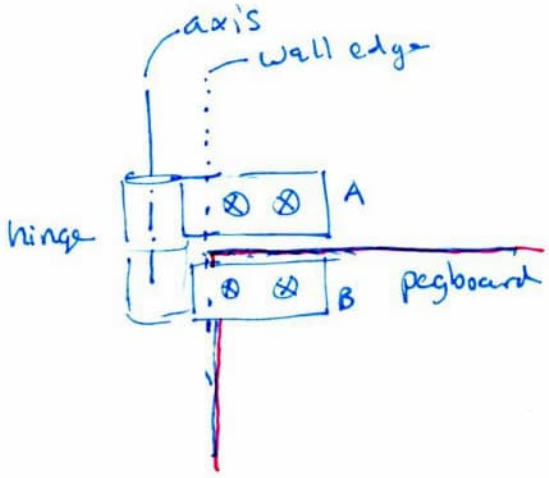




can maintain flush?
↳ no interfere w/wall

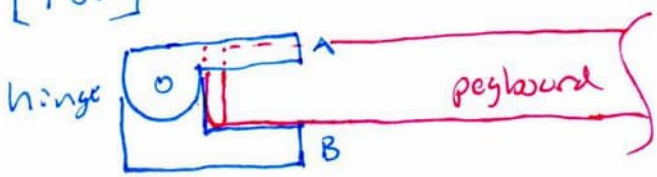
hinge





port A → flush w/wall
port B → flush w/pegboard

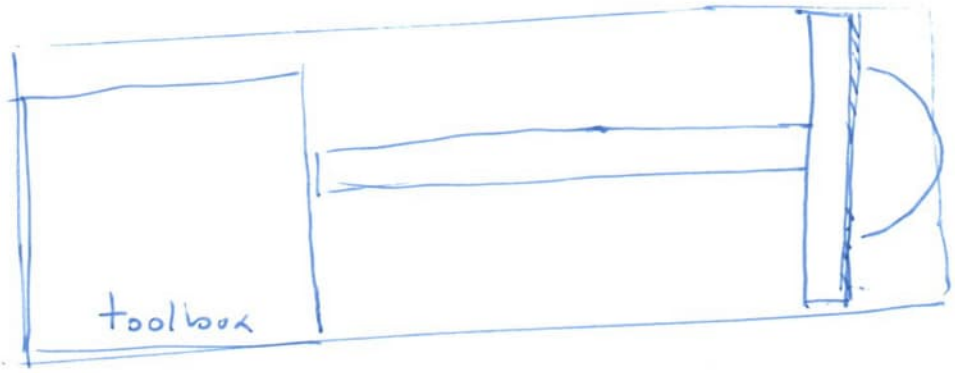
[TOP]



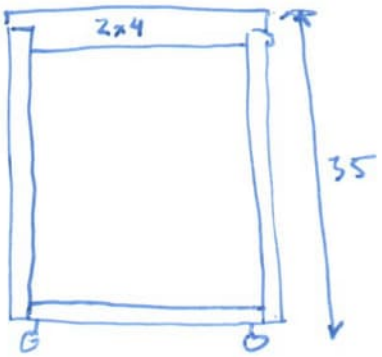
09.23 Tech

minimum effort to eliminate big table

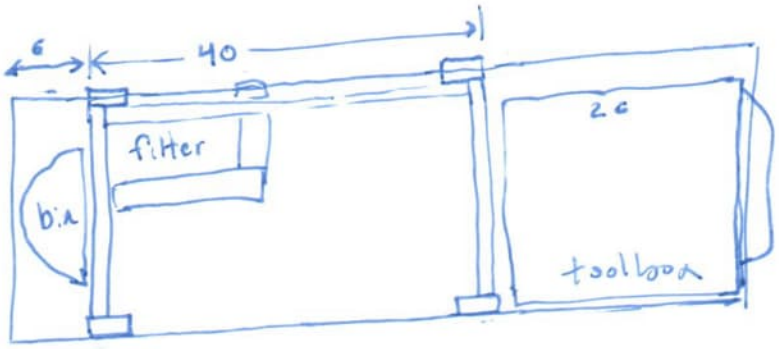
X



Steps:
- remove cables
- remove top beams.
- remove vac seat
- shorten lower horiz.
- put 40" rect beams on new table, 19"



✓

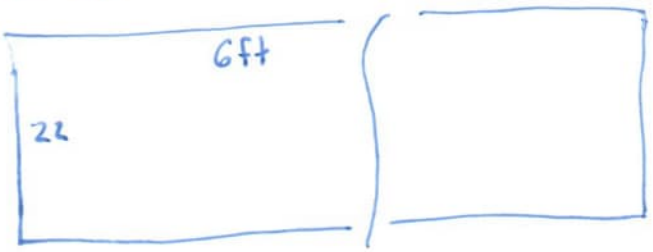


[09.23 Tech]

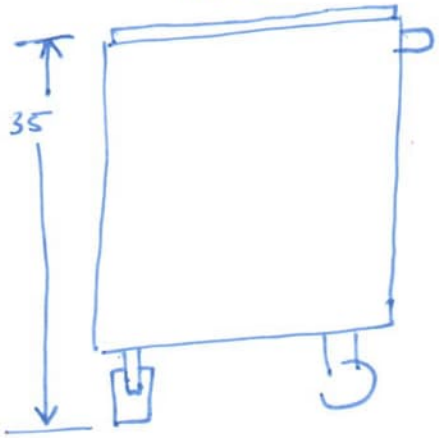
Table design

Toolbox TOP

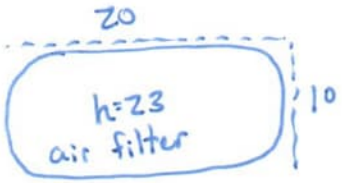
Table top



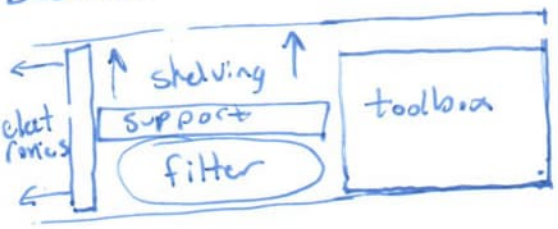
Front



storage
- tapes (thin plate)
- air filter
- cut board
- outlets

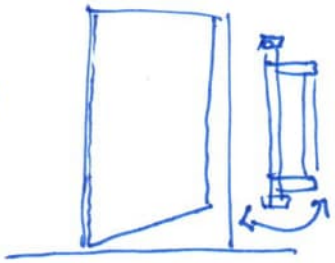


Desired:



[09.21] Tech

Vert bar use cases?

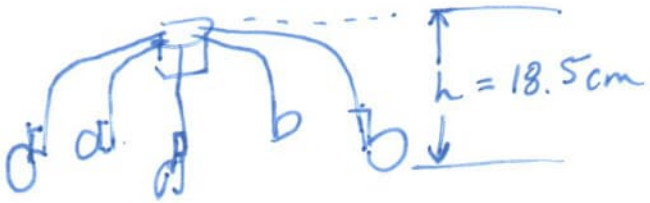


· closet: 2x4 shelf, ties & rings

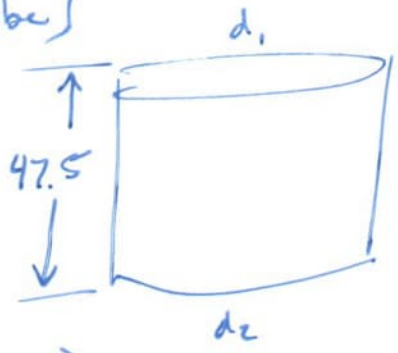
·

[09.22]

Rolling chair base



[Tube]



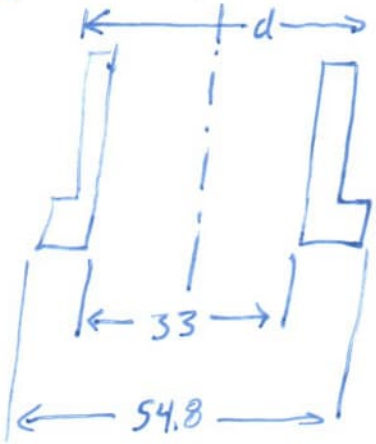
d_1 49.2

d_2 47.7

d_{pvc} 42.9 (outside diam)

d_{steel} 33.3

[ADAPTER]



49.2 - 33.3 = 15mm

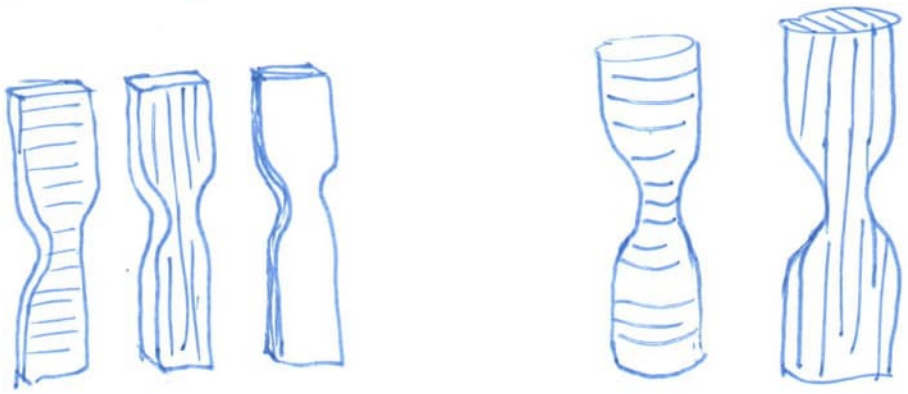
wall ≈ 7.5mm

↳ strong enough not to compress?

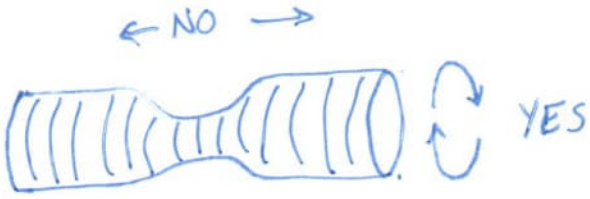
[09.20 Tensile testing]

Thin Shape 3 tests required

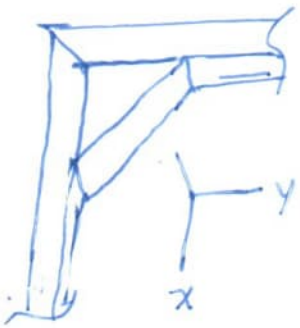
Round Shape: 2 tests required

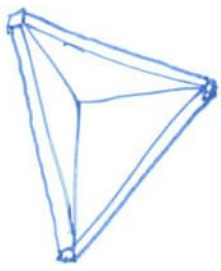


HOWEVER designer chooses loads for strong direction



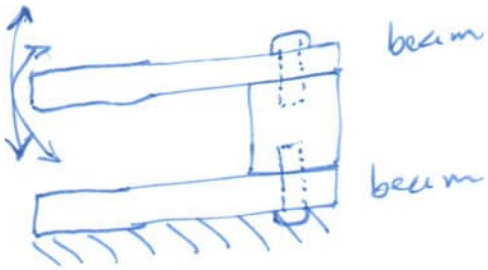
Example design





↳ has 1 weak vector

09.20 (2) Tensile Testing



shear is worst case
↳ how to prove it?

← in this situation

designers will add this

if loads are known, designer accomodates
- ↳ increase size
- ↳ proper grain direction

if loads are unknown,
- ↳ it is in twisting
- OR
- ↳ it is in IMBALANCE
- OR
- ↳ machine has failed
  - ↳ THEN
    - ↳ Load is NOT in planned direction

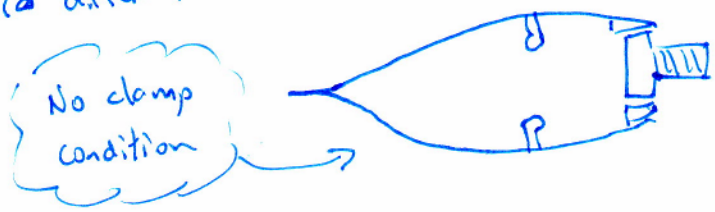
"If a part fails you replace the designer.
But if a system fails you adjust the design"

↳ parts should never fail in the intended load direction

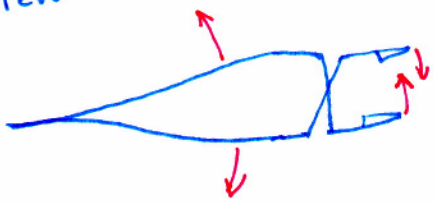
09.22 Tech (2)

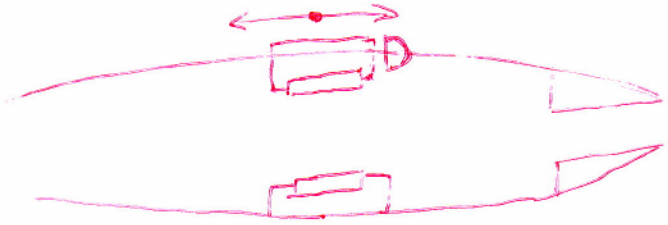
[Tweezer]

want: clamp @ different sizes



reverse tweezer : purpose = clamp & hold + variable size

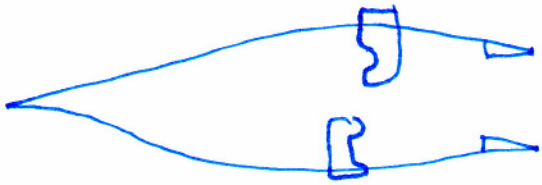




09.22 Tech

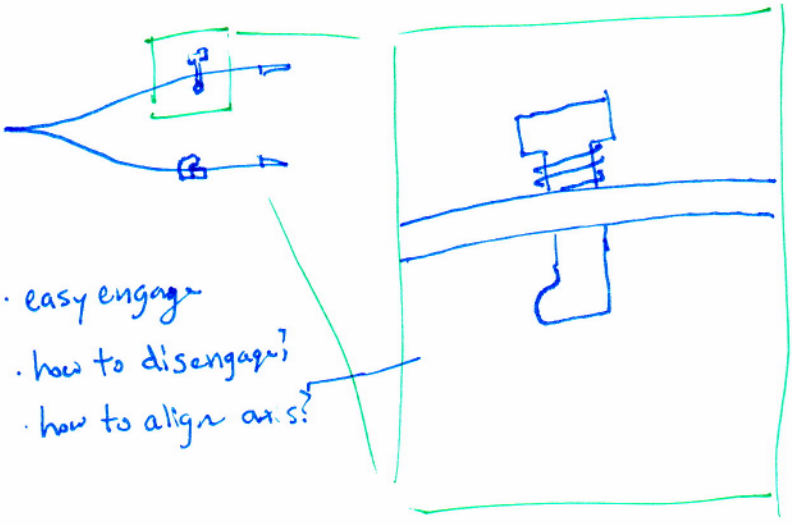
invent tweezer

ordinary

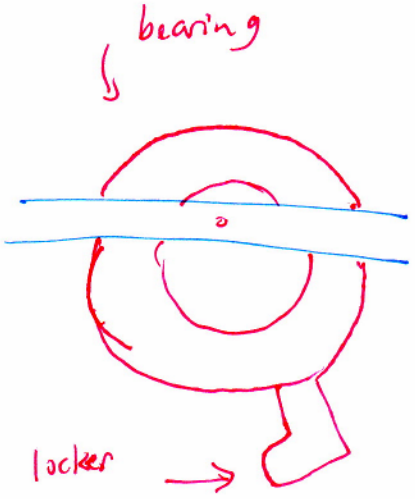


locking

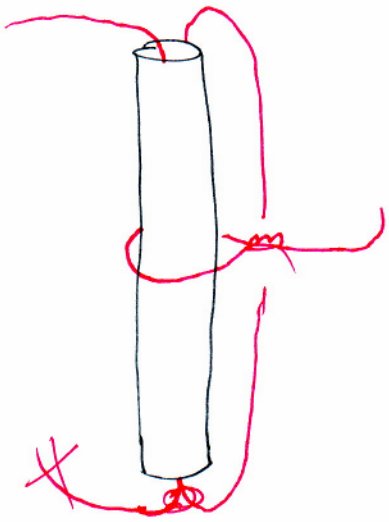
want:
- both function in 1 device
- change function w/ 1 hand
- locker does NOT interfere w/ ordinary function
- lock function!
  - ↳ consistent pressure
  - ↳ engage w/ 1 finger
  - ↳ disengage w/ 1 finger
  - ↳ does NOT accidentally engage
  - ↳ does NOT jiggle

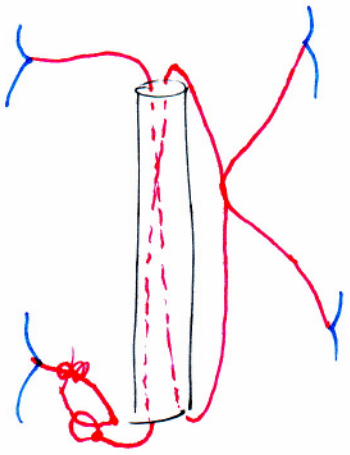


- easy engage
- how to disengage?
- how to align axis?



Tying Bundles 09.21

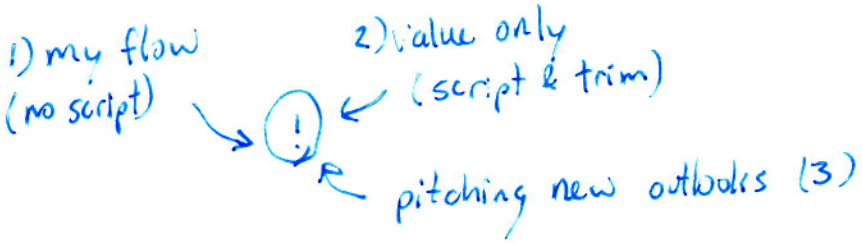




[09.20 Self · tech ideas]

[On making video content]

- challenge at hand: conflicting intentions



[What if]

- Each 1-minute of film targets 1 value add
  - ↳ simply ask: am I adding value? (yes = proceed)
  - ↳ exceed 1 minute only if explanation requires
- Sell my ideas
  - ↳ After adding value, immediately following
  - ↳ value → explanation → promotion

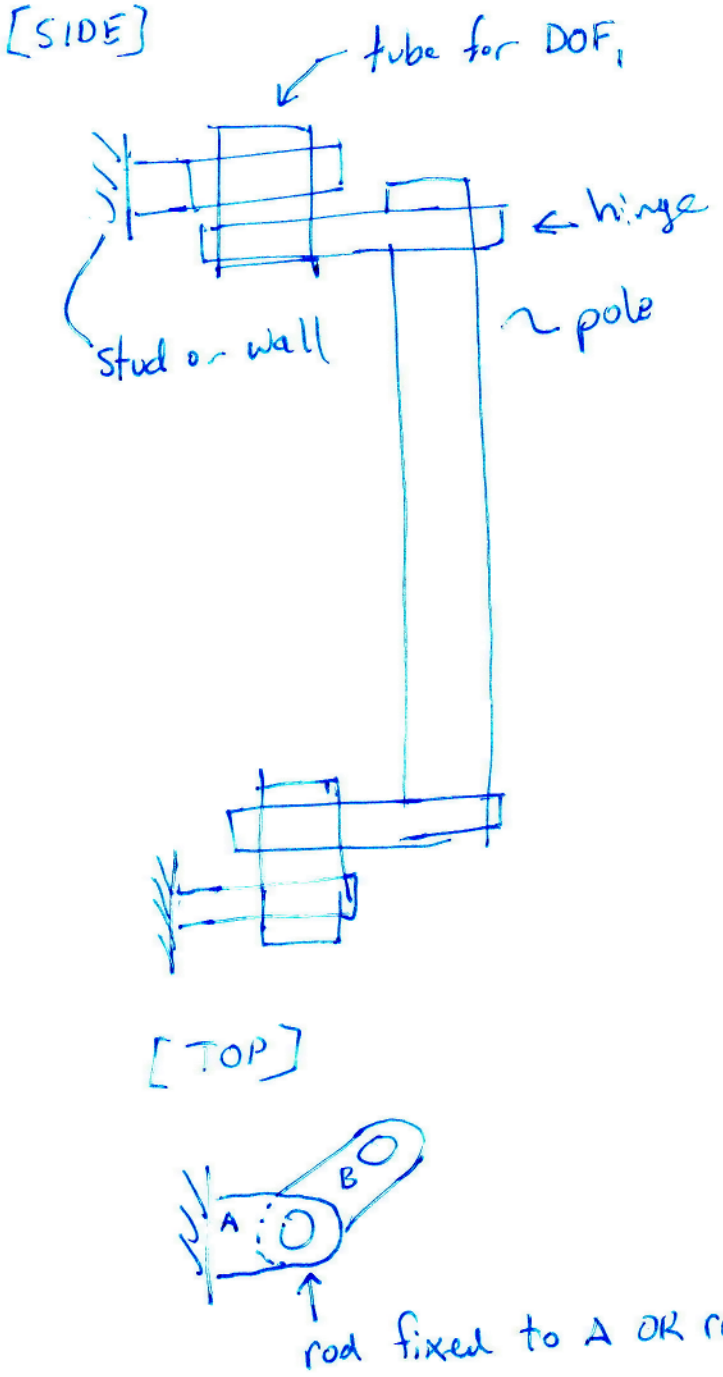
[Lesson]

- last video: enclosures
  - ↳ made cuts (large sections) despite "but I liked this part"
  - ↳ "It does not add value directly @ topic"
  - ↳ Then, received comment: "your videos add more value per minute than any others! ♡♡"

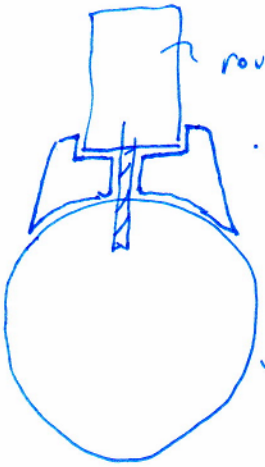
[09.20]

Design

2-DOF Jointed beam



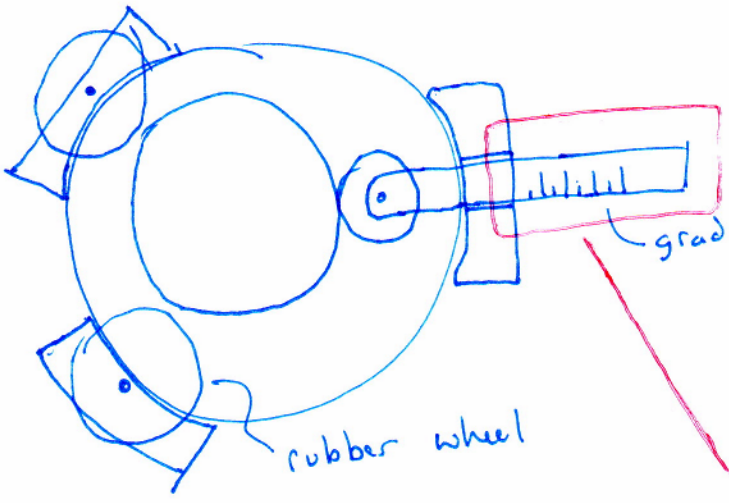
[09.07 Tech]



- control perpendicularity of router
  - ↳ perform vacuum while cutting

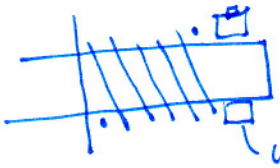
FRONT

internal clamping of round stock

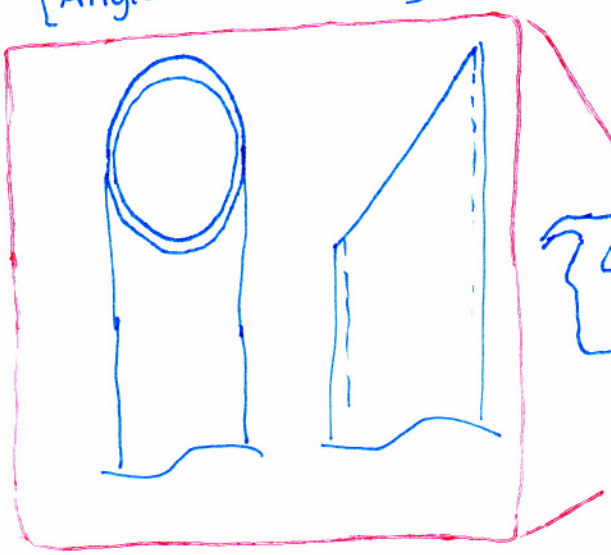


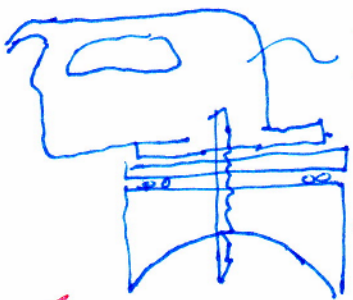
- perform measuring
- clamp & rotate

[Angled cut control]



control force w/ spring

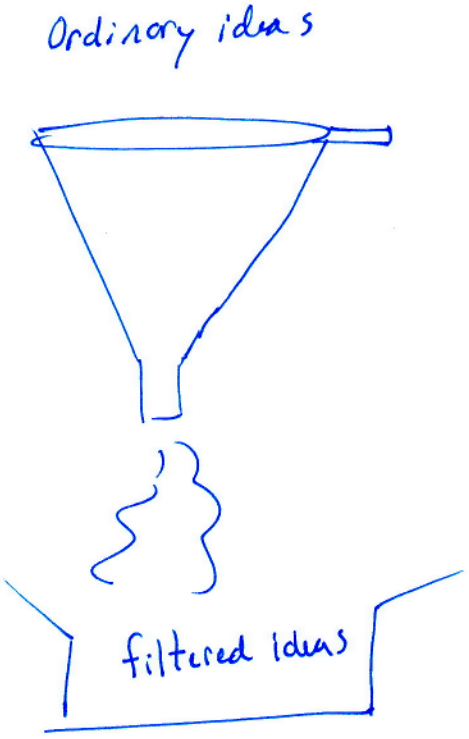




- Use pivot base to control perpendicular OR angled cut

[09. xx video chat]

"Ideas are cheap. Execution is gold"

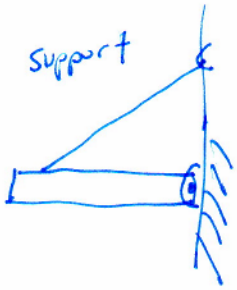


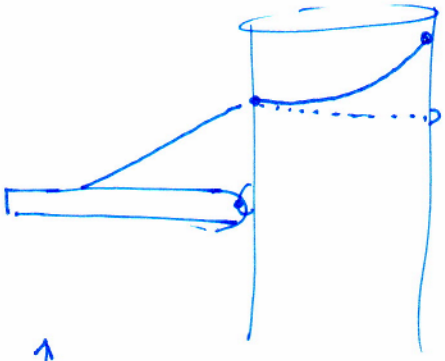
- ☐ manufacturable
- ☐ safe
- ☐ scalable
- ☐ novel element
- ☐ compatible
- ☐ AI won't displace
- ☐ geographically immune
- ☐

09.06 Tech

cantilever

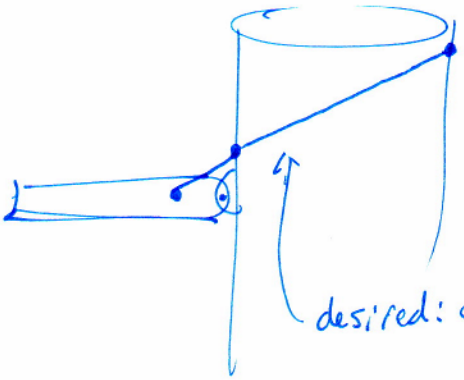
support





↑ can achieve full height h_z for support?

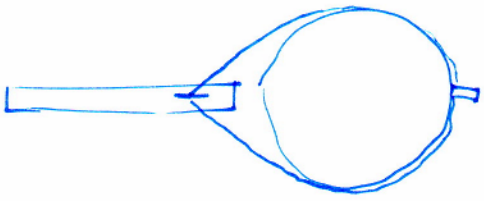
SIDE



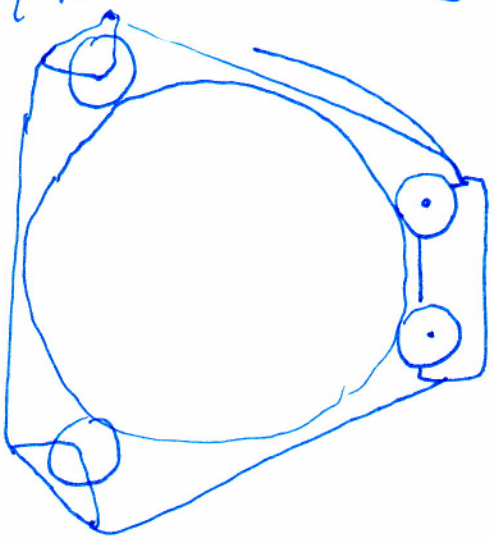
desired: one continuous beam behavior

if it works it allows bearing against pole surface for 360° rotation of beam

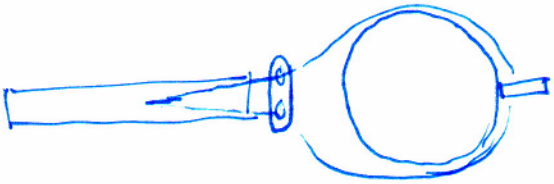
TOP (A)



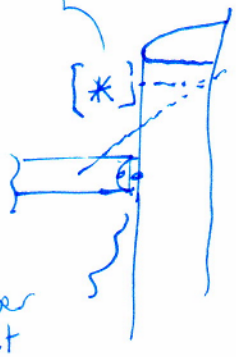
[upper set of bearings]



TOP (B)



upper set



lower set

[09.09 Tech -Video]

[N America]

Mouser
Digikey
McMaster
Automation Direct
Arrow Electronics

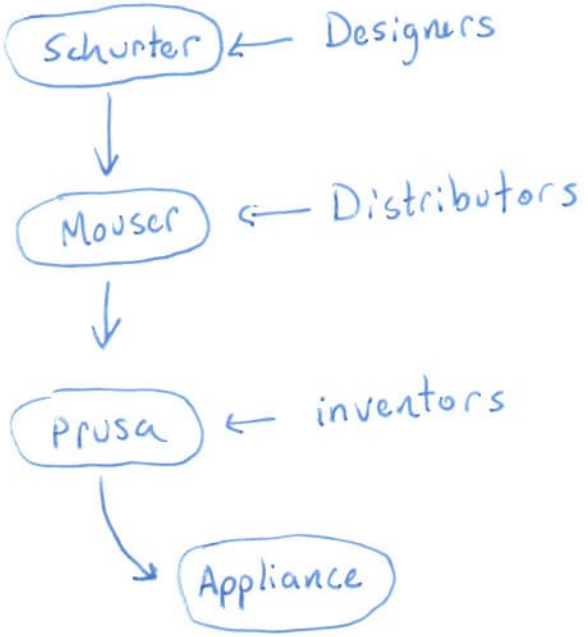
Amazon

[Asia]

Digikey
Rs Components
Misumi

Cytron
Lazada

[oops! I meant Manufacturer or Designer]



(IEC) International Electrotechnical Commission
iec.ch/ip-ratings

isolite
The Emergency Lighting Experts

IP RATING CHART

Ingress Protection (IP) Ratings gauges the protection of mechanical casings and electrical enclosures against intrusion, dust, accidental contact, and water.

IP Ratings are determined by combining one digit from each of the two columns below.

SOLIDS

1 Protected against a solid object greater than 50mm, such as a hand.

2 Protected against a solid object greater than 12.5mm, such as a finger.

3 Protected against a solid object greater than 2.5mm, such as a screwdriver.

4 Protected against a solid object greater than 1mm, such as a wire.

5 Dust Protected.
Limited ingress of dust permitted. Will not interfere with operation of the equipment.
2-8 hours

6 Dust tight. No Ingress of dust.
2- 8 hour

Rating Example:

IP65

Ingress Protection

LIQUIDS

1 Protected against vertically falling drops of water.
Limited ingress permitted.

2 Protected against vertically falling drops of water with enclosure tilted up to 15° from the vertical.
Limited ingress permitted.

3 Protected against sprays of water with enclosure tilted up to 60° from the vertical.
Limited ingress permitted for 3 minutes.

4 Protected against water splashed from all directions.
Limited ingress permitted.

5 Protected against jets of water.
Limited ingress permitted.

6 Water from heavy seas or water projected in powerful jets will not enter the encloure in harmful quantities.

7 Protection against the effects of immersion in water between 15cm and 1m for 30 minutes.

8 Protection against the effects of immersion in water under pressure for long periods.

[09.05 Tech]

video: enclosures

[rules of thumb]

1: mating fit (0.3mm), 0.6mm diameter

2: deboss: 0.5mm +, no serif font DS 150

↳ DS 150 bold

↳ 6mm height, 6mm from base

↳ agree w/ z axis

3: draft angle mate: start @ 2°

4: clamp ring: 270°

↳ with compliance

↳ without: start @ 190°

5: wall thickness 2.4 mm

↳ dims < 100mm

↳ multiple of extrusion width

6: hole, vertical ≤ 6mm

↳ no overhang

↳

7: base chamfer 0.8mm

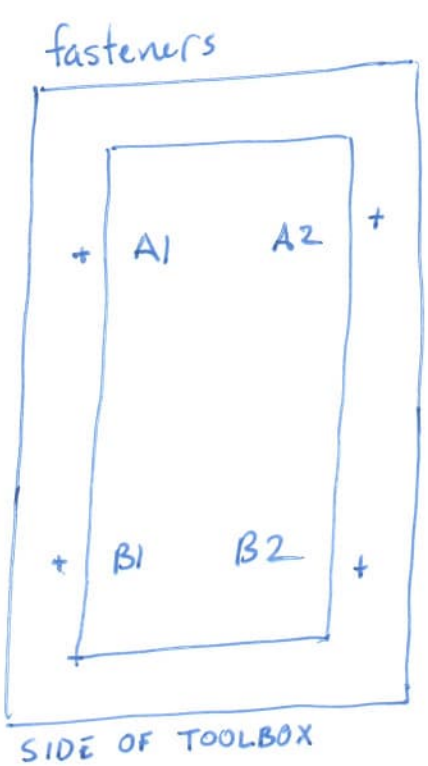
↳ no burr, slightly notice,

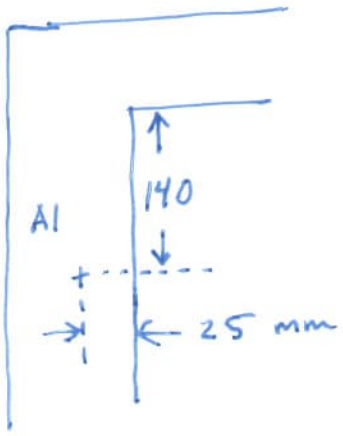
8: Threads: 4mm hole, M2.5 screw

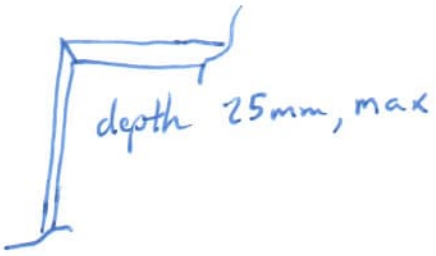
↳ print-in-place: ≥ 6mm (M6)

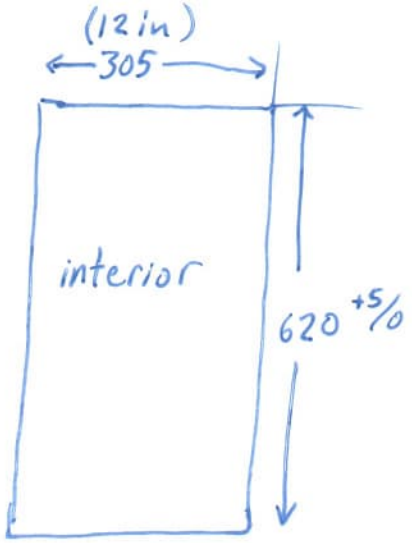
[09.09] Tech

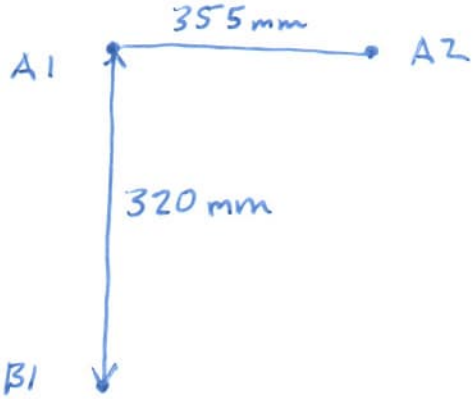
Toolbox Dims





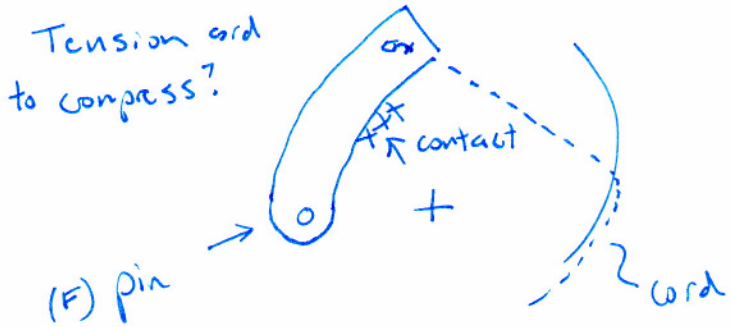






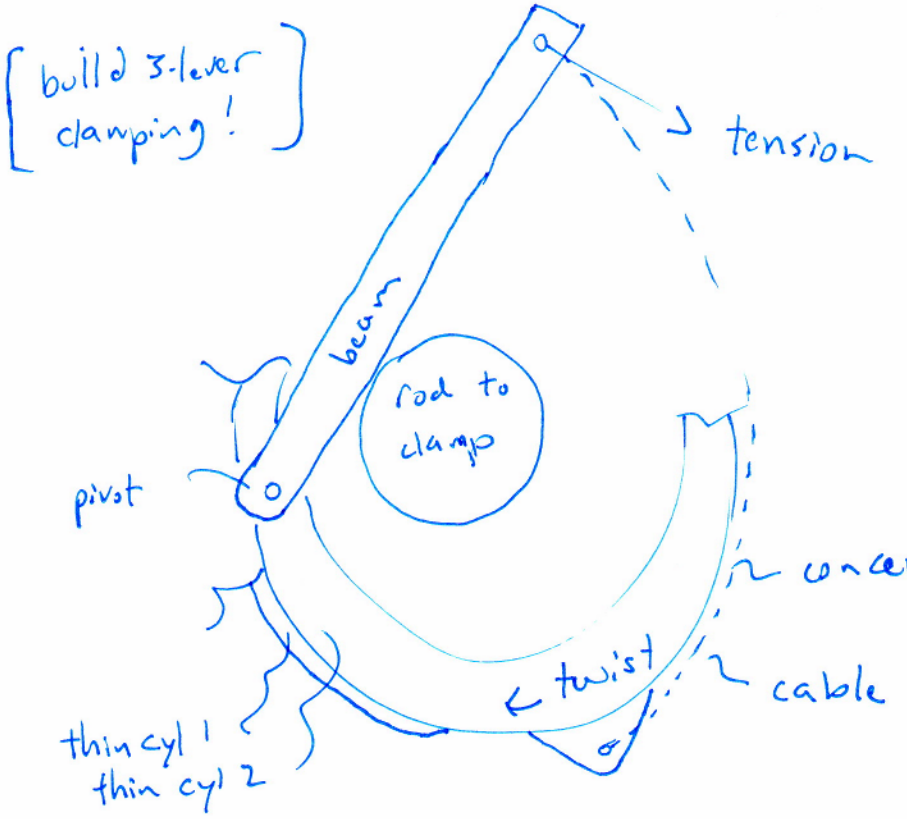
rivets: 14 cm from interior top edge
2.5 cm outside vertical edge
32 cm vertical spacing

[09.04 Tech 2] [collet/chuck design]



(F) fixed radius
(C) compressing radius

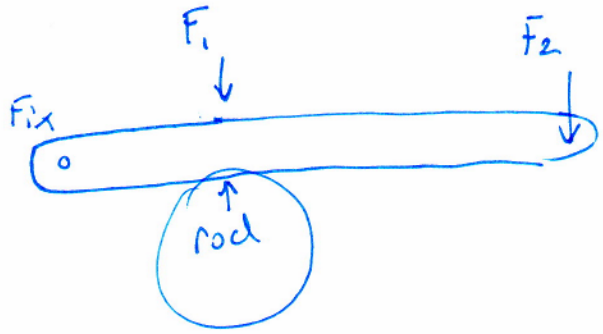
[build 3-lever clamping!]



let beam behave as lever

- using cord allows for pre-tensioning & eliminate backlash/nonconcentric clamp

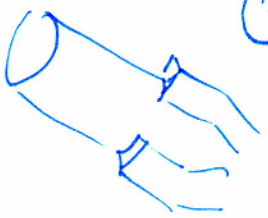
- thin cylinders
  - ↳ paired
  - ↳ remain concentric
  - ↳ 1 fixed, 1 rotate
  - ↳ lock when tight



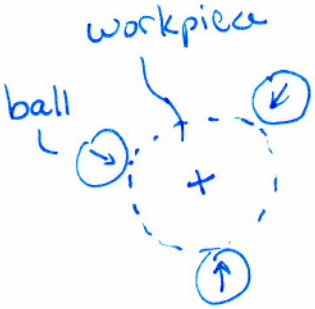
[09.04 Tech]

collect concepts:

can be used as ROBOTIC end effector
↳ add adjustable tension, encoder on actuation, add anti-backlash easily



(?) can I convert roundness requirement to flatness?



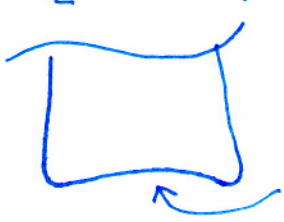
clamping pieces must be concentric

LASER

clip on scissors
↳ on saws
↳ on fans!

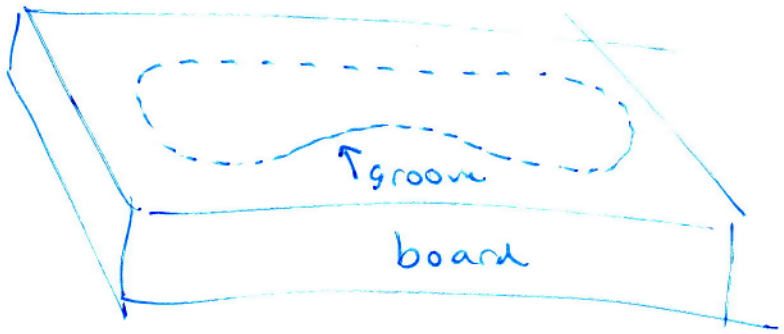
Grip / clamp

OR, adjustable volume reservoir?

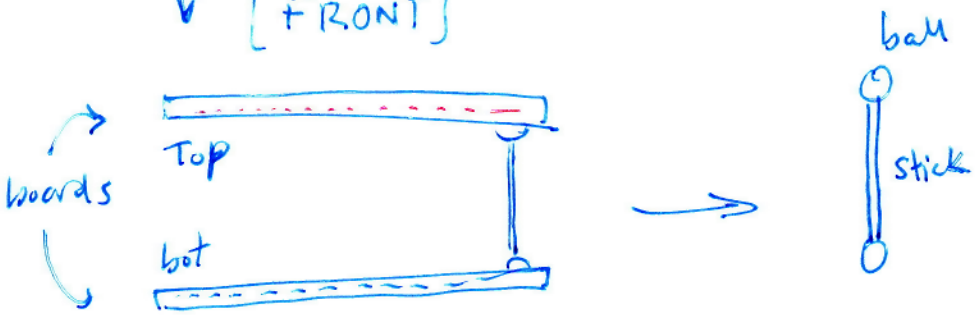


[09.03 Tech]

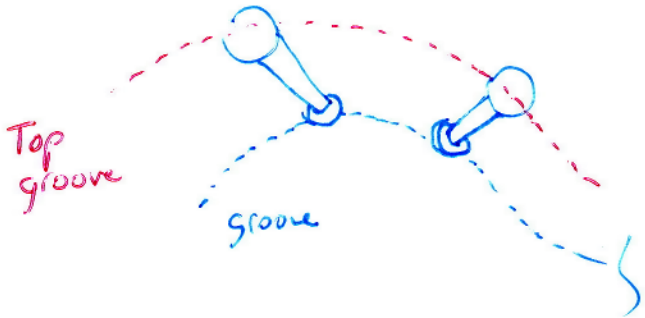
ISO



[FRONT]



Top perspective

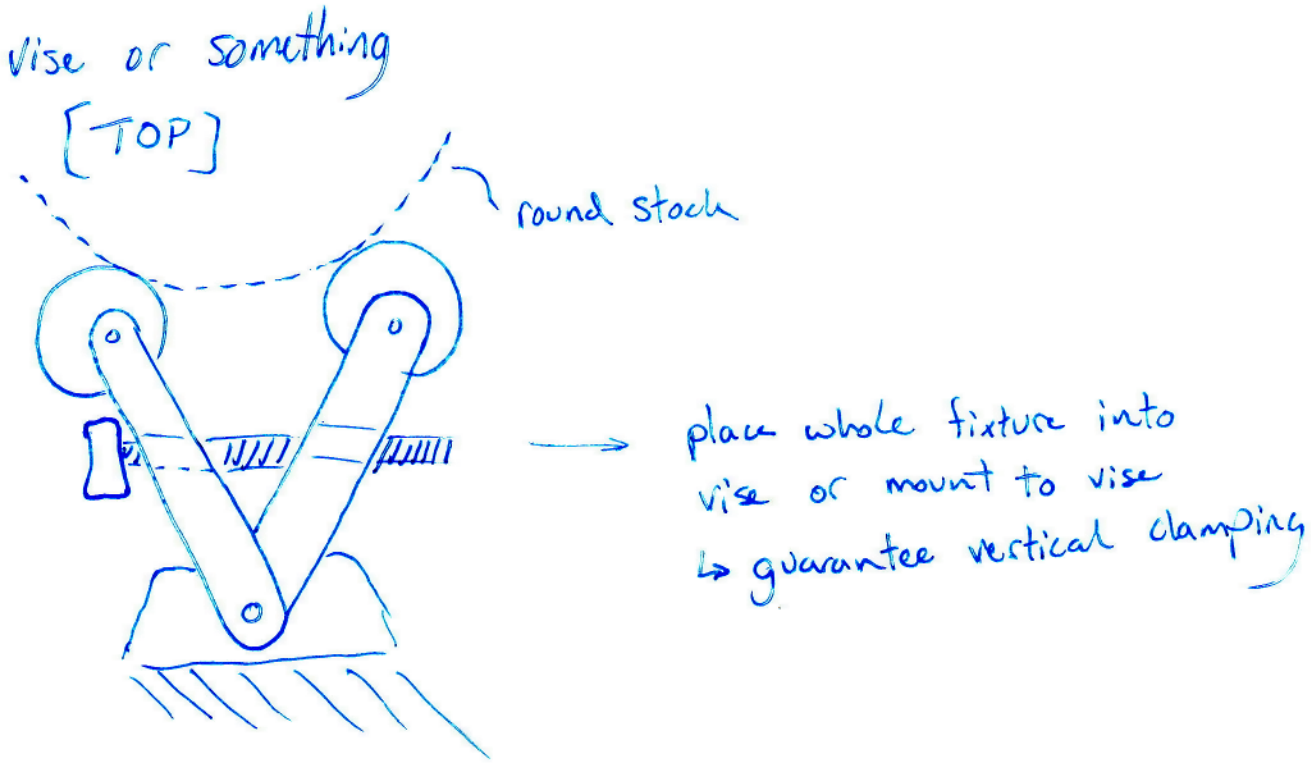


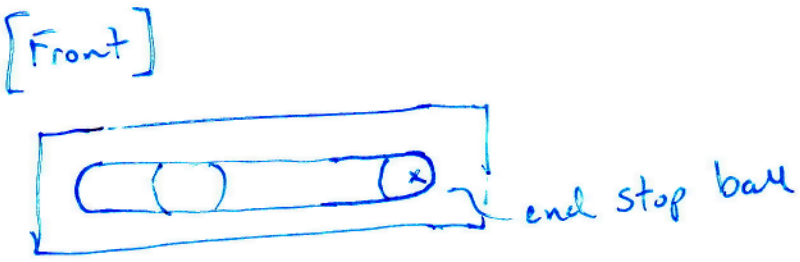
← add flexible panel, textile
↳ sheet can sweep along path
↳ performs like tambour door

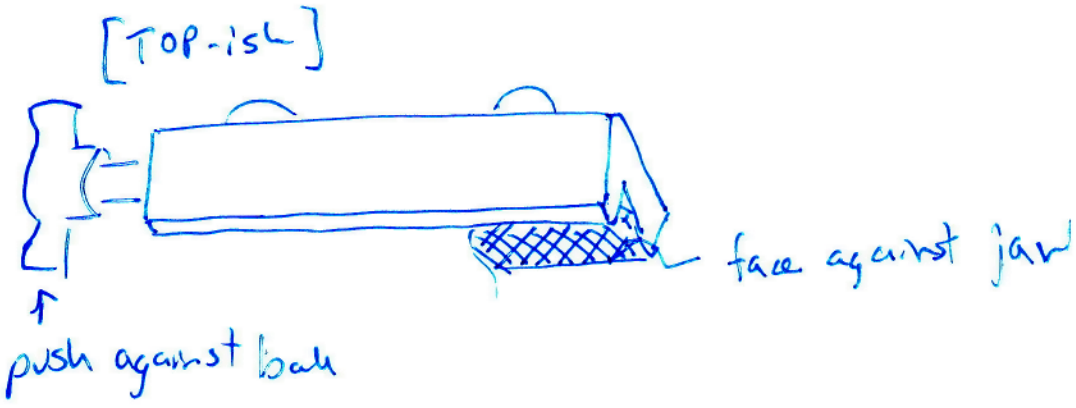
↳

ex use case:
big scrolling whiteboard

09.02 [Tech]


vise or something
[TOP]
round stock
place whole fixture into
vise or mount to vise
↳ guarantee vertical clamping


[Front]
end stop ball


[TOP-ish]
face against jaw
push against ball

09.02

2 paths for Videos:

[Its Teachable]

↳ Im already working a project which has teachable elements

- less script, more intimate
- maybe timeless
- guaranteed parts/supplies on hand

x pace is slow

- hits "engineering mindset" in realtime

[Topic Needed]

↳ this topic is central to my learners

- scripted more, planned

x disrupts my projects

- great for timeless reference

x risk of AI waste[1]

Footnote

1) AI waste is that which AI can produce or even enhance my own

~~08.29~~ 08.30

"Dont set bigger goals just because good things happened."

Floor epoxy → goals were limited by:

1) material cost
2) time, to coat sections
3) available garage space
4) limit setbacks if coating fails

if item 1 is negated, proceed thoughtfully!

[C8.2x Video: Design interaction]

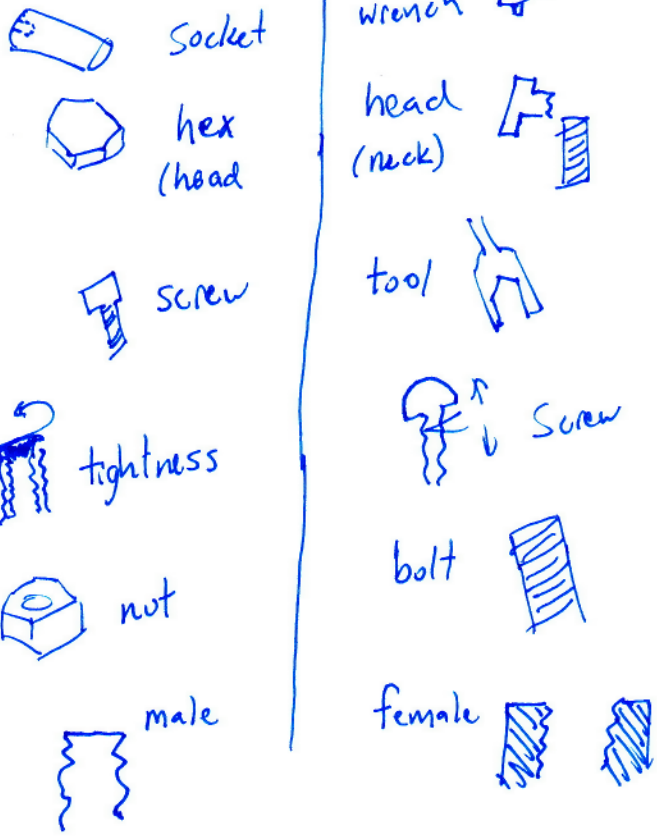
Toolant Tools Demo

Hex ball wrench

wrench

socket

[Break first]



Toolant

Designer — ↳ meet intentions

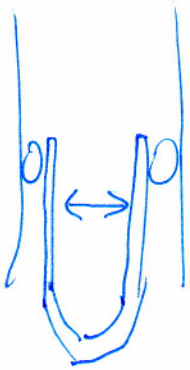
Manufacturer — ↳ meet design

its stronger than everything — maintain peace & order!

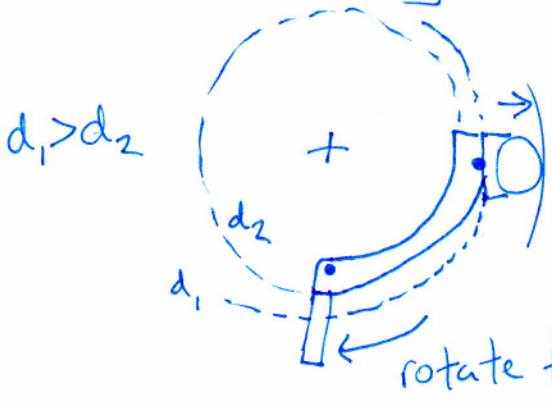
— performs as expected

[03.28 Tech]

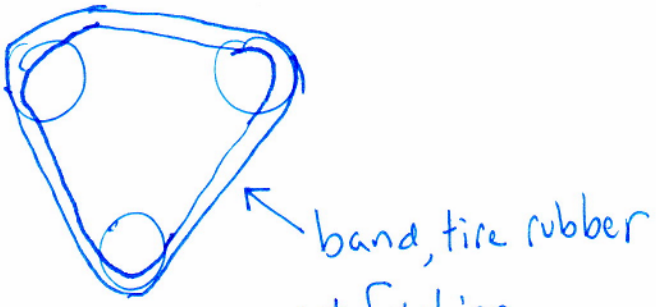
[Tube clamp - Light Hold]

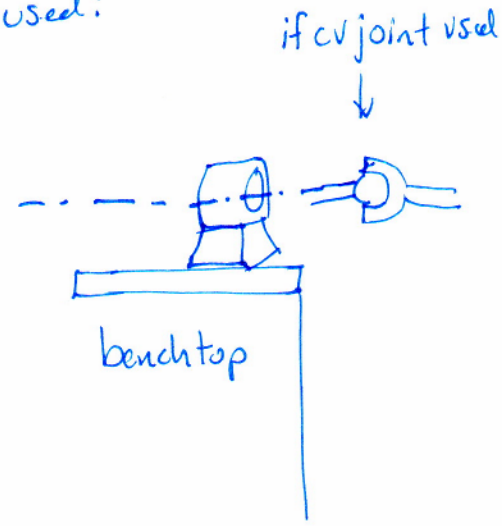


[TOP]



[benchtop turning:] no need for aligned tube if cv joint is used:

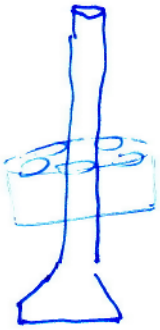




[08.27 Tech]

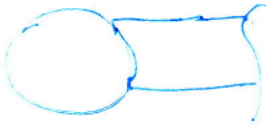
Layered adjustable rack:

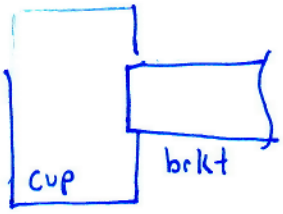
Tall vertical, rigid



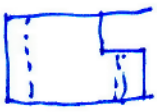
← currently, spools: fixed diameter & quantity

Cup + bu[illegible]

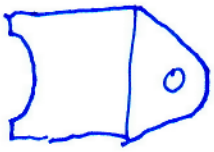




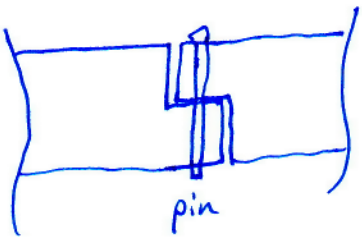
brkt



cup side mount side



brkt interlock



08.27 Short video - compliance, fit, design

1) perfect fit

2) postprocessing fit

3) intrinsic fit

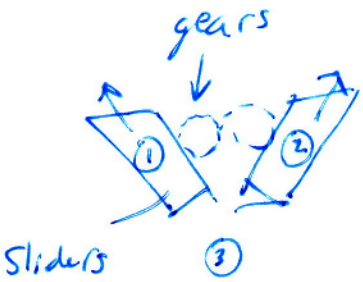
4) compliant fit

5) parametric compliant fit

6) borrow a fit

08.27 Design

tri-clamp round clamp



positions A

stir plate rev1

rev 2 needs

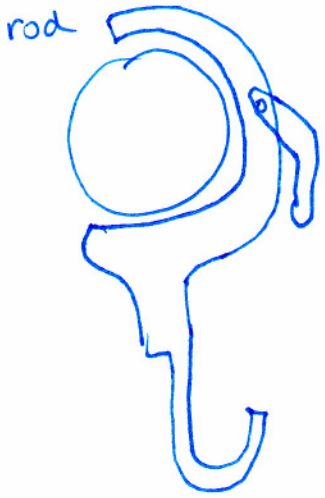
- weight, sink in water
- larger center hole for water to move down
- louvers to let H_2O pass at diagonal

cheap centering laser

use small old battery → laser pointer, 5v. → on hot air gun, etc

[8.24 Tech]

Pole clamp



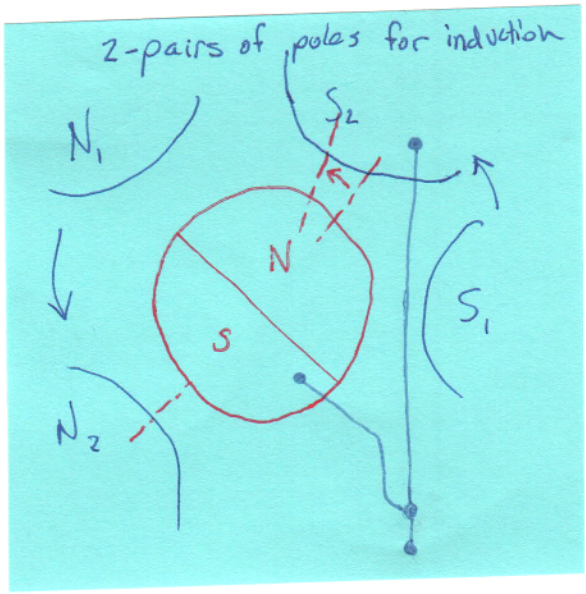
← make 4-bar link to clamp

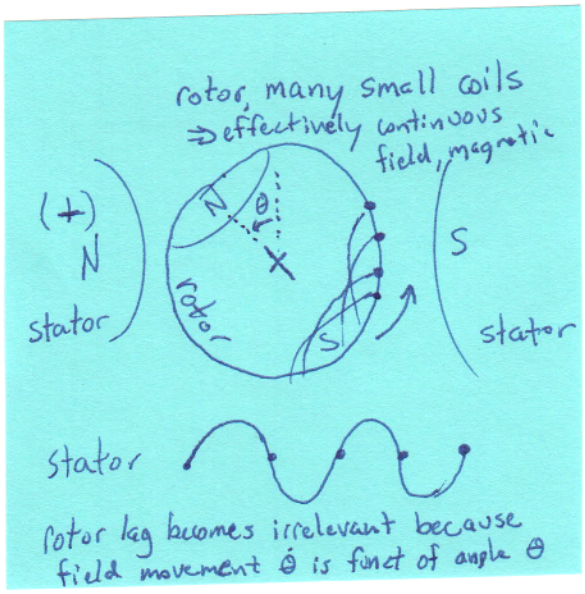
A) rotate down to clamp while reaching

B) pull string to clamp

08/23 Understanding vacuum motors

measuring cheaper (2 of 2) vacuum motors

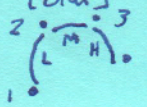




	W	Hz	dial
1	351	2810	min ~~68,000~~
2	410	2970	
3	518	3340	
4	788	3980	full

Measure: power input (AC120V) & noise @ peak dB

[Dial]

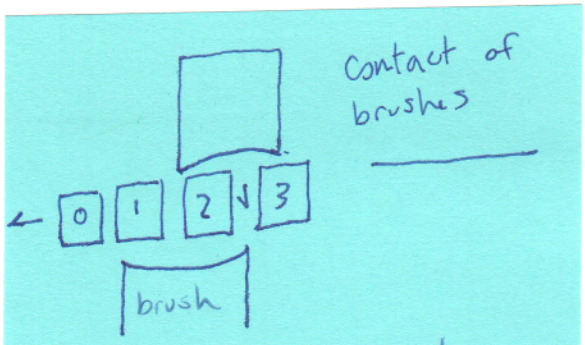


Hz

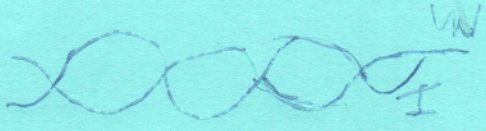
4,000 x 60 ÷

Speed?

2 → 120,000
4 → 60,000
8 → 30,000
16 → 15,000



brush contacts are discrete, 2 per brush, but coils are continuous electrically



Understood model of power controller in-use:

$$RPM = \frac{60 \times 2}{P}$$

online: $RPM = \frac{120 \times f}{P}$

f = input frequency

P = poles, in motor

[2024.08.23 Tech]

Key results:

- Urethane U428 - requires 48 hour cure
  - lg. volume, ~~rubber~~ rebar inside ½ in tube

- urethane / cotton (PL Premium)
  - Loct PL Premium - extremely good bond, cotton fabric
  - Seems cured in 3 hours!

- expanded rubber / JB weld
  - good mech. bond w/ JB weld, estimated 50% strength

- fly bait?
  - dead housefly found near glue
  - PL 300 appears same color & look as Quickstrike solid fly poison!?

- Velcro (2 sided) on poly webbing
  - Fabric no-stitch POOR bond

- ABS → PVC all-purp cement → glass jar: POOR result
- Foam floor / Loctite PL400: POOR result
- Foam floor / ABS cement black: OK (too thin application)
- Poly webbing / black hot glue / velcro GREAT strong & flex, requires warm/insulated cooling.

Sensitive to curing w/ vaseline/silicone cover?

	No	Yes
PL300	√√	

- poly webbing / urethane PL300: GREAT! slightly brittle
  ↳ failed in glue, stick to both sides!

RESINS
- phone call w Aaron's boat builder

old	new
poly	

[08.23 Tech]

Try it out!

- Coat sharp edges/corners w/ Loct PL Prem
- Flame treat HDPE/nylon, etc pre-adhesive?
-

important results:

Expanded PVC x EPVC ▷ Titebond #PVC Trim 6401 model

- no yellowing/degrading in UV sun

JB Weld: paperclip/binder clip on steel straw 8265 model

- does not crack under flexing

Henkel silicone sealant (tube): becomes clumpy inside container

- may degrade in only 30 days!

Nylon (or PP) modified by course granules

- sanding mesh is used against nylon, heated, pressed into panel
- soldering iron @ 260°C +, depress mesh into polymer
- JB weld may peel from panel & mesh remains bonded
- | steel nut | epoxy | mesh | nylon |

Urethane const. adhesive may beat U428 in toughness & bond!

- Loctite PL premium = IDH no. 1390 594
- urethane 1-part adhesive
- very good rigidity - Not for water-immersion

Floor foam: medium result w/some options:

- silicone, clear: 50% bond (my judgement)
- urethane 1390 594: 50% bond, peels off clean, ok flexibility

[08.23 Tech]

Resins notes from Boat builder:

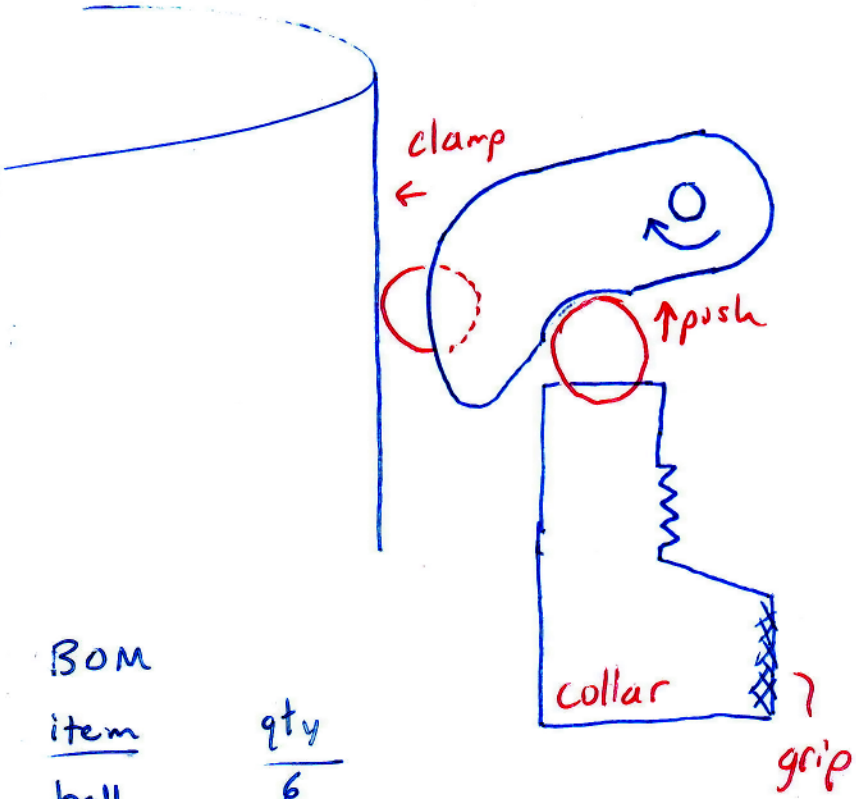
	Polyester resin	Epoxy	Vinyl Ester Resin
ratio	drops	50/50	1/10
hardener	peroxide, special		
common brand	Bondo,	West System	West system
Fumes	High	low	medium
relevance	older method	often used	becoming popular

west system 105

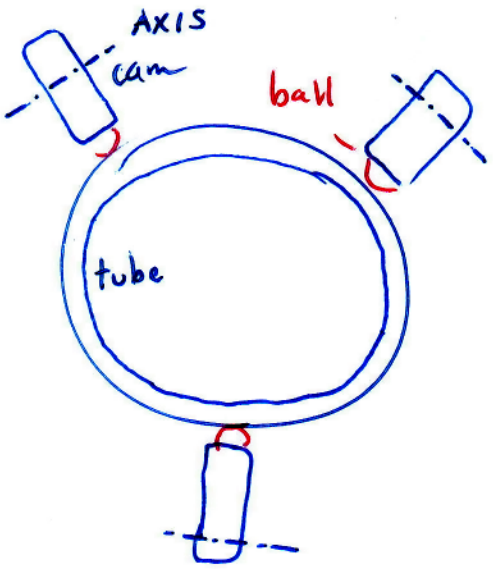
8/21 Designs

Cam-based collet thing

[SIDE/SECTION]



[TOP]



BOM

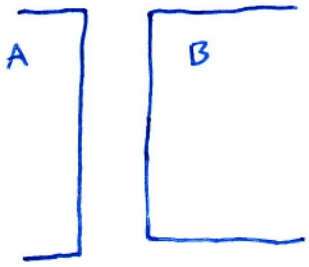
item	qty
ball	6
cam	3
sleeve	1
collar	1
pin	3

[08-21 Designs/Tech]

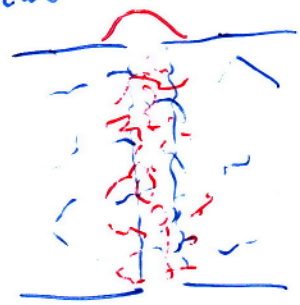
Bonding Video plans

1) Chemical bond
2) Mechanical bond
3) Tacky bond
4) Gradient bond

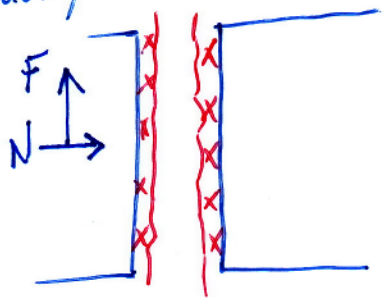
Parts



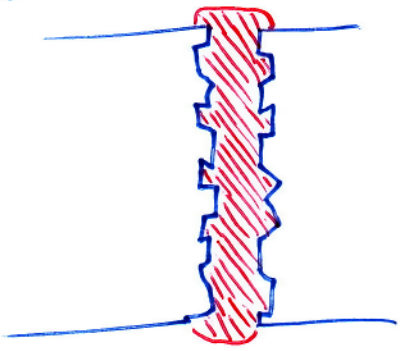
Chemical



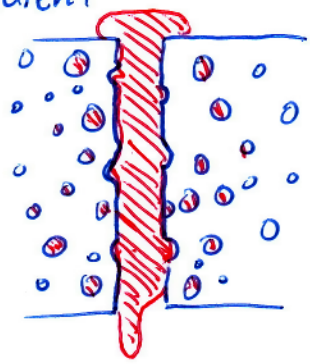
Tacky



Mechanical



Gradient



[8/21]

Bonding (2)

Video layout: 1) show decision tree but don't explain

2) perform array of examples, and refer to diagram

- wheel, scuttle & cyano acrylate
- ABS - PVC tube
- ABS - ABS prints

Manufacturers

Titebond DAP 3M

Thickness

fluid more body putty

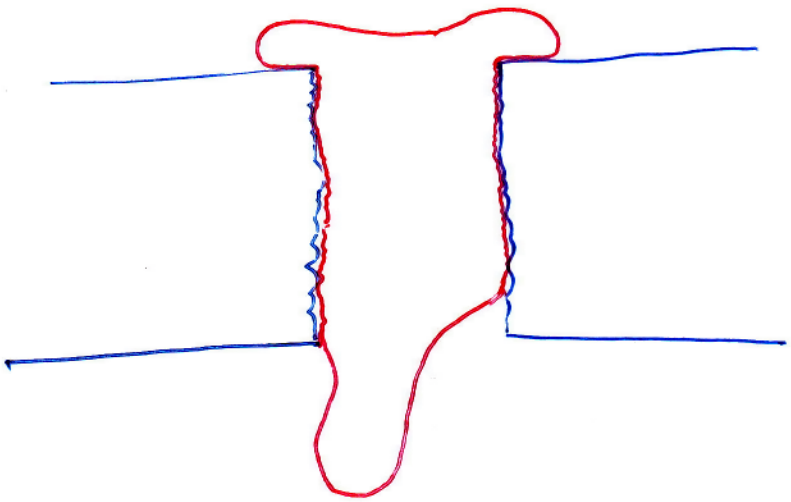
Wood Glue	Construction Adhesive
DRIPPY	PASTY

- ✓ water cleanup
- ✓ shrinks some
- ✓ water resistant (polymer)
- ✓ sandable / paintable
- ✓ bond strong as pine

[08.21 Bonding (3)]

To be covered:

- shear strength of Bonds
- novel test method (minimal equipment)
- Bonding textiles
- predict chemical bonds w/ solvents
- sanding & shaping
- dilution ↔ cleanup
-



David 08-06

SWOT why not soldering irons before robot lab

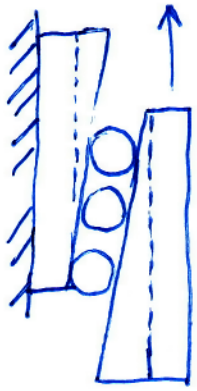
discover how we fail - what needs occur if initial full suite is available

(student)
why data isn't summarized

[2024.07 Designs]

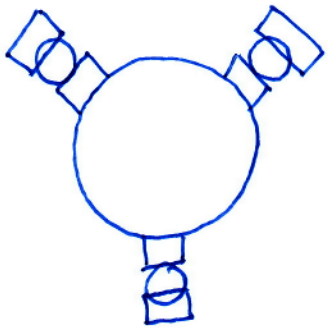
accurate

SIDE



TOP

TOP
concentric cylinder



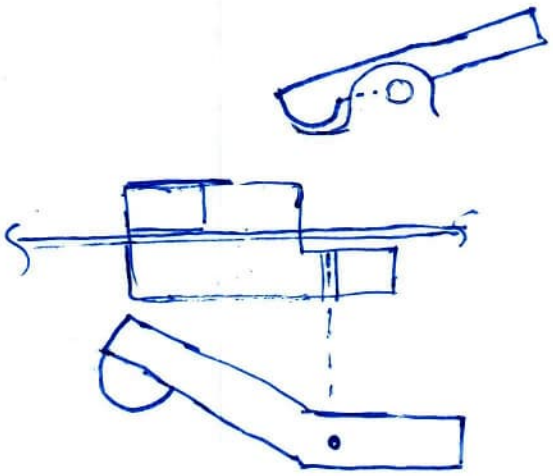
[2024.07 Notes, tech]

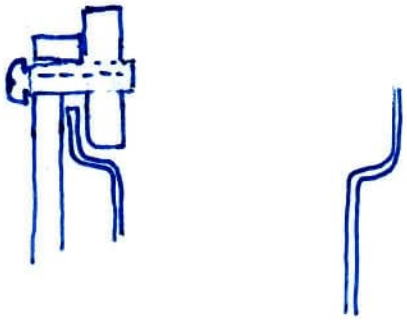
How Batteries behave

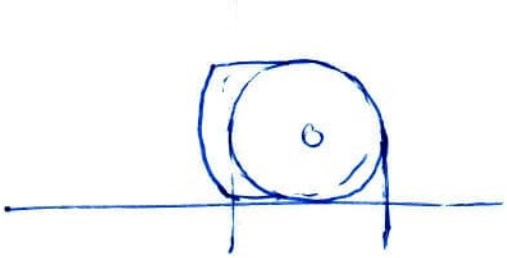
- Power vs voltage source
- pwr: terminals, wires, heat, corrosion
- anatomy
- BMS inside: abuse it!
- solar charge
-

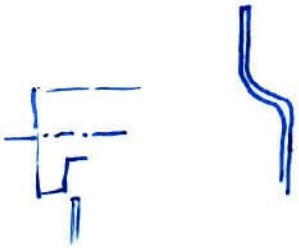
- is my tool limited?

[2024.07 Notes, tech]

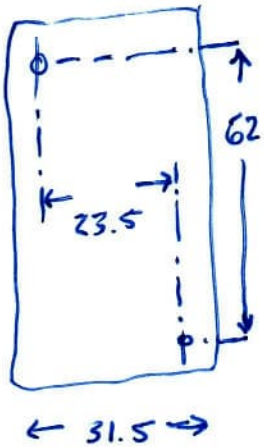




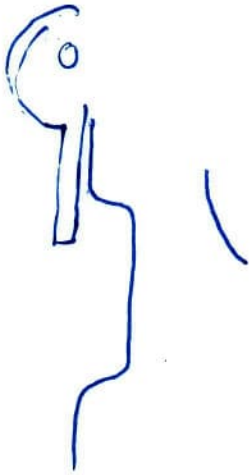




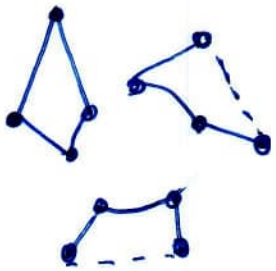
CU1 Backside

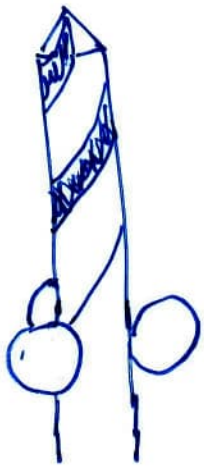


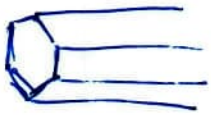
Brushless Grinder: 7.6 A 18.7v no load



How to: grip 1" OD rod w/ hex adapter



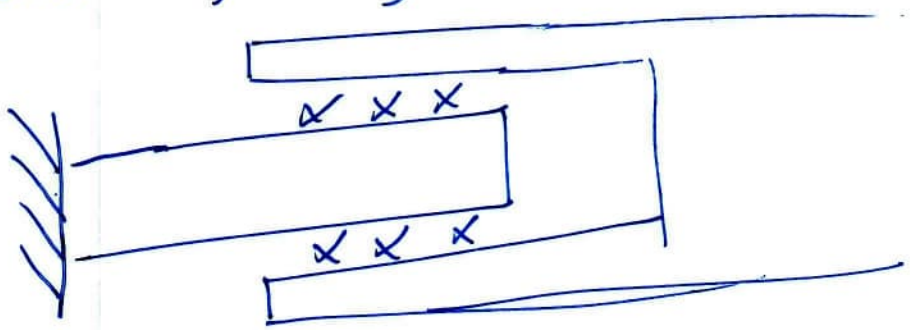


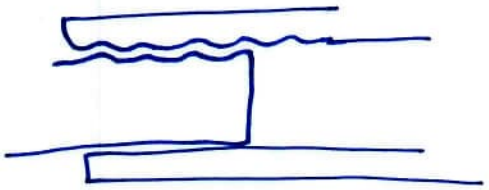


7/27 Self coach: Remember

07.15 design

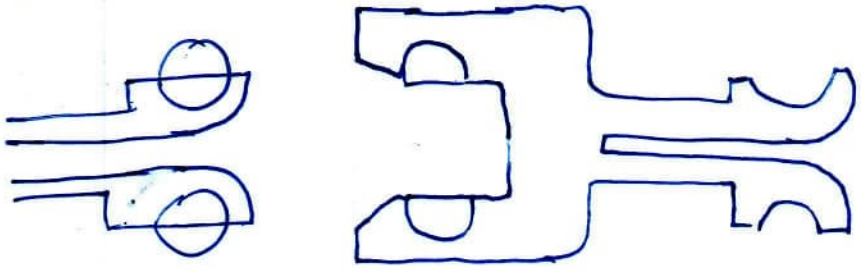
Goal: sliding & locking





[07.25 design]

ball link/pivot/hinge



2024.07

Video production · focus · ideation

Broad
Overwhelming → specific
purposeful

Imagine the makers in a lab: viam, sctl-asia, tamu

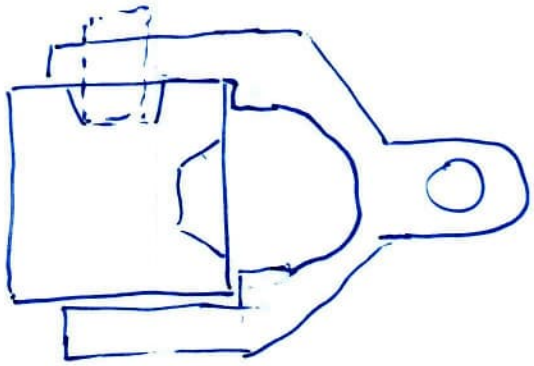
they need experience in DETAILS.

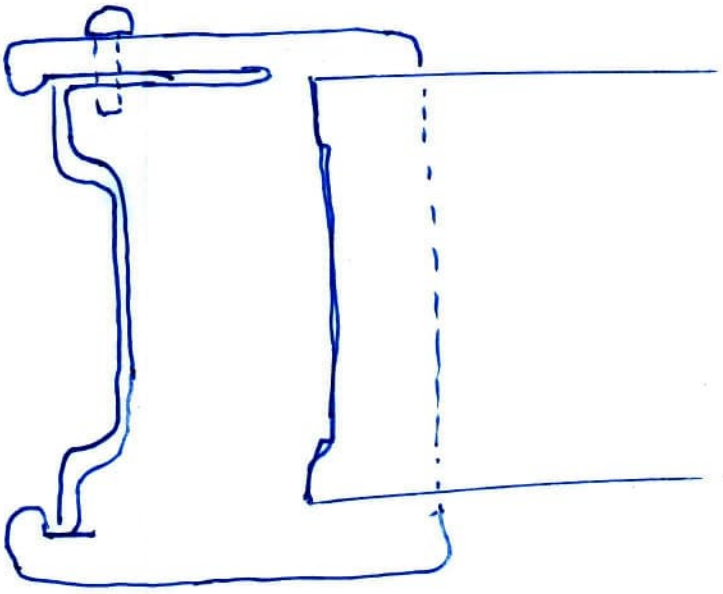
- wiring
- fasteners
- USB

they need APPLIED knowledge
- not in books
- not theory
- ready-made

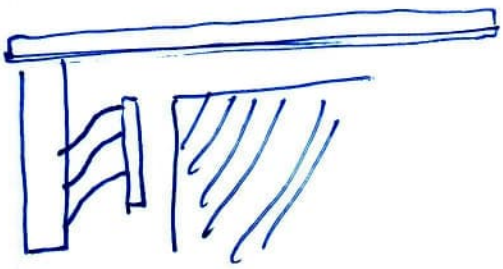
Where can they find:
- solutions with see-touch-feel-hear
- general components (not a pet project)
- non-expiring knowledge (ie USB gen 3.1)

07.15 Design





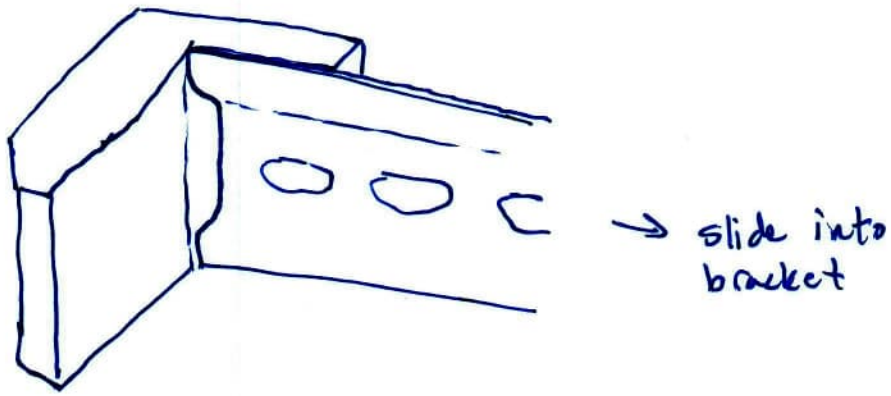
Top (DIN)



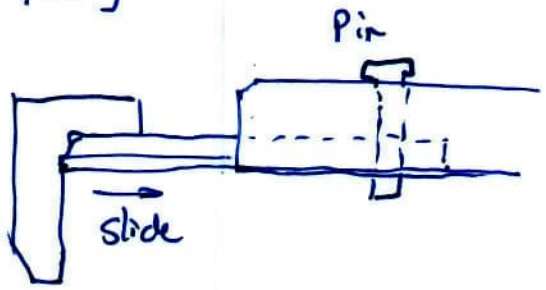
compress & hug

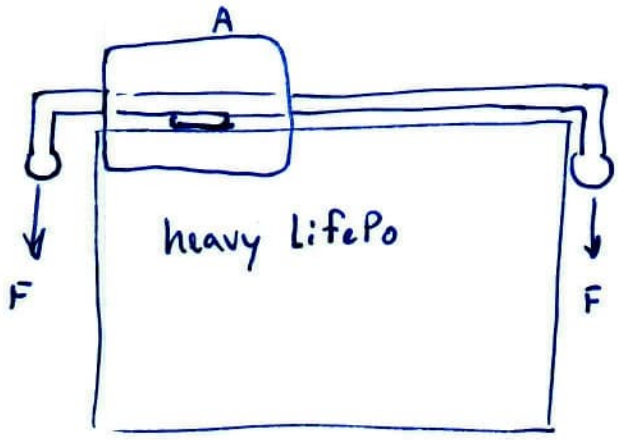
[2024.07 designs]

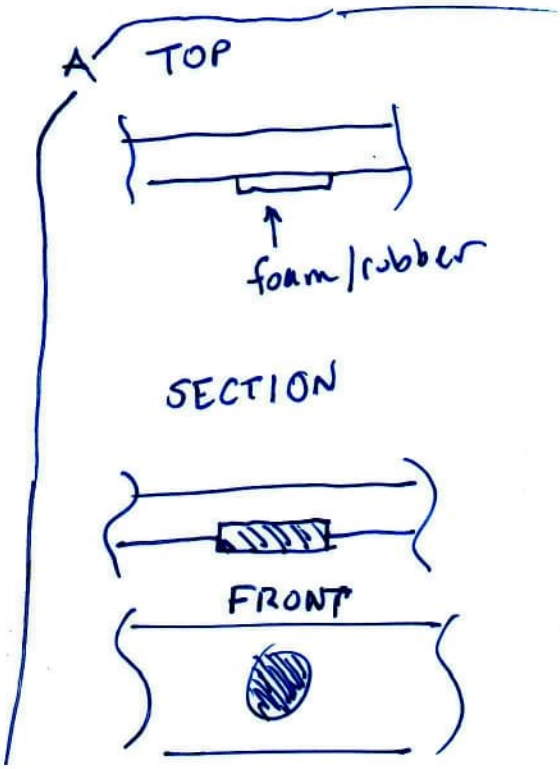
Bracket for suspended battery (or heavy item)



[TOP]



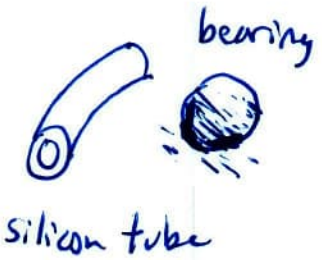


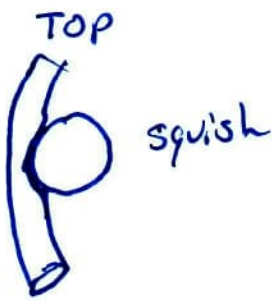


[2024.07 design]

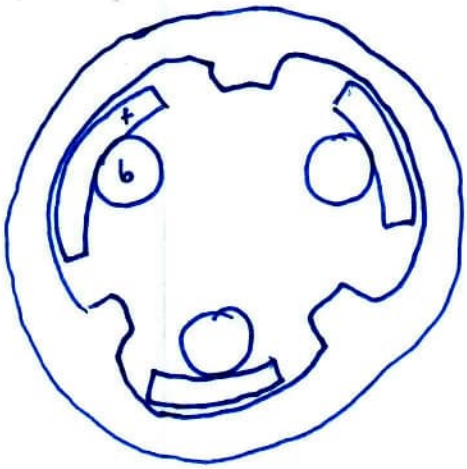
CV Joint

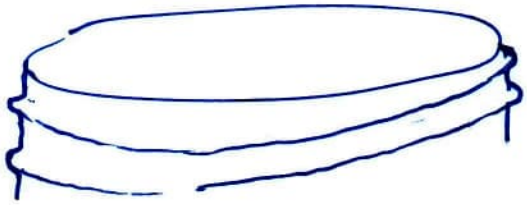
[07.06 Design]





SECTION

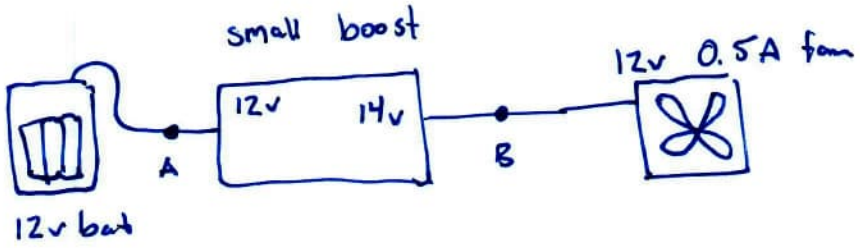


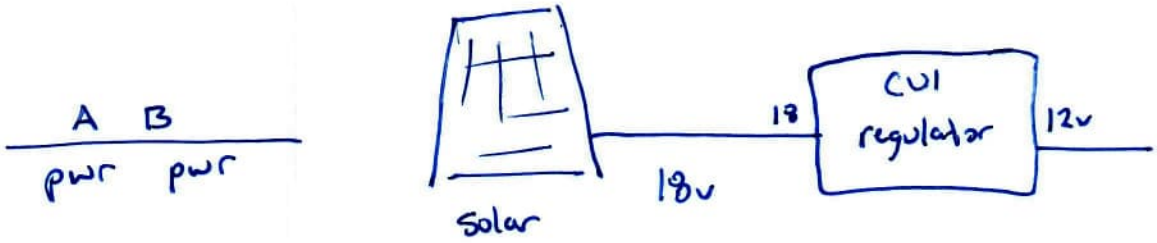


- balls guide cap along threads
- tube may crush to spread balls
- max threading torque yields balls past male thread

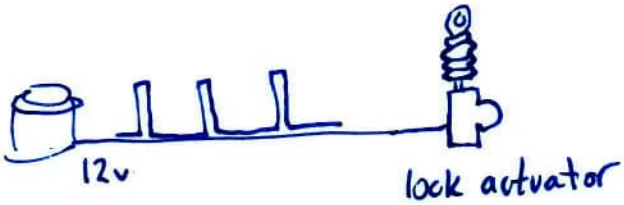
2023.06 Tech

Test cases





▷ measure energy, periodic load



Critical Study!

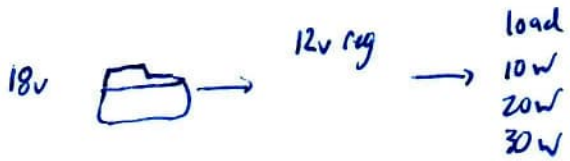
How much Pwr needed?

recharge: ◦ Solar → 12v adapt →
10W CUI

discharge: LiFePo →

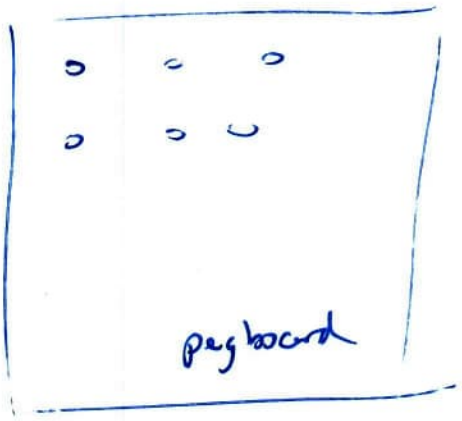
cheap 5W adapt

12v → adapt → 5v 10W



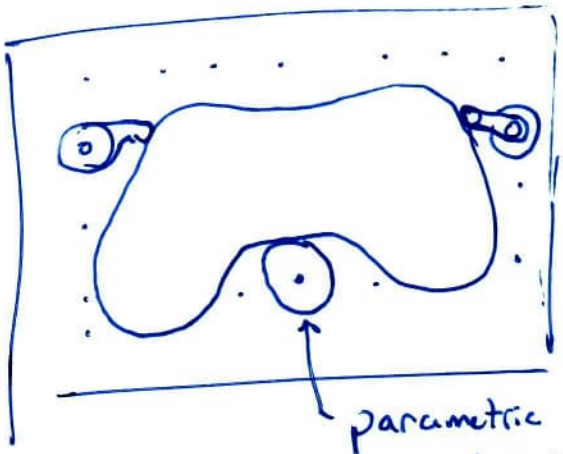
[2024.06 Design]

Bracket for storage, custom



1) • rotate pegs to secure items

2) • tighten down



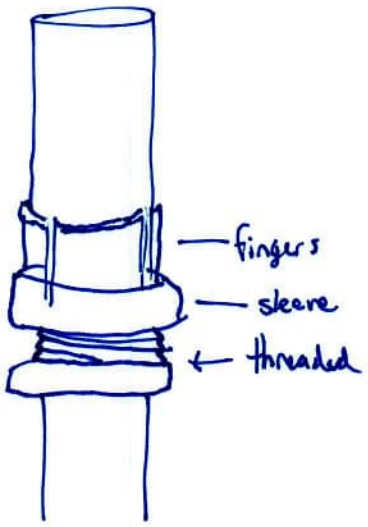
parametric round brackets (work like cams)

↳ 3D printable

↳ standard hardware

[2024.06 Design]

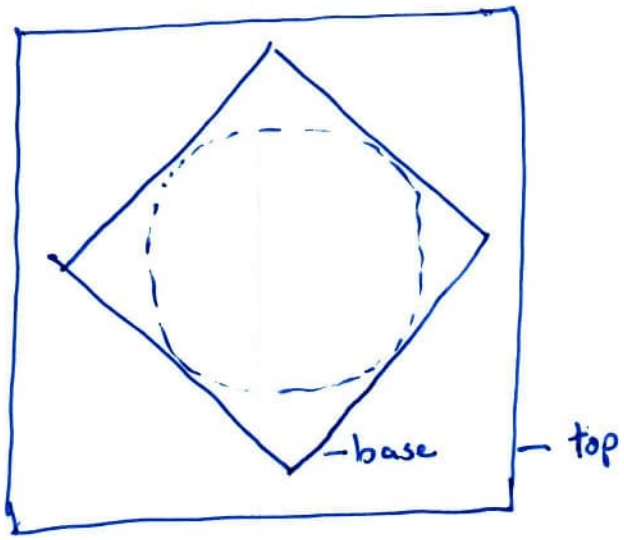
Parametric collet, 3D print



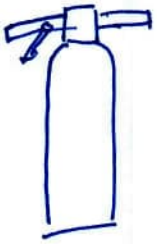
use case:

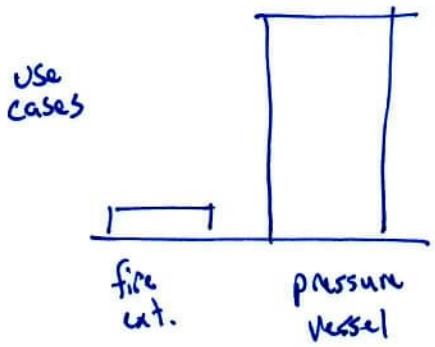
1) small diam fix to large diam
2) modify for drill chuck?
   ↳ clamp for turning tubes?
3) secure rotating joint

[coffee table design] 2024.06



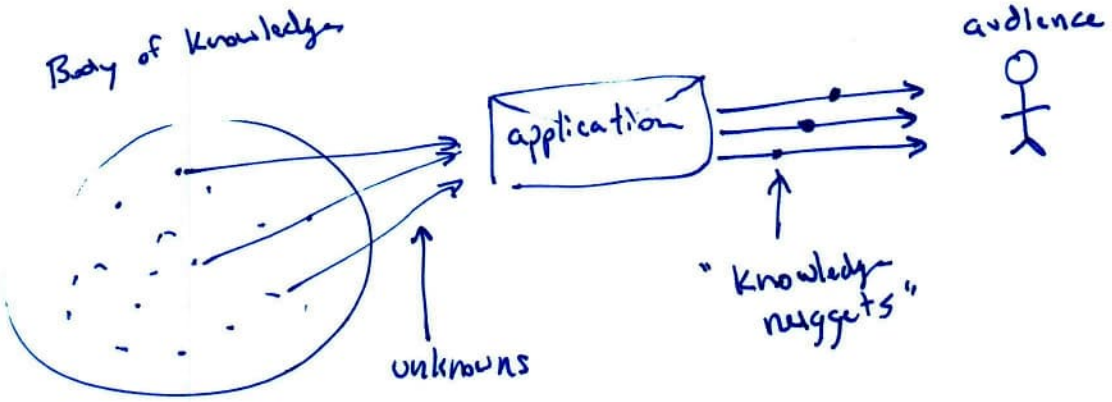
04.01 tech notes (2)



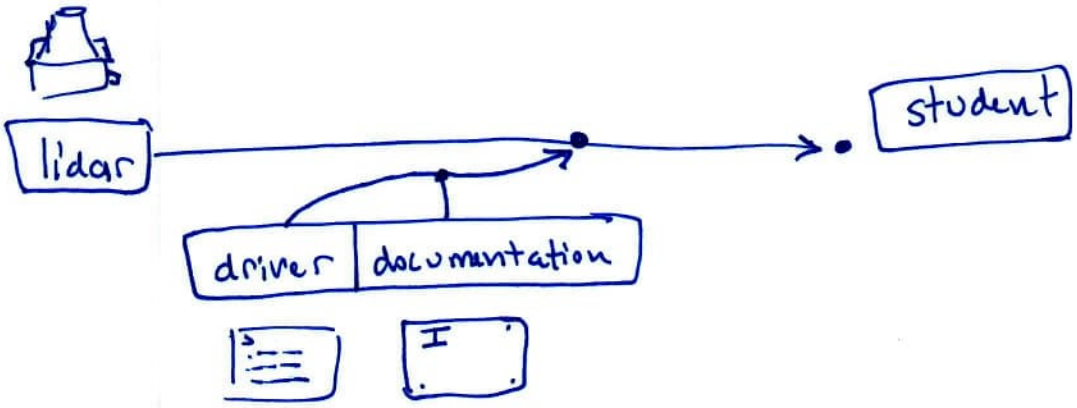


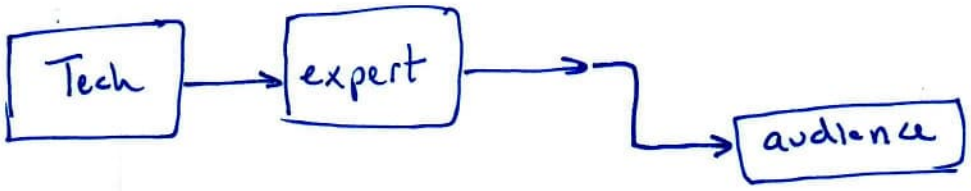
- nonexpert sees a fire extinguisher
- expert sees a pressure vessel
- through docs, multiply the value of the device
  - ↳ REQUIRES: step-down in tier of expertise

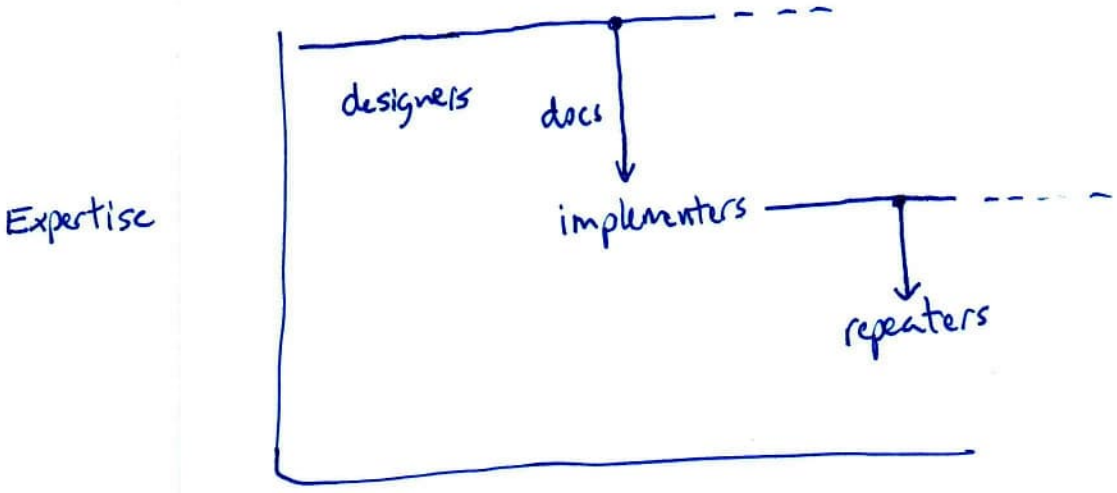
"the expert cannot see his own prerequisite knowledge"

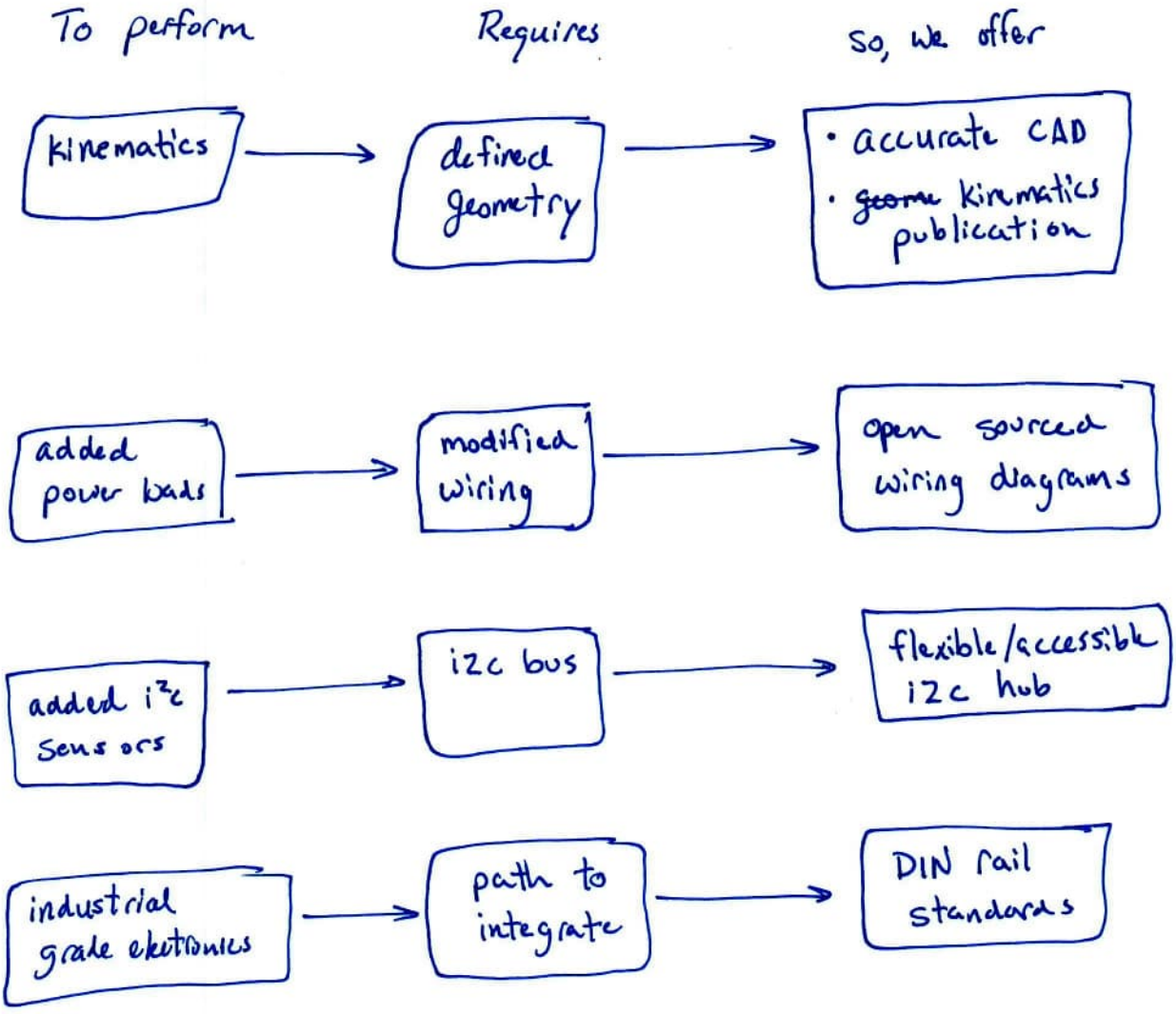


04.01 tech notes (1)





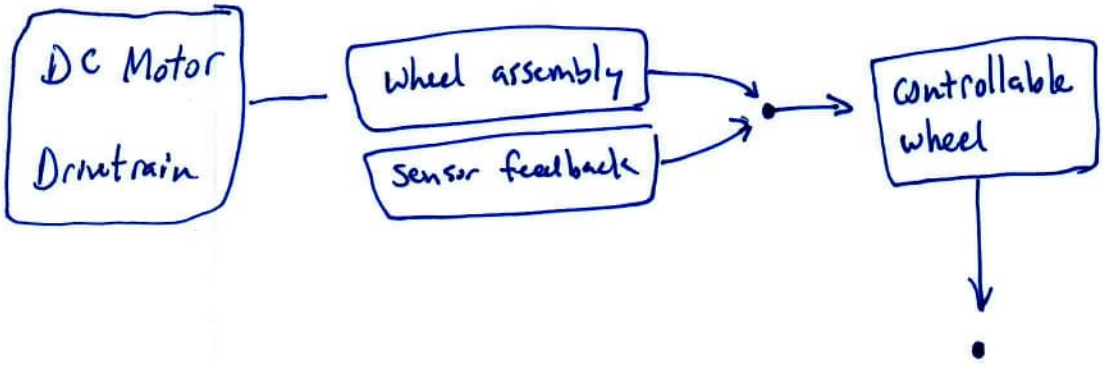



To perform
Requires
So, we offer
kinematics
defined geometry
• accurate CAD
• ~~geome~~ kinematics publication
added power loads
modified wiring
open sourced wiring diagrams
added i²c sensors
i2c bus
flexible/accessible i2c hub
industrial grade electronics
path to integrate
DIN rail standards

[Engineering efforts] to make a robot

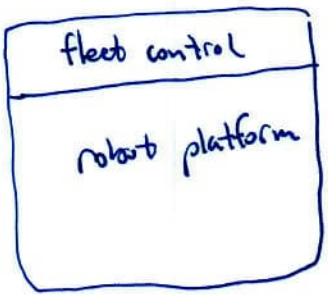
- claim: all robotics development requires a focus + prepackaged modules OR high expense

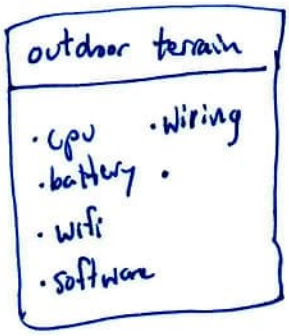
modular solutions + borrowed tech → realistic robotics



Q: How to show where engineering effort is allocated in a generalized robotics research

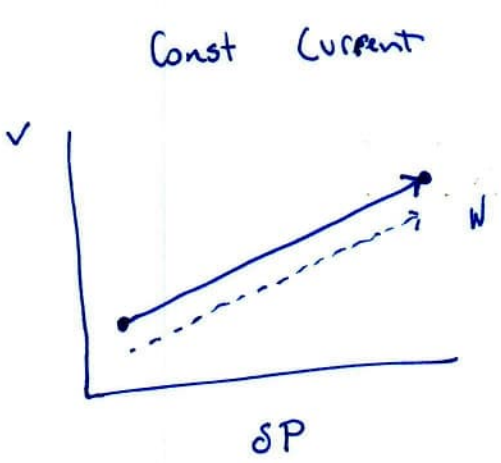
Fleet control algorithms





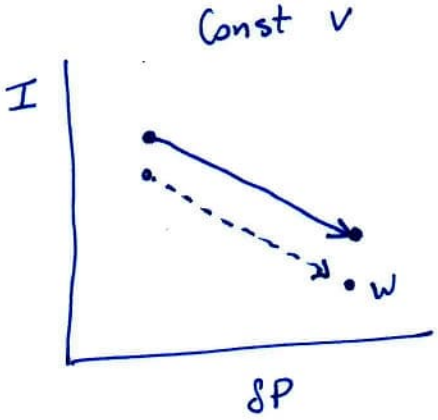
04.26 Experiments

[Blower Experiment]



[work increase]

- δP * flow ⇒ work
  δP raises more than flow drops



[work decrease]

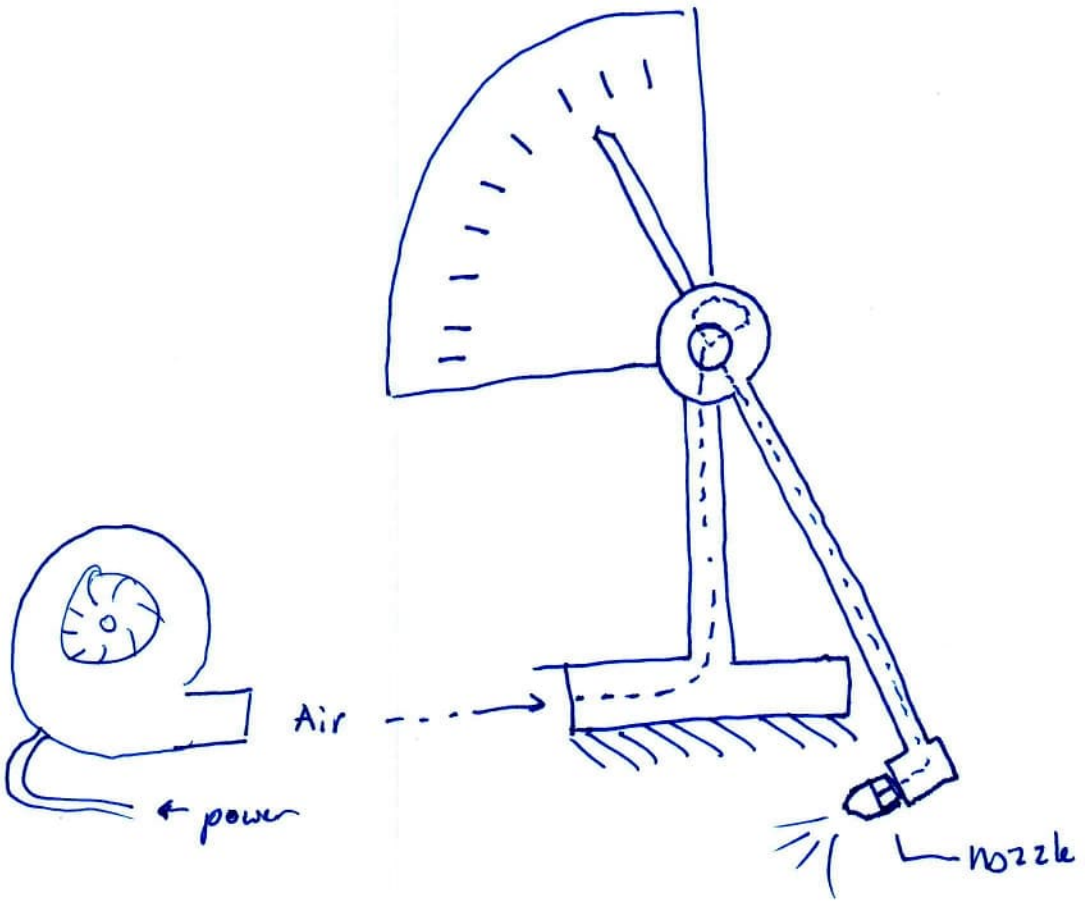
flow drops more than δP increases

(?) how to make a system with constant work?

where exists a natural system w/constant work?
or- work w/~~natural~~ linear relationship to work input?

2024.04

[Work meter] responds statically to a constant power



2024.05.02

[Content MXET 300]

What should be published?

lab outline ⟶ what topics can be covered w/ SCUTTLE?

lab supplies ⟶ what tools are needed?

lesson content ⟶ what must instructor learn/teach?

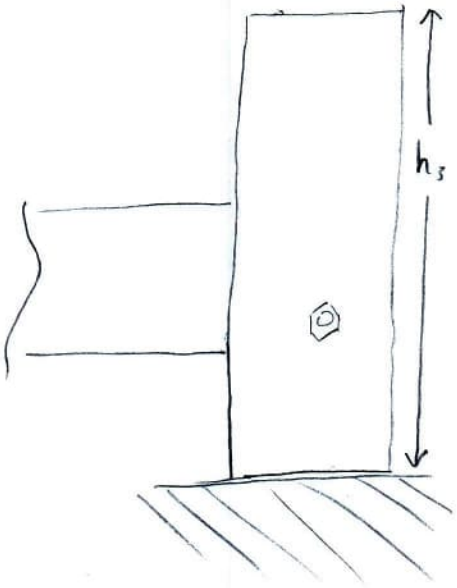
what content can support lab?

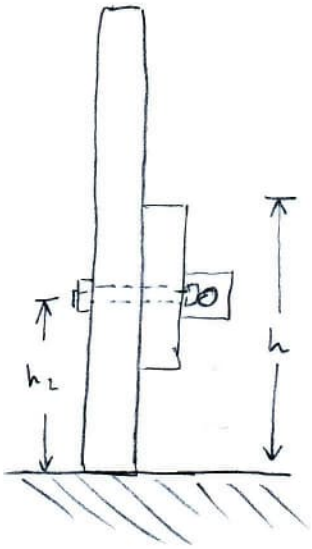
↘ project?

↘ routines

2024.03

Foot



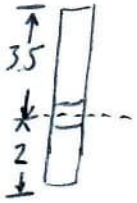


$h = 22$ in

$h_2 = 18.5$

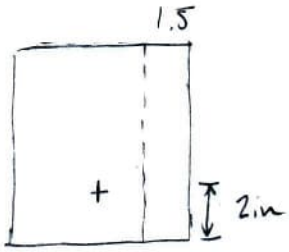
$h_3 = 30$

head $h_3 = 36$



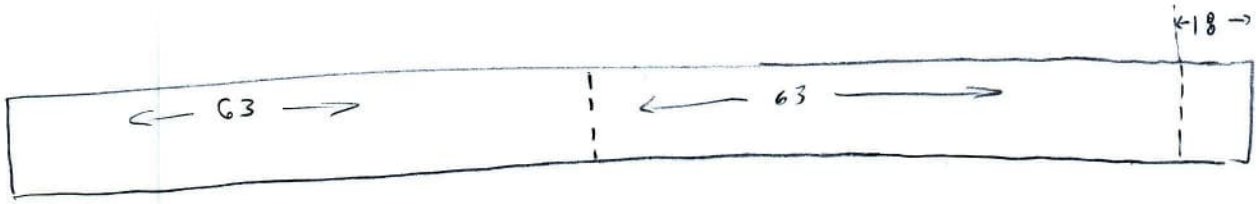
Carriage Bolt ½"

L	PN	$
2 in	63389	0.71
2.5in	59063	0.85

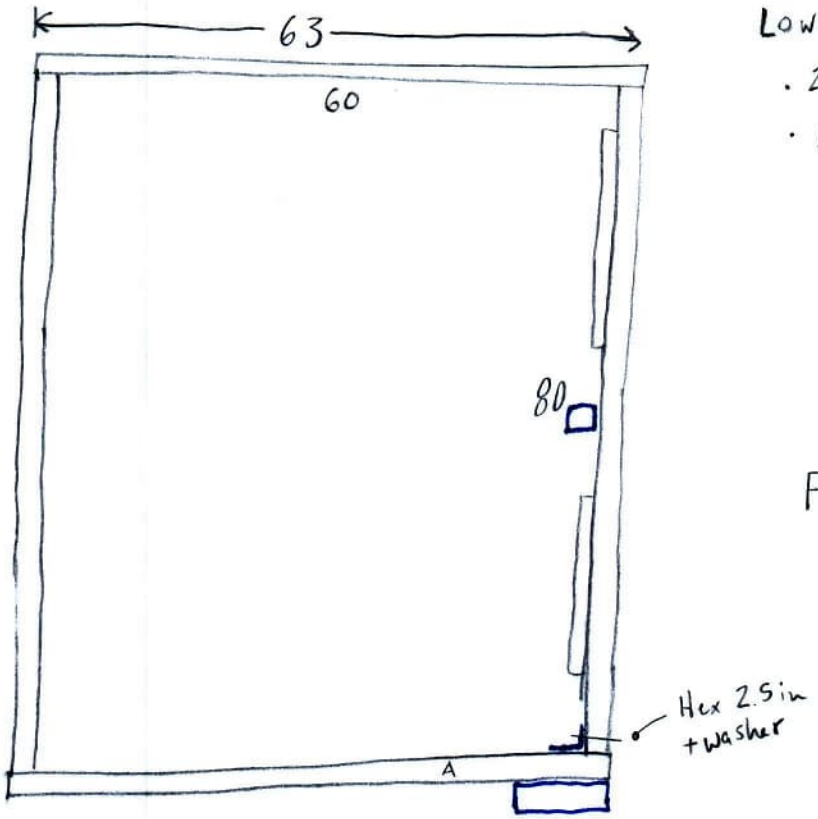


Cut 63" board

12 ft = 144

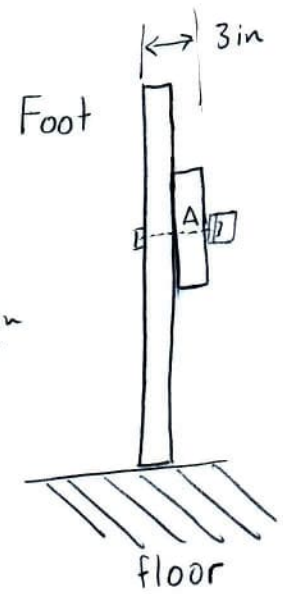


2024.03

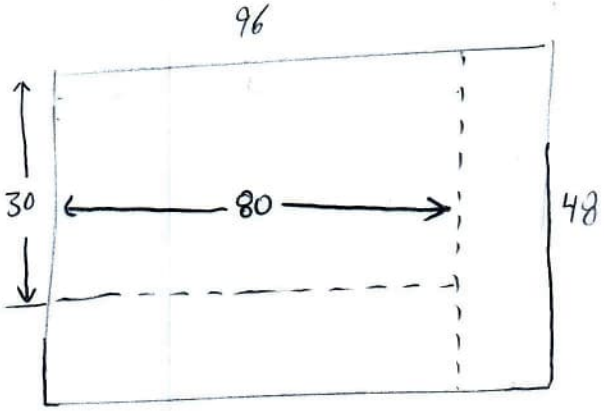


Lowes 3/10

- 2x6 pine 63" x2
- Hex bolts 1/2 x 2.5" (4pcs)



Cut 4x8 Panel



✓ 1/2 in x 4in hex bolt

X M12 x 100 lag screw

X 1/2 in x 4in carriage bolt

1/2 x 2	6pcs	63329
1/2 x 4	8pcs	63331