

Yap for ev brr - Strawberry shorkcake WAHO

Sunday, June 1, 2025 4:50 PM

HUB

- 2 hubs w/o stud pressfit
 - o But would req 6hr of sanding down again cuz rotorpin feature no fit
 - o Could mill to correct size? Maybe?
- 1 w/tap used to be in but drilled out, need to see if hole to big
- 1 with bolt stuck in it, maybe able to get out

Prio high to low

1. Front Sprocket
2. ~~Shock Mount~~
3. Wheel Speed Sensor mounts
4. ~~Hub fix~~
5. EV Bearing Carrier (Left & Right)
 - a. Cut stock on bandsaw
6. Front Adapter
7. ~~Rear Sprocket/Adapter~~

HSMWorks

- No worky?

w

Questions For Shop Manager

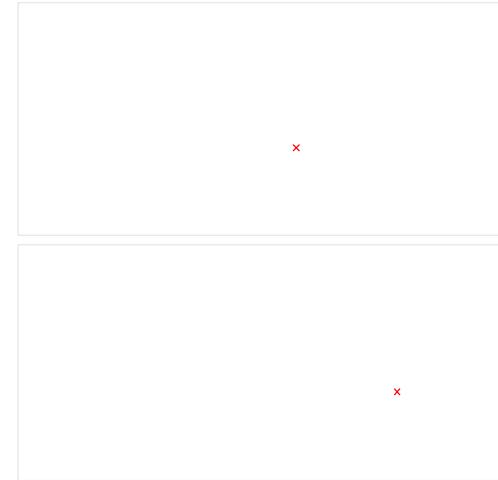
Saturday, February 15, 2025 5:39 PM

Question	Answer
What is the proper process to get a Tool/Probe replaced if it gets broken as more teams start to use the shop?	
What are the expectations for labeling tools in the machines? Especially regarding the CNC Lathe, where tools take a very long time to get set-up and typically aren't removed as often as the CNC Mill.	
What is the labeling procedure for keeping tools/stock in machines for extended periods of time? In reference to when removing the tool/stock would lose the part origin and cause tolerance issues.	
We are aware we no longer have access to Q-Machine Shop, does this include the welding shop (access to the plasma table)?	
In O-Machine Shop, the CNC Mill Coolant Tank does not properly filter chips, leading to improper draining & coolant overflows. We are unsure of how to fix this issue?	

- O_Machin e_Layout...
- O_Machin e_Layout...

- Make shop diagram documents

Question	Answer
Will we keep using coolant from Q-Machine Shop? If so what is the procedure on moving it down & what is the timeline of getting more ordered, as O-Machines still run low?	
How will the coolant concentrate get stored in O-Machine Shop?	
Can we get a fire cabinet and hazardous chemical containers in O-Machine Shop?	
Can we get overhead drop cords (extension cords/power strips) for O? The current system is a massive tripping hazard.	
Can we get designated chip bins for the CNC Mills & Lathe, currently using the facilities garage can & cleaning it ourselves because they have no way to remove the chips?	
With the removal of Q-Machine shop access, we no longer have access to a tool post grinder. Can this be added to O-Building Machine Shop or can we use the ones in Q-Machine Shop?	
The bandsaw blade in O-Machine Shop is dull leading to unsafe cutting conditions, is this something we will need to replace or the school?	
The outlet for the drill presses does not seem to work, can someone see about having this looked at?	



How do we label scrap and is there a certain place we should put it? We are currently planning on taking about every month depending on how fast we generate scrap material.	FSAE Scrap bin, chips go in dumpster by steel bridge
BRAKE PRESS	We will have to reassemble ourselves
Coolant (running at 3%)	
Separator unit for Mills	
Waterjet Update?	



1. What is the proper process to get Tool/Probe replaced if it gets broken as more teams start to use the shop?
 - a. Broken Tool Form, Explanation of why tool was broken will be required
 - b. Standard Hass tools will be stocked by shop (Paul wants). Special tooling is teams' responsibility
2. What are the expectations for labeling tools in the machines? Especially regarding the CNC lathe, where tools take a very long time to get set-up and typically aren't removed as often as the CNC mill?
 - a. Since we have two mills, long lead time parts can be used on the mill.
 - b. The Lathe cannot be held up for long part cycles (1 week) without communication.
 - i. Paul recommended some form of communication with other teams (Note on machine was the recommendation)
3. What is the labeling procedure for keeping tools/stock in the machines for extended periods of time? In reference to when removing tool/stock would lose the part origin and cause tolerance issues
 - a. See above, and current labeling policy
4. We are aware we no longer have Qshop access, does this include the welding lab. (access to plasma)
 - a. We never had access to this space (Kennedy's)
 - b. We do not have access to plasma but can request
 - c. Laser is currently running and stocked if needed
5. In O-Shop, the CNC Mill coolant tank does not properly filter chips, leading to improper draining and coolant overflow. We are unsure how to fix this issue?
 - a. Ethan has responded (check), machine will get filter matching Q machines
6. Will we keep using coolant from the Qshop?
 - a. Coolant will be ordered as need (5 gallon tubs stored)
 - b. Paul wants to know why we go through so much coolant? Is not supposed to be consumable and mixing with 8:1 ratio should mean we have enough currently
 - i. Proposed drainage issue with chips could be part of issue
 - c. Also stated we have a refractor to check coolant concentration (stated Abri knows how to use it)
7. How will coolant concentrate get stored in O-Shop
 - a. 5 Gallon tube. See above
8. Can we get a fire and chem cabinet in O-Shop
 - a. Needs to know why and what size
 - b. Easy to put in cabinet if needed
9. Can we get overhead drop cords for O? Current solution is tripping hazard.
 - a. Yes, working on this.
10. Can we get designated chip bins for the CNC mills and Lathe? Currently using facilities garbage and cleaning ourselves.
 - a. Yes we can get chip bins, tool list
11. Can we get a tool post grinder for O-Shop
 - a. Yes, add to tool list
12. The bandsaw blade in O is too dull, can this be replaced?
 - a. Yes, put in a request with Earl, CC Paul. Mark should be doing this

Notes:

For Requests:

- Send an Email to Earl and CC Paul on everything.
- Tool List
- o Paul would like use to send all the equipment and tools needed so if can make the request at one time
- o Things like grinders, sanders, presses, cabinets, storage etc.
- o Earl is creating the broken tool form; these will remain stocked. Turn around is unknown
- o If we need to use machines in Q (quoted long machine occupying parts), we can put in a request with Earl and CC Paul.
- o He is looking to get Stolberg perms to let these machines get used as needed
- o Lathes are open most of the time

For O-shop Issues:

- Tool list is important, Paul says he is looking to get any of our needs, but one at a time is slowing the process down with the school
- Coolant issue is looking to be solved, procurement will be done separately from Q. Still through Earl.
- Can make requests in the mean time during transition if O cannot meet our needs

For new Building:

- Est January 26 open
- Water Jet will remain in O (he has yelled at facilities again)
- Shop will come with a tech, another office for Paul also
- Shop expected to copy Q and make it unneeded to use Q
- o Get any tools/equipment needs for Paul

Meetings

Tuesday, December 17, 2024 2:23 PM

12/17/2024

Tuesday, December 17, 2024

Schedule this week

Tuesday 17th: 9pm-12am
Wednesday 18th: 10am-7pm
Thursday 19th: 10am-7pm, 9pm-12am
Friday 20th: TBA
Saturday 21st: 9am-1pm
Sunday 22nd: 10am-9pm

You can work in O-Building whenever you want, these are just the times I plan to be on campus

TUE: Finish Acc wood, Work on Acc mounts, Coolant, Hub CAM, and Machine shop layout

WED: Work on getting drill/boring bar to work on CNC Lathe

THUR: Acc Mounts, Spherical, & Hubs

Priority Items

- Hub CAM
- Spherical Cups
- Spherical Spacers
 - Need to be able to drill & use boring bar so will be working on fixing that
- Refill HAAS w/ coolant
- Work w/ David to get side panel molds out
- Fix HAAS Tool Post

11/18/2024

Monday, November 18, 2024 8:10 PM

- Catch up on current projects, progress, road bumps, days can come in and work on it
- How do we like the teams tracker? What's bad, what's good?
- Projects (deadlines being set Wednesday night but til then...)

V-band

- Inner diameter in-progress, needs chamfer
- Tue lily + elliot w work on it,

Rotor Lock/Pins

- Need to be drilled
- Sam & emiliano

Throttle Body Core

- CAM tue
- scott

Throttle Body Adapter

- James Harris Tue

Throttle Body Air Filter

- CAM is done
- dom

Projects to hand out

MDF mock Lid:

- Moloney & David
- Friday 3-6

MDF Jig

- Ben & stone
- Thur 6-8:30

Acc Mounts

- Cameron

HAAS tool setter

Work on moving stock tm 7pm

1/13/2025

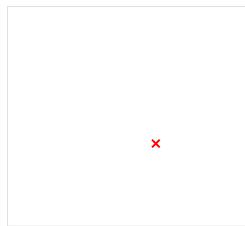
Monday, January 13, 2025 6:23 PM

Schedule

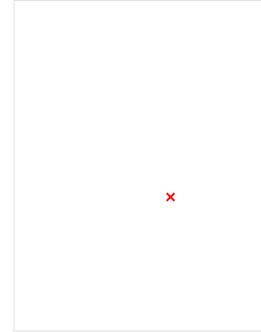
- Timeline to do coolant on other mill
- Leadership help
- Structure Change

Up for Grabs

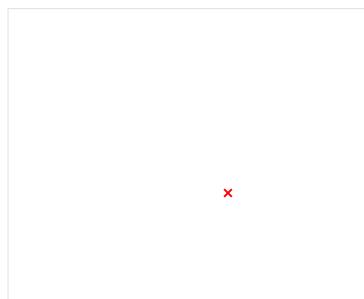
- LF Upright (x2)
- RF Upright (x2)
- Yolk Plate
- Hub (x8)
- Bearing Motor Mount
- Bearing Carrier (x2) (dom)
- Splined Shaft (x2) (david + james)
- EV Front Sprocket (x2) (james harris)
- RW Mainplane Inserts (lily + nick)
- RW Endplane Inserts (lily + nick)



✗



✗



✗

CNC Mill

Bearing carriers

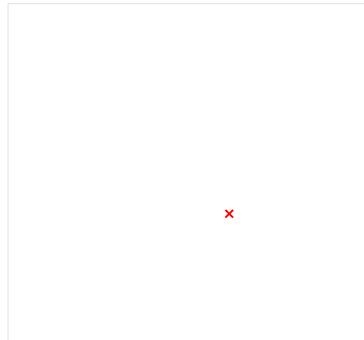


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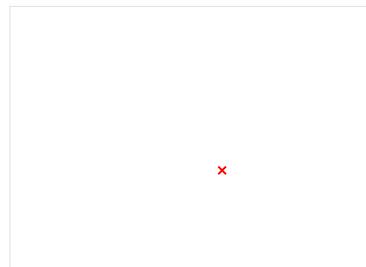
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Waterjet



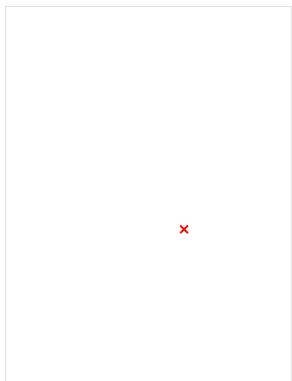
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CNC Mill



✗

CNC Mill & Lathe



✗

Upright

1/20/2025

Monday, January 20, 2025 7:11 PM

- Steering Spacer (impregnated bronze) find stock????
 - o Stock under LV table or Green Ammo Box
 - o Press-fit for steering Rack
 - o Manual lathe
 - o (Lily)
- Steering Pickup (alum)
 - Cnc mill x4
 - (Moloney)
- Soft jaws
 - o Hubs (Dom + Moloney)
 - o Uprights
- Test 12x12 bed

1/27/2025

Monday, January 27, 2025 7:39 PM

Meeting Notes

Arbi Updates

- I will be in Georgia this weekend 8pm-9pm
- We will be using the CNC Lathe & CNC Mill to finish the hubs so no other parts can run that weekend
 - o Hub Soft Jaws need to be done by Friday

Machines

- Left CNC Mill is still down: the tools go into the carousel not at the right angle and it errors out
- CNC Mills no longer run "Low Axis-Lubrication" error codes

Parts

- Bronze Steering Spacer/Insert: Lily will be working on it, will review her progress Wednesday (Jan 29th)
 - o Mihai, Marco, Emil, Sammy, and Bailey are all great points of contact if confused on how to machine and what the fitment should feel like
- Hub Soft Jaws: Dom & David will be meeting Wed to review CAM, parts due by Friday
- EV Front Sprocket: New front sprocket didn't fit the chain, I gave the wrong CAD file out. Or the part wasn't finished with a small enough endmill
 - o Have stock to make 2 more
- Steering Pickup: Still need to review CAM with Moloney
- Uprights: Sam & Cameron will be reviewing their CAM next Monday
- Yolk Plate: After doing 12x12 test, cannot cut a profile on 12in, the machine will error out as it tries to go to far
 - o Will be using design without jacking bar
 - o Should have updated CAM to review Tue

2/3/2025

Monday, February 3, 2025 7:32 PM

UPDATES

- 6/8 Hubs are 90% done
 - o Countersink wheel studs, Axle housing re-finished
 - o The other 2 just need the 4th operation
- Blue Press in Q is down right now
- Ruby is broken but is ordered, will need to be re-probed
 - o ETA Tue/Wed
- Mills need to get cleaned so coolant doesn't overflow

PARTS

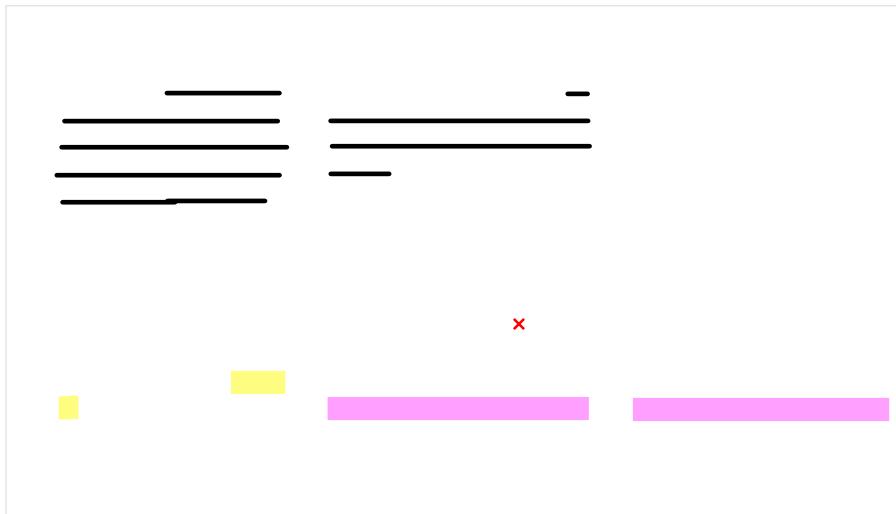
- Upright CAM review meeting after Main Meeting
 - o Also Upright Jaws
- Bray will get back by Wednesday about when he can run the Yolk plate (dates & times)
- Busbar Endlines will be handled by Dom
 - o Next Wed (Feb 12th)

SHOP STUFF

- Thursday the 13th: Clean shop O and Red cabinet in Q
 - o Will start at 7pm
 - o Arbi's will pay for food for those who helped if shop looks nice
 - Waffle House, Chick fil a, La Suprema, Chipotle, The Ranch (no margs), Walmart

2/17/2025

Wednesday, February 12, 2025 7:21 PM



Dates

April 12: Formula South
May 14: IC Comp
June 17: EV Comp

CHART Breakdown

- PINK is at competition
- YELLOW is when we will be at Formula South

Meeting Notes

Comp Schedule

- We have 7 weeks till Formula South, cars need to be running by then
- 4 weeks to IC comp after that
- 4 weeks to EV comp after that

Plan for the week

- Uprights: Start latest Wednesday
 - Need to determine if tool needs to be bought
- Busbar Ends: Will be done by Friday
- Hubs: Run Abri CAM then Camerons CAM
 - G53 Z4.1 Offset

TO-DO for the Week

- Come back with 2 things you want to learn how to do
- Tag the tools
- Cheese cloth for the mill
- Put "SURPLUS" paper label on the mill/lathe combo

Questions/Comments/Concerns for Abri

- Ask Tyler abt OTS order
- Ask about more coolant, running low, 60% full (Ethan/Paul)
- Ask about solving chips clogging issue (Mark/Ethan/Mike)
- Ask surplus to remove the mill/lathe combo (John surplus contact)
- Meet with Val about Manufacturing questions
- Msg Kennedy abt drawing classes
- Setup another "dinner" workday

Next Week

- Review how to use Arch CNC
- Go through parts progress/machine issues
- Create a list of priority of what manufacturing wants to learn

2/24/2025

Wednesday, February 12, 2025 7:21 PM



Dates

April 12: Formula South
May 14: IC Comp
June 17: EV Comp

CHART Breakdown

- PINK is at competition
- YELLOW is when we will be at Formula South

MACHINE PEEPS WANT TO LEARN

- CNC Lathe: How to use (have not touched)
- Arch Router
- Manual Mill
- Surface Grinder
- Planer/mitter saw in arch
- CAM refresher!!!!
- Chattering/Rubbing/Feeds & Speeds
- Specking tools (geometry & coating)
- CAM (2+1, 3+1, 5, 4+1)
- Jigging types

Meeting Notes

Comp Schedule

- We have 6 weeks till Formula South, cars need to be running by then
- 4 weeks to IC comp after that
- 4 weeks to EV comp after that

Plan for the week

- Uprights: Wed start the first real 1
- Upright Soft Jaws: Will start on Monday Night (check in tue)
- Steering Brass Insert: Bray using his manual lathe (check in tue)
- Busbar Ends: Will check in tue
- Hubs: Still waiting on counterbore

Label Workday (Thursday)

- 7~8pm start time
- Sam will lnk abt food

TO-DO for the Week

- Come back with 2 things you want to learn how to do
- Tag the tools
- Cheese cloth for the mill
- Put "SURPLUS" paper label on the mill/lathe combo

Questions/Comments/Concerns for Abri

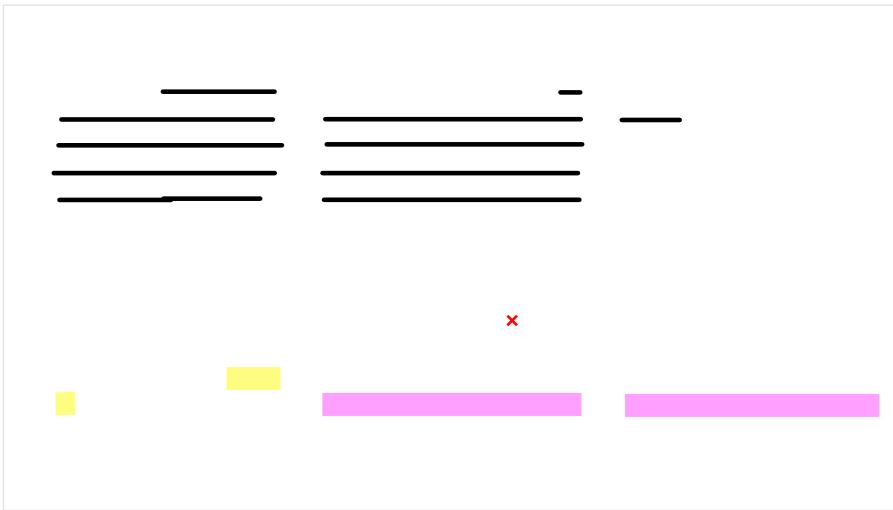
- Gauge & Tube length issue for brake press
- OTS probe from Q
- Ask surplus to remove the mill/lathe combo (John surplus contact)
- Msg Kennedy abt drawing classes
- Let ben EVT know abt using bandsaw
- MSG sammy abt hubs DRAWing

Next Week

- Review how to use Arch CNC 6:30pm
- Go through parts progress/machine issues
- Create a list of priority of what manufacturing wants to learn

3/3/2025

Wednesday, February 12, 2025 7:21 PM



Dates

April 12: Formula South
May 14: IC Comp
June 17: EV Comp

CHART Breakdown

- PINK is at competition
- YELLOW is when we will be at Formula South

MACHINE PEEPS WANT TO LEARN

- CNC Lathe: How to use (have not touched)
- Arch Router
- Manual Mill
- Surface Grinder
- Planer/mitter saw in arch
- CAM refresher!!!!
- Chattering/Rubbing/Feeds & Speeds
- Specking tools (geometry & coating)
- CAM (2+1, 3+1, 5, 4+1)
- Jigging types

Meeting Notes

Comp Schedule

- We have 6 weeks till Formula South, cars need to be running by then
- 4 weeks to IC comp after that
- 4 weeks to EV comp after that

Plan for the week

- Uprights:
- Hubs:

Label Workday (Thursday)

- 7~8pm start time
- Sam will lmk abt food

TO-DO for the Week

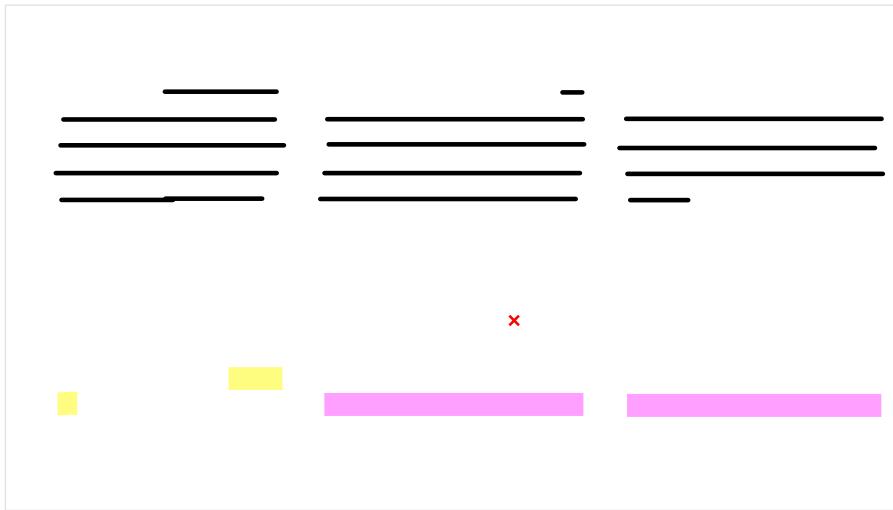
- Tag the tools
- Put "DO NOT SURPLUS" on the press brake & hydraulic press & cabinets
- Cheese cloth for the mill
- Put "SURPLUS" paper label on the mill/lathe combo

Questions/Comments/Concerns for Abri

- Gauge & Tube length issue for brake press
- OTS probe from Q
- Ask surplus to remove the mill/lathe combo (John surplus contact)
- Msg Kennedy abt drawing classes
- Let ben EVT know abt using bandsaw
- Running low on stainless stock (size:)
- Tyler msg abt running low on labels

3/24/2025

Wednesday, February 12, 2025 7:21 PM



Dates

April 12: Formula South
May 14: IC Comp
June 17: EV Comp

CHART Breakdown

- PINK is at competition
- YELLOW is when we will be at Formula South

Meeting Notes

Comp Schedule

- We have 2.5 weeks till Formula South, cars need to be running by then
- 4 weeks to IC comp after that
- 4 weeks to EV comp after that

Plan for the week

- Uprights: One in machine, one stock left, need more
- Hubs: 2 need cb & studs, 3 need studs, might need 3 more studs
- Brake Rotors: On formula south
- Rotor pins: sammmmmmmmmmmmmmm

Group Yip

- Ppl outta tasks to do
- James finish 3-view, then finish 2 hubs
- Front sprocket, output shaft, inserts backups
- Steering Pickups investigation

TO-DO for the Week

- Measure all steering pickups and write down thickness for each

Questions/Comments/Concerns for Abri

- Tyler more stock upright
- Get timeline for uprights/hubs
- Meet with sam abt feeds n speeds
- Regroup abot parts
- Poke cam abt upright drill alignment issue

Next Week

- N/A

4/14/2025 Tooling

Monday, April 14, 2025 7:05 PM

- Center Drill (3/8 shaft dia.) x2
- Good short reduced neck ¼ ball apprx. \$70
- 3/8 balls

Material: 7000s alum
Long enough for upright: ~4in
Carbide?:

- 3/8 long endmills
- Better long (~5in) ¼ flat??
- CCMT Inserts
- VBMT Inserts
- Tool holders??

X

Notes:
Left front needs to be redone (upright)

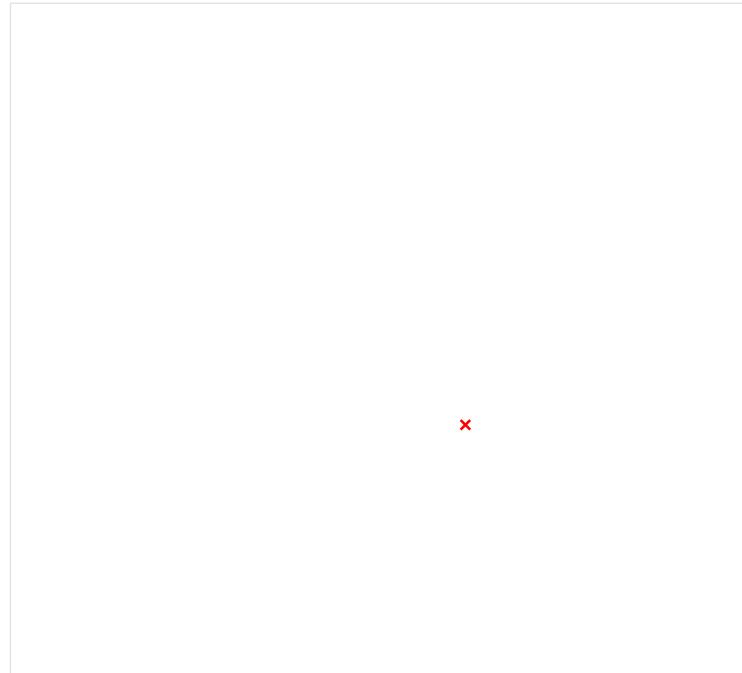
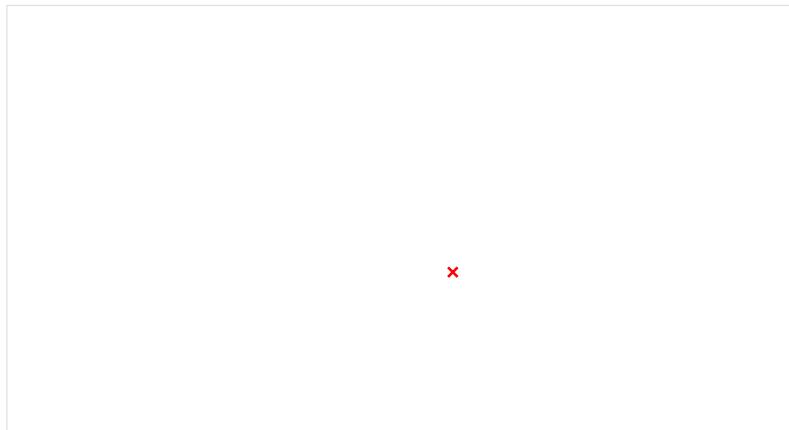
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[Tooling Guide.docx](#)

[End Mill Guide.pdf](#)

Design

Thursday, May 30, 2024 6:12 PM



IC Feedback 2024

Thursday, May 30, 2024 6:13 PM

Skitter

- Composites: Bring ppl in, have them make something, have them come across problems they are probably going to come across and work up their skills before actually applying it to parts going on the car
 - o *bc saw a lot of failure and wasted time with fuck ups on the real parts
- Creating Standard Procedures
- Learned a useful lesson, too many small pieces on the header
- Hard time adjusting the camber bc the shims are on the bottom and you have to jack the car up, so next iteration of uprights
- Measure every hour you spent designing the car, cost at engineering rate, and every hour spent manufacturing, so on and so on
- It's worth spending the time doing the CAM versus cranking out soft jaws, have some slides on it and some data on it while u measured it
- Its never a presentation, its always a thesis defense
- Thought process is great, bring some numbers and get some points
- Weight saving in the uprights, making smart moves about the radii in there, can go even simpler sometimes and say we'd save more grams if we machined out a pocket, but what we just drilled a hole, all the way through maybe not all the way through, just a plunge. Again how much time could you save there. What about speed holes. Round so they are strong and as long as you've left enough material everywhere. Instead of doing this really complicated machine op, using this absolutely ridiculous tool, just drill 3 vertical holes and take out a bunch of material.
- Just consider the time to machine vs the weight saving
- Logging all of data in slides
- Have a whole bunch of small presentation, never going to be a start to finish, but 3 slide presentation on this thing, 3 slides on that, 2 slides on this
- Back up what saying with numbers

Ease of repair?

- Can it be fixed in the field?
- Is special training/eq required to service subsystems? Will this prove unreasonable outside FSAE environment?
- Are special tools required to diagnose/service vehicle?

Sub-System accessibility?

- Can all areas of vehicle be accessed without major component (engine/acc) removal?

Part interchangeability?

- Are components from various corners of the car interchangeable?
- Can components be substituted in-field with conventionally available items?

Manufacturing complexity?

- Are unusual/specialized machining ops/materials required?

Have fasteners been standardized?

- Have the number of fastener sizes been minimized?

Can the team efficiently build more than one car?

Other Judges

- Generally speaking none of the design judges care to much about manufacturing
- When I look at the car, after talking to design lead, "so that's the theory behind it, did that come to fruition, what does that look like"
- Did I make this design rly cheap, rly easy to manufacture so I could get to test sooner, okay cool great, where's the test data to show that actually worked out
- Car looks a little busy, reusing parts and wiring harnesses
- Radiator fan fine is not tied up
- If grab someone off the street and they aren't immediately like "wow that's beautiful", there's things to improve
- All welds need to be perfect and manufactured parts need to be good
- Car is here so all parts were manufacturable
- Can see distortion on the weave, fucked tape
- Things difficult to assemble?
- What were high level goals and how does everything relate to those high level goals. If goal was to get car done by X date, here's my gantt chart, all the allotted time, resource loaded plans and capacity constraints that show we only have time to design these 10 components, okay how much time do you have to fabricate, how much time to design, did targets come on time or were they early/late, how did that effect everything else supposed to happen afterwards
- Okay to say we don't have someone who knows how to design uprights and can give the time to learn so we remade the ones from last year, not a perfect answer but better than no answer
- If not actually changing setups, then don't have setup changing parts, just extra weight, show effect of changing setups
- What will we learn for next time and how will we apply
- What do we see immediately and see, oh a lot of thought has been given to this and that but its not even throughout car
- Loose wires near hot things bad cuz inc temp inc resistance
- Nothing jumped out to ask a question "why did you do that", "cant get that out"

Back to Skitter

- Shouldn't be talking to other judges abt manufacturing, that's the one judges role
- Have an example of: this is the upright they handed me and I told them no, page, and these were the concerns/estimated time/utterly unrealistic specs and back and forth and back and forth
- If part rly bugs me to make, be like oh this is going in the design binder
- Divide and rise
- Bring props, prototypes, and broken parts

EV Binder 2024 TODO

Thursday, May 30, 2024 6:14 PM

Current limiting factor isn't tooling available, it's knowledge, time, and technically tooling cost (however that is divided during the design process > out of scope)

How to show

Show training plan

Ease of repair?

Can it be fixed in the field?

Is special training/eq required to service subsystems? Will this prove unreasonable outside FSAE environment?

Are special tools required to diagnose/service vehicle?

Sub-System accessibility?

Can all areas of vehicle be accessed without major component (engine/acc) removal?

Part interchangeability?

Are components from various corners of the car interchangeable?

Can components be substituted in-field with conventionally available items?

Manufacturing complexity?

Are unusual/specialized machining ops/materials required?

Have fasteners been standardized?

Have the number of fastener sizes been minimized?

Can the team efficiently build more than one car?

Design Research o-o

Thursday, May 30, 2024 6:15 PM

Options

Riccardo wave, dry sump, test intake, radiator

Conductor sizing, radiator, acc cooling, temp modeling

Test arb(s), yoke plate improvements, bell crank redesign

CNC Notes

Thursday, February 22, 2024 6:56 PM

OMP40 Not Calibrated/Probe Length

Tuesday, February 11, 2025 10:32 PM

Background: We were transferring probe dimensions/calibration from one HAAS CNC Mini Mill (Mill 1) to another (Mill 2) because Mill 2 doesn't have a working tool probe (OTS sensor). We changed the probe length in OFFSETS. Then when we went to calibrate the diameter of the probe (WIPS), it would throw "**Alarm 1011 OMP40 Not Calibrated**".

Documents:



<https://www.haascnc.com/service/troubleshooting-and-how-to/troubleshooting/Wireless-Intuitive-Probe-System-WIPS-Troubleshooting-Guide.html>



<https://www.haascnc.com/service/online-operator-s-manuals/mill-operator-s-manual/mill---macros.html>

Solution: Since we didn't calibrate the length in the Mill 2, the macros didn't populate properly. So must go to "CURRENT COMMANDS" and under "MACROS" and go to number "10561" and change the number to match the new probe length found on Mill 1. Probing diameter should now run without error.

Probing Failure & Problem Solving

Friday, January 3, 2025 6:31 PM

Lathe

- Machine has not crashed, but drill chuck is not aligned with spindle center
- Tool Turret is aligned on Z-axis
- Cannot check spindle alignment without removing spindle head (needs special lift because v heavy)
- Need Coaxial indicator to test X-axis alignment from Spindle to Tool Turret

Mill

- Probe end was broken & needs to be recalibrated with new end piece
- Batteries are dead (reading 3.2V & 1.2V), need to replace to proceed
- Alias code keep reappearing, need to delete as the mess with the tools ability to be calibrated

X

Links

Probe Calibration Manual

<https://www.haascnc.com/service/troubleshooting-and-how-to/how-to/wips-probe-calibration-ngc-ad0382.html>

Troubleshooting Guide

<https://www.haascnc.com/service/troubleshooting-and-how-to/troubleshooting/Wireless-Intuitive-Probe-System-WIPS-Troubleshooting-Guide.html>

Renshaw Probe PDF

<https://www.haascnc.com/content/dam/haascnc/videos/bonus-content/ep29-probe-troubleshooting/OMP40-2%20installation%20guide.pdf>

Lathe Alignment Guide

<https://www.haascnc.com/service/troubleshooting-and-how-to/how-to/lathe-crash-recovery--video-series.html>

Spindle-Toolholder Alignment

<https://www.haascnc.com/service/troubleshooting-and-how-to/how-to/st-lathe---spindle-center-line---ngc.html>

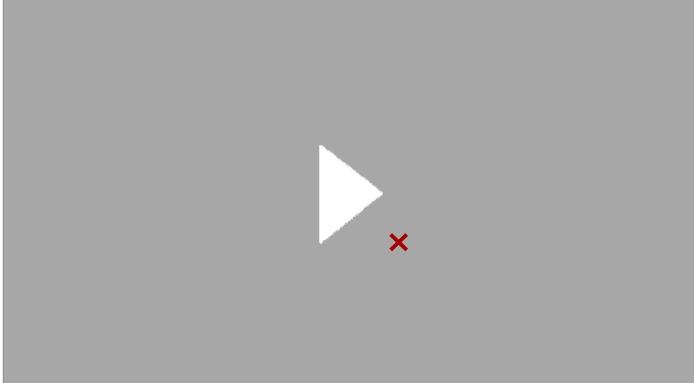
X

Parts we need to buy ^

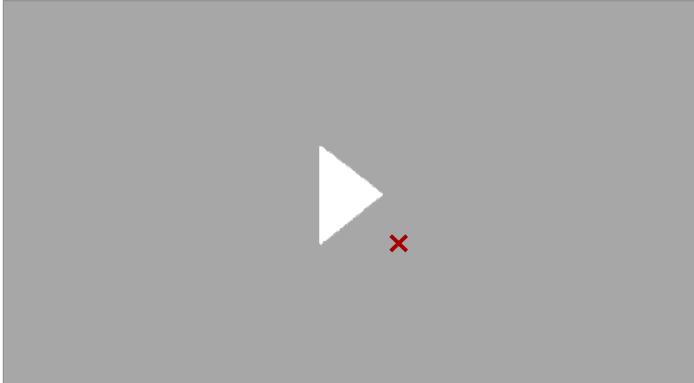
Avoiding Work Piece During Tool Change

Thursday, February 22, 2024 6:56 PM

Link: [How to Command a Safe Tool Change Position to Avoid Fixtures and Rotaries – Haas Tip of the Day](#)



[Easily Create Your Own Custom M and G Codes – Haas Automation Tip of the Day](#)



Purpose: The purpose of this is to prevent us from ramming tools into parts during tool changes. This is a concern when you have long tools, tall work pieces, or large fixtures such as a 4th axis. Program works by creating a sub-program when an M06 is called, when a tool change is called in the G Code. Programs simple tell machine where to move the axis before a tool change.

How it works: Program is set to program 09000 and is set to the Alias M Macro Call 09000. This will move the Z axis tables to the machine coordinates below. This location is closest to the door and furthest to the right of the machine. If the vice setup of the machine is ever changed, keep this in mind as you will probably want to set it up further to the right of the table to provide more room for

Warnings: Setting up this program requires turning on the ability to edit 09000 programs in the settings of the machines, so be cautious when editing. I set this up by following the video almost step by step.

Note: In the standard post processor, this does not save you from running into the part. The safe position in the post processor is not the maximum height of the machine (at least in the case of the Mini-Mills, Z0 sits at tool change height but the machine has about 4 more inches it can go up). Safe position is considered Z0, if your work sits above that, the machine will come down into the part.

Machine Coordinates

X: -16

Y: 0

Z: 4.41

Endeavors

Tuesday, July 18, 2023 3:10 PM

Anything that I'm working as lead that's not written on paper is here, this is more team stuff than manufacturing :D

Tracking

Monday, December 18, 2023 3:46 PM

[Manufacturing Tracker.xlsxm](#)

Sponsor Emails

Friday, July 14, 2023 5:59 PM

LOCAL MACH SHOPS ONLY!! (plz double check before sending out)

Subject: Inquiry for Sponsorship - Kennesaw State Motorsports

Dear [Company Name],

My name is [Your Name] and I am writing on behalf of Kennesaw State Motorsports, a team of students that designs, builds, and competes with Formula-style cars at the FSAE IC and EV International Competitions. We are reaching out to explore a potential sponsorship with [Company Name]. Our machine shop at Kennesaw State University has encountered unexpected construction delays, resulting in a completion timeline of mid-October. As a result, our team's timeline and manufacturing process for the Formula SAE competition has been severely impacted.

In light of these challenges, we would like to connect with [Company Name] to discuss the potential for sponsorship, including machine services, and other forms of support. In return, we would offer prominent brand promotion during the international Formula SAE competition and within our university community.

We would greatly appreciate the opportunity to discuss this further and explore the potential partnership. If you have any specific sponsorship opportunities or require additional information, please let us know.

Thank you for considering our request, and we look forward to the possibility of collaborating with [Company Name] Inc.

Best regards,
[Your Name]

For Big Companies LOL, gotta flex

Subject: Sponsorship Inquiry - Kennesaw State Motorsports

Dear [Company Name],

My name is [Your Name] and I am reaching out on behalf of Kennesaw State Motorsports, a team of students that designs and builds Formula-style cars for the FSAE IC and EV International Competitions. We're thrilled to share that we recently secured an impressive 6th place overall in the EV competition, surpassing our local competitors at Georgia Tech. We're driven to continue our upward trajectory, and we believe that a sponsorship from [Company Name] would be instrumental in achieving our goals.

With your support, we can enhance our design and fabrication capabilities, gaining access to cutting-edge machinery, tools, and resources. In return, we offer prominent brand promotion during the international Formula SAE competition and within our university community.

Our shared values, commitment to excellence, and passion for engineering make us an ideal candidate for sponsorship. Let's discuss this exciting opportunity further and explore how we can mutually benefit each other.

Thank you for considering our request. We look forward to the potential partnership.

Best regards,
[Your Name]

Kennesaw Motorsports - Formula SAE
1100 South Marietta Parkway Q134 | Marietta Ga, 30060
ksumotorsport@gmail.com | [Facebook](#) | [Instagram](#)

CC: KSUMotorsport@gmail.com, Awats111@students.kennesaw.edu

What you want first and then context

- Sponsorship request first, then context
- Initial Email smaller, send longer
- LinkedIn & phone call
- :P

Draft for a new sponsor email template

Dear [company],

My name is [Insert] and I've noticed on [LinkedIn/Website/Social Media] that your company specializes in jobs involving [manufacturing/metalworking] and provides quality service to your customers. I am currently the Vice President of my university's Formula Sae team, which is a competition that challenges engineering students to design, fabricate, develop, and compete with a small-style Formula car in competitions across the US. We are currently working on a [project] that requires the use of [component/machine] and would like to have an opportunity to connect with [company]

For context, the use of these [Components/Machines] would enable us to [whatever the goals for your project are].

If possible we would love to schedule a [call/meeting] with a date and time that works for your schedule. Thank you for your time and hope to hear back from you soon.

Kennesaw Motorsports - Formula SAE
1100 South Marietta Parkway Q134 | Marietta Ga, 30060
ksumotorsport@gmail.com | [Facebook](#) | [Instagram](#)

CC: KSUMotorsport@gmail.com, Awats111@students.kennesaw.edu

Training Stuff

Tuesday, July 18, 2023 3:20 PM

CLASS THOUGHTS (not final)

- Intro to Manufacturing:
 - o Different Machines
 - o Tools
 - o Common Terms
 - o Maybe in mach shop so I can actually show them
- Safety in the Machine Shop:
 - o Picture Search w/ candy prize to encourage memorization
- Series of Events in Computer Labs:
 - o Start w/ a CAD class (not taught by me)
 - o Next have a drawing that builds on what they CAD to teach proper callouts etc.
 - o Then have a CAM class that builds on that
 - o Continuation or CAM/Finally have a CNC class where we use Desktop Mills to CNC something small
 - I was thinking a simple engraving on some cut scrap sheet metal, its simple because its fast and easy, and personal
 - Can also check CAMs before they go thru
 - Can add a "challenge" of making it one continuous line like a Heart or Letter, but rly just makes it easier for us because its not multiple operations
- Materials & Tools:
 - o Pros and Cons of the Alum & Steels we use most/why we use them where
 - o Different tools (endmills,drills,etc.) pros/cons/idk
 - o YUh
- Waterjet if ready:
 - o General idea is to show how to waterjet some sheet metal, have read a drawing and mark it, and then bend it
 - o Would be simple simple shapes like a box or triangle
 - o Could also outsource waterjet pieces

Desktop Mill Manufacturing thoughts:

- Will be machining 0.5"x2"x2" Black/Yellow Color-Core HDPE Plastic (only do 5000 rpm)
- There are currently 3 desktop mills in the Makerspace
 - o Need to get card access from Mike & check with scheduling for Tim
- One line engravings, they can pick the shape and we will walk them through the CAM
- CAD day 1, CAM day 2, CNC day 3
 - o To make sure no one falls behind if they miss one, we will

TO-DO Before Classes:

PPTs

- Intro
- Safety
- Cad
- Materials & Tooling
- Cad for lab & drawings

Final Classes Dates:

8/29 - 8pm - Intro	9/5 - 8pm- Safety
9/8 - 7pm - Cad	9/12 - 8pm- Materials/Tooling
9/15 - 7pm - CAD for Lab & Drawings	9/19 - 8pm - CAM & Desktop Milling
	9/22 - 7pm - Water jetting

Approval of PPTs & Lab Plans

- Intro
- Safety
- Cad
- Materials & Tooling
- Cad for lab & drawings
- Milling Class Doc
- WJ Class Doc

Random

- Cut up HDPE into 2x2x0.5 blocks
- Get candy to chuck at ppl
- New Safety Docs
- Videos playlist to help those virtual
- Layed out plans for classes to make sure they run smoothly

People at intro meeting

-

CAD Class Pt.1

Friday, September 8, 2023 4:47 PM

Title: Introduction to SolidWorks and CAD Thinking

Agenda:

I. Introduction to CAD and SolidWorks (5 minutes)

- Welcome participants and explain the importance of CAD in design and engineering.
- Briefly introduce SolidWorks as a popular CAD software used for 3D modeling.
- Highlight the relevance of CAD thinking in product design and development.

II. SolidWorks Interface Orientation (5 minutes)

- Demonstrate the SolidWorks interface, focusing on:
 - Command Manager
 - Feature Manager Design Tree
 - Graphics Area
 - Property Manager
- Emphasize the importance of familiarizing oneself with the software's layout.

III. The CAD Mindset (5 minutes)

- Explain the CAD mindset:
 - Thinking in 3D: Encourage participants to visualize objects in 3D space.
 - Design Intent: Stress the importance of planning and sketching before modeling.
 - Parametric Modeling: Mention how changes in one part affect the entire model.
 - Reusability: Emphasize creating features that can be reused in different designs.

IV. Hands-on Modeling Exercise (15-20 minutes)

- Choose a simple part like a basic geometric shape (e.g., a cube with a hole) for beginners.
- Provide step-by-step guidance on how to create the part in SolidWorks:
 - Sketching the shape
 - Extruding and creating the hole
 - Adding fillets or chamfers
 - Modifying dimensions
- Demonstrate how to use features like fillet, chamfer, and dimension tools.
- Encourage participants to ask questions and follow along on their computers or observe your live demonstration.

V. Tips and Tricks (5 minutes)

- Share a few essential SolidWorks shortcuts or best practices for efficient modeling.
- Discuss the importance of saving projects and version control.
- Mention available online resources and SolidWorks community forums for further learning.

VI. Q&A and Conclusion (5 minutes)

- Open the floor for questions and clarify any doubts.
- Summarize the key takeaways from the session, emphasizing CAD thinking.
- Provide additional resources for self-study and practice.

Homework (Optional): Assign a simple modeling task for participants to complete on their own as a follow-up exercise, reinforcing the concepts learned in the class.

Remember to adapt the pace and complexity of the class based on your audience's familiarity with CAD and SolidWorks. Encourage active participation and engagement to foster CAD thinking effectively within the given time frame.

Knowledge transfer

Monday, July 10, 2023 6:20 PM

First and foremost, time is the one thing that every member can contribute to a design team.

No matter what their role or their year in school, if someone is putting in the time to find how they can best contribute to the team's success, they are useful to the team.

Both old and new members should persistently be working to effectively build a racecar and learn to design a better one in the future.

For many of us, especially the young ones, putting in time meant reading relevant articles, machining important parts, and being exposed to every system and test on the car.

For those who were older, it meant stepping into a managerial position that oversaw scheduling, manufacturing, and providing insight to underclassmen.

Machine shop specs

Tuesday, September 5, 2023 10:59 AM

Name of Manufacturer: OMAX
Type of Equipment: Waterjet
Model Number: MAXAM 1515
Power requirements: 3-Phase, 480 VAC, 60Hz
Water requirements: water hookup for a hose (abt. 12g/min)
Air requirements: 20 cfm up to 30cfm
Location of equipment: Breeze way

Name of Manufacturer: OMAX
Type of Equipment: Sump Pump
Model Number:
Power requirements: 115 VAC, 20A **GFCI
Water requirements: Drain flow 5gpm min
Plumbing requirements: Check valve outlet, isolation valve on inlet and outlet
Location of equipment: Breeze Way

Name of Manufacturer: OMAX
Type of Equipment: Waterjet Pump
Model Number:
Power requirements: 480 VAC, 60Hz, 40 A
Water requirements: 20 psi min., 3.2gpm min.
Location of equipment: Breeze Way

Name of Manufacturer:
Type of Equipment: Waterjet Chiller
Model Number:
Power requirements: 480 VAC, 60Hz, 15 A
Location of equipment: Breeze Way

Name of Manufacturer: Dell & OMAX
Type of Equipment: Waterjet Computer & Controller
Model Number:
Power requirements: 115VAC, 15 A **on its own breaker, wall mounted outlet, & GFCI
Location of equipment: Breeze Way

Name of Manufacturer: OMAX
Type of Equipment: Waterjet Hopper
Model Number:
Air requirements: 75psi min. 20 CFM
Location of equipment: Breeze Way

Name of Manufacturer:
Type of Equipment: Hydraulic Press
Model Number:
Power requirements:
Location of equipment:

Name of Manufacturer:
Type of Equipment: Manual Mill
Model Number: JTM-1
Power requirements: 3 phase, 230 V, 60 Hz, 40 A
Air requirements: Air hookup nearby 5cfm
Location of equipment:

Name of Manufacturer:
Type of Equipment: Manual Lathe
Model Number:
Power requirements:
Water requirements:
Air requirements:
Location of equipment:

Name of Manufacturer: HAAS
Type of Equipment: CNC Lathe
Model Number:
Power requirements: 220 VAC, 40 A
Air requirements: 4 scfm @ 100 psi
Location of equipment: O100-1

Name of Manufacturer: HAAS
Type of Equipment: CNC Mill x 2
Model Number:
Power requirements: 220 VAC, 40 A
Air requirements: 4 scfm @ 100 psi
Location of equipment: O100-1

Type of Equipment: General Equipment (Belt sander, band saw, power tools, etc.)
Model Number:
Power requirements: 120VAC, 20A outlets spaced around every 4ft, no more than 4 junctions per circuit
Location of equipment: O100-1

Name of Manufacturer:
Type of Equipment: Composites Fridge
Model Number:
Power requirements: 220/20amp(single) 115/20amps
Location of equipment:

Name of Manufacturer:
Type of Equipment: Composites Venturi
Model Number:
Air requirements: 20 CFM
Location of equipment:

Name of Manufacturer:
Type of Equipment: Dyno Computers/Dyno Controller
Model Number:
Power requirements: 115VAC 15A **isolated
Location of equipment:

Name of Manufacturer:
Type of Equipment: Eddy Current break
Model Number:
Power requirements: 115VAC 20A**isolated
Location of equipment:

In Gen:
A low height water spigot should be available to fill coolant tanks.

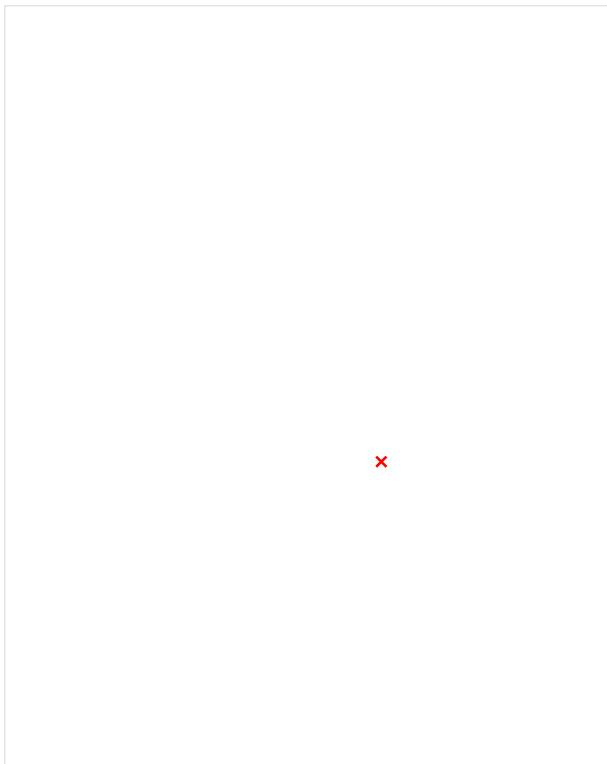
Drop down air connections show be accommodated for
Separate branch 120v 20A for vacumes
Another branch of 120V for cleaing drop cords

**try meet with guy cuz confusion
**is there a plan to update the fume extractor in dyno / fan in composites

Every air drop should have a drier and a regulator

Master CAM -0-

Monday, September 18, 2023 6:14 PM

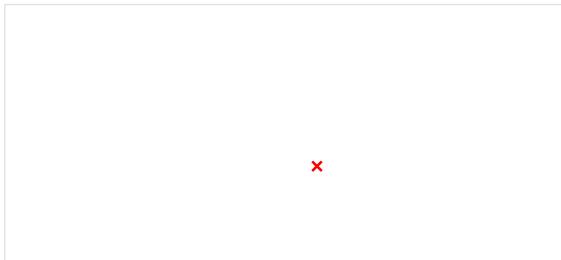


✗

✗

<https://www.mastercam.com/sae-international/>

- MasterCAM sponsorship approved 10/5/2023
- Licenses expire - Oct 31, 2024
- Qty: 10



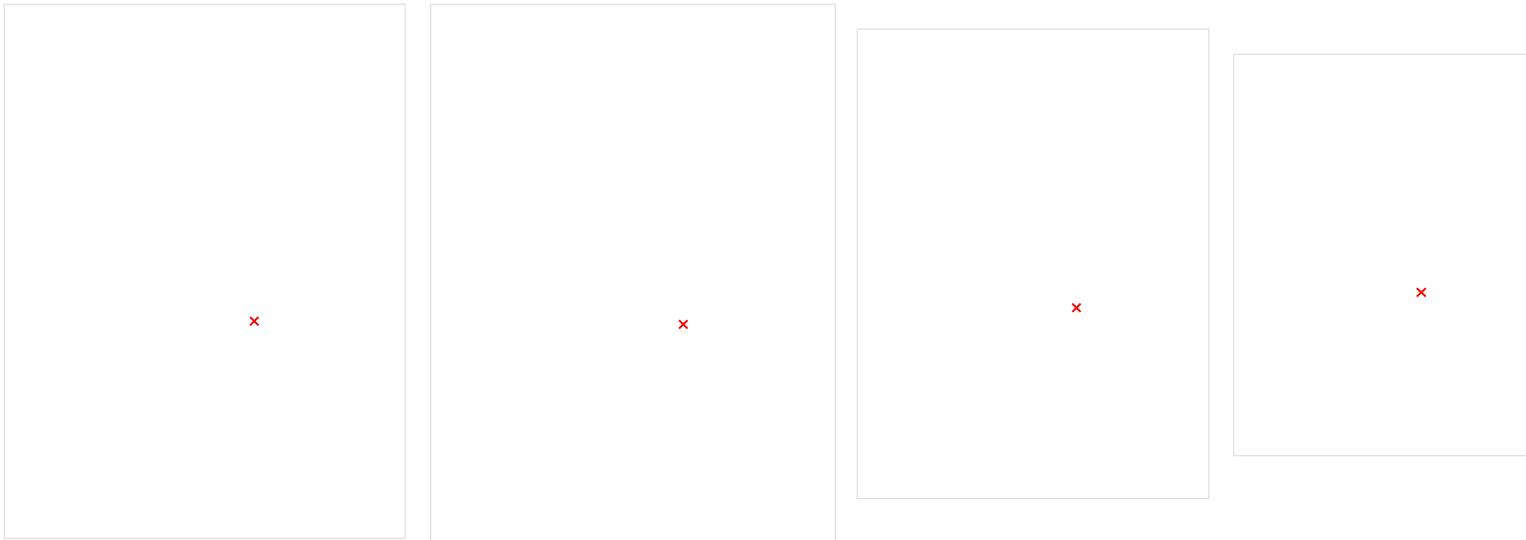
✗

LICENSES TRACKING SHEET

Name	License Number	Date Given
Shop PC Left	W489886	11/7/2023
Shop PC Right	W489887	11/7/2023
Abrianna Watson	W489888	11/8/2023
Joshua Bray	W489889	4/3/2024
Brenden Barclay (BJ)	W489890	11/15/2023
	W489891	
	W489892	
	W489893	
	W489894	
	W489895	

Shop Space Thoughts

Monday, October 16, 2023 12:23 PM



Schizo Notes

Thursday, November 2, 2023 11:58 AM

- 3/4" 4FL
- 3/8" BALL
- 3/4" BALL
- 5/8" 2FL
- 5/8" 2FL
- 5/8" 2FL x2
- 5/8" 2FL
- 3/8" 4FL
- 3/8" 4FL x2
- 5/16" 4FL
- 11/31" 4FL
- 1/2" BALL
- 1/2" BALL x2
- 1/2" BALL x2
- 1/2" 2FL
- 1/2" 2FL x2
- 1/2" 4FL
- 1/2" 4FL x2
- 1/2" 4FL
- 3/4" 2FL
- 3/4" 2FL
- 5/8" 4FL
- 11/16" 4FL
- 11/16" 2FL
- 1/2" 3FL
- 3/4" 2FL x2
- 3/4" BALL x2
- 3/4" 2FL
- 3/4" 2FL
- 3/4" 4FL x2
- 3/4" 4FL
- 7/8" 2FL
- 9/16" 4FL
- 3/4" 6FL
- 3/4" 3FL
- 3/8" 2FL

Machining Tracking

Monday, June 26, 2023 8:55 PM

What do I want out of the system:

- Easy access to drawings & dxf files
 - What the part is
 - How many are needed
 - What stock it uses, do we have it yet
 - Priority
 - Cam file / CAD
 - Subgroup
 - Responsible lead
 - Responsible engineer
 - Machinist
 - Tooling required
 - A way to link to pdm would be nice so everything is updated but not necessary

Welding

Thursday, July 13, 2023 4:19 PM

All stuff welding related :D

Weldmenting Assessment

Friday, July 14, 2023 12:19 AM

[Microsoft Forms](#)



In the microsoft forms group the welding form has been added

Weld Vids

Friday, July 14, 2023 12:19 AM

<https://www.youtube.com/@PacificArcTigWelding/playlists>

Goated channel for learning basics and fundamentals many great series

<https://www.youtube.com/@TheFabricatorSeries/playlists>

Another great resources must watch TIG Theory and Lecture

Welding Go EEEEEEE

Wednesday, July 12, 2023 9:16 PM

Intro To Weld --> Weld 1102--> Partial Weldment--> Weldment Theory--> Advanced Weldmenting Techniques--> 375 Amp BBY

Intro to weld:

Material prep

1. First identify the material you are welding as each material has different procedures
2. Let's start with steel,
 - a. We weld mostly 4130 chromoly tube; chromoly has mill scale from the manufacturing process that needs to be removed from the top layer of welding, failure to do so will result in contamination in the weld and will make for a weaker weld
 - b. To remove the mill scale you must use an abrasive such as the wire wheel, or scotch-brite pads.
 - c. The metal should no longer be gray and have a nice shiny finish to it
 - d. Your metal is now ready to weld
3. Now let's move on to aluminum
 - a. Aluminum requires a more intensive cleaning process than steel since it is more prone to contamination within the weld.
 - b. Most of your aluminum parts are cut on the water jet and will contain garnet in the edge of the weld. Garnet will contaminate your aluminum welds and make for a more difficult weld and a weaker joint.
 - c. To remove the garnet you must file down the edge of the part until shiny
 - d. Now that the garnet is removed you must now clean the part with a scotch-brite pad to remove any surface contamination of the metal
 - e. Once done you should wipe down the surface with acetone to remove any remaining contaminant's
 - f. Not only will you need to wipe down the part but also the filler rod you will be using.
 - g. Your aluminum is now ready for welding
4. In general these are the practices you should follow for the majority of the parts we weld here. While on occasion we weld different grades of steel the general procedure remains the same. While we weld more metals than just aluminum and steel the other metals will be discussed further on in the guide

Torch Setup:

Torches come in a wide range of sizes, shapes, and use different "Consumables"

Consumable- Items that wear over time and you will constantly be changing/ adjusting and changing out

Ex...

Tungsten, Welding Cup, Gas Lens, Back Cap, Collet Body

The torch is the part of the welder where all the consumables go onto. Please note there are 3 main types of torches you will see in our shop.

Ex...

Series 9 (Limited to 125 Amps)

Series 17 (Limited to 150 Amps)

Series 18 (Limited to 350 Amps)

Next up is the back cap



The back cap as the name implies, screws into the back of the torch. Its main purpose is to seal the torch and store your tungsten based on length. The shorter the back cap the shorter the tungsten must be but also the smaller overall size the torch will be. This allows for greater maneuverability and can get you into some tight places. Keep in mind that the back cap threads are dependent on torch size. 17/18/26 all can share consumables as well as 9/20

Now to move on to collets



Now to move on to collets



These hold your tungsten and allow the current to flow through the torch handle and into the tungsten. The important thing to remember here is that depending on the thickness of your tungsten that will determine the size of collet that you will need. There are 2 types of collets including wedge and split collets, some argue that wedge collets hold a tighter arc but they are a bit more expensive than split collets

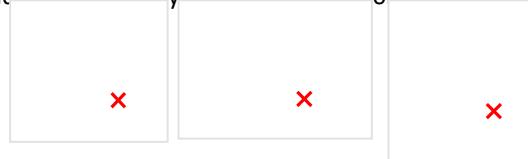
We can't forget about Gas Lenses



Above can be seen 2 different types of gas lenses

The Bronze looking one is known as a standard body and has holes on the side allowing argon to flow out and onto your material. The other one is known as a stubby gas lens. As a personal preference we have switched over to gas lenses due to a more compact size. This is a personal preference and some argue that Standard bodies work better. Find the one you prefer, with welding it is important to remember that there are many ways to weld so find the way in which you are comfortable. For us that means Stubby Gas Lenses.

Last but definitely not least Welding Cups



Welding Cups come in various shapes and sizes as well as material, above you can see a few cups that we most likely have around the shop. The pink is a standard alumina cup, these are great for ac and dc welding and are usually the cheapest available cups, the white is a furick cup, furick cups are expensive but offer a much slimmer package they also use smaller gas lenses. Edge cups are the crème de la crop they are either made of glass, pyrex, or quarts. The Quarts cups can handle AC-DC welding and also use gas lenses.

This is just step 1 of cups step 2 goes into which sizes are used for what materials,

A size 4-8 is recommended for aluminum to decrease white oxidation line on material

A size 8-12 is recommended for Steel and this is what is mainly used on chassis welding and tabs

A size 16-18 is used for Titanium and sometimes stainless steel Keep these cups to exotic materials as they use more argon.

As a rule of thumb your gas flow should be 2.5x the size of your cup size so a size 8 cup uses 20 CFM

Stick-out is also based off the size of your cup, the rule of thumb here is your stick-out is cup size/ 16 in inches for a size 8 cup you should have 8/16ths or 1/2 in of stick-out. This is a rule of thumb but generally stick-out can allow you to have better visibility in most areas. In dire situations a size 18 cup will give you the most stick-out and might be necessary

And know you know how to set up your torch

Machine Setting

There are a couple of settings that you will be changing regularly when welding such as amperage, polarity, postflow/preflow . While our machines allow to change more settings there is no real need to change them.

Amperage:

Amperage is the amount of "heat" you are putting into a part the higher the amperage the more heat you will put into a part. The general rule of thumb is to use 1 amp per thousand of an inch of material thickness. For example if you are welding a part with a thickness of .045 you should use around 45 amps. Now this rule does not have to be followed but it will give you a good starting point of where to set amperage. As we move into more advanced joints the material thickness will vary so you will need to be able to control the foot pedal well. Speaking of foot pedals, the foot pedal connected to the machine allows us to vary our amperage and will have a maximum amperage to what you set on the machine. As you get better at controlling the foot pedal the need to change amperage on the machine

will decrease as you will be able to weld most materials with the same amperage setting on the machine.

Polarity:

Our machines have two settings for polarity, AC and DC. DC is used to weld steel, stainless steel, titanium and various other metals. AC on the other hand is used to weld aluminum and various other metals we don't weld here. In general DC does not have many settings you can change, on the other hand AC does; With AC you can change the frequency, balance and waveshape, we'll get more in depth with what each of those do later on.

Postflow/preflow:

Post flow is the amount argon you will have after you finish welding. This is critical as having argon flow when done welding will prevent oxidation of the weld and will therefore make a stronger weld. Not only does this prevent oxidation of the metal but oxidation of the tungsten. Preflow is the same thing as post flow but come before an arc is struck. Pre flow will help make sure that there are no contaminants in the air surrounding the material. Some metals don't require as much post flow as others like aluminum for example does not need much post flow on the material itself but it is needed to cool down the tungsten, metals like titanium require larger amounts of post flow as oxide will form if the metal is not covered properly.

Argon/Cups

Filler Material

Welding plan

Friday, July 14, 2023 1:12 AM

Get person welding. Look for consistency in welds and them move down in thicknesses to gain more control.

A consistent weld should be:

Good pattern

not too big of a heat affected zone.

Weld should mostly penetrated, as the thickness goes down penetration should become easier and more evident in the weld.

When first training a welding one thing that the Trainer should look for is a good torch angle and be sure that it's not too steep and this could lead to problems welding. Torch height is also important to keep consistent.

Good technique with filler rod should include keeping the filler rod at a proper distance from the weld puddle and not adding an excessive amount of filler to the weld as this will lead to too tall of a weld. The weld should remain mostly flat throughout.

The key step when training someone is to make sure they know why they are doing what they are doing and what changes that they are making are having an effect on their welds. If they are being inconsistent its good to ask what changes they made, were making the welds look better or worse.

Sheet of a thickness that not too thick but not too thin should be used when first training a welder. .070 works well for starting some one off

As the trainee becomes for comfortable with welding consider moving to tube welding.

To start off have them weld tube ends together as this is more difficult to do and will help move around tube.

Archive

Wednesday, July 12, 2023 5:45 PM

This is all the information in the old OneNote (KS6C-E) :D

KS8 Front Uprights

Friday, March 07, 2025 11:33 AM

If you are reading this to manufacture uprights, please read through my entire yap about the general process and how the attempts failed..)

Reason for Manufacturing:

KS7.2 had the newest front uprights, these broke at Barnesville from a fatigue failure, so we wanted to redesign and remanufacture a new set for KS8-E. Also wanted to get KS8-C caught up because it has the old KS6 upright design.

What's needed?

2 pairs of front redesigned uprights.
2 sets of front uprights.
Have 5 pieces of stock, 1 is extra from the previous time uprights were made and is 6x6x3 instead of 7x8x3 but it still works.

General Process:

1st job:

Probe a 3x7 end of the stock and run an adaptive to machine all 4 sides, to get reference points. These are exactly 3x7 apart (stock is slightly oversized on all dimensions).

2nd job:

Keeping the stock in the same orientation, probe 1 corner as a reference and center drill the bottom suspension pickup (where the spherical goes) and the steering pickup holes. These then get drilled on the manual mill due to the height restrictions of the CNC. I ended on found out that a 3/8 in (25) drill bit can be put in a 1/4 collet, so I used the use of the ODK for this step, (if center drilled though)

The stock was always exactly on point.

3rd job:

This is the inside face of the upright, and is where I can get the majority of features. Probes 1 of the machined corners, center drill and drill the brake caliper holes (3/8), dat holes (1/4), upper suspension pickup holes (1/4), and the steering pickup holes (3/8) remove as much material as possible to reduce chatter.

For operations: An adaptive then a variety of operations to finish features.

4th job:

This is the outside face of the upright. Not a lot of features/cleanup here. Again, Probe 1 of the machined corners. Soft jaws were made and used for this job.

Operations: An adaptive, then various operations to finish features.

What's successful?

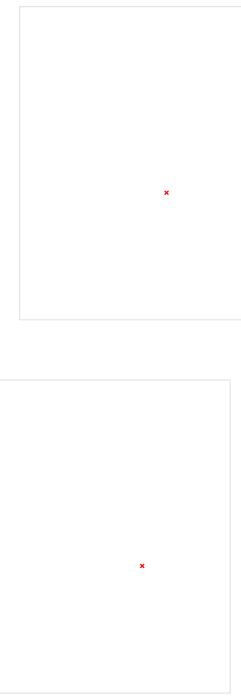
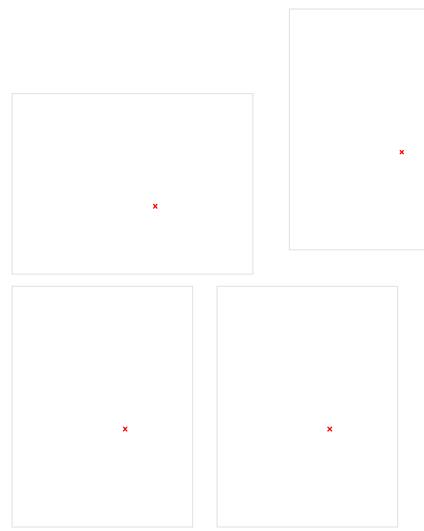
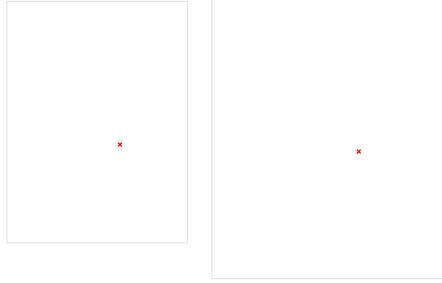
The gap between the steering pickup is exactly 1/4in, could use a 1/8 endmill, but will need a fairly long one which is going to cause chatter too, the 1/4 cutters like hell because it's pretty long and it's taking a full width. The fillets being exactly 1/2in, we don't have a lot of 3/8 ball mills, so we have to use a 1/4 ball mill of 1/2 ball mill which causes chatter wether way.

2nd Attempt (Fail)

2nd Attempt (Fail): This one failed immediately due to a tool probing issue. I had just installed

the new OTS sensor and calibrated the OTS but hadn't calibrated the Spindle Probe on the OTS. So the adaptive clearing and a few horizontal passes were done with the spindle probe on 1/2" diameter. The part was machined to what they were supposed to be which is significantly more than the stock to leave is set to, so therefore the part was immediately out of spec. I continued running the adaptive until the spindle probe would not probe the part again. Since everything was good, I was updating feeds and speeds throughout the process to improve the efficiency of the jobs. When I flipped the part and started the adaptive again, the spindle probe would not probe the part again with I think .15 step over?? Did not pull the upright out of the jaws, nor did it twist in the jaws. (more on those later)

After the spindle probe was loose, but the outside fit was pretty good. The outside fit was almost a slip fit until it had been pulled in and out many times, then it kinda wore some and became a slip fit. Was told it could still work with a little effort though.



Now - EV Comp List

Monday, May 27, 2024 7:18 PM

Needs

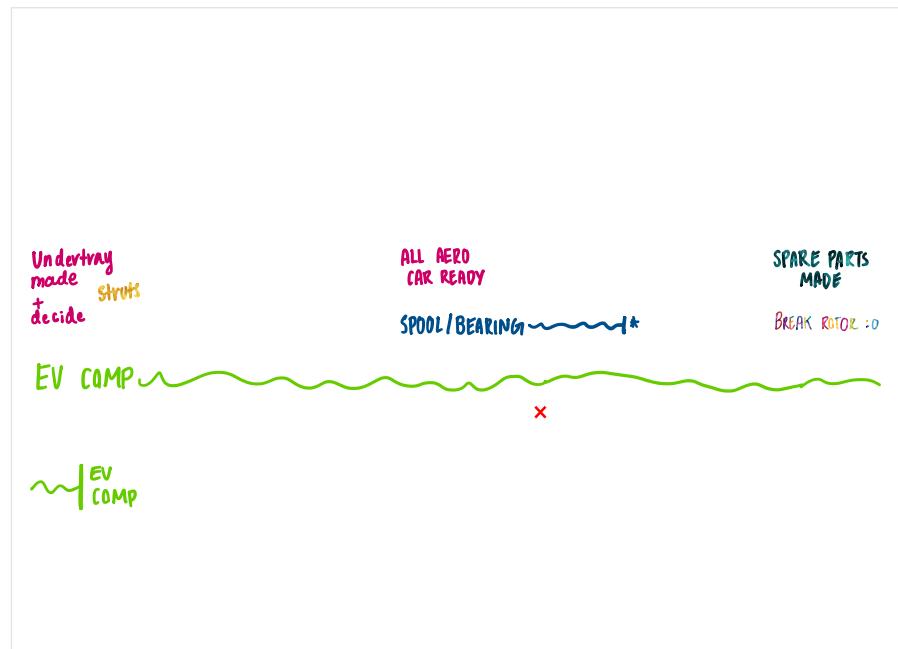
- 2x Front (10 tooth) sprocket
- 1x Front Sprocket adapter
- 1x Bearing Carriers (L/R)
- 1x Spool (Old)
- 2x Rear Struts (face to final length, drill, tap)
- 4x Rear Strut Inserts (CNC, drill, tap)

Undertray

- 5/31 get cross braces on jacking bar (via Marco)
- Re-drill holes on undertray mounts (before Sunday)

Wants

- Break rotor inserts? (24)



Now - IC Comp List

Monday, April 15, 2024 4:39 PM

List of things needing to be manufactured, during the main meeting the priority of these items will be discussed with the team, as for what needs to get done first

IC- header bungs
 IC - Uprights
 ○ FL
 ○ FR
 IC - Motor mount right side
 IC - front steering pickup (should be done w /upright)
 IC - Toe rod tab/mounting
 IC - front sprocket? (spare)
 Dif ration/redesign?
 IC - pedal box needs redesign/updating
 IC - throttle Bracket?
 IC - Dif cariers (Can they go on car ??)
 IC - Do we need anything for clutch?
 IC - do we have enough shims in case we lose some during before comp?

IC Priority
 - Throttle by Fri 19
 - Bungs by Wed 24
 - Waterjet: shims & Dif/bearing carriers @ GT Tue 23
 - Dif sprocket just before comp

EV Priority
 - Front Sprocket til Plate CAD Done
 - Plates
 - WJ sprokets & plates if possible

Would like to have have before IC
 EV - Motor mount plate
 EV - Bearing carrier plate
 - Will have to be machined anyways, so maybe worth it
 EV - Front sprocket
 EV - output shaft if not useable

EV- spool :skull:
 EV- rear sprocket
 EV - Upright
 FL
 FR
 EV - Upright Pickup
 EV - Swap and reweld rear CA
 Motor cooin fitting

EV sprockets
 order of priority: - Jonathan
 10 tooth front qty (1)
 16 tooth front qty (1)
 37 tooth rear qty (1)
 16 tooth front qty (1)
 10 tooth front qty (1)

and then 428 parts, double confirm on these if chill
 12 tooth front qty (1)
 45 tooth rear qty (1)
 11 tooth front qty (1)



BEFORE EV COMP (in order of priority)

- 10 tooth (x2) & 16 tooth (x2)
 - CAM
 - CNC First side
 - Cut on bandsaw & finish on manual lathe
- EV 37 tooth rear sprocket
 - Turn down to 0.227 overall thick
 - 0.130 Tooth
 - Halfway down/0.048 either side
- Clean up sprocket spacers
- Front uprights
 - Left
 - Right
- EV Bearing Motor Plate (might not need)
 - Clean up sides
 - Might need soft jaws?
 - CAM
 - CNC bearing side & get overall thickness to size
- Spool

GT DXF LIST (in order of priority)

IC
 Right Bearing Carrier

- Stock
 - 0.5 alum
- DXF
 - Name:

Right Diff Carrier

- Stock
 - 3/8 alum
- DXF
 - Name:

Chamber Shims

- Stock
 - 1/8, 0.06, 0.095 alum
- DXF
 - Name:

Dif Shims (atleast 1/8 thick)

- Stock
 - .25 alum
- DXF
 - Name:

EV
 Motor mount plate

- Stock
 - 1x 0.25" Aluminum
- DXF Name
 - K57E motor mount w resolver NO lightweight

Bearing carrier plate

- Stock
 - 1x 0.5" Aluminum
- DXF Name
 - K57E Bearing Side Motor Mount NO lightweight

Rear sprocket (37 tooth)

- Stock
 - 1x+ 0.25" Aluminum
- DXF Name
 - 520 Pitch 37 Tooth Rear Sprocket NO Chamfer

Sprocket adapter to bearing Spacer

- Stock
 - 1x 0.5" Aluminum
- DXF Name
 - Sprocket Adapter to Bearing Spacer

Front Sprocket (10 tooth)

- Decided to CNC whole part instead at a later date

Aero Stick

Friday, May 26, 2023 2:51 PM

Aero Stixk

- min wheelbase 1525mm
- max 700mm forawrd of wheel
- max 250mm behind wheel
- 1200mm max height for rear wing
- forward of front axle below 250mm
- everything else must not be higher than 500mm

Aero Block

- nothing within 75mm of tire

Mar 6-Mar 13

Friday, March 8, 2024 11:23 AM

Mar 6 - 13

TOOLING

- parting tool on CNC lathe is broken and needs to be replaced
- Manual Lathe tools are in Middle Cabinet in main
- All other tools are in Red tool box in O Machine Shop, key is on railing behind right mill, ALWAYS LOCK ONCE DONE
- If you have any questions or need more stuff to do msg me!! I am here to help so you don't waste hours fixing a problem I've probably already seen :)

Axle Endcaps

- 3D print part in PDM, make sure to test fitment before batch printing

SendCutSend

- Tabs need to be cleaned and bent
- To find part name PDM > KS7E/C > Manufacturing > SCS Order
- There are likely no drawings so have a subgroup lead double check direction of bend and bent line before putting on the press break

Header Bungs

- Stainless steel 2in round stock, needs to be turned down to 1.75 +0.01
(for fitment in cnc lathe)
- Program for CNC lathe is in Manufacturing discord, again check fitment before batch running
- Will need to get clamped on manual mill and bored out

IC Bearing Carriers

- Center needs to be bored out for bearing pressfit, please have Bray/Mihai present when doing this

KS7 Shock Spacers

- Alum 0.65in round stock, on manual lathe needs to be center drilled, drilled to spec, and parted
- Qty:16, CAD in Manufacturing channel, Tolerance: height/D: +0.005, Everything else: +0.01

Jacking Bar Insert

- CAD in PDM, need to be tapped w/ 1/4-28, check threads with rod end in left most red cabinet

Rear Wing Inserts

- CAD in PDM, need to have threads checked with rod end, if fitment is poor re-tap them

Waterjet

- Current List of Parts that need to be waterjet: EV Dash Tabs, PDU Tabs (qty for both cars), Seatbelt tabs, BOTS Bracket, Compressed Air tab, Pedal Box?? Bray??, Surlock tab (polycarb), Side panels for lid, Rim for top acc lid

Accumulator Fan Mounts

- New Acc fan mounts need to be printed & checked for fitment

Steering Pickups

- Alum 1" plate stock needs to be cut for qty 10 steering pickups
- Can try milwaukee portable bandsaw or jigsaw
- Stock size 2"x2"x1" +0.5

Jacking Bar Tubing

- Shrimple Vertical Bandsaw/Coping Tool Operations
- Stock is left of Chemical Cabinet, follow drawing specs & tolerances, if not called out +0.01
- Jigs also will need to be made

Aero Spars

- Some of the Aero spars are 3D printed, check w/ nathan & Project Proposal to get qty/toler/etc.

HDPV Spacer

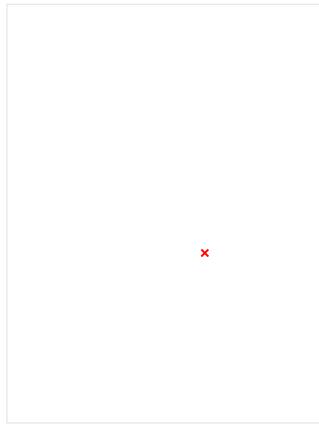
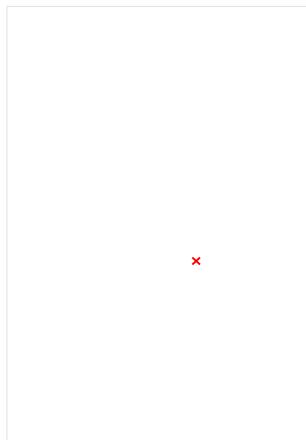
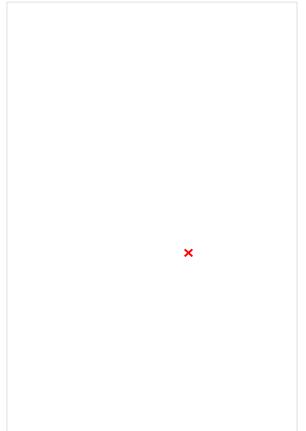
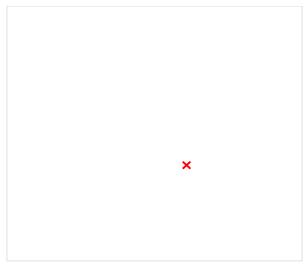
- Polycarb 0.125" will need to be waterjet, then milled to correct thickness, check w/ Johnathan

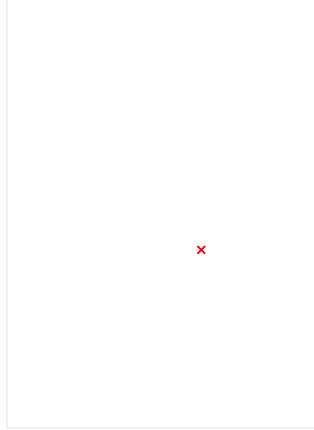
Heat Shield

- Cut side pieces for heat shield out of 0.03 sheet stock on vertical bandsaw
- Can print 1:1 ratio drawing and draw onto stock using calipers, can also glue drawing to stock as guide lines
- Tolerance: + 0.1 bc welded

Machining Notes:

Tools I like for manual lathe:





x

Manufacturing time line:	Known to make:	Think about time line:	Gona be problems:	Deadlines as tight. Pm for tracking. Checking parts what needs to be made.
Build end march 1st?	Acc mounts Upright Crosses Acc lid FW RW	TSAL MDB PDU V2 AVF Ev dash VCU	ETs Intake test Alignment tool	
What are the big groupings?				List items in the transfer: List all items on old car List all items in CAD
Date on calbder Whats require of them	UT Mounts Aero Hardware	Seat IC firewall Ecu mount		
Machine shop debackle	Headers Dif carriers PDU cover	Floor pan		
Know our priority of what to manufacture	EV dash cover			
Know what to manufacture:	Switch panel Pedal box? Bus Boxes Acc cooling? Throttle bracket Axle end cap Jacking bar Dash box (non ev)?	Aerodynamics <ul style="list-style-type: none">- Upper Mainplane Mold- Bottom Mainplane Mold- Upper RW Mold- Bottom RW Mold- Firewall Mold- FW Mount- EV Undertray- UT Mounts (on the undertray & on car)- FW Tabs- RW Tabs- EV Jacking Bar- FW Mounts- RW Mounts- FW Spars- Jacking bar tabs	Rolling chassis: <ul style="list-style-type: none">- Uprights<ul style="list-style-type: none">o Pickups- Steering pickup<ul style="list-style-type: none">o Tie rod insert (lathe off old tube, put on new)o Adjustable toe plates- Chassis Jigs (critical area, 3D others)- Control arms<ul style="list-style-type: none">o Spherical cupso Jig for alignment (can be MDF)o Control arm tabso Control Arm triangle plate- Shock mounting tabs<ul style="list-style-type: none">o Welded inserto Aluminum insert- Need to find bell cranks<ul style="list-style-type: none">o Bronze insert- Steering rack<ul style="list-style-type: none">o Bronze Spacer (Tooling Wear Offset)o Chassis Inserts for yolk plate- Wheel speed trigger wheels (on inside wheel/steel)	EV: <ul style="list-style-type: none">- Acc Box (Bent)- Lid (bent)- Acc wooden slats (MDF)- Acc mounts (CNC Mill/WJ)- Acc battery slats- Acc tabs- LV Boxes???? (3D Print)- LV Batt Box- E-Button Tabs- Head rest tabs- TS/LV Switch plate tab- Can bus tab- Railin Tabs- Motor Tab- Body push button tabs- Start button tab- Steering wheel e-button Tab- TSAL tabs- Floor pan tabs (front & rear)- Seat belt tabs- Buzzer tab- VCU tab- Anti-Intrusion plate- Pedal box, pedal box slot bracket, pedal box tabs, petal face- Steering rack tabs- PDU box tabs- Grounding Tabs- Inertia Switch Tab
Drop a list of things I alr know to make				
4 hr jet clean up				
Talk to mihai heils abt Nov 2				
4x4 plate for critical jigs				
New brass				
Chromoly hardened				
A36 pedal box				
				Outboard table: <ul style="list-style-type: none">• Upright• Pickups• CA S• New BC bushings• CA welding jigs• Spherical cups
				Pedal box: Main Hooks Tube Frame inserts All pedal tabs face
				Acc: Top
				Lower
				Box: Slats Floor Outside Wood inserts
				Mounts: Inside Outside
				Cooling: Check tolerance Drawings Method of manufacture
				Lid: Lower Lid DXF DRAWINGS assembly Upper Lid

Rolling Thoughts

Wednesday, January 10, 2024

7:49 PM

Tie rod in front, toe in back

Rolling Chassis

- Uprights (Qty: 8 min)
 - o CNC Mill
 - o Have stock for max 10
- Soft jaws for Uprights (Qty: 2)
 - o CNC Mill
 - o We got blanks alr
- Upright Pickup (Qty: 8 min)
 - o Waterjet to cut stock, CNC Mill
 - o 1" 6061 Alum Sheet
- Steering Pickup (Qty: 4 min)
 - o Waterjet out stock, CNC Mill
 - o 1" 6061 Alum Sheet
- Tie/Toe Rod Shims (Should have enough)
 - o WJ part
 - o Sheet metal
- Rack Mount Tabs (Qty: 4)
 - o WJ & Bend
 - o 0.065" 4130 Steel Sheet
- Steering Bushing (Qty: 2)
 - o **CNC Lathe** w/ tool wear offset
 - o 1" Inprego Bronze Tube
 - o Not in CAD
- Chassis Mounts - CA, Toe/Tie, Shock (Qty: 34)
 - o WJ & Bend
 - o 0.050" 4130 Steel Sheet
- Bellcranks Bushing (Qty: 8)
 - o **CNC Lathe** w/ tool wear offset
 - o 0.50" Inprego Bronze Tube
- CA Triangle Plate (Qty: 8)
 - o WJ
 - o 0.050" 4130 Steel Sheet
- Shock Insert (Qty: 12)
 - o **CNC Lathe**
 - o 0.50" 6061 Aluminum Tube
 - o CAM'd
- Motor Tabs (Qty: 4)
 - o WJ
 - o Can be delayed, no motor
 - o 0.25" 4130 Steel Sheet
- EV Rear Shock Tabs (Qty: 4)
 - o WJ
 - o 0.05" 4130 Steel Sheet

Part Breakdown:

- CNC Mill = 6 Parts
- CNC Lathe = 3 Parts
- WJ = 9 Parts
- Bender = 2 Parts

*excludes all WJ tabs that aren't critical for chassis rolling & all pedal box parts

Minimum Viable:

Parts needed for rolling chassis, but reusing old components

- **Steering Rack Mounts**
- **Steering Bushings**
- **CA Triangles**
 - o **Fronts**
 - o **IC Rear**
 - o **EV Rear**
- **EV Rear Shock Tabs**
- **Bell crank tabs**
 - o **Fronts**
 - o **IC Rear**
 - o **EV Rear**

Water-jet Issues

Wednesday, November 29, 2023 5:56 PM

- Wip Joint leak
- On head valve leak
- Air leak in water height controls
Lines were run incorrectly
- Broken Nozzle
- Old contaminated garnet
Dumped
- Plumbing for drain/filter
- Extension cords for 120V items
- Jet stream is poor

Manufacturing To-Do

Tuesday, February 27, 2024 4:27 PM

IC

In order of assembly...

- Remove ATS tabs from sheet and label into baggie
- Clean edges & bend if needed
- Weld Toe Rod/Tie Rod Tabs
- Lathe Shock inserts
-
- Put old suspension on car
- Weld Seatbelt tabs
- Machine new steering spacer)
- CNC front motor mounts
- Weld on new motor mounts
- Cut remaining heat shield pieces on vertical bandsaw/jigsaw
- Weld PDU Tabs
- Weld Dash Tabs
-

EV

In order of assembly...

- Remove ATS tabs from sheet and label into baggies
 - 0.25 stock
 - 0.125 stock
 - Busbar stock
 - 0.065 stock
- Clean edges & bend if needed
- Weld Toe Rod/Tie Rod Tabs
- Weld Rear Bell crank Tabs
- Weld Rear Shock Tabs
-
- Put old suspension on car
- Weld Seatbelt tabs
- Machine new steering spacer (might be waiting on stock)
- Cut spacers for Acc welding (0.03) on vertical bandsaw/jigsaw
- Weld Acc Mounts & gussets together
- Weld EV Stop buttons to Chassis
- Weld Dash Tabs
-

Rtrackin KS6

Sunday, March 3, 2024 2:42 PM

- IC Chassis
 - Finish Fully welding
 - Prepare for transfer
 - Weld
- IC Seat Belt Bar
 - Cut and Cope
 - Weld to Chassis
 - Weld on supports
- EV Chassis
 - Finish Fully welding
 - Prepare for transfer
 - Weld
- EV Seat Belt Bar
 - Cut and Cope
 - Weld to Chassis
 - Weld on supports
- Acc
 - Weld Box
 - Mounts weld
 - Jet Chassis Mount Tabs
 - Bend
 - CNC Aluminum Mounts
 -
- Modules
 - Assembly Test Module
 - Test Module
 - Glue Clear piece on
 - Wallow holes on messed up piece to make fit
 - Busbars
 - Order Copper
 - Jet
 - Bend
 - Test with Module Board
- Lid
 - Bend
 - Weld
 - Assemble internal components
 - Wire circuitry
 - HV Path
 - Attach to Acc Box
 - Fix bad holes
 - ✓ ▪ Weld
 - ✓ ▪ grind
 - ✓ ▪ Re drill
- Circuits
 - Assemble
- E-Car Water Cooling
 - CAD
- IC Water Cooling Loop
 - Need to order bungs
 - Get tubing pieces from dyno
 - Weld

- Fuel Tank
 - CAD
 - Water Jet
 - Weld
 - Tubing
 - Cap and flange
 - Cut neck
 - Turn neck
 - Make cap?
 - Get wire pass trou transfted
 - Add drainplug
 - Order neck parts
- Pedal Box
 - Need CAD
 - Mostly Water jet + bend
 - Jet
 - bend
 - Weld and assemble
- Bodies
 - Prepping Molds for lay-up
 - Lay-Ups
- Aero Molds
 - Glue Ups
 - Arc
 - Rear mainplate
 - RW E3 f & b
 - RW E4 f & b
 - Undertray?
- Rear IC Suspension
 - Need stock
 - Spherical Cups
 - Jig + Weld
 - Assemble
- Steering
 - Weld in steering tubes
 - Bushing
 - Weld in Steering rack
 - Columns
 - Inboard to outboard assembly
- IC Brake Lines
 - Need more hard line
 - Need new soft lines
 - Route in chassis
- Wiring
 - Need wire (Ordered)
 - Finish Wiring harnesses
- Tabs
 - Pneumatic Shifting Tabs
 - Brake Light Tabs + Mounting
 - Tsai weld in
 - Weld in seatbelts
 - Stick brake light on IC
 - Starter button cad
 - New master switch IC
 - Switch pannel EV
 - Clutch pneumatic tab
 - New head restraint tabs
 - New master switch
 - E-Car E-Stop mounts
 - Will be more tabs to be made

- IC Front Engine Mount
 - Transfer to new Chassis
 - Cut and weld chassis side mount
 - 4th axis no work
- Log Headers
 - Cut and re-weld
- Inverter Mounting
 - Need to CAD a solution
 - Order isolators
- Diper
 - Weld Tabs
 -
- Muffler
 - Weld

- Dash stuff
 - Dash tabs
 - Starter button tabs
 - Order starter button?
 - Cluth mounting in car

To get to Rolling Chassis:

- Steering
- Suspension
 - Jig + Weld Tabs
 - Transfer all EV
 - New IC rear CA, transfer rest
 - Bell Crank Bushings
- Brakes
 - Need Pedal Box
 - Need new lines for IC
 - Transfer EV stuff over (Practically New)

- Misslist:
 - Jacking bar on ev car
 - PDU mount (EV)
 - Push bar in totaly

- Ic jacking bar:
 - Tube cut
 - Flat sides
 - Welded insert

- Prep work:
 - Ensure Al plates are ready
 - Head rest foam cut
 - Glue head rest
 - Make covering

Arch speed and feeds

Tuesday, January 17, 2023 8:56 PM

Operations:

Do not use 2d contour on onsrude.

Foam	MDF	Wing Molds
Flat end mill 1200 in/min	Flat end mill 800-1000 in/min	3d adaptive Scallop
3in step down	.5 in step down	Body Face 3d adaptive Contor (ball)
Ball 1200in/min .1 cusp	20% step over Up to 70% if using short tool	Ball 900 in/min .05 cusp

<https://www.the-carbide-end-mill-store.com/m5/778-2712-3-4-ball-end-mill-xx-long-length-778-2712-2-flute-30.html>

Potential for body rough and finish

Long straights will get chatter if long stickout

Copy and replace with this.

Delete all UIO and TCP commands

```
N120 G92Y(@YAXG92)
N125 G16X
N130 G27
N135 G40
N140 G70
N145 G80
N150 G90
N155 G94
N160 G00 G79 Z(@ZPARKP1)
N165 G00 G79 A0. C0.
N170 (UAO,1)
N175 G70
```

Control arms

Monday, December 27, 2021 8:14 PM

The spherical holder are made on the CNC lathe

You must check and use the ware offset to get a good press fit when the product come out the lathe.
You should not be able to insert by hand nor shoud it require any force on the press gauge

The tubes are purchased and notched by VR3

The jig is a flat plate with a fixed hole for the CA outer joints and 4 laled holes on each end of the arms angle

The plate must beable to be flipped to do both Left and right arms.

Turned inserts are then placed in the holes that hold the spherical housing at consistent heights

To start weld prep we clean the shperial housing and end of the tubes on the wire wheel or with scothc bright.

Next we take the end of the arms where only one tube go to the spherical and crimp them using the shapre line in the crimping tool. A dead blow or hydraulic press work best. It is critical to ensure the notch is oriented correctly.

Next we use the jig to place the spherical holders (all3) and place the tubes in the correct configuration. I sometimes use a filler wire to space the tube exactly in the middle or offset some what down.

I always start by tacking the non notched tube starting from chaissis side. When the oposing tube starting fomr chassis side. Then flip the arm and tack the back side.

When fully tacked put back on jig to verify.

Next full weld both chassis side and upright side. To weld the middle and side I use the inverse v block to hold the arm as 30deg angles to access the hard spots.

I regulary weld at 60amps here using 3/4 to 1/2 power.

If the arm is a push or pull rod arm next I remove the stickers and clean the triangel parts.

I weld them on at low amps perhaps 40ish and alternate to not cook the arms.

DO NOT weld on the rod connection. This is done last and then the suspension is assembled.

To press the arm use sockets to ensure loading only on the outer race. Check each joint to ensure no speage of the teflon lining is apparent and that the joint is not bound.

How to use the bender

Wednesday, December 8, 2021 8:30 PM

Aquire sheet to bend

Mark bends

Make either inside or outside of bend radius **not center of bend**

Set bend order and mark side of fold

Check that all bends fit in box and pan brake

Check the set radius of the bender

Insert part to desired bend line

Ensure sheet is square if possible

Recite desired bend angle

Bend to half of desired angle and check

Proceeed and check intill desired number is aquired

Keep in mind spring abck of materieal.

O-building

Tuesday, March 21, 2023 6:13 PM

Electrical Table

Machine Type	Input Volts (VAC)	Full Load (A)	Requested Amps (A)
Mini Mills	220	25	30
ST-10	220	40	45
TM-1	240	40	45
Vectrax CT	220	?	?
OMAX MAXIEM 1515	480	?	?

List of Machines

- Mini Mill (1)
- ST-10 Mill (2)
- Vectrax (1)
- TM-1 (2)
- OMAX (1)

List of mach we are missing

- Vertical band saw
- Horizontal band saw

To add to cad:

- Water jet
- Cooler (for jet)
- Pump
- Drain box

Plan for sump pump

Coates email

- Mention manual lathes and that possibility
- Cover bases before we do the enclosed layout
- New cad with both mini mills
- Will inform with when we have decided on new manual machines

Keep all the ccs

Smol items:
 Vice
 Trash cans
 Cabinet
 Tool boxes
 Smol surface plate
 Tool grinder
 Belt sander
 Stock storage

Spring Manufacture List (better)

Friday, February 10, 2023 1:10 PM

X

Item	CAD/Drawing in PDM?	Quantity	Manufacturer	Done?
VCU adapter & RTD buzzer Tab	y	1	Mihai	Y
Pot arm retainer tab	discord	5	Abri	Y
pedal box axial pivot	discord	2	Peter	Y
Pedal box bushing for pot	discord	1	Justin	Y
Muffler Mount and plate	Y	1	Marco n Alex	Y
Bearing Carriers	Y	1	Abri	Y
Breaklight EV car	y	1	Abri	Y
Pull rod testing inserts	?	?	Ethan	y
Breaklight tabs EV	y	2	Marco	y
Wing 4 element	discord	8	Tyler	y
M6 safety wire bolts	n/a	12	Tyler	y
Shock Bushing	y	1	No stock	
Bell Crank Bushing Insert	y	2	No stock	
Steering Column Spacer	y	1	Casey	y
Steering column redo	y	1	Emil	y
MTS Machine Adapter	discord	2	Abri/Casey	y
MTS to Carbon	discord	1	Casey	y
Test Material to Endlink	discord	5	Abri	y
Trophy Track Waterjet	discord	3	Tyler	y

Metals Projects

Wednesday, November 22, 2023 2:06 PM

8:41 PM

- UT Mount: .090" A36 Steel
- ECU Mount: 0.05" Alloy Steel Sheet 4130 (4 tabs)
- IC Dash: stainless steel (4 tabs)
- EV Firewall: .04" A36 Steel
- EV Floor Pan: .05" A36 Steel (16 tabs)
- IC Firewall-.05" A36 Steel (2 tabs)... mat. For firewall?
- Aero Package: .125 aluminum (24 ribs)
- ETS...
- EV Front Wing Mount: 7 steel tabs, 6061 aluminum 1/8"
- ↳ - Jacking Bar: aluminum 6061 t6 tube (bar and inserts)
- EV Rear Wing Mount: 1/16" 304 Stainless Steel (1 ft x 1ft), .25 OD x .215 ID 6061 – T6 Tube (48 in), 1/4" 6061-T6 Sheet (1ftx2ft)
- Headers:
- Diff Carriers:
- Rear Sprocket & Spool: Sprocket – $\frac{1}{4}$ " thickness stock aluminum 7075, Spool – 4" round bar stock aluminum 7075
- PDU Cover: 1/16" Aluminum sheet metal, NO DRAWING FOR BAC PLATE OR TABS
- Acc Mount: 1" aluminum 6061
- Acc Chassis Tab: .125" alloy steel, .09" alloy steel
- Cooling loop tabs: .065" steel
- Lid: Alum .0125 (Main plate, sheet enclosure, enclosure shield, side cover)
- Busbars:
- Uprights:

Pdu cover tabs?

VCU tabs?

✗

Shop Space

Tuesday, July 2, 2024 9:47 PM

Largest stock: 5ft by 5ft

Wide thin stock

Short heavy stock

Plastic stock

Tube stock

Soft jaws: 6x1x2 in

Lathe holders: 2x5x3.5 in

Fixtures and fixture plates

Parts done

Parts in progress

Garent bags: 20x10x3in

Current metal stock pile: 80x75x30in

Current plastic pile (not much used): 35x70x55in

Drill press: 22x70x24in x2 mach

Grizzly drill press take one whole wood table

Wood table tall: 30x60x38 tall (qty 6)

Lathe position 17 by 8ft from door and left wall

Can moved 5ft forward back side to side

Tables its on 30x100x33in

Mini mill 6ft out from wall, 12ft from front, 52in from each other

Desktop mills take up whole wood table

Westward tool box (66x41x20)

Husky small black (12x20x9)

Husky middle black (26x21x16)

Red husky big (18x44x44)

Red tool cabinet (24x60x38)

Old gray tool cab (61x30x40)

Tool carts (40x20x36 tall)

Lathe tool box tall (20x16x28)

Open silver tray (30x24x48)

Shop (24+18.5 long)

Electrical on left wall 16-20 ft from front

Mill 11ft from back, 8ft from left wall

Air line left of it

Enpack press 5ftx4ft in back left corner no move

Bender (40x48x48) footprint

Trash can 24 dia x 3 ft tall

Mill trash can needs to be 2ft

Manu Lab

Wednesday, September 4, 2024 10:34 PM

Tue 10th 8pm

- Elliott
- Sam
- Dominik
- James
- scott

Tue 17th 8pm

- Jordan

Thur 19th 8pm

- Nathan
- Harris (James)
- Cameron
- Emilliano
- lily

Tue 24th

- Ashley

Thur 26th

- Wasim

SCS Order

Friday, February 23, 2024 5:07 PM

***need dxfs and put in order form

***submit order 02/26

- Spars
- Air tabs
- 1x Water pump tabs - 0.050
- Pedal box
- 1x Throttle bracket - .090
- Sprocket *
- Aero tabs
- 4x Header Flanges - 0.25
- Firewall Tabs
- 2x PDU backplate (IC)
- Tsal Tabs
- Catch can 2x
- Ic kill switch
- Break rez/ bots bracket

Timeline

Wednesday, November 20, 2024 5:43 PM

Sept 18th: Priority A Circuits Design Done
Sept 20th: Module and Acc Box Design Final, Chassis and Inboard suspension design final, aero mounting and driveline design final
Sept 26th: Estimated ESF open
Sept 27th: Estimated SES open
Oct 4th: Estimated Alumni Funding Letter date
Oct 11th: Order chassis, hardware, stock
Oct 21th: Chassis Jigs manufactured
Oct 28th: Chassis and CA Welding Begin, Priority A circuits ordered
Nov 1st: Design Freeze
Nov 4th: Assemble Accumulator Box
Nov 18th: Rolling Chassis
Nov 25th: Start of thanksgiving break, Begin Circuit Assembly (Earlier if components and boards arrive)
Dec 2nd: Last day of class, start of finals
Dec 9th: Motor in IC car, end of finals
Dec 16th: Driveline Assembled
Dec 30th: IC Wiring done
Jan 3rd: First Start IC
Jan 6th: First day of spring classes
Jan 17th: IC car fully assembled
Jan 20th: EV wiring done, Presidential Inauguration (the U.S President)
Jan 24th: EV First Start
Feb 7th: EV Fully Built
March 10th-14th: Spring Break
March 14th: Estimated IC drop dead
March 28th: Estimated IC static events due
April 18th: Estimated EV Drop Dead
May 2nd: Estimated EV Static Events Due

Timeline

Nov 4th: Design Freeze
Nov 14th: Order Submitted
Dec 16th: Rolling Chassis
Dec 23th: Motor/Start IC Car

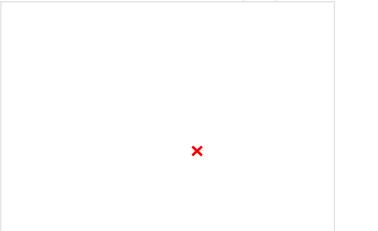
Waterjet Guide

Part Design for Waterjet/Create a DXF:

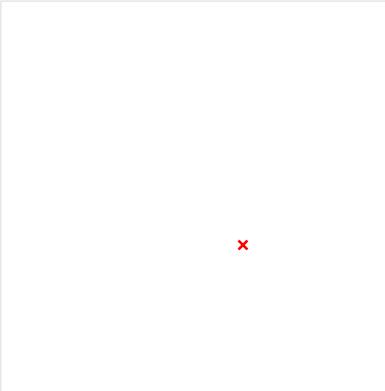
1. Design your part
 - a. Must be sheet metal part or designed in a way that a flat pattern can be cut out on the jet
 - b. **Parts must be in inches** when DXF is made or it wont be sized properly when cut



2. Get a DXF File of Part (File type the waterjet uses)
 - a. Right click flat surface, select "Export to DXF/DWG"
 - b. Select where you want to save the DXF (Use a flash drive)
 - i. Name the part, smart to include material/thickness in part name
 - ii. The side-window below will open, just hit the check mark

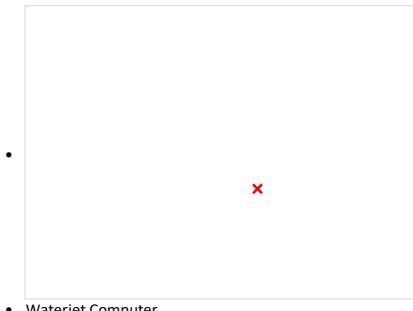


- c. Another menu will open showing the DXF outline
 - i. Double check this to ensure it is the shape you want the jet to cut out
 - ii. Hit save

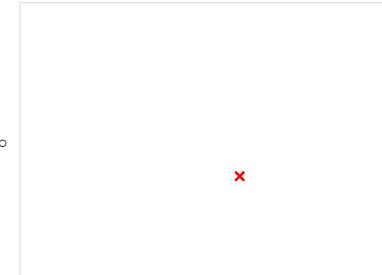
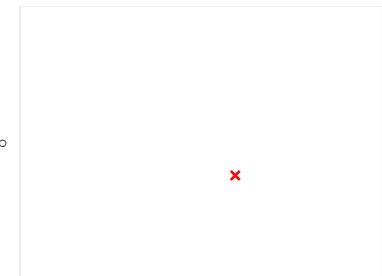


- d. Once saved take the flash drive to the waterjet computer

The Waterjet: (Pictures and descriptions of waterjet)

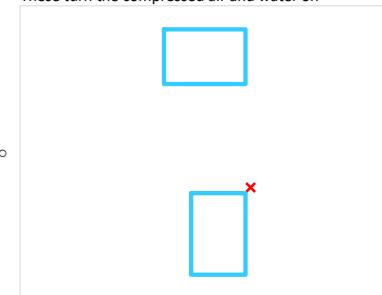


- Waterjet Computer

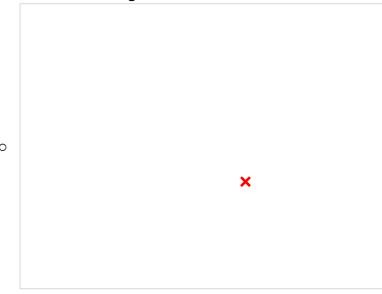


- Controls the waterjet
- Used to set up and run the DXF for the jet
 - Through the OMAX Layout and OMAX Make programs

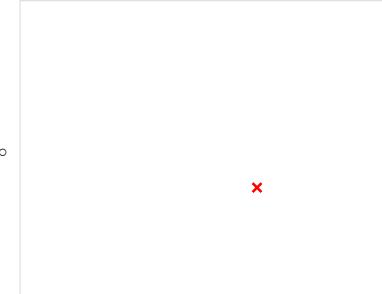
- Air and Water Valves
 - These turn the compressed air and water on



- Water Level Switch
 - Controls the height of the water

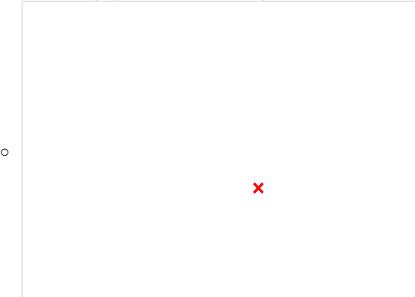


- Garnet
 - Sandy abrasive that combines with the water to cut through material
- Garnet Holder
 - Stores the garnet
 - Uses the compressed air to deliver the garnet to the jet

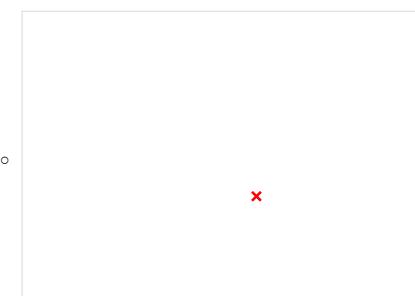
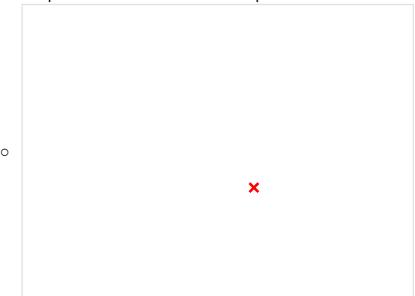




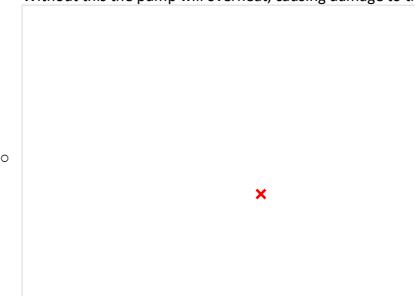
- Water Pump
 - Delivers high pressure water to the jet



- Water Pump Controller
 - Two dials that control the pressure of the pump
 - Keep the dials in between the sharpie lines



- Water Cooler
 - Cools the water flowing through the water pump
 - Without this the pump will overheat, causing damage to the pump



Using the OMAX Software:

OMAX Layout

Buttons:

- a. "S" = Select
- b. "Q" = Quality, "1-5" , 1 is worst quality 5 is best
 - i. Affects the speed at which the jet will cut

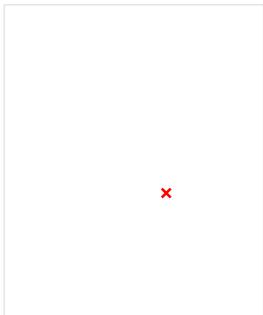
- ii. Higher quality = slower speed, vice versa
- c. "A" = All
- d. "D" = Deselect
- 1. "S+A" = Select All
 - a. Must select all lines of a part before doing any other function
 - b. When selected parts will turn yellow
- 2. "D+A" = Deselect all
- 3. "S+Q+A+3" = Select Quality All 3
 - a. Selects the quality of the cut
 - b. We use quality 3 for almost all parts
- 4. "M" = Move
 - a. Once selected, will move the shapes around on the plane

Creating a Path:

1. Right Click "Lead i/o"
 - a. Bottom left of menu



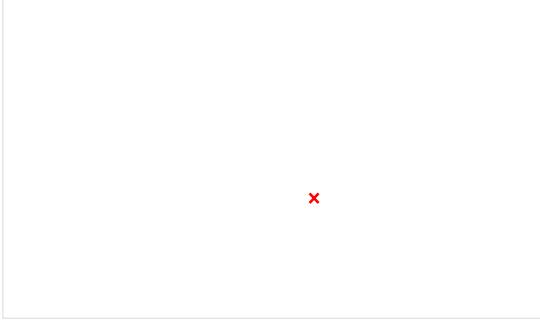
2. Press "Auto Path (Quick)"
 - a. Will look like image below
 - i. Green lines indicate lead in path



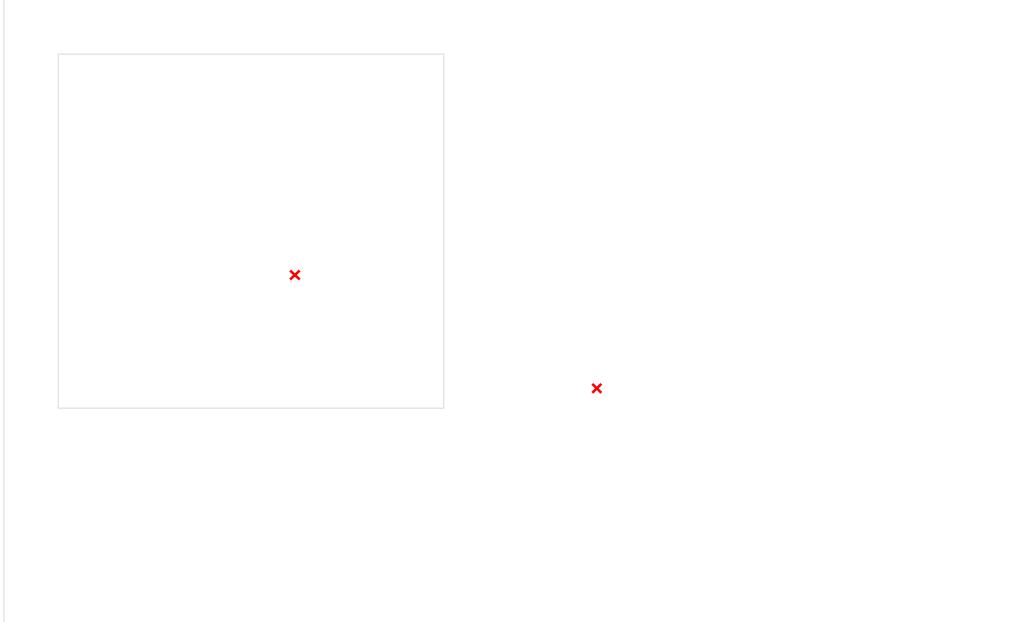
3. Right click "Path"
 - a. Right side menu



- b. Select "Automatically Generate"
 - i. Select the start point
 - ii. Use the start point of the green line in the bottom left



4. A menu will pop up showing the path the jet will take
 - a. The path will be red
 - b. Make sure the path is on the outside of the line of the outer edge of your part
 - c. Make sure the path is on the inside of the line of any holes in your part



5. Once you've ensured the path is correct hit save

OMAX Make

Moving the Jet Nozzle:

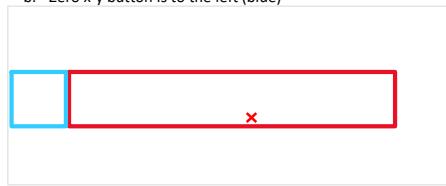
Buttons:

- a. "Arrow Keys" = Move jet in direction of arrow pressed
- b. "Shift + Arrow Keys" = Move nozzle in direction quickly
- c. "1" = Moves nozzle down quickly, "7" moves nozzle up quickly
- d. "Page Down" = Moves nozzle down much slower, "Page Up" = Moves nozzle up slowly

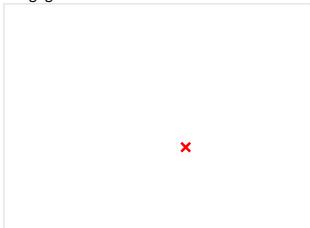
Zeroing the Nozzle:

Zeroing = Setting where the water jet will start the path

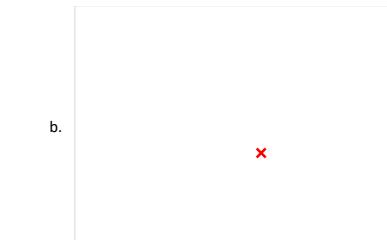
1. Move the nozzle to a clear area with enough room for your part
 - a. Keep in mind the start of the path is to the bottom left of the part
2. Press the zero next to the coordinate indicator
 - a. The bottom set of coordinates indicate distance from start path (red)
 - b. Zero x-y button is to the left (blue)



3. Place the gage on the sheet metal



a.

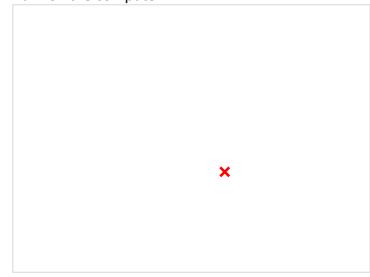


- b.
- c. Sets proper distance of nozzle from material
 - i. Ensures proper cut
 - 4. Lower the nozzle towards the gage
 - a. As the nozzle gets closer to the gage use "Page Down" to move slower
 - i. Ensures you do not crash the nozzle into the material and damage the jet
 - b. Nozzle should be close to gage but not pinching it
 - 5. Set the zero on the height
 - a. Top left of the screen labeled "Z-Height"



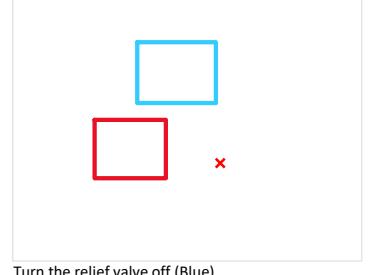
Setting Up the Waterjet:

1. Plug USB drive with DXF file into the dongle of the Waterjet Computer
 - a. Turn on the computer

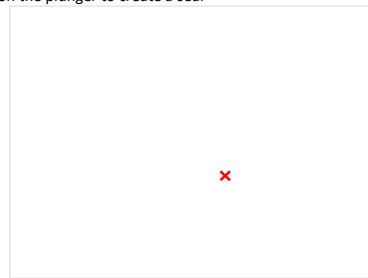


2. Turn on the compressed air
 - a. The nozzle can be moved with only air and computer on

3. Go to the Garnet Holder



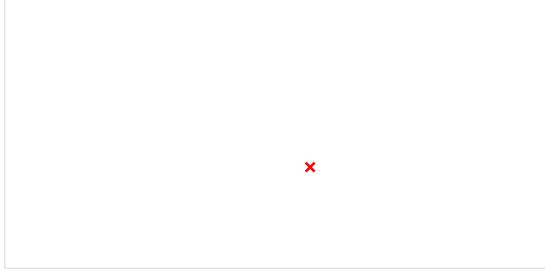
- b. Turn the relief valve off (Blue)
 - c. Pull on the plunger to create a seal



- i. As you pull on plunger turn on the air (Red)
 - d. Give it a second and ensure that there is enough pressure so that the plunger will not fall back in
 - e. Put the cover back on the holder

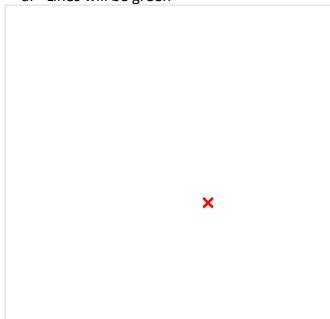
4. Open the OMAX Layout Software

- a. Go to "File"
- b. Select "Import from other CAD"
- c. Go to file location and select the DXF file
- d. Screen will look like this, click "OK"



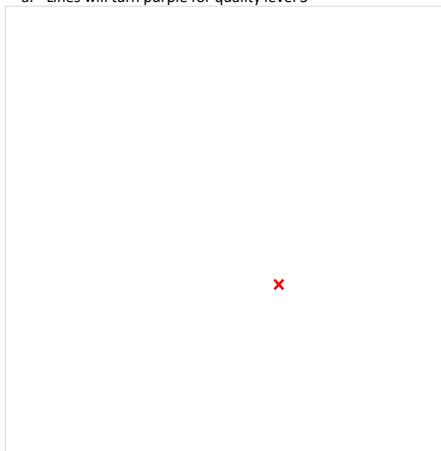
5. Once open position the DXF

- a. Lines will be green



6. Select the quality

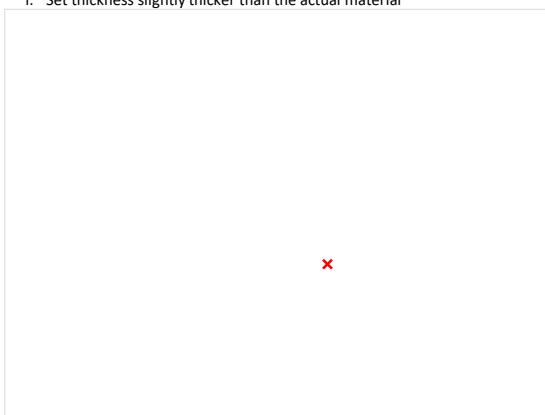
- a. Lines will turn purple for quality level 3



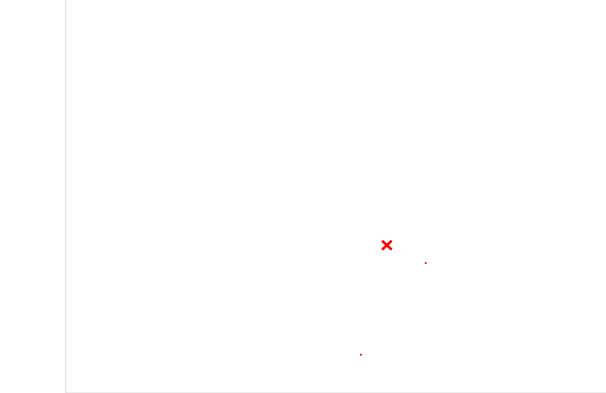
7. Create the cut path

8. Open OMAX Make

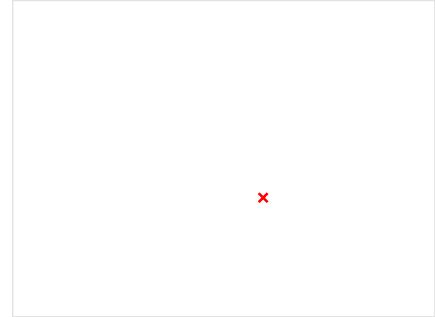
- a. Right side menu, right click "Path"
- b. Right click and press "Open ORD in OMAX Make"
- c. Set your material and thickness
 - i. Set thickness slightly thicker than the actual material



- d. This software runs the DXF and is used to manually move the nozzle



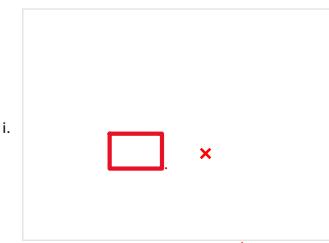
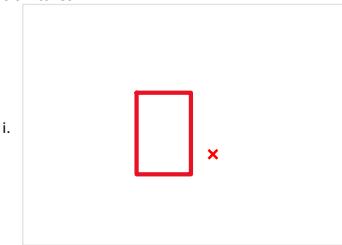
9. On the control panel on the side of the computer
 - a. Press the green button and the black one underneath it
 - b. This is a safety feature, pressing the buttons shows the machine that it is safe to move



- c.
10. Move the nozzle to the right, out of the way
 - a. This gives you room to put the sheet on the jet bed
 - b. Place the proper thickness of material on the bed
 - i. Determined by your part
11. Place weights on the sheet to keep it from moving on the bed
 - a. If sheet moves, your part will be messed up

Cutting the Part:

1. Turn on the water (Picture of water flowing from tube)
 - a. **Must turn on the water before turning on the pump**
2. Turn on the pump
 - a. **Turning on the pump before the water will damage the pump**
 - b. Two switches



- c. Hit reset on the pump controller
 - i. Safety feature show pump it is safe to run

ii.



- d. Check the dials on top of the controller, make sure they're between the sharpie marks
- 3. Turn on the water cooler
 - a. Just need to turn the switch on
- 4. Go to OMAX Make
 - a. Set your zeros
- 5. Raise the nozzle using the "All Up" button



- 6. Raise the water level to a level where it will cover the lip of the black cover around the nozzle
 - a. If you don't raise the nozzle before raising the water level the nozzle may get clogged
- 7. Lower the nozzle using the arrow next to the Z-Height indicator (Pic)
- 8. Click "Begin Machining"



- a. Click Start



- 9. The jet will begin following the path and cutting the sheet metal

- a.



Material Stockpiles

Wednesday, November 1, 2023 8:55 PM

Note:

If you plan on using stock highlight what ur using so ppl don't try to use the same shit

Example:

- Aluminum

- 0.065 Thick
 - 23" x 21" - HV

Current Stock:

- Aluminum
 - 0.065 Thick
 - 23" x 21"
 - 15" x 24"
 - 11" x 17"
 - 24" x 4"
 - 5" x 9"
 - 15" x 16"
 - 24" x 24"
 - 0.25 Thick
 - 17" x 13"
 - 12" x 12"
 - 5" x 8"
 - 26" x 15"
 - 5" x 8"
 - 24" x 24"
 - 10" x 20"
 - 10" x 6"
 - 4" x 9"
 - 15" x 24"
 - 10" x 20"
 - 0.375 Thick
 - Palet
- Brass
 - 0.035 Thick
 - 26" x 24"

Current Stock:

- Steel
 - 0.050 Thick
 - 10" x 12"
 - 40" x 40"
 - 15" x 15"
 - 9" x 26"
 - 48" x 48"
 - 0.090 Thick
 - 24" x 24"
 - 12" x 18"
 - 19" x 5"
 - 24" x 27"
 - 0.125 Thick
 - 20" x 14"
 - 12" x 15"
 - 8" x 36"
 - 0.25 thick
 - 4" x 8"
 - 0.375 Thick
 - 9" x 12"

Current Stock:

- Polycarbonate
 - 0.050 Thick
 - 36" x 24"
 - 24" x 48"
 - 24" x 48"
 - 28" x 48"
 - 22" x 22"
 - 0.125 Thick
 - 48" x 48"
 - 24" x 36"
 - 36" x 36"
 - 75" x 48"
- G10
 - 0.031 Thick
 - 24" x 36"
 - 18" x 24"
 - 24" x 36"
- GRFP
 - 0.060 Thick
 - 24" x 36"
 - 24" x 36"
- Epoxy Glass
 - 0.03125 Thick
 - 36" x 48"
 - 36" x 48"
- GPO2
 - 0.040 Thick
 - 72" x 36"
 - 72" x 36"
 - 72" x 36"
 - 72" x 36"
 - 72" x 36"
- Acrylic
 - 0.25 Thick
 - 17" x 16"

Year Review

Monday, July 1, 2024 7:07 PM

Fall:

- Knowing ahead of time what needs to be changed to make manufacturing easier
 - o Way to display that info/talk abt it
 - o Meetings maybe
- Around ranked priority list time, make a more structured timeline
- More sponsorships for manufacturing
 - o List of companies for manufacturing, emails are okay
- One page of DFM
 - o Things to consider for different manufacturing methods
 - o Example of good part/good drawing
 - o To help w/ newbies and leads
 - o "don't do ____"
- Making a last updated date to material stockpile
 - o Little more organization for material/stock
- Liked the plastic manufacturing
 - o Some transition into using actual machines
 - o Make spherical cups, small things that are consumables for car, tabs, break buttons, soft jaws
- Having Drawings implemented into PDM
 - o Maybe way to freeze parts in PDM
- Manufacturing/composites communication
- Waterjet for this year
 - o Laser-cube 0-0
 - o Waterjet 0-0
 - o Tabs/jigs be biggest holdup for welding
- Only track jigs for 3d printing, leave parts to subgroups unless asked otherwise

December/Spring:

- Earliest purchasing in September, month lead time to stock (Jan 18th)
- More open manufacturing meetings abt timeline
 - o More detailed status checkmarks
 - Example: find stock, cut stock, cnc op 1, cnc op 2, debur
 - Update note

Comp/Summer:

- Design Pres
 - o DFM Phase, make sure everything is organized clean on car
- Validation
 - o Making parts for summer, have a thread to request/talk abt part, make a meeting if asked
- Organize shop :3
- Manufacturing meetings each week to bring up ideas

Grayson:

- Mold Fabrication Start time can stay the same.
- Composites is revising our production process to better fit our timeline
- Need higher quality on molds to help reduce composites fabrication time
 - mainly less defects is preferred (this is what nips us in the butt the most)
 - MDF Delamination won't happen this year as we have our own air compressor that I will be getting hooked up
- We are redesigning molds this summer to make things easier
 - Looking at other materials (likely different foams)
 - If you want to do that test mold for quality, I can test this entirely new process this summer on just one wing
- Text me if you have questions :)

Sam Yang

I'd assume a lot of stuff is grain of salt because of availability of machines

- Knowing ahead of time what changes needed to be made on a part would be ideal only for weight and sim accuracy stuff
- Seems like manufacturing and composites had a hard time during the year knowing what is acceptable for mold CAD
- Was never super limiting, only really limiting when it came to like working out with abri's time
- Need to talk about how much can get manufactured into next year, upright, hub, etc.
- No good way of knowing like tradeoff of manufacturing methods

Arbi:

Manufacturing Tracker got released 12/19/24

Was manufacturing in arch Oct-Dec 22

SendCutSend order submitted 2/26

November 29th - started working on waterjet and noticed issues

Dec 10th sent out WJ parts order

Dec 19th got parts & garnet got in
^ Bray was working on it dec 22

Midwest steel order came in 12/20

Online metals order came in 12/15

Had people start organizing shop stock and tools nov 2

Got chassis tubes 12/1

Chassis Jigs 12/21

Had people 3d printing parts all oct, nov, dec

12/28 ran parts for lathe for car to not hold up welding

12/30 - was still tracking down leaks on wj

Jan 1-7th i was out of town but had a list of stuff for people to do and was always by my phone

jan 9th-10th bray started working on fixing leaks for wj

jan 11th - held meeting to assign tasks

Feb 27th bronze finally came in from order

Jan 11th lost all access to machines in O and was working to get tools out

Jan 18th (bray was "still having problems to get it to run smoothly") but was handed lathe and mill parts to run on his at home

Jan 18th - Started giving stock to ATS bc wj was still not working right and other options kept failing

Jan 27th - bray finished his lathe/mill parts & waterjet filters get jank jbwd fix

Jan 29 - made acc welding slats in arch, firewall mold in O

Jan 31st tried geting plasma cutter for tabs, failed

Feb 5th - bray asked for part and was given steering pickups, got real filters for wj

Feb 7th - still getting 3d prints done, acc parts ready to get picked up and welded

Feb 9th - Mills up and running and started to get coolant in them

Feb 14th - waterjet still not running great

Feb 18th - bray started making pickups on new mills, wj parts list got sent to school

Mar 8-15th out of town but had list running

To Make

Tuesday, April 22, 2025 7:32 PM

Part	CAD	Drawing	CAM	Priority	Stock	Notes
EV Output Shaft	@Bailey - No	Same	Same	1	Yes	
EV Front Sprocket	@Bailey - No	Same	Same	2	Yes	
Front Uprights	Yes	Yes	Technically Done	6	Yes	
Rotor Pins	Yes	Yes	No	5	Yes	Need Lathe Inserts - Tooling - Need Order
Wheel Inserts	Yes	@Jordan - No	Under Review	4	Yes	Ask Santana for Bandsaw
Acc Mounts	@Bailey - No	Same	Same	3	Yes	Ask Santana for Bandsaw Access for Stock
IC Front Sprocket	Need Review	-	-	-	-	
Acc Handles						