

3S Trailer Suspension

Meeting # 6

Start Date & Time: Thursday, 6/25/2020, 12:00pm

Members Present: Anson, Caitlin, Kirk, Robert

End Time: 12:50pm

Last Meeting:

- Worked on our Product Requirements Document
- July 6th? - go see trailer - Monday
- In New Hampshire you need brakes on your trailer above 3000lbs
- Design for brakes?
- Electric trailer brake assembly online?
- 3500lbs 160\$
- Questions to ask Swenson
 - Do you want us to worry about a max speed limit and how we go about testing it?
 - Do you want us to go off Idaho laws or on a nationwide law? In all 50 states
 - In New Hampshire we need brakes on trailer if its above rated 3000lbs?
 - In Idaho if your trailer physically weighs more than 1500lbs you need brakes on the trailer

Today's Objectives:

- Turn in Product Requirement Documentation
- Scale for prototype? 1:10, 1:5 etc.
- Order parts/equipment
- Start Calculations

Notes:

- Go over PRD with Swenson
- Remove the brake laws link
- Less than 8 hours instead of a range <8 hours
- Dynamic load capacity - is it 2 or is it 3?
- Minimum of FOS of 2 - reasonably priced?
- Max of 3 - overpriced?

- We are correct on the minimum FOS - we don't want to get carried away with too high of a FOS
- General rule of thumb - generally have a FOS of 3 - because it's a dynamic load
- Keep it simple - FOS of 3 just 1 #
- Dependent suspension system - shock to 1 side of the suspension = other side will absorb some of that shock - our calculations were only concerning 1 side of the system - we should redo it and calculate using both sides.
- Can one component be under the FOS if the others compensate for it?
 - Depends on how big of a cost increase - how conservative are our calculations? We want one component to be able to fail first before something more important fails - and easily replaceable.
- Overall length - we didn't know exactly what to measure from
 - We are not stuck with those dimensions - could make lever longer - lever ratio - calculate it out - we have a lot of room to work with
 - Max length = 4ft? - now we calculate it - and figure out new spring - Don't limit to a fixed dimension
- Shipping weight - went online - reference
 - Hard to find actual weight - axles were easy but everything else was not easy to find
 - Shipping weight - going to be different with the different weight capacities
 - Spilt column E and find weights for different capacities
 - 10% of capacity is what axle should weigh
- Mounting interface requirements - need way more details
 - Include conceptual attachment
 - Sleeve bearings
 - Pin locking mechanism that ties axle to lever arm
 - How mounting will happen
 - Mounting from spring holder lever
 - Use attributes of these concepts to fix this part of it
- Smooth - not helpful at all - don't keep this
- convert all the months and years into hours
- Conservatively 50% of those hours from the car will be pulling the trailer
- Never want to service the welds
- How long do we want this thing to last?
 - Want to last 20 years - 4800 hours
 - 50 years - 12000 hours - not unreasonable
 - 10000-20000 hours is the goal
 - Welds = 10-20k hours
 - Everything needs to last 10k-20k hours
 - Acceptable to grease bearings every so often

- Only using sleeve bearings
- Might have to do maintenance - grease in pivoting joints
- Need to separate them - how long it's going to last - periodic maintenance
- Durability - at least 10k hours
- Reliability - 90%
- Salvage somethings from places – axle - RC cars axles?
- Spring or spring and shock absorber system for later?
- Environmental requirements - approach to all these things?
 - How would you test these things?
 - Test it just outside in all those elements
 - Or do an accelerated test?
 - We are at a good start for now - beyond the scope of our project
- Off the shelf purchase - for our design - this is where the hub would mount?
- Mounting spindle - specifically where the stuff is mounted
- Not designing new wheels or tires

For Next Time:

- Complete PRD
- Design concepts for a visual representation
- Choose Scale – 1:10?
- Send Swenson design and links to purchase materials

Comments/Concerns/Reflections from Today:

- Swenson has extra wood for laser cutting
- Scraps of metal in the shop

Next Meeting Time & Date: **Friday, 6/26/2020, 9:00am**