

3S Trailer Suspension

Meeting # 15

Start Date & Time: Tuesday, 7/14/2020, 9:30am

Members Present: Anson, Caitlin, Kirk, Robert

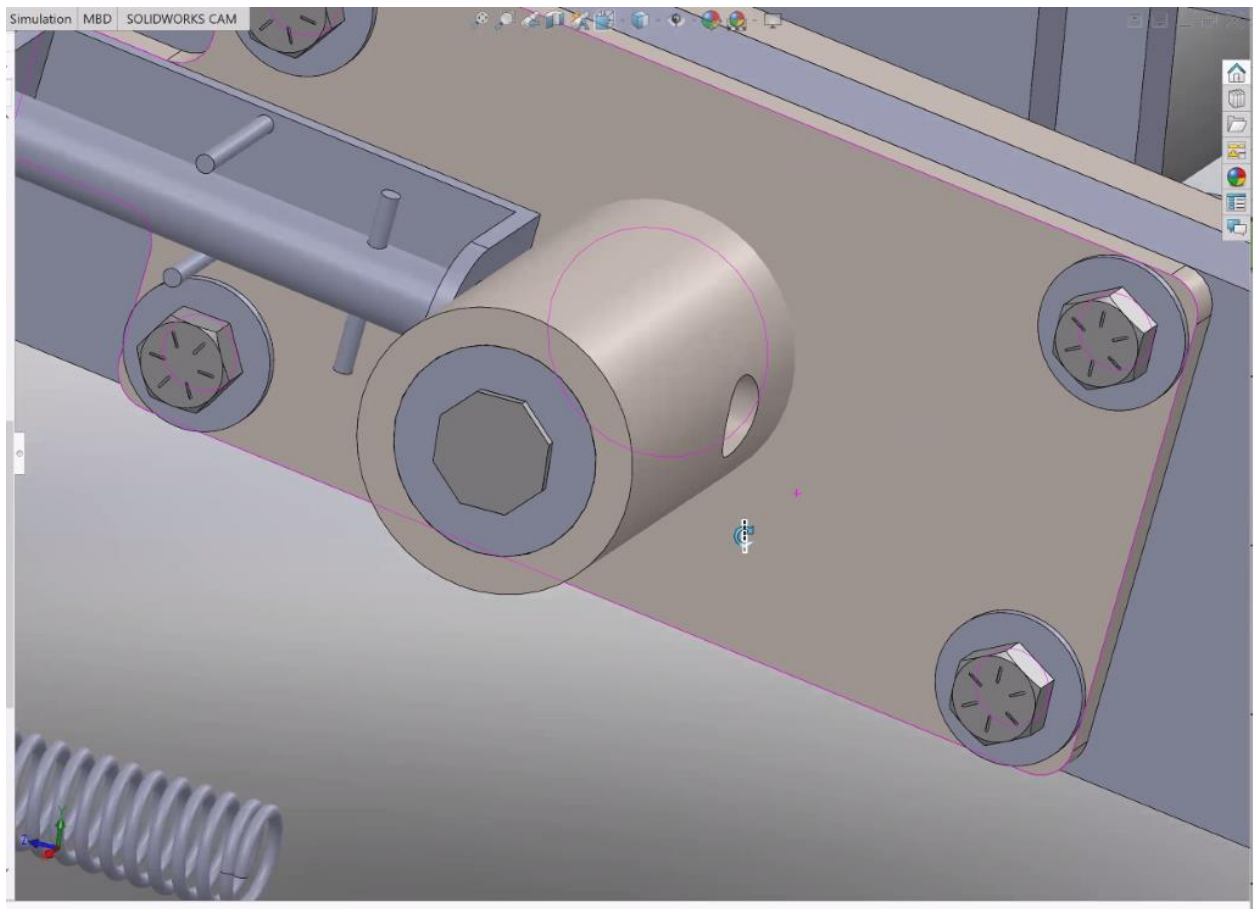
End Time: 1:00pm

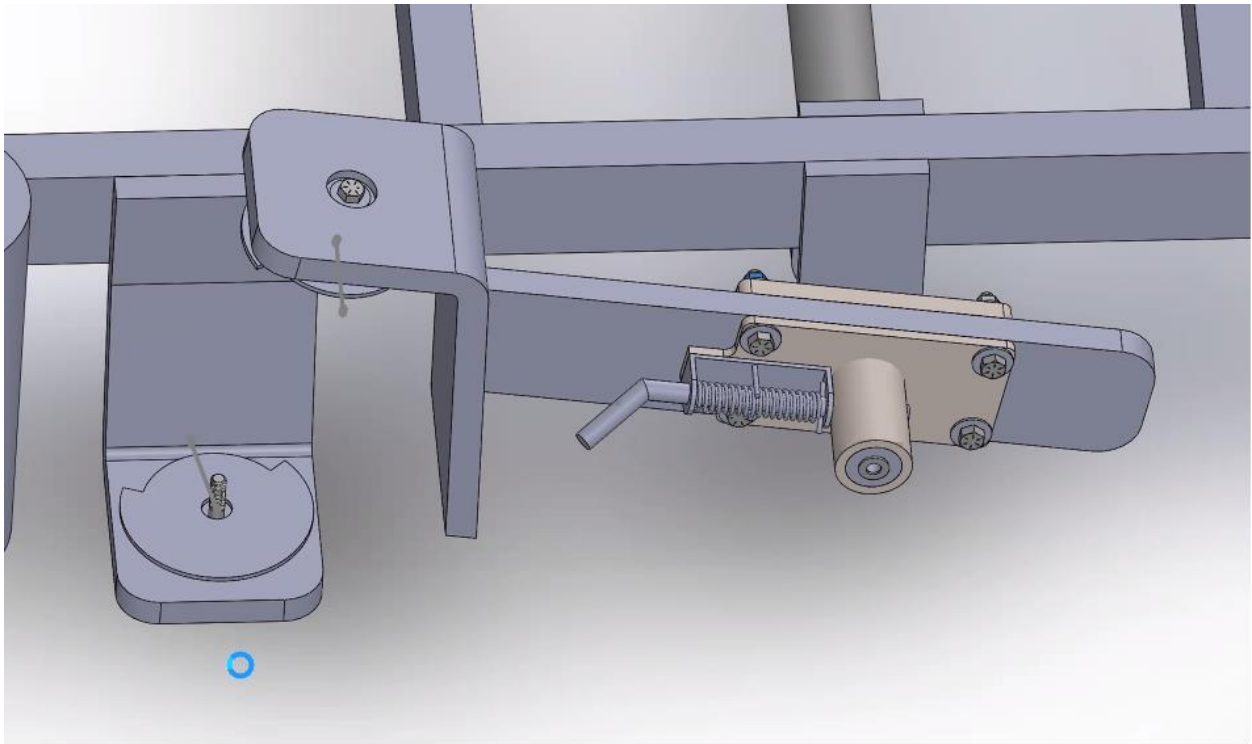
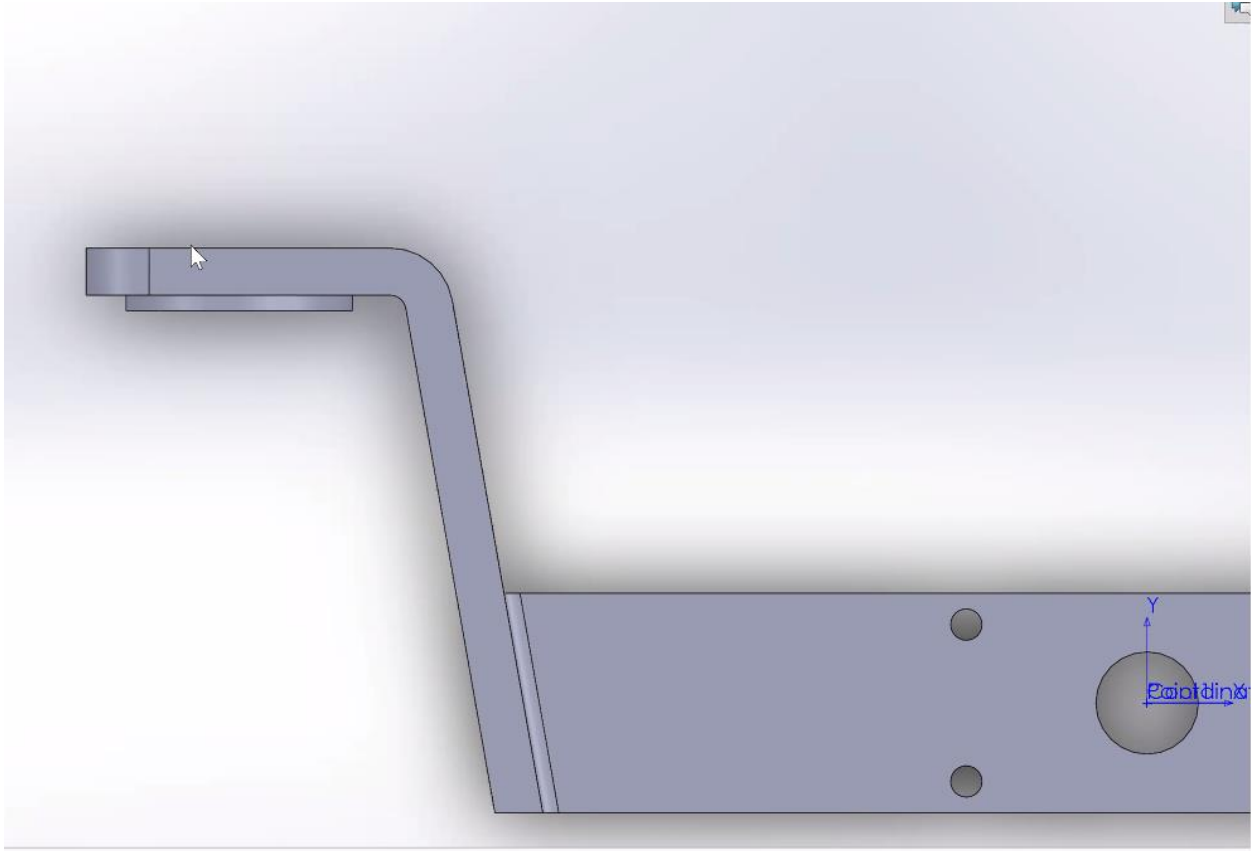
Last Meeting:

- Thursday July 16th at 12:00pm is our Design review Date
- Coil spring mounts

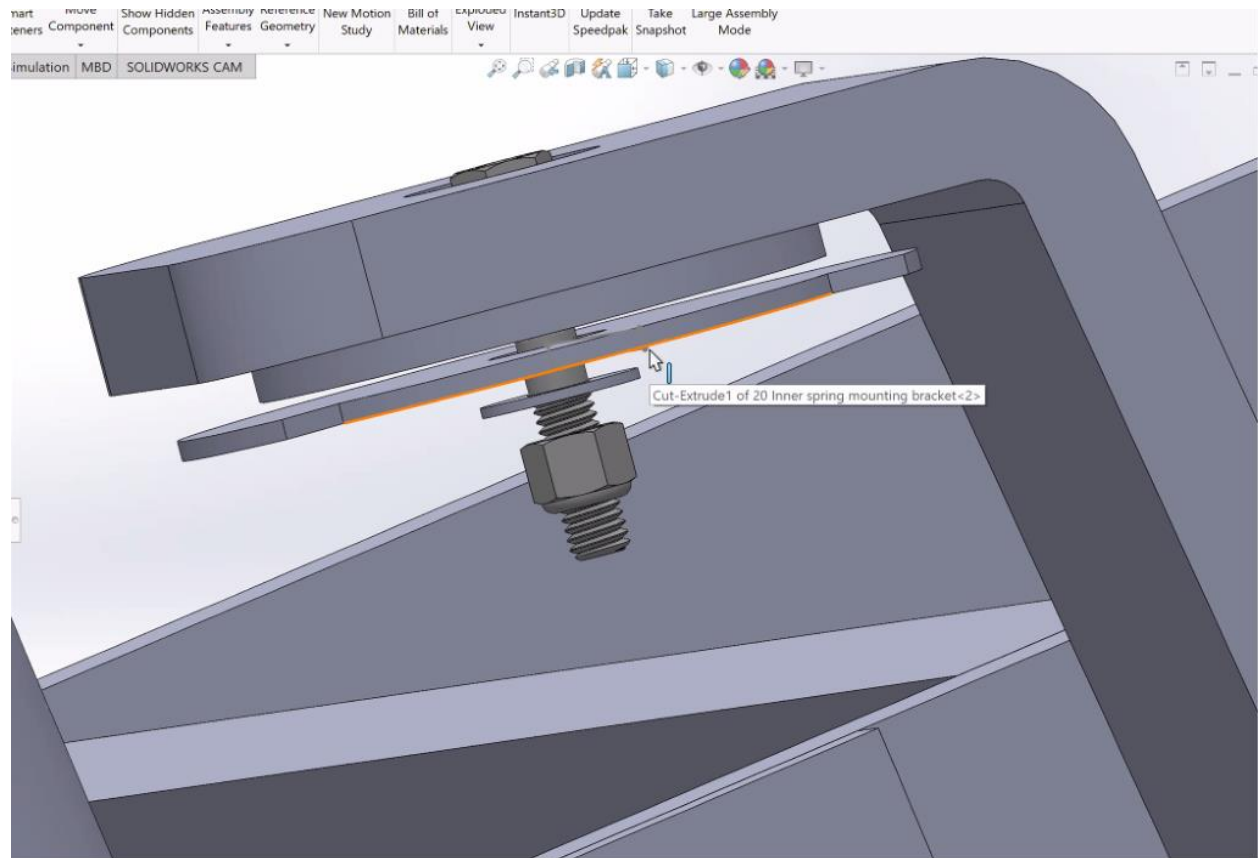


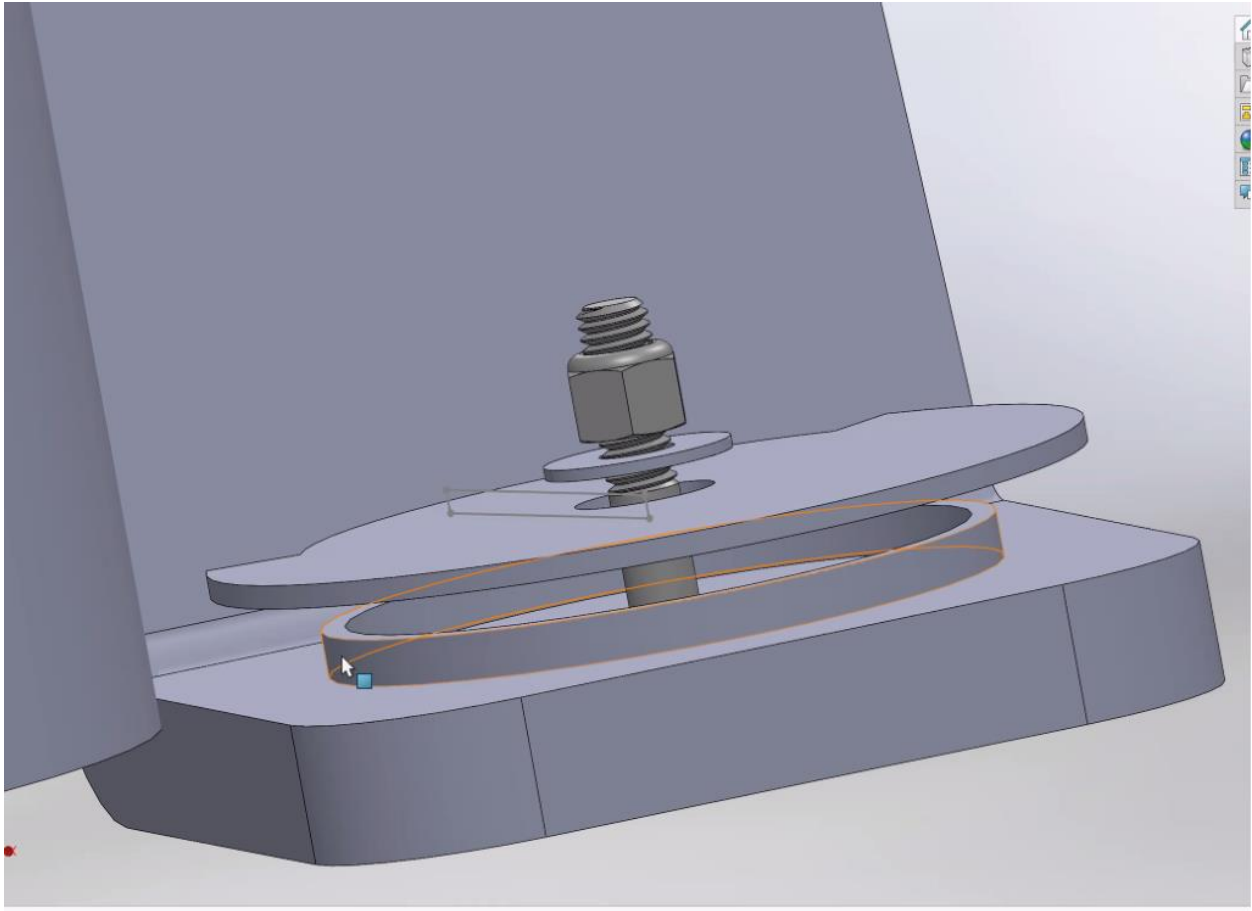
- Our 2000lb compression spring - OD = 4.687"



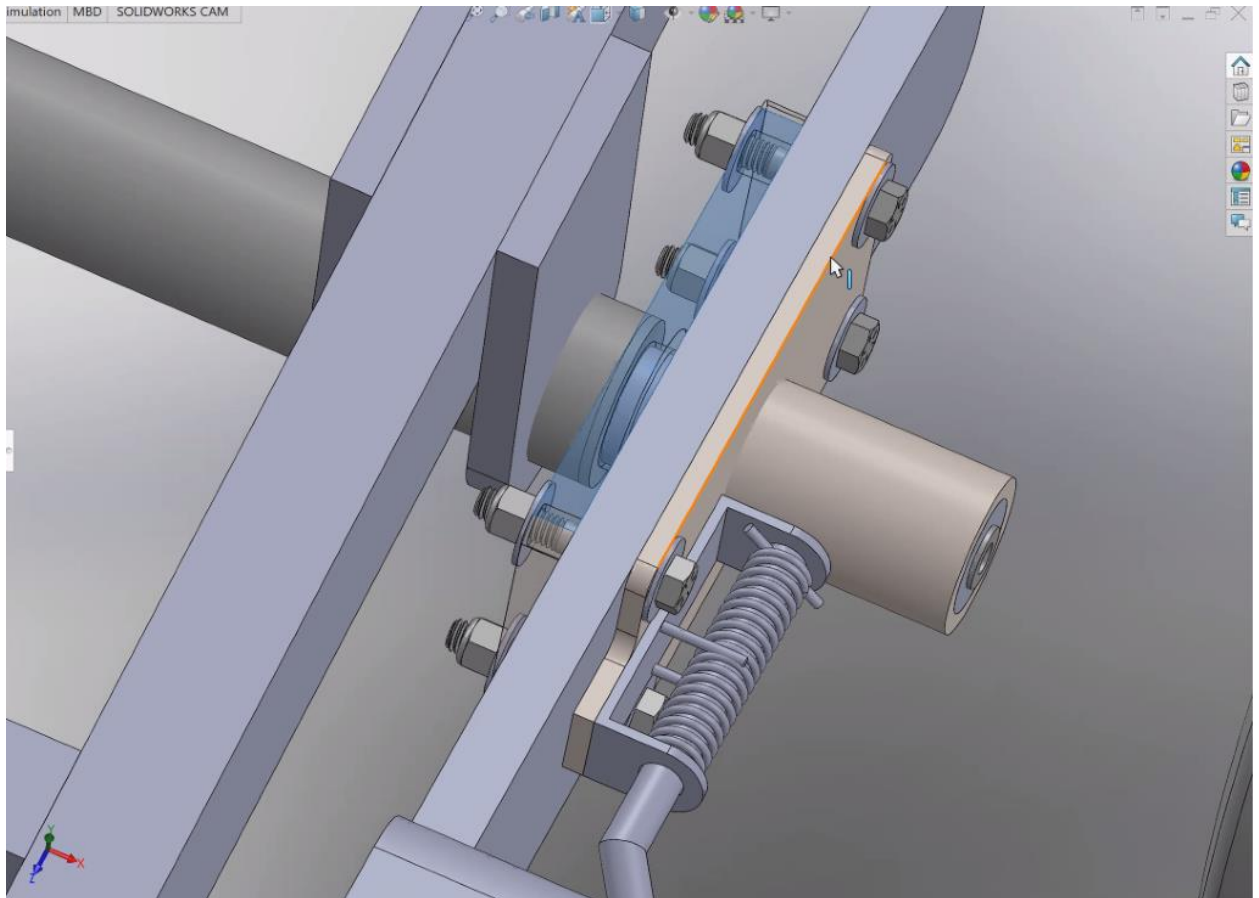
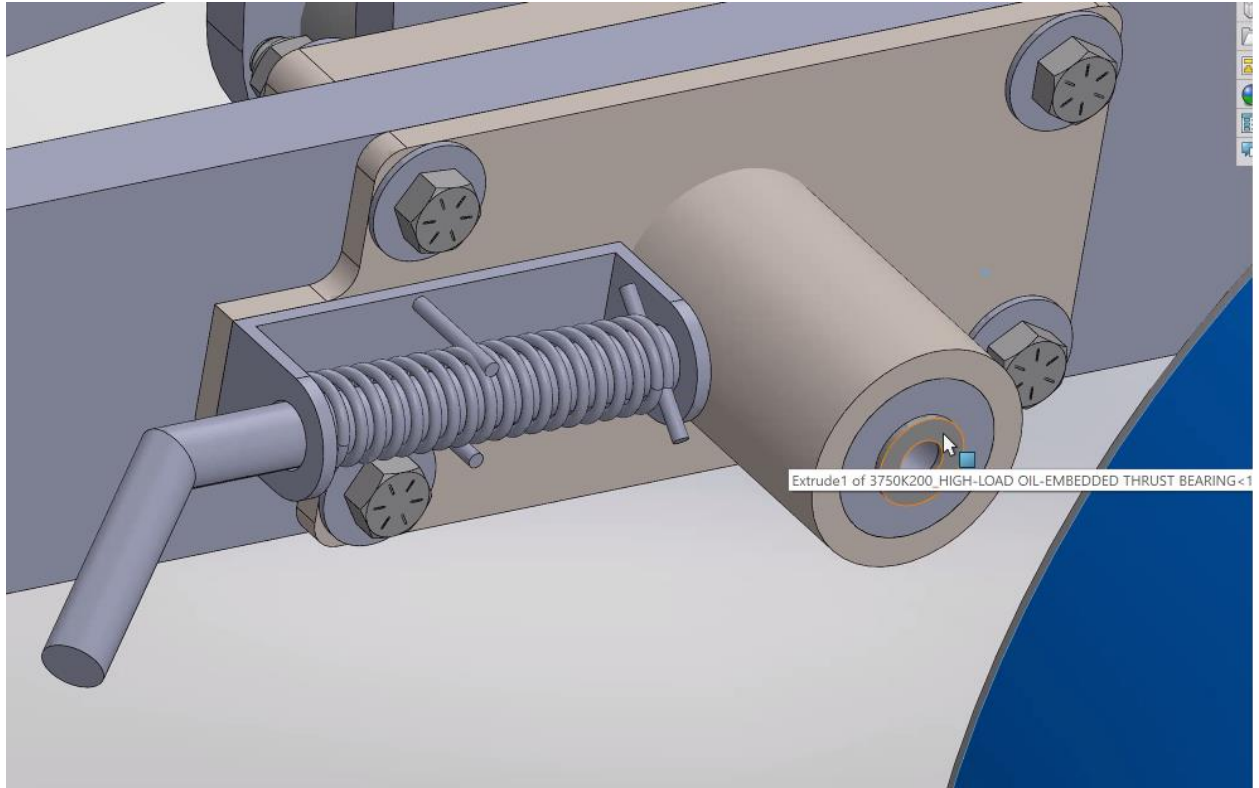


- Try a Sch 40 pipe - pipe is much more cost effective than the already sized metal tube





- Top and bottom coil spring mounts
- We are going to have to find different bolts because we need more threads
- Use the same bolt on top and bottom of the mounts



- If we were exclusively dependent, we wouldn't need that second sleeve bearing
- All the wheel hubs are different how they attach and mount?
- Do you want us to design something that attaches any type of wheel hub?
- Open aspect of the project - we didn't have that in the scope
- Not a requirement to do the tire mount - not in the scope of our project
- 1 inch of clearance from top of axle to bottom of frame
- Design review - Thursday the 16th as our meeting
- because everything is FOS of 3

Today's Objectives:

- Prepare for Design Review on Thursday
- Last minute Questions for Swenson
- Finalize design and make presentation

Notes:

Competency	Not ready Red	Yellow	Ready to go Green	Readiness (R,Y,G)
Value Proposition	<i>Missing</i> – No attempt to describe why the project is important; not relatable for the audience	<i>Technical only</i> – Partial articulation of project impact; not relatable for non-technical audience	<i>Engaging</i> - Clear articulation of larger project impact; relatable to a non-technical audience	
Product Requirements	<i>Superficial Formulation</i> - Some relevant factors identified, few measurable,	<i>Adequate Formulation</i> – Most relevant factors considered, some measurable,	<i>Insightful Formulation</i> – All relevant factors considered, many measurable	
Preliminary Proof of Concept	<i>Missing</i> – No mention of modeling, testing, or prototyping at any scale	<i>Satisfactory</i> – High-level data without specified purpose or application	<i>Complete</i> – Focused data with relevant interpretations and conclusions	
System Design (including any Models, Drawings, and BOM)	<i>Missing</i> – No overall system architecture or knowledge of how subsystems relate to one another; no models or drawings available.	<i>Basic</i> – Broad concept of a design with a basic idea of how it satisfies client needs; models, drawings, BOM partially complete	<i>Thorough</i> - Proposed solution(s) directly addresses client needs and specifications; models, drawings, and BOM available	
Manufacturing and Validation Plan	<i>Disorganized</i> – Vague idea of components to be purchased and how parts fit together; largely unaware how to fabricate needed parts; unclear path for validation	<i>Developed</i> - Selection of purchased components in progress; materials identified but may not be optimal; validation plan partially complete	<i>Well Planned</i> - Specific vendors and model numbers ready for order; tooling and fixture needs understood; drawings reviewed by shop manager; clear validation plan	
Project Management	<i>Wistful</i> – Path to completion unclear; budget uncertain	<i>Appropriate</i> - Credible timeline and budget given	<i>Insightful</i> - Contingencies considered in managing time and budget	
Risk Management	<i>Unaware</i> - No acknowledgement of project risks; relies only on a “home-run” solution	<i>Considerate</i> – Acknowledges risks and incorporates potential plans for worst-case scenario	<i>Mitigated</i> – Identifies logical risks and clear paths and fallback plans to address each	

- PowerPoint slides

- Objective
 - Value proposition
 - Background and customer/product requirements
 - Key attributes
- i. For complex systems, it is helpful to start with the “big picture” functionality of the device, then break it down into subsystems and the key features of each.
 - ii. Provide evidence of rapid prototyping and virtual testing that gives you increased confidence that the design will work.

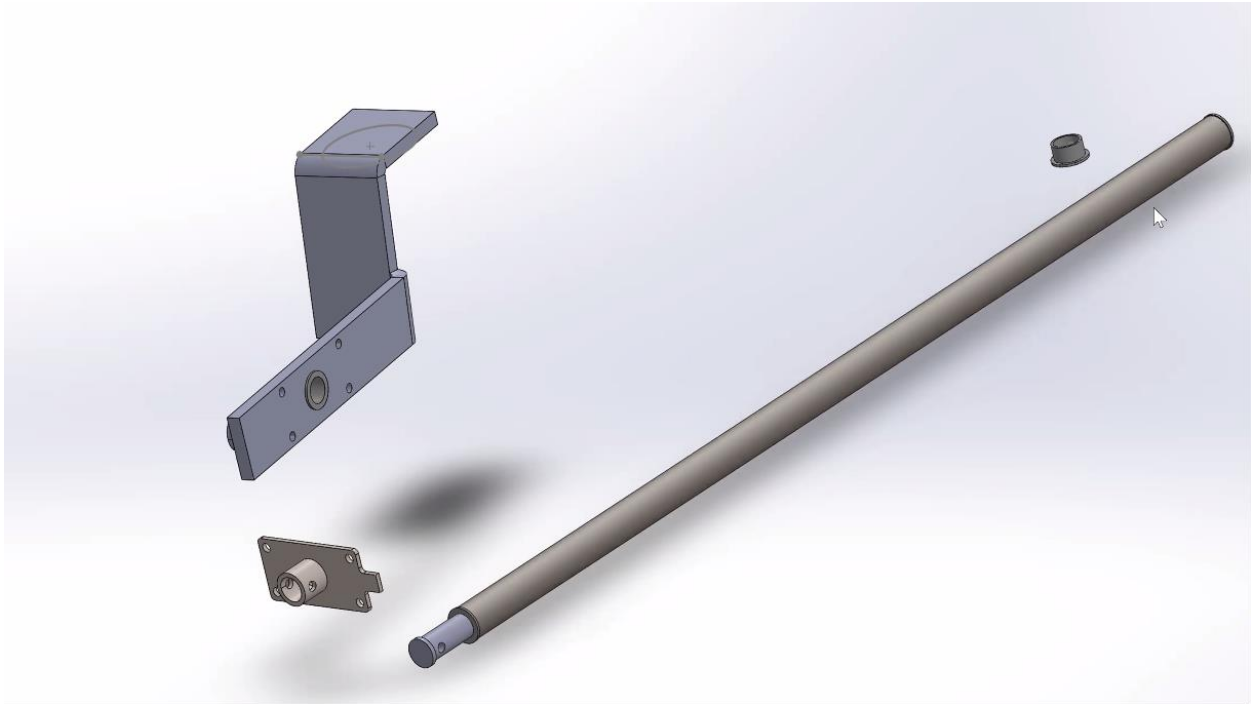
- Provision of a complete set of drawings and BOM for prototype device
 - Manufacturing plan
 - Make vs. buy
 - Sourcing of components or raw materials
 - Location or process for manufacturing
 - Who is responsible for fabricating each component w/ approx. timing?
 - Estimated cost for each component and a total cost roll-up
 - Summary of validation approach to confirm it meets requirements
 - Project schedule and budget
 - Potential risks with the project and how we will mitigate
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- A physical representation of demonstration of an early rapid prototype
 - Physical evidence, data, or examples supporting your decisions

The suggested approach for **performing** your presentation is:

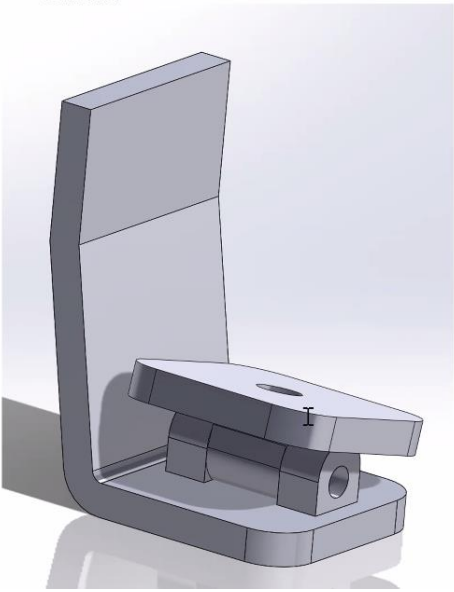
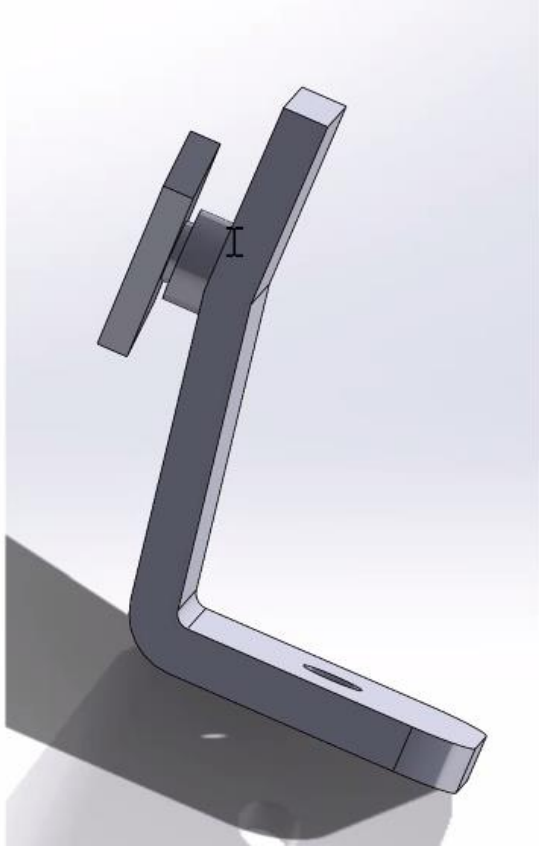
- 1) Choose team members which are competent and well-versed in the project for speaking roles.
 - a. It is **not** a requirement for every team member to speak
 - b. Choose team members to represent their respective disciplines or expertise for different aspects of the project.
- 2) Plan to deliver your presentation is **~20-30 minutes**, allowing time for audience questions and discussion. *Note: This time frame typically corresponds to ~20-30 slides.*
- 3) Speak at a moderate pace and use language which is easily understandable for a wide range of audience members. Be aware of the audience and adjust to their non-verbal feedback throughout.
 - a. Talk in a conversational voice and tell the “story” of your project
 - b. Avoid the temptation to read your slides to the audience.
- 4) Ensure that you are speaking synchronously with your slides and other visual aids.
 - a. A good strategy is to make your slides highly visual with pictures, graphs, tables, etc. and use your commentary to enhance the message.
 - b. Make sure that each slide “stands alone” and provides a simple message or *key takeaway*.
- 5) Dress and conduct yourself in a professional manner.

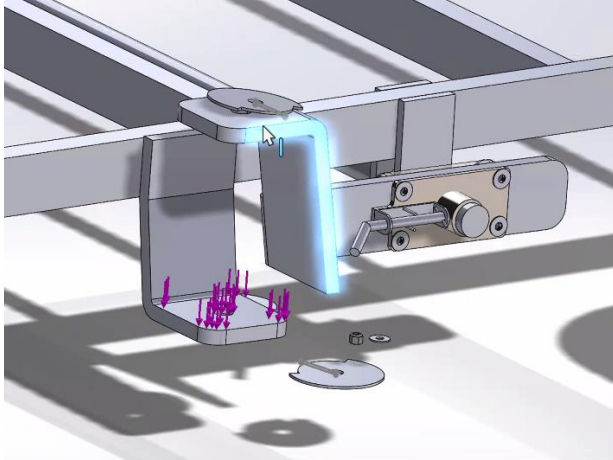
12:00pm meeting with Swenson

3 1/2" nom not really made

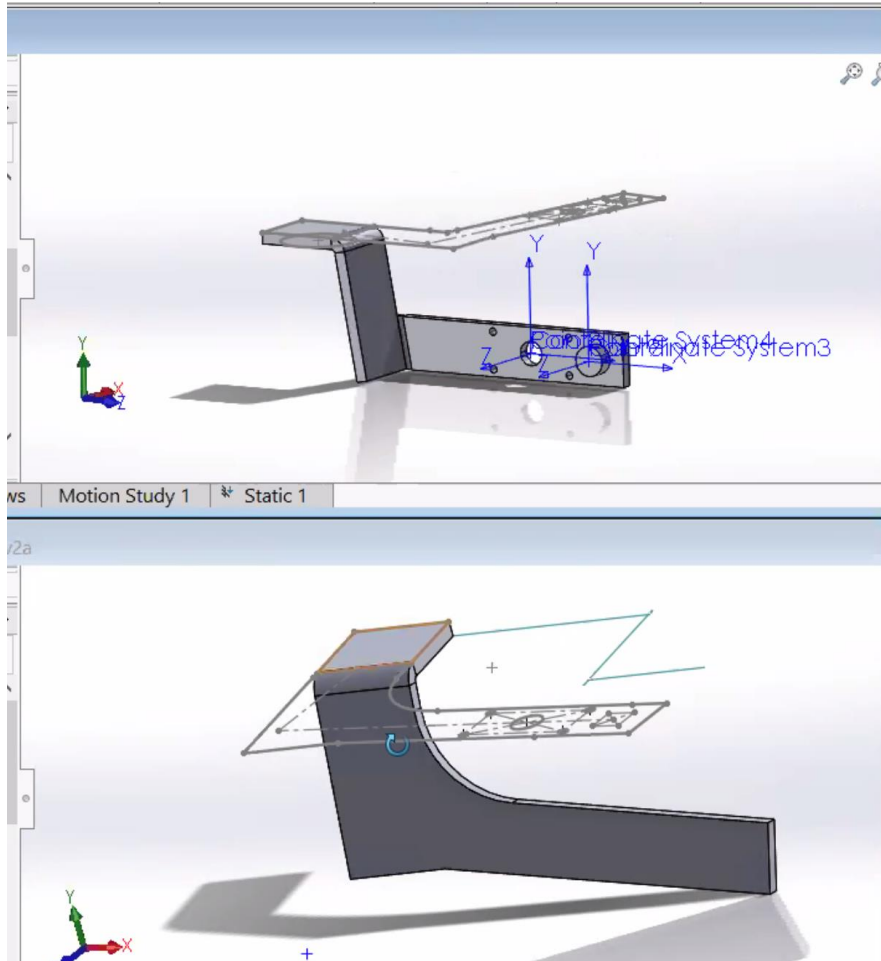


- Production standpoint
- Assembly instructions
- Wants detailed drawings
- Dummy frame
- Bill of materials would not include the trailer
- Detailed section view - no point in trying to model whole trailer as well
- Assembly drawing





- Is this too much weight on 1 single point?
- Will this fail?
- Anson
 - Improved lever ratio
 - We need to be able to handle the increased load
 - We also need more leverage
 - We are also increasing the stroke
 - Can we use 1 spring and increase the lever ratio?



- Sweeping corner will not work
 - It will just stretch it 3/4 in thickness
 - 2X the thickness
 - Weldment???
 - Might not need the same thickness all the way through
 - We need a big picture representative
 - Systematic review of the design
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- Start with whole design - big picture - what are we trying to make
 - Here is the lever arm - here is the ratio - this is how we are going to mount it
 - Spring mounts - how we will mount it
 - Springs - what did we calculate, why did we choose them
 - Provide evidence of virtual testing and prototyping
 - Calculations
 - 3 separate BOM! Yes

- Hard to describe actual Manufacturing plan
 - How we will make the small-scale prototype
 - What are we going to laser cut - 3D print?
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- Make-Vs-buy - for prototype
 - Sourcing of components or raw materials - prototype
 - Estimated cost of each component for full scale model?
 - He is okay with rough estimates
 - Don't care about prototype cost roll up
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- Potential risks - running out of time?
 - Technical risks DFMEA - what could potentially go wrong?
 - What will we do about it?
 - Also do it for small scale prototype
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- Provide enough context for people to understand
 - Explicitly explain to people what a normal suspension system looks like vs what our suspension system looks like
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- Why are we even doing this?
 - Plan on spending a minute or two about why it is

For Next Time:

- Kirk - Hinge on top mount - Redo the design - FEA
- Anson - Springs, and Lever arm ratio
- Robert - FEA, Design for 2000 lbs.
- Caitlin - Work on PowerPoint, help others with FEA or design questions

Comments/Concerns/Reflections from Today:

- There is a lot to get done tomorrow before our design review

Next Meeting Time & Date: Wednesday, 7/20/2020, @ 3:00pm