

Summer 2019-Spring 2020 Sr. Design Proposal

Sr. Design Members: Adam Thurgood, Omar Ruiz, Thomas Entwit, Brannon Hudson

I. PREVIOUS DESIGNS

U IDAHO

Failures

- No tensioner
- Lack of inter year communication
- Failure to test
- Failure to iterate design

Successes

- Center jackshaft, front input shaft, adjustable rear driver
- Adapted to stock skid

RAD

Failures

- Single pivot suspension
 - Single shock limited durability
- Dangerous location for chain

Successes

- Operational device
- Clever use of pivot to eliminate chain follower/tensioner

II. SAE RULES PERTAINING TO PROJECT

8.4 Drive

8.4.1 Chain Drive Oil Bath Requirement

Solutions that utilize a chain to drive the primary clutch from the engine are permitted. However, this design solution has historically created excessive temperatures and has been prone to failure. Therefore, if this type of drive system is selected, the chain must be enclosed in a case with a constant oil bath.

8.6 Track, Track Suspension, and Traction

8.6.2 Track Suspension Requirements

The following measurement procedure will be used to verify track suspension travel:

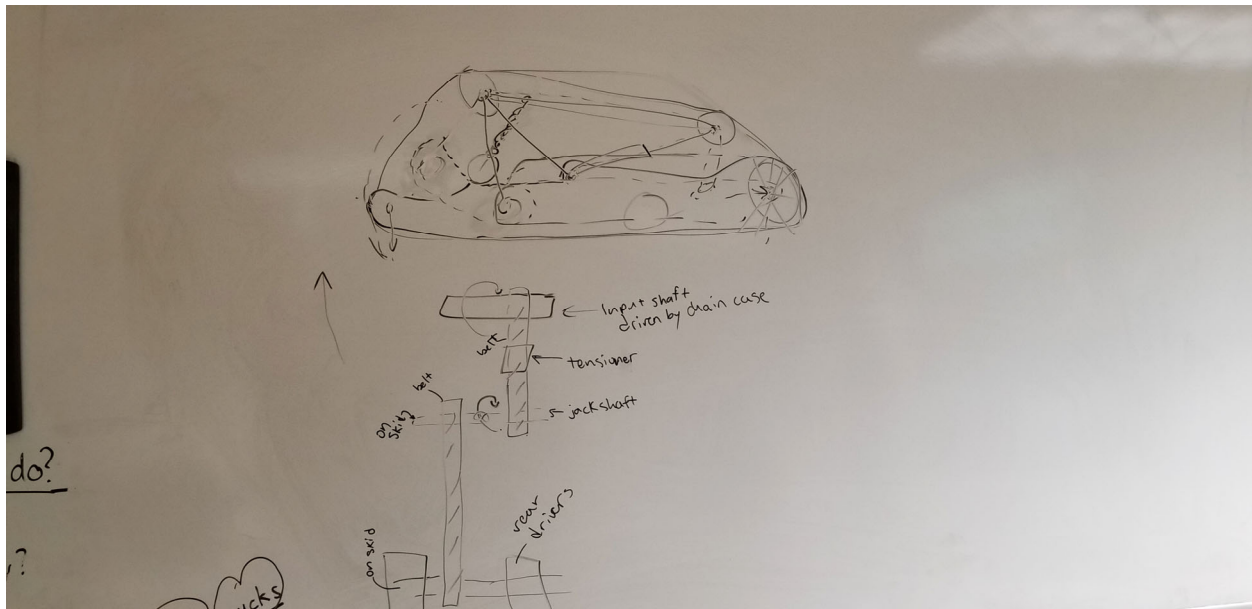
With the driver in the seated position, a measuring stick will be placed at the rear bumper of the snowmobile. This point on the measuring stick will be noted as "Point C." With the driver still on the snowmobile, weight will be added to the snowmobile until the track suspension is fully compressed. This point will be noted on the measuring stick as "Point D." The track suspension travel is the distance from "Point C" to "Point D." The track suspension travel must be equal to or greater than three (3) inches

8.7.7 Chassis Modification

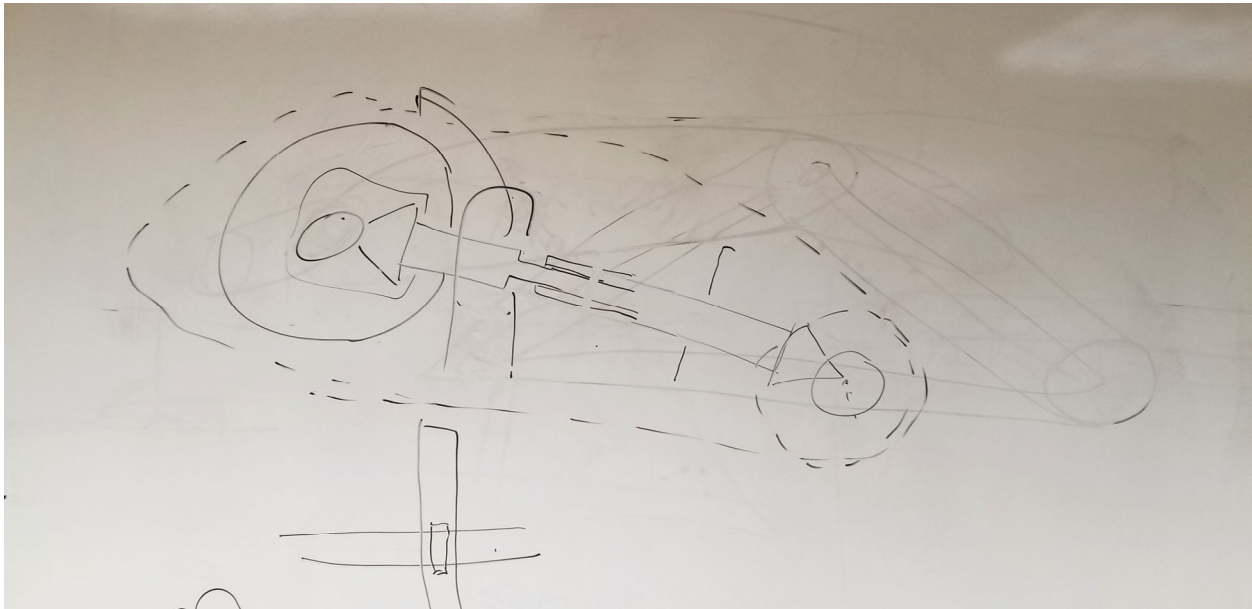
The snowmobile chassis must be from a stock qualified snowmobile; a snowmobile that was produced in a quantity of at least 300 units. Teams are not permitted to build their own chassis from the ground up. No modifications may be made to the snowmobile chassis that will reduce structural integrity. Traditional snowmobiles had a basic chassis consisting of a bulkhead and tunnel. The modern snowmobile chassis incorporates a triangle or pyramid to stiffen the bulkhead and tunnel. Teams that modify their snowmobile chassis from stock form will be required to prove their modifications maintain or improve the original structural integrity of the original design. Both design analysis and quality of fabrication will be taken into account before the team is allowed to compete.

III. INITIAL DESIGNS & IDEAS

TENSIONED BELT REAR DRIVE CONCEPT



VARIABLE LENGTH REAR DRIVE - SHAFT CONCEPT



IV. BUDGET AND SPONSORS

FULL SPONSORS

- BRP –Skidoo-Camsco

PARTIAL SPONSORS

- SLP
- Valley Power
- Timiken bearings
- ARP bolts
- Ice Age

BUDGET

Factors:

- Shocks (\$300-600 each)
- Skid rails (\$300-Ice Age?)
- Drivers (BRP?)
- Materials, Hex Shafts, Aluminum and steel stock (\$500)
- Bearings (timiken?)
- Belts
- Axles
- Hypoid-ring gears

Overall Estimated Budget: \$3000

V. DESIGN TIMELINE

PRE-SUMMER

- BRP materials order, drivers and track, suspension components (new skid?)
- Preliminary designs for ordering purposes
- Review of design origins

SUMMER

- Metrology
- CAD model of current suspension
- Full CAD design & FEA iteration
- Design Review process and iteration
- List of purchase materials from metal/bearing, and component manufactures

EARLY FALL

- Purchase of materials
- Bill of Materials
- Start of manufacturing

OCTOBER

- Preliminary in house testing
- Possible Track Dyno Setup or Road Testing
- Abstract for CSC competition
- FEA documentation ready to be sent to CSC
- Secondary Materials purchase

NOVEMBER END

- Final manufacturing

DECEMBER

- On Snow testing as snow permits
- Final presentation
- Tertiary purchases

FEBRUARY

- Completion of on snow testing and revisions
- Paper documentation

MARCH

- Ready for CSC Competition

APRIL

- Lifetime improvements of system, final in house testing

SPRING EXPO

Final presentation

GOALS FOR SUMMER-FALL TEAM

Design and manufacture rear drive snowmobile system that meets the requirements of the CSC competition, and a 1000hr design life at highest road load conditions.

GOALS/RESPONSIBILITIES FOR SUMMER-FALL INDIVIDUALS

Omar

- During summer semester become CNC Lathe & Mill Certified, and be CNC lead.
- Solid Modeling lead

Thor

- FEA Analysis lead during summer
- Skid lead during Fall Semester
- Logbook and Sr. Design Folder handler

GOALS FOR FALL-SPRING TEAM

Manufacture and test rear drive snowmobile system that meets the requirements of the CSC competition, and a 1000hr design life at highest road load conditions.

GOALS/RESPONSIBILITIES FOR FALL-SPRING INDIVIDUALS

Brannon

- Testing Lead
- During Fall semester become Lathe & Mill Certified
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Thomas

- Insure communications between groups stays consistent
- Sr. Design sponsor contact

VI. LEADERSHIP ROLE IN CSC TEAM**TEAM STRUCTURE:**

No Graduate Students at this time

Advisor: Dr. Daniel Cordon

Captain: Alexander Kiss

Co-Captain: Steven Gasseling

Teaching Liaison: Colin Parke

- In charge of maintaining and operating 201 and 401 courses
- “Freshmen manager”

TEAM LEADS:

Brandon “Tyler” Reiken

Mark Jaskowiak
Zachary Avelar
Hayden Hulse

SENIOR DESIGN:

Brannon Hudson
Omar Ruiz
Adam Thurgood
Thomas Entwit

SENIOR DESIGN LEADERSHIP

- Not administrative
- Lead by example
- Bring younger members to large projects
- Keep strong ties with the team
 - Communication
 - Meetings
 - Sub-Group Meetings
 - Available for the team to ask for help
 - Design reviews