**2018 Main Projects**

**Track/Suspension Efficiency Testing**

 Lead: Kiss

 Description: Similar to what Minnesota-Duluth did last competition. The team is designing a

 water trough test bench, designed to measure drivetrain and clutch efficiency.
 An electronic motor will be used to spin the track, and with various

 modifications implemented, we will be able to compare the power consumption

 of the motor and determine our increased drivetrain efficiency. This is a brand

 new project and will require a lot of time in design and development.

**Big Wheel Kit and Adaptation**

 Lead: Buttons

 Description: With the new chassis, we need to remake the adapters for the big wheel kit,

 install the big wheels on the skid, and determine the necessary length of the new

 track. This will require Solidworks, Mastercam, and CNC machining; as well as

 contacting Camso for a new sponsored track.

**Tunnel Resonance Testing**

 Lead: Cade

 Description: In the past, the team has used both sound damping adhesive and a paint-on sound
 material. We want to determine which is better for the 2017 chassis by

 determining which produces more noise when the sound material is applied.

 This involves minor machine shop time, Matlab, and material testing.

**Secondary Airbox Redesign**

 Leads: Buttons and Little Zach

 Description: With the new secondary airbox from the 2013 to 2017 chassis, we want to

 simulate the airflow within the airbox and determine if we can make something

 better that allows us more room for packaging within the snowmobile. This will

 require in-depth learning and testing in ANSYS fluent, as well as Solidworks

 modeling, and the reading of various technical papers.

**Polyurethane Bushings and Washers**

 Leads: Ben

 Description: Metal-on-metal contact is inherently noisy, and to limit that we wanted to

 develop polyurethane bushings for both the skid and the skis. We also want to

 use plastic washers when possible instead of metal, these may be found from an

 external sponsor, or made in-house as necessary. This project will require

 Solidworks time, machine shop time, and some testing.

**Rider Input Testing Apparatus**

 Lead: Ian

 Description: To determine the effects on the rider, the team is trying to quantify the results of

 rider ergonomics. This will include on-snow testing with strain gauges, as well

 as developing a testing strategy. We will then test our various modifications to

 see if they aid in ergonomics.

**DATAQ**

 Lead: Brian

 Description: The goal of this project is to develop a data acquisition and logging device to

 capture test data from the snowmobile. The device should be able to read

 Controller Area Network (CAN) messages from the engine control unit (ECU),

 as well as signals from various sensors that we may choose to add, and write

 captured information to an SD card for later analysis. To accomplish this, we

 need to:

* Figure out what information is available from the ECU (what’s available, can we decode the contents, how many messages we can request or sniff, how frequently, etc.)
* Decide what other information we want the ability to capture
* Use this info to develop specifications for the system
* Select a microcontroller and hardware platform based off of these specifications
* Potentially design amplification/filtering circuits for sensors
* Write backend code to read whatever we need (CAN, frequencies, voltages, currents, etc.)
* Write user interface that allows system to be adapted and configured (add/remove sensors, CAN messages, change sample rate…) without needing intimate knowledge of the code.

**Electronic Throttle Control Development**

 Lead: Phoenix

 Description: In the past, the team has tried to use an electronic throttle, but the project has ran

 into problems with reliability and implementation. This project will require a lot

 of time coding a motor to engage a gear train to open and close the throttle

 bodies. This will be primarily an EE project, but will need some minor

 mechanical components.

**Ski Testing and Validation**

 Lead: Buttons

 Description: With the new chassis, we want to compare the stock skis to various aftermarket

 skis to compare performance and efficiency. This will include contacting

 companies in search of sponsorships, as well as testing various ski setups on and
 off snow.

**Exhaust Redesign**

 Lead: Senior Design Team

 Description: With the new chassis, the senior design team will need to redesign the entire

 exhaust, including tuned pipe, muffler, and catalyst integration. This will

 require simulation with various software, a solid model design, and a final

 integration strategy. We will need to contact the appropriate sponsors for

 available support.

**Engine Calibration**

 Lead: Jason/Ian

 Description: With the new chassis, this is an all hands on deck project, this will require the

 entire teams help to complete before competition. We will need to do an initial

 calibration before the exhaust redesign to detune the engine, and then a post-

 integration calibration on the eddy current. We will then confirm the calibration

 on the water brake to ensure runability at the competition.