



University  
of Idaho



## CSC REAR DRIVE

TEAM SKIDADDLE :

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## VALUE PROPOSITION



Currently, there are no rear driven snowmobiles on the market as a stock platform without significant aftermarket modifications made and/or purchased. Technical innovation is highly valued in the Clean Snowmobile Competition. Over the last 16 years of the competition there have not been any rear drive configurations that would dramatically improve traction in soft snow and therefore better fuel efficiency. There are also no longer any aftermarket distributors of rear drive systems. The goal is to answer this need by developing a rear driven snowmobile skid that will improve traction and fuel efficiencies, as well as circumvent aftermarket modifications and costs. Our team is proposing a dual front/rear drive system for this year's CSC by the University of Idaho team. Our design seeks to have minimal impact on braking system redesign. Although some suspension modifications will be necessary, the design will be easy to swap with the stock configuration and require no input from the user while operated.



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# TEAM SKIDADDLE

## 2017 SKI-DOO MXZ TNT 850 E-TEC

### System Specifications

- Engine Power Output – 118HP
- Driver Torque - ~500-1583 ft-lbs
- Driver RPM – up to 4000 RPM



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# SAE COMP & RULES

## Competition Requirements

Description	Value	Unit
Sound Requirement - SAE J1161	< 67	dBA
Endurance Run	100	mi.
Acceleration -10 sec run	500	ft.
Weighted Acceleration	500	lbs.

## Rules

### SAE 8.4.3 Brake Performance Requirement

- All brake modifications must retain the braking performance of the stock sled

### SAE 8.4.8 Moving Parts Isolation

- Parts isolated from the driver and other competitors

### SAE 8.6- Track, Track Suspension

- 8.6.1-The track must be commercially available
- 8.6.2- The suspension travel must be  $\geq 3$ in.

SAE 8.5.1- Ski runners must be commercially available

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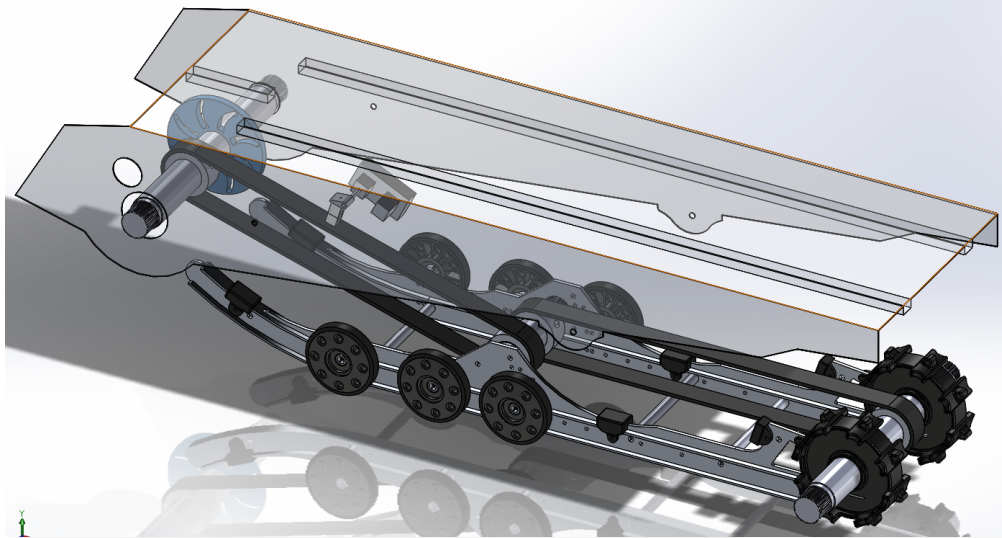
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## SINGLE AXLE BELT DRIVE



CAD model represents where belts/axles/drivers "could" be located. Does not represent final design.

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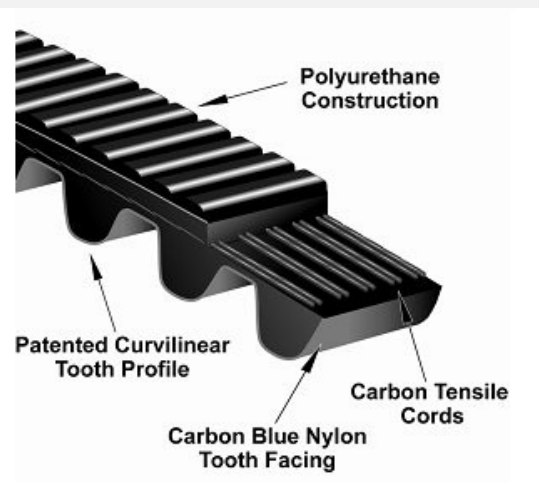
## SINGLE AXLE BELT DRIVE

### Belt & Pulley types/specs

- Brand Gates \$239
- Length 70.5in Width 2.5in
- Polyurethane W/Carbon Cords

### Further Considerations

- Re-active Tensioning



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# TEAM MANAGEMENT



## SCHEDULE

- |                                    |            |
|------------------------------------|------------|
| ▪ Detailed CAD,BOM & FEA –         | 10/4/2019  |
| ▪ Mid-Design Review – week of      | 09/09/2019 |
| ▪ Detailed Design Review – week of | 9/23/2019  |
| ▪ Fabrication begins –             | 10/07/2019 |
| ▪ Complete dFMEA –                 | 10/18/2019 |
| ▪ Fabrication finishes –           | 11/15/2019 |
| ▪ Testing begins –                 | 11/18/2019 |



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# TEAM MANAGEMENT



Budget: \$1,750

- |                       |       |
|-----------------------|-------|
| ▪ Belts -             | \$352 |
| ▪ Belt Tensioners-    | \$100 |
| ▪ SQ Tubing-          | \$18  |
| ▪ Plate Aluminum -    | \$724 |
| ▪ Misc Hardware -     | \$60  |
| ▪ Waterjet -          | \$80  |
| ▪ Belt Tension Gauge- | \$40  |

Total	\$1,374
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# DESIGN VALIDATION PLAN

Requirement	Test	Test Subject	Target Date
Maximum torque driver shaft(s) shall sustain is 500 ft-lbs	SolidWorks analysis and/or Abaqus FEA	CAD Models	9/16/19
Forward Suspension arm shall sustain considerable tension, compression, and tosion forces	SolidWorks analysis and/or Abaqus FEA	CAD Models	9/16/19
Forward Suspension arm shall sustain considerable tension, compression, and tosion forces	On snow testing	Fully functional prototype	11/18/19
Forward Shock will not exceed a compression of 3 in.	In-HEV testing	Fully functional prototype	11/18/19
Rear Suspension arm shall sustain considerable tension, compression, and tosion forces	SolidWorks analysis and/or Abaqus FEA	CAD Models	9/16/19
Rear Suspension arm shall sustain considerable tension, compression, and tosion forces	On snow testing	Fully functional prototype	11/18/19
Rear Shock will not exceed a compression of 3 in.	In-HEV testing	Fully functional prototype	11/18/19
Maximum weight shall not exceed 20 lbs of the stock skid	Weigh the full system on the scale in GJ 126	Fully functional prototype	11/18/19
Design skid shall have less roll resistance than stock skid	CSC Roll Down Test	Fully functional prototype	11/18/19

