

# PHS Sustainability

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# Final CAD Model(s)

Drive Belt



Fig 1. Drive Belt

Direct Contact



Fig 2. Direct Contact

# Virtual Prototype

## Question we are trying to answer:

What is the stress on the virtual prototype and is there going to be any structural damage from this design?

## What was the answer:

Stress on the bike stand: 6.0491[MPa]

No structural damage to the bike and stand

Factor of safety: ~300

## How did it inform design:

The team confirmed no structural damages occur from either drive belt or direct contact design.

Team can continue forward with current designs.

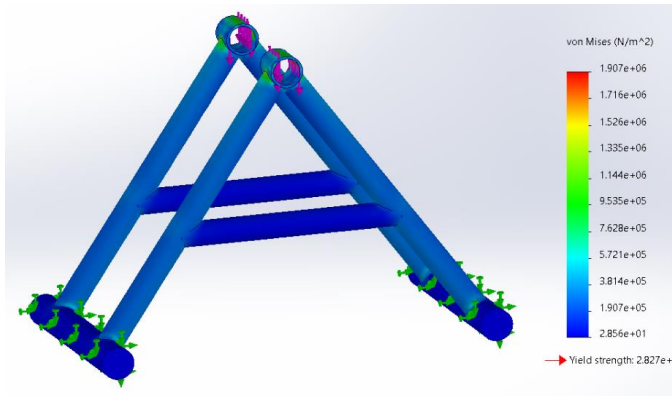


Fig 3. Structural Analysis in SolidWorks for 1023 Carbon Steel

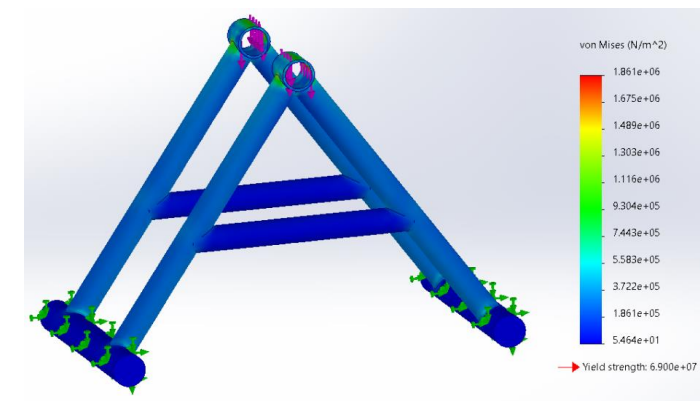


Fig 4. Structural Analysis in SolidWorks for Aluminum 3004-O, Rod(SS)

# Physical Prototype: Direct Contact

## Question we are trying to answer:

Does direct contact adequately spin the alternator?

## What was the answer:

Yes, the bike created enough friction to rotate the alternator

## How did it inform design:

The team confirmed that the direct contact design works for the human powered bicycle (HPB).  
Team can continue forward with this design.



Fig 5. Direct Contact



Fig 6. Carson riding HPB

# Physical Prototyping: Drive Belt

## Question we are trying to answer:

Does drive belt adequately spin the alternator?

## What was the answer:

Yes, the drive belt was able to spin the alternator consistently

## How did it inform design:

The team confirmed that the drive belt design works for the human powered bicycle (HPB). Team can continue forward with this design.



Fig 7. Attaching Drive Belt

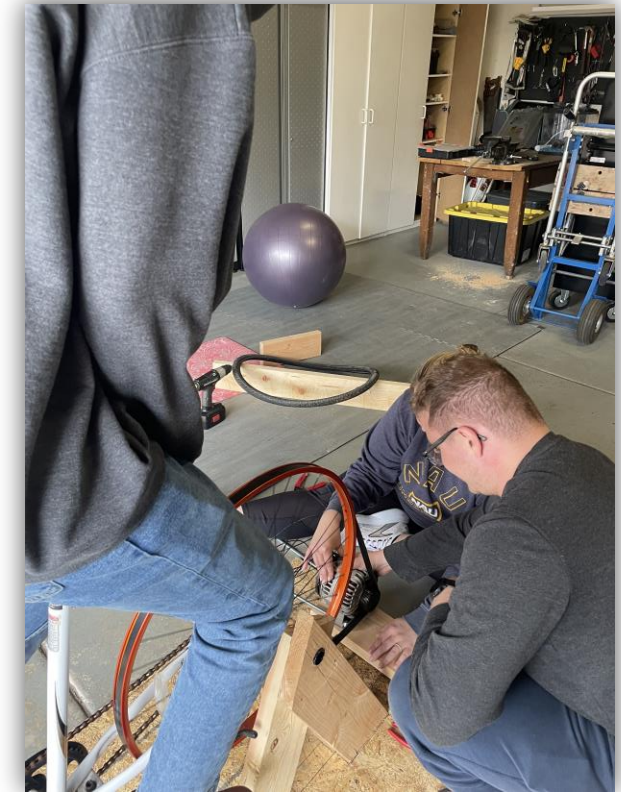


Fig 8. Drive Belt

# Physical Prototype: Energy Generation

## Question we are trying to answer:

Does the bike generate energy when pedaling?

## What was the answer:

Yes, the drive belt was able to illuminate the lightbulb. Continued troubleshooting needed for the display screen to show accurate outputs.

Voltmeter reading: 32 volts

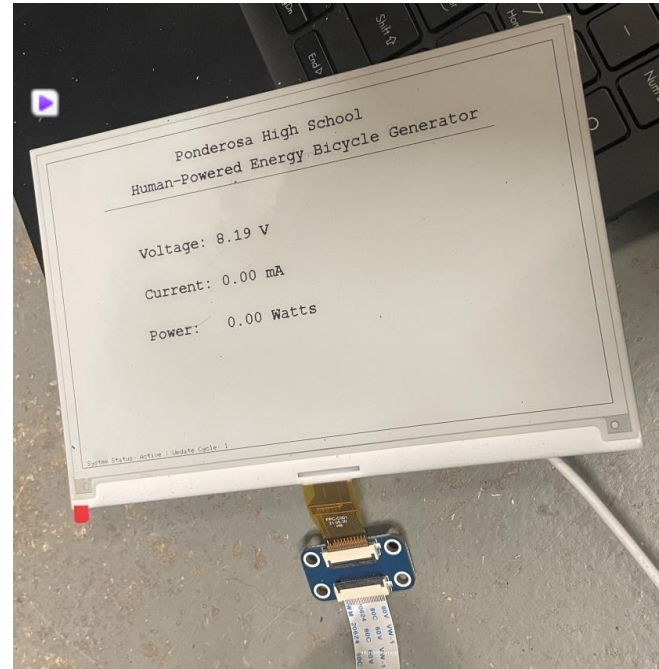
## How did it inform design:

The team confirmed that the bike is able to generate energy, but continued troubleshooting is needed for electrical to work properly.

The team will need to revise the circuit design.

[Bright Light.mp4](#)

[Voltage through Lightbulb- Voltmeter.mp4](#)



# Thank you!

## Any Questions?