# CAPSTONE EXPERIENCE 2015

# Title: Chassis Dynamometer.

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***Project Background, Problem Statement, Impact, & Sustainability***

The objective of this project was to couple the PTO dynamometer and the Chassis dynamometer together. The Chassis Dyno was not equipped with data collection capabilities where the PTO Dyno does. Rotational force will be sent through the rollers on the chassis dyno, through a connecting shaft to the PTO dyno where data such as torque and horsepower can be seen and recorded. This project is to help impact the ABE Department by benefiting the Purdue ¼ Scale Tractor Team and the PUP project in testing their vehicles at the wheels rather than just at the flywheel. This project may also be used as a demonstration piece in class. The project will go on to benefit the ABE department curriculum for many years to come to be used as a testing device and educational tool. The existing PTO shaft on the PTO Dyno was too short to use the hitching point and exceeded the 15 degree angle max on the Cardon Style u-joint knuckles.

***PTO shaft Plate***

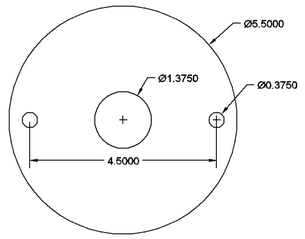



Fig 1. Shows the Plate design based on the stock PTO shaft mounting system on the PTO dyno which was fabricated and welded onto the new PTO Shaft.

***Chassis Dyno Mounting Plate***

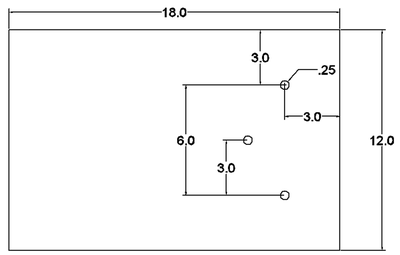



Fig 2. Shows the plate designed to be welded onto the bottom of the chassis dyno and secured down with concrete fasteners.

***Finished Product***

Fig 3. Shows the finished "Dual Dyno" system mounted to the floor and ready for initial testing.

***Alternative Solutions***

1. Purchase a longer PTO shaft and mount it on the PTO dyno to couple the two together.
2. Raise the Chassis dyno off of the floor to allow more acceptable u-joint angles.
3. Raise the PTO adapter on the chassis dyno by adjusting the belt power transfer mechanism.

***Final Design***

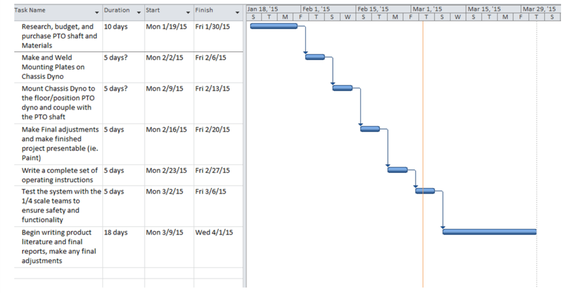
- Option 1 was the chosen course of action. It was both simple and robust and made the most common and economical sense.
- Purchased was a 54" collapsed, 80" max length, ASAE compliant 540 RPM PTO shaft capable of 35 horsepower. Given the Max horsepower of 35 and 6-spline quick connect rated 540 RPM, calculated max torque of 340 ft-lbs. Cost: $129.99

***Project Constraints***

- Budget – initial budget of $500, more can become available upon request, but was not needed.
- Time – Physical work on Project needed to be completed by 10 April, 2015.
- U-joint angles needed to be within the 15 degree maximum.
- Chassis Dyno needs to be secure to the floor in a position not in the way of the door or other equipment at the ADM building.

***Project Schedule***

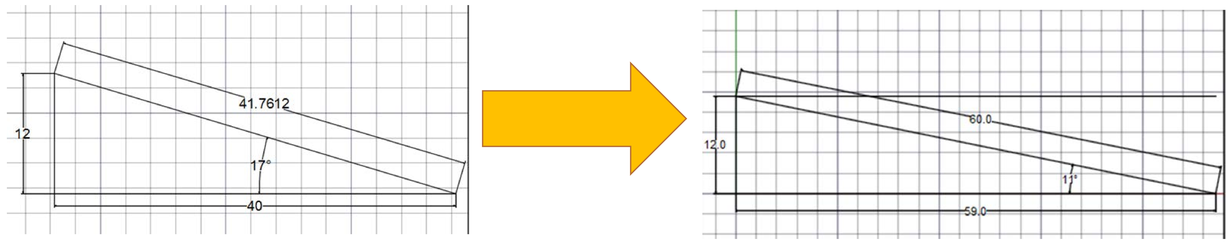
| Task Name | Duration | Start | Finish |
|---|---|---|---|
| Research, budget, and purchase PTO shaft and Materials | 10 days | Mon 1/19/15 | Fri 1/30/15 |
| Make and Weld Mounting Plates on Chassis Dyno | 5 days? | Mon 2/2/15 | Fri 2/6/15 |
| Mount Chassis Dyno to the floor/position PTO dyno and couple with the PTO shaft | 5 days? | Mon 2/9/15 | Fri 2/13/15 |
| Make Final adjustments and make finished project presentable (ie. Paint) | 5 days | Mon 2/16/15 | Fri 2/20/15 |
| Write a complete set of operating instructions | 5 days | Mon 2/23/15 | Fri 2/27/15 |
| Test the system with the 1/4 scale teams to ensure safety and functionality | 5 days | Mon 3/2/15 | Fri 3/6/15 |
| Begin writing product literature and final reports, make any final adjustments | 18 days | Mon 3/9/15 | Wed 4/1/15 |




***PTO Shaft***



The picture on the left depicts the measurements of the "Dual Dyno" system prior to making any adjustments or changes. By adding the longer PTO shaft as seen in the picture on the right, the shaft angles were brought from 17 degrees to 11 degrees.

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