

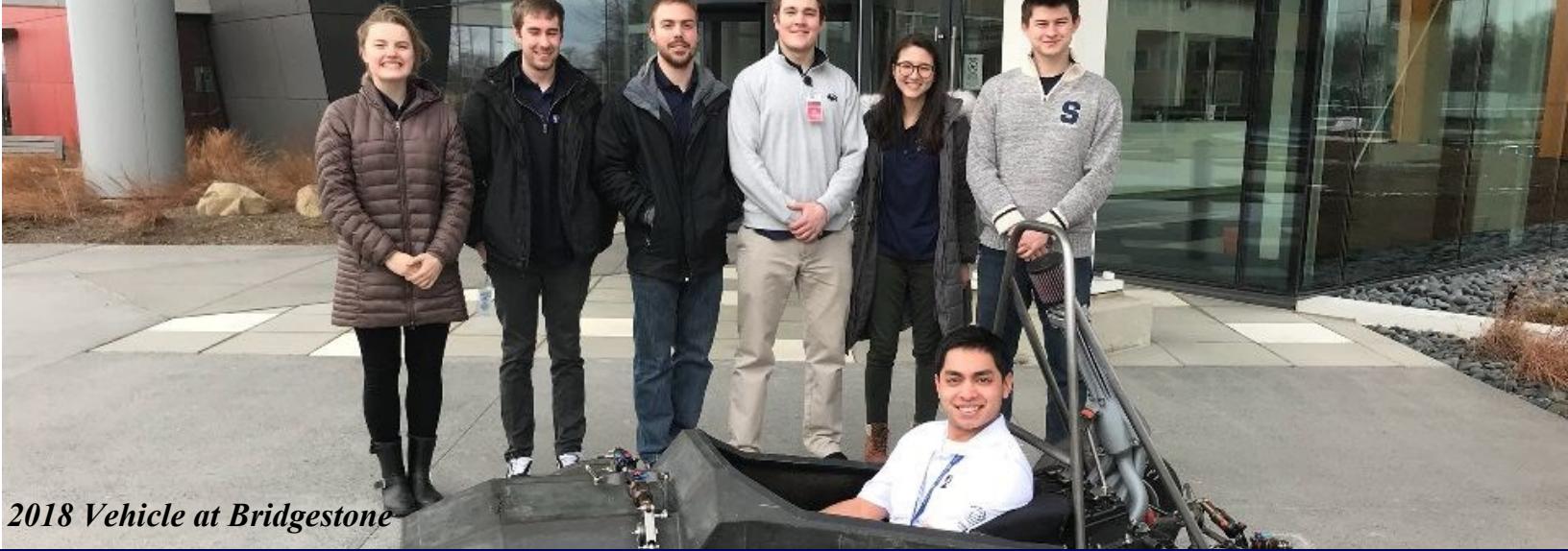
PENN STATE RACING

MARCH

2018



TEAM NEWSLETTER



2018 Vehicle at Bridgestone

A MESSAGE FROM THE TEAM

Dear reader,

March was another month full of exciting accomplishments for Penn State Racing. After our first ever monocoque was completed in February, we promptly paired it to our rear steel tube sub-frame. Quickly following were the front and rear suspension and anti-roll bar assemblies to complete our rolling chassis. Additionally, all aerodynamic components were laid up, vacuum bagged, cured, and mounted this month.

These completions were mandated by our trips to Bridgestone and Ford this spring break, where we conducted kinematics & compliance (K&C) and wind tunnel testing, respectively. Our members sacrificed their Spring breaks to accompany the car and carry out these important tests. Now, with the help of engineers from both companies, we will interpret the data and use it to make informed decisions when tuning our vehicle. A well documented process of manufacturing, testing, adjustment, and validation is exactly what judges are looking for during the Design event. We are very grateful to these companies who share their resources to help develop our vehicle and team.

Alongside the manufacturing of the vehicle, we are continuing to prepare for the competition's static events. This month, our Cost Report was submitted to FSAE judges for review. This document assigns a production price to the vehicle by accounting for all material, labor, and tooling costs associated with the car. Now that the Cost Report is complete, Administration will turn it's attention to the Business Presentation. We are also beginning to compile binders full of supporting material for the Design event.

In this newsletter, progress made in the last month and plans for the upcoming month are outlined. Also featured is our Member of the Month!

Thank you for your continued support!

PENN STATE RACING



AERODYNAMICS & COMPOSITES

In March, Aerodynamics & Composites completed the first iteration of our 2018 aerodynamics package. This includes our new underbody diffuser, nosecone, sidepods, multi-element front wing, and multi-element rear wing. For the second iteration, we will reuse the molds, refine the surface finishes, and develop more permanent mounting solutions for each component. Once the second iteration is complete, we will also be able to paint the full car and add the decals for our many sponsors. The full package is lighter than last years, especially considering we will not need to replicate the many body panels that were replaced by our enclosed monocoque chassis. We also anticipate that the new side-wings will contribute to faster lap times.

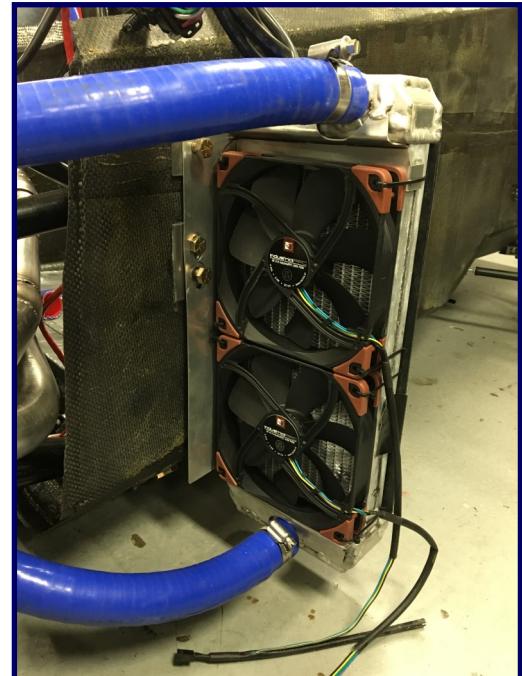
In April, we will begin to review the data generated at Ford's wind tunnel. During an 8 hour testing period, we were able to gather downforce, drag, and moment data from dozens of different combinations of yaw angle, angle of attack, and wind speed. We tried to most closely replicate the conditions our car will see during the various dynamic events at Formula SAE Michigan. Once we interpret this data, it will be useful to compare it to that of last year's car and this years Computational Fluid Dynamics simulations.



POWERTRAIN

In March, Powertrain installed brand new custom radiators courtesy of TitanX. The heat exchangers are cut to a specified size, welded to tanks that will hold cooling fluid, and coupled with bespoke pipe fittings. It was very important that our radiators were sized appropriately to accommodate this year's new sidepods and side-wings. Given that there are few comparable radiators on the market, we may not have been able to accomplish this without the help from TitanX. They are yet another testament to the value of our generous supporters. Powertrain also collaborated with Suspension in March to finish steering. These subsystems overlap at the steering wheel, into which controls for shifting, clutch, traction control, launch mode, and the dashboard are wired. A new key feature on the steering wheel is the clutch function, which will engage the clutch gradually for a slower rolling start of the car. Last year, the absence of such a function meant that we could only get off of the line using launch control, which is typically reserved for the Acceleration event. We are also very excited to observe how our redesigned intake manifold will affect our engine's performance. We anticipate it's new geometry, smaller volume, and pressure sensors will help to increase power, throttle response, and fuel efficiency. Next month's testing will hopefully verify these improvements.

In April, we hope to test our drivetrain on our newly refurbished Dynojet dynamometer. Thanks to the Learning Factory, this chassis dyno which remained dormant for many years is now operational. Last month we confirmed its functionality by testing the 2017 car on it, and now that the 2018 powertrain is ready, we will conduct test runs to develop an effective tune. We set a goal early this year to improve the throttle response and power delivery of our vehicle, and these dyno runs will help us to do exactly that. Additionally, like K&C testing does for suspension and wind tunnel testing does for aerodynamics, the dyno testing will prove to the Design event judges that we made conscious, well informed decisions to improve the overall performance of our vehicle.

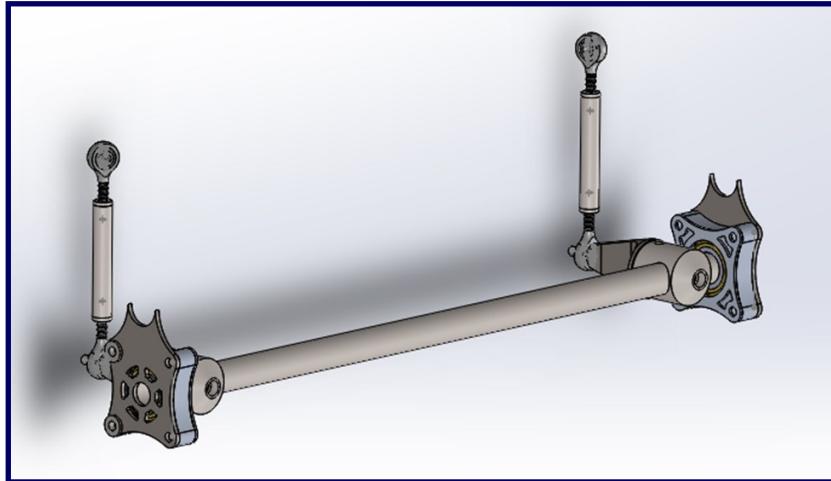


Cutsom TitanX radiator (back)



Cutsom TitanX radiator (front)

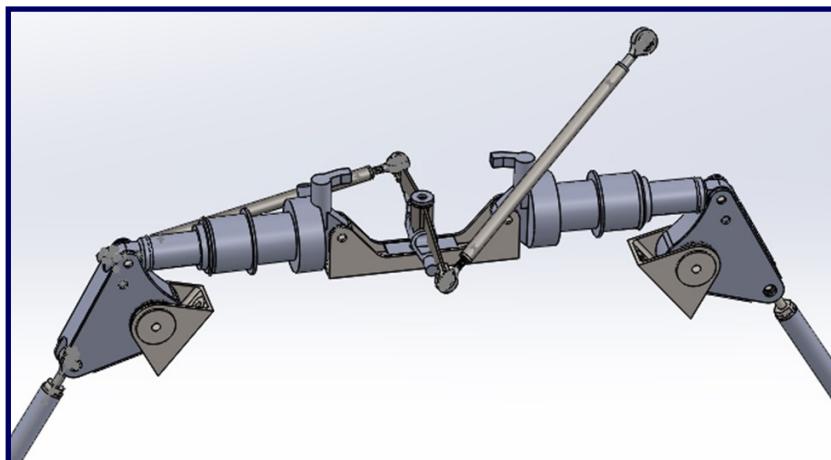
SUSPENSION



Rear anti-roll bar assembly

Suspension worked diligently in March to complete and mount the front anti-roll bar, rear anti-roll bar, and steering assemblies. These achievements, alongside Powertrain's progress, mean that this month the car will move under its own power. Even while we await the completion of our aerodynamics package, we can now begin our dyno testing, and hopefully track testing shortly thereafter. Once we do get the car to the track, we will finally see how differently our completely redesigned systems perform.

Even before we get to the track though, we can begin to tune our suspension. With some help from engineers at Bridgestone, we will interpret the data we generated last month during K&C testing. Their machine is meant to simulate many miles of road usage, and can influence our decisions for spring and anti-roll bar stiffness. We will then go even further and attempt to quantify the performance increases by adjusting said parameters. This will be accomplished by importing our suspension setup, tire choice, and exact track layout into a program called OptimumG. This program will simulate the optimum achievable lap time with the given variables and allow us to compare different setups. Even with these digital aids though, it is of utmost importance that we get out to the track as soon as possible to become familiar with the car and improve its reliability.



Front anti-roll bar assembly



MEMBER OF THE MONTH

SHANE STRALEY

Shane, junior, has made quite the impression during his first year on the team. He has been a vital member of Powertrain, having aided the rebuild of our 2018 engine with all new components. Shane's skills were well utilized on this project, as he and his father have rebuilt countless engines with Straley Racing Engines, the family business. Our 600cc four cylinder motorcycle engine pales in comparison to the airplane, racecar, and drag car engines that Shane has helped to build, some in excess of 10 liters displacement. Shane's humility has also helped him to be successful with this team. Ask anyone on the team about him and they will have only positive things to say.

Congratulations, Shane!



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THANK YOU!

In addition to our sponsors, we are thankful for the unending support of the following individuals:



Dr. Thomas Juska
Applied Research Lab



Dr. Karen Thole
Department Head,
Mechanical and Nuclear
Engineering



Admiral Paul Sullivan
Executive Director,
Applied Research Lab



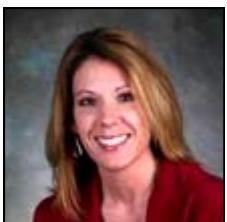
Dr. Matthew Parkinson
Learning Factory Director



Dr. Todd Palmer
Applied Research Lab



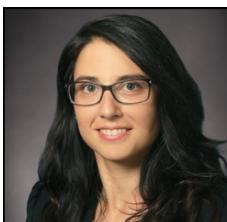
Cindy Winkelblech
Program Administrator



Becky Benson
Administrative Support Assistant



Bill Genet
Learning Factory Supervisor



Dr. Stephanie Stockar
FSAE Faculty Advisor



Rob McAllister
Learning Factory Supervisor

We also thank all of the Penn State Formula SAE alumni that continue to provide us with invaluable guidance and assistance every year!

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Penn State Formula SAE would like to express our most sincere gratitude for the generous university and corporate partners who made our project possible—it would be impossible without your continued support. Thank you for your support!

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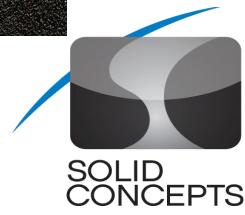
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