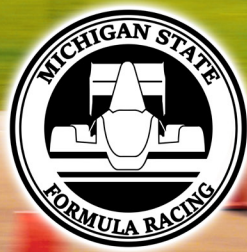


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Vehicle Manufacturing

Despite a fluid start to the spring semester, the team is continuing to push forward with the new vehicle platform. The powertrain and suspension systems have completed most of their manual mill and lathe parts and are now focused on finishing CNC parts. After the few remaining components are milled, team members will be full-speed ahead with fabrication work, assembly, and the chassis layup.

The electronics department has made strong leeway in manufacturing, specifically, team members have been working on the internal wiring harness and printed circuit boards. The system has started manufacturing the external wiring harness and mocked up a part of it using a 3D printed copy of the new chassis' rear electronics enclosure. This is the first time that an electronics enclosure has been purpose-built into the chassis, which should provide greater protection for sensitive electronics as well as extra design points for excellent system integration.



A 3D-printed part of the chassis used for wiring

S.E.S. Trouble and an Effective Solution

The structural equivalency spreadsheet (SES) must be completed by every Formula

SAE team prior to manufacturing a composite chassis. The spreadsheet involves manufacturing a plethora of different samples to be dynamically strength tested in a lab before importing the results into a spreadsheet, conducting calculations, and proving that the chassis design is structurally sound.



Chief Engineer and Chassis System Leader, Garrett, laying up SES samples

After testing the first round of SES samples, the team quickly realized that the pre-pandemic film adhesive (the material that holds the honeycomb core to the carbon fiber skins) was well past its usable life. After brainstorming what to do, [Axiom Materials](#) came to the rescue by providing brand-new film adhesive. In fact, the amazing folks over at Axiom even manufactured samples and tested them before sending the film adhesive over, just to make sure that the next round of SES samples would go smooth. Thank you, Axiom!

Despite the setback, the chassis system is finishing up the final round of SES samples as fast as possible. The chassis layup will immediately follow SES approval.

Give Green Day

Once every year, Michigan State University hosts [Give Green Day](#), their annual day



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of giving to university programs. This year, Give Green Day will take place on Tuesday, March 15, 2022. Like many other university groups and student organizations, the MSU Formula Racing Team will take part in Give Green Day by hosting a crowdfunding campaign to raise funds for team safety equipment, material for vehicle manufacturing, and competition travel expenses.

During the 15-month period that the team was not allowed to work, efforts were shifted towards COVID-19 by donating PPE and material to pandemic-related causes. Now that the team is back to mostly-normal operations, team leaders have had a hard time finding donors to provide PPE, raw material, and pre-manufactured components for this year's vehicle build.



The team gladly donated PPE in March of 2020, before any statewide or university masking or distancing directives, only a few days after the shop was indefinitely shut down

While the team has been able to make do so far, competition is only two months away, and with manufacturing deadlines fast approaching, the team can no longer afford to spend valuable time waiting for in-kind sponsorships and donations.

We are humbly asking you to consider donating to our crowdfunding campaign so that we can purchase the materials and

components required to finish our car in time for competition. Our team goal of \$5,000 will be used to purchase PPE, tooling, raw material, and manufactured components, as well as help fund the team's travel expenses to and from Michigan International Speedway in May.

To contribute, please visit our CrowdPower page: givingto.msu.edu/crowdpower/msu-formula-racing. Thank you for your continued support of our team.



Please consider supporting the MSU Formula Racing Team's mission to engineer a legacy!



Last year's car in the legendary Spartan Stadium



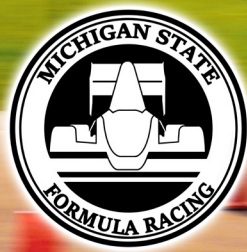
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Name: Arinc Kuloglu
System: Chassis
Hometown: Istanbul, Turkey
Major: Mechanical Engineering
Class Standing: Freshman



Why did you choose to join Michigan State Formula Racing?

Since my childhood, I have been intrigued by cars, especially high-performance ones, in a way that I can listen to an engine sound for hours just for relaxation. Likewise, I started disassembling the R/C vehicles that my parents bought and collecting their components such as electric motors and servo-steering systems when I was 5-7 years old. To this day, I have been following the same path, which led me to join the Michigan State Formula Racing Team. Throughout my school years, I have been involved in many robotics and engineering clubs, such as FIRST Robotics Competition. However, when I learned about MSU FSAE, I was mesmerized by how challenging an upper-level engineering club could be, which was one of the reasons why I applied to MSU. After applying, I realized that joining the team was the next step that I certainly had to take in my career. I told myself "I will do what it takes to be on this team!"

What is your favorite part about being a member of the team?

On my first days at the shop, I was more of a silent bird since I wanted to observe the team dynamics before socializing right away. This gave me a better understanding of each team member's general traits and their responsibilities within the team. As someone who enjoys working on intensive projects, I concluded that our team also shares the motto: "work is better when you are having fun." After bring on the team for several months now, this statement certainly holds true. I enjoy laughing while working with the leads and other members; I enjoy challenging myself to bring designs to life in the team; I enjoy becoming a part of the team's legacy.

Name: Matt Shaffner
System: Suspension
Hometown: Freeland, MI
Major: Mechanical Engineering
Class Standing: Freshman



Why did you choose to join Michigan State Formula Racing?

Right from the start, when I saw the car at Spar-ticipation, I knew this team meant business. The craftsmanship was impeccable and I wanted to be a part of it. The racing team seemed like a great place to utilize my manufacturing skills and I quickly found out that the team was somewhat like FRC robotics, which I participated in during high school. It was all about hands-on experience, and having a strong foothold in STEM is very important for me. Especially for engineering majors, it's very important to understand the manufacturing process. Knowing how things are made and making them yourself is as important as knowing what to make. My family farms for a living, so understanding how to fix and maintain things is integral to having a successful business. I am incredibly grateful for the skills I have now learned at MSU FSAE. They are not only technical skills, but life skills.

What is your favorite part about being a member of the team?

I enjoy learning new skills while contributing to the larger goal of building a top-of-the-line race car. My favorite part about being a member of the team is the gaining real experience that I can later utilize in industry. I truly believe machining is an invaluable skill that I will surely use throughout my life.

How have you been able to make a difference in the team?

I have been able to make a difference in the team by working hard and milling parts for the suspension system on the car, as well as helping out in other areas when need be. From simple blocks for CNC machining to sanding molds for carbon fiber layups, I have worked on a variety of projects for the team and I enjoy branching out when someone new needs assistance.



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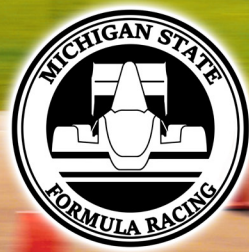
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Name: Justin Yan
Hometown: Sterling Heights, Michigan
Degree: B.S. Mechanical Engineering (2021)
Years on the team: 2018-2021
Roles: Powertrain Team Leader (2019-2020)

How did you contribute to the advancement of Michigan State Formula Racing?

My largest contribution to the team was solving a 5-year oil pressure issue that had caused multiple engine failures. In 2019, I had gone through an exercise to determine the potential two causes for poor oil pressure of our dry sump oil system under lateral/longitudinal accelerations, which were oil tank design or oil pan design. I had designed and tested a new oil tank and found it didn't solve the issue. When COVID-19 shut the shop down, I was no longer in charge of the oil system but I contributed ideas to the new dry sump oil pan design and wound up doing all the manufacturing, testing, and data analysis for the system. The oil system now functions reliably and provides good oil pressure.



Justin at the 2021 FSAE Michigan competition

What is your favorite memory from the team?

It's hard to pinpoint one favorite memory, but from my last year on the team, I would say the week leading up to competition was my favorite. It was great seeing the team working together like a well-oiled machine. I had a lot of fun since I was doing a little bit of everything. I was helping the aerodynamics team with the front wing, doing powertrain checklists and packing, running through mock-tech inspec-

tion, and getting the car ready for competition. Other honorable mentions include the night we tested the new oil pan and oil pressures were perfect, or working overnight with my friend Garrett and then driving to campus to watch the sunrise on top of a parking structure.



Justin at the wheel of Car 11

How did your experience as a member of Michigan State Formula Racing help shape your future?

It's given me great experiences that taught me valuable soft skills such as time management, project management, and problem solving that can be applied in life. I've also learned a lot of hard skills not taught in the classroom. My experiences on the team and challenges I had to overcome have also increased my self-confidence, both in my capabilities and who I am as a person. Lastly, I've gained amazing friends through the program that share many memories and experiences.



Justin guiding Calum during a testing day

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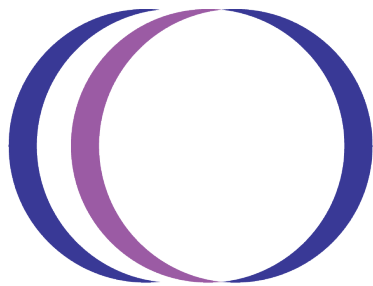
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COMPOSITES ONE®

Name: Composites One
Location: Schaumburg, Illinois

Based out of Schaumburg, Composites One aims to provide manufacturers with the products they need, helping them to learn new processes and serving them with people who know and understand their business. With products ranging from putty compounds to thermoplastic chopped strands, there is something for any composites application.

With more than 500 supplier partners and a broad supply chain network consisting of more than 30 distribution centers Composites One assists manufacturers with whatever the need may be whenever it may occur. The Composites One team specializes in helping customers evaluate their business and understanding new processes that result in better finished parts and productivity.

Thanks to the generosity and knowledge of Composites One, the team was provided with carbon composites. Additionally, they provided the resources for us to get into contact with their large supplier network, which enabled us to connect with additional sponsors.



Name: Ricardo
Location: Shoreham-by-Sea, United Kingdom

Tracing its history all the way back to 1915 and named after its founder Sir Harry Ricardo, Ricardo plc is a global strategic engineering and environmental consultancy company that specializes in the transport, energy, and scarce resources sectors.

With historic accomplishments and inventions such as the first British-designed mass-produced engine used in the Mark V tank, ahead of its time 1938 Alfa Romeo Tipo 162 3-liter 16-cylinder engine, the invention of viscous coupling, and many more innovations, Ricardo has tremendous amounts of industry knowledge in market fields ranging from motorsports to energy and environment.

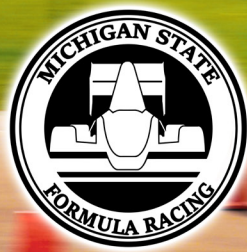
Alongside their physical products, Ricardo offers a range of software products in the fluid dynamics and structural mechanics fields. Ricardo has provided the team with one of their state-of-the-art 1D fluid dynamics simulation products – WAVE, which the powertrain system uses for the design and development of our intake and exhaust systems.

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