

# THE SPARTAN RACER

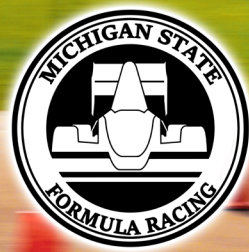
NOVEMBER 2021

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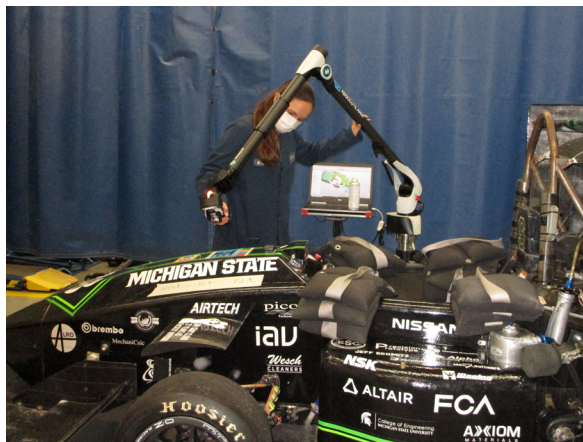
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## Static Vehicle Testing

As the weather continues to cool down and the leaves start to change, the on-track testing of car 38 is coming to a halt. However, the team was given the unique opportunity to use Ford's coordinate-measuring machine (CMM) for some static testing.

The CMM at Ford is able to measure the precise physical dimensions of an object. For the team, this was the car's suspension hardpoint coordinates. The vehicle was placed on a steel platform stage where the CMM's probe collected 3D data points from each spherical suspension ball joint. It then plotted and reconstructed the suspension hardpoints. The scanned model of the real car's points can be imported into CAD to see how accurately the car was built. This was excellent for the verification and quality inspection of our suspension and chassis/frame systems.



A ford technician uses the CMM machine to locate suspension hardpoints

After CMM analysis, all of the inboard and outboard control arm points were verified to be within a millimeter left to right. This confirmed that last year's manufac-

turing was precise and within tolerance. On top of that, the Ford technicians also complimented the team on how well the car was scaled.

## Manufacturing Begins

Though a lot of design work is still wrapping up, vehicle manufacturing has begun. One of the most drastic design changes from last year was the switch from a three-quarters monocoque to a half monocoque. As the monocoque is the largest and most complex part of the chassis, the manufacturing process presents a massive challenge for team leaders every design cycle. The team does not have the capabilities, nor the resources to manufacture the molds themselves, so it's imperative a plan is set so they can complete the car on time.

This year, Ford has generously agreed to support the team by machining the chassis molds. From gluing tooling boards together to perfecting the surface finish on the completed molds, this machining job is one of the hardest tasks every design cycle.



SR-20 on the steel platform stage

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**Name:** Olivia Reyes  
**Role:** Powertrain System Lead  
**Hometown:** Ann Arbor, MI  
**Major:** Mechanical Engineering  
**Class Standing:** Senior



## Why did you choose to join Michigan State Formula Racing?

As I've gotten to know myself, I've learned my passions circle equally around curiosity and competition. My first exposure to MSU Formula Racing was seeing the car at the Engineering Colloquium. I couldn't believe that students my age built that car to compete against hundreds of other teams. I went in with no previous automotive experience or interest, but within the first weeks, I was obsessed.

## What has been your favorite project that you've contributed to so far?

My favorite project was designing the exhaust manifold and the muffler for SR-20. During COVID, I spent a lot of time learning acoustic principles and applying them to the powertrain system using simulations. When it came time to compete, although I felt clever in my design for the muffler, I got a nice dose of humility when our car didn't pass sound. After I worked endlessly throughout that night, we were able to attenuate 6 decibels from our car and pass the sound test the following day. The difficulties that I overcame were rewarding in the end, but also proved to be important lessons.

## Do you have any professional work experience?

During the Spring of 2021, I had the opportunity to be an intern at Blue Origin's Rocket Factory in Cape Canaveral, Florida. There, I assisted in the production of Blue's New Glenn Rocket as a Manufacturing Engineer. I provided engineering support for three System Integration structural builds through nonconformance reporting, dispositioning, and resolving. I was also able to get certified to work on flight hardware and worked side-by-side with technicians on the second shift to drill, lift panels, assemble and repair components of the spacecraft.

**Name:** Ryleigh Turner  
**Role:** Structures & Mounting  
**Hometown:** Dearborn, MI  
**Major:** Mechanical Engineering  
**Class Standing:** Senior



## Why did you choose to join Michigan State Formula Racing?

My interest in cars was sparked from a young age, as both of my parents are engineers at Ford. Formula increased this interest, as it is an excellent way to learn the process of designing and building a car. Being able to apply the concepts that I'm studying in my classes also makes it an amazing opportunity to apply classroom principles to real-life vehicle manufacturing.

## What are you most excited about for this upcoming racing season?

Being able to finally be in person is definitely the most exciting thing. I am now able to actively assist in the design and manufacturing of the car. By also being with team members in-person, I am able to bounce design ideas off them and receive feedback.

## What is your favorite memory from your time on the team thus far?

Attending the Pittsburgh Shootout has been my favorite memory thus far. This was the first time I was able to participate in a competition and see the car drive competitively. It was interesting being able to talk to the other teams, learn more about their cars and the different ways that they were designed. Overall, the competition was a great team bonding experience and a great way to see the clear dedication each team put into their cars.

## What are your long-term career goals?

One of my goals is to be able to work in the automotive industry. Michigan State Formula Racing not only furthered my passion for cars but also furthered my knowledge of cars and provided me with hands-on experience. I would love to continue to develop these skills within the automotive workforce and be able to aid in the design and manufacturing of cars one day.



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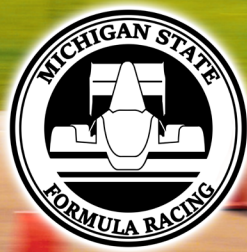


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**Name:** Jocelyn Modelski  
**Hometown:** Brighton, Michigan  
**Degree:** B.S. Applied Engineering (2017)  
**Years on the team:** 2011-2012  
**Roles:** Operations Team  
Chassis Team Member

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

My main contributions were regarding alumni and sponsor relations. I restarted the newsletter, reached out on LinkedIn to update our contacts, and had fun digging through the shop for photos of alumni to put on the website.



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

My time with the team fueled my passion for manufacturing, especially assisting with the carbon fiber layups and machining small parts. This enthusiasm for “hands-on” first shaped my degree, where I switched from Mechanical Engineering to something I hoped would take me away from a desk and out to the shop floor. Then, my career where my favorite roles have been working as a Manufacturing Engineer and then a Process Engineer. And of course, my habit of getting older vehicles that I have to keep fixing — like my 1994 Harley Sportster I just finished reassembling after fixing a starter issue (just in time for storage).

### What is your current professional role?

I am currently a mechanical engineer for Dematic where I design and commission conveyor systems globally within newly built fulfillment centers for portfolio customer Amazon.



### What is your favorite memory from the team?

The first time we got the car driving, we were out in the parking lot for hours until finally, we were successful in the early morning! Exhausted but giddy from the accomplishment, we all went to IHOP at 4 AM for my favorite meal as a team.



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Specialty Products

**Name:** Evonik Industries  
**Location:** Essen, Germany

Though Evonik does not manufacture tires, spark plugs, or brakes, their products can be found as a component in all of those things. Evonik has been a leader in specialty chemicals with the goal of working towards improving products for everyday needs. Evonik operates through five divisions shaped by sustainability, diversity, and innovation.

Reaching over 100 countries around the world, Evonik's capabilities go beyond chemistry to produce solutions for its customers. They have also based themselves off of the core value to strive everyday towards sustainability. By being an active member of the World Business Council for Sustainable Development they integrate the sustainable use of resources in many of their practices.

Evonik's donation of their Rohacell, a PMI-based structural foam, has benefited the team greatly. Rohacell foam is used as the inner core for the team's carbon fiber aerodynamic components. The team appreciates Evonik for their generous contribution to this year's aerodynamics package.

**Name:** McCausey Specialty Products  
**Location:** Roseville, MI

Specializing in prototyping and fixture materials and solid-sawn and laminated scaffold plank, McCausey has been a trusted partner of the team for years. As a fifth-generation owned and operated business located right in Michigan, their industry knowledge and material selection are unmatched. McCausey usually focuses on the industrial, commercial, automotive, aircraft, and aerospace industries, however, they continuously adapt to cater to new markets.

For over 30 years, they have prided themselves in being a preferred supplier of model and tooling material to many automotive and aircraft industries. McCausey offers a wide variety of composite tooling board materials, specifically designed for precise fixture fabrication.

This year, McCausey has supported the team by donating the necessary amount of tooling boards required to manufacture the new chassis molds. Without their generous donation, the team would not be able to hit this year's early completion target. Thank you, McCausey, for your continued support!



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