We’re back from the Michigan International Speedway! Long story short, we had a successful competition and took down some team records as we competed against some of the best teams in the world! Be sure to read about our journey, starting on page 2. What’s even better is we’ve finally made it off the waitlist for Formula West, so we’ll be heading to Nebraska in a few weeks! More details can be found on page 7!

**Overall** - 270.1 / 64th  
**Cost** - 93.4 / 2nd  
**Presentation** - 61.7 / 19th  
**Design** - 70 points  
**Autocross** - 44 / 66th  
**Endurance** - 1 lap

Designing, manufacturing, assembling, and testing Road Warrior 9 took a lot of work. Thankfully Lily had a great team completing the projects, in fact the largest in the program’s history! Click the YouTube link below to meet the hard working individuals that are making this season so successful!

https://youtu.be/QLIHzUQPD8M
Tech Inspection is always a twisting roller coaster of ups and downs. As a quick refresher, it consists of an equipment check, a full car tech inspection, fueling the car, tilt the vehicle, checking the noise, and testing the brakes. On the first day of competition we were 36th in the tech line and passed all the fun pre-tech checks with no issues. We were sent back to the paddock for minor fixes after the main tech inspection, and got our first sticker upon returning. To close out the first day we headed to scales to weigh Lily. We were excited to achieve one of our top goals; manufacturing a lighter car. Road Warrior 9 weighed in at 453, several pounds less than RW8. The team left MIS energized and excited, as going through full tech inspection with a first year car on the first day is not a common occurrence.

After the highs of yesterday, Thursday knocked the wind out of us. To start off, it’s a very challenging day. All three static events are scattered at different sites and times over the day, and two of them require the car to be present. That means you can’t work on the car for two blocks of time, which can really hinder progress as you wait in the tech lines. We started the day with the Design Presentation, a nerve wracking event where each design and manufacturing decision is put under a microscope by a panel of judges. Our Engineering Directors, Mo & Richard, began the presentation but unfortunately had to improvise as the judges stepped in and pushed to get right into each system. Regardless, the team captains began presenting and defending their subsystem designs. Feedback from our members varied dramatically on how the event went, but our team would worry about it after we got through the rest of tech.
We headed to fuel and Lily’s tank was filled to the brim with 100 Octane fuel. Our team kept an eye on our fuel level, as we had just installed a newer tank and there was still a little air to be worked out. Then we sat in the long line for the tilt test. Unfortunately we did not pass tilt on our first go due to clearance on one of the tires, but we received a variety of feedback from different judges saying we were just fine. Our team made some quick adjustments and waited in the long line again. We passed on the second time and quickly moved to the next inspection, noise.

Last year brakes rained on our parade. It was noise’s turn this year. The measuring scale used for noise changed in this SAE season, going from DBA to DBC. This caused a lot of problems for 4 cylinder engine teams, as this scale picks up and punishes the higher frequencies. To emphasize this point, our exhaust / muffler package did not vary too much from last year and we passed noise on the first time at Lincoln. After our first check Lily failed at 118, eight points above the acceptable range. This was not a hurdle our team anticipated but our Powertrain Division rallied and began brainstorming ideas. While that happened Lily rolled over to one of our favorite events: cost.

Kristina led the event with assistance from Richard. Even though they were rattled by the roadblock we just experienced at noise, they confidently presented the report to the judges. Our real case examples went over very well, and the pair did a great job of explaining how they would cut cost on certain components. Being one of the lowest cost cars at competition, we knew the judges would audit our report. Thankfully we were able to go through the process immediately after cost, letting us get back to the paddock for repairs. Kristy went through her flawless report, quickly showing the judge where all of the numbers and values came from.

When Lily made it back to the paddock the team was hard at work making adjustments to the muffler. Special thanks to Auburn’s Formula Team for helping us by welding parts of the muffler. At this point we had acquired a portable sound sensor and began running some preliminary tests. The results were not looking good, and the adjustments barely impacted the noise. Justin and Mo went back to the drawing board, and Niner and Krissy began preparing for marketing.
As the team worked on Lily’s exhaust, our Business Division headed to the MIS Suites for the last static event of the day. The marketing event did not start off the way we hoped, as the layout / size of the room could not accommodate a projector. Even though we made sure to bring everything we would need, there’s no way we could’ve prepared for that situation. So with a small slice of the screen showing our presentation, we began the event. Our hard work and practice showed, and it was noted by the judges. There was some unique questions asked at the end and a broad range of feedback provided. Niner and Krissy left the event a little nervous due to the screen and some of the questions, but the focus was definitely on how Lily was doing.

Back at the paddock the team was still working to make RW9 quiet. We exhausted the resources and materials we brought with us, and knew there was no way we could get through the rest of tech that afternoon. With no options left Mo, Richard, Justin, Asaa, Hunter, and Filippo headed back to our home shop to fabricate a solution. They worked through the night, and the program is grateful for that dedication.

Friday morning our team pulled Lily off the Penske and began installing the new muffler. It definitely was a little different than our design but we were confident it would get us through noise. Unfortunately the team that went back to the shop had no way of testing it, so when it was thrown on RW9 our car was still over the range. We made some quick adjustments, thanks to Lincoln Electric, and decided to bring it over to noise. Lily had a hard time starting up with this new muffler, as barely any air was able to push through the system. But once she did we went through the noise test and came in several units below the limit. Even though this new dual muffler was putting a strain on the engine we headed to brakes.

During the brake test not only did Lily refuse to start but the engine just couldn’t perform to get enough speed. But thankfully our brakes locked each time we ran the course, so it was just a matter of tinkering with the Powertrain. By this time we had already missed acceleration and skidpad, as those events are only open Friday morning. But after a few muffler adjustments and several changes to the engine calibration, Lily was able to get her fourth tech sticker and was cleared for dynamic events!
The team headed to the autocross track but with the engine running differently we wanted to put Lily through some test laps. In the practice area Mo drove her around to get a feel for the engine’s response and to make sure the muffler was functioning. Unfortunately after a few laps RW9’s wonderful dual muffler blew apart at the weld. All that air pressure took its toll on the area with the smallest diameter, and the weld failed. Immediately Lily lost her first tech sticker as she was now unsafe to drive.

We had two hours left until the track closed and were faced with the challenge to fix this muffler and to get checked in tech again. Niner, Justin, Filippo, and Krissy hustled back to the paddock to reinforce and re-weld the muffler. While that was being done the team tried out a custom muffler that was purchased as a back up earlier that day. That turned out being louder than our first attempt, but it was a good effort to keep moving forward.

By the time the car got back to tech Niner and Justin were waiting with the reinforced muffler. Hunter quickly fashioned a heat shield to the system and we once again had all four tech stickers.

With less than an hour left in the day we hauled Lily and the track cart back to the autocross course. Mo suited up for the first Warrior Racing autocross lap in the last 3 years. RW9’s engine still did not like exhausting through the muffler, but the car roared off the starting line. His two laps were in the low 60s, which took down the team’s previous record! Now that Lily was warmed up, Mike took over. He is our youngest driver but he’s got a lot of racing experience under his belt. It showed as he broke the team’s record again by finishing in 61.03 seconds! After this crazy day the team was exhilarated with finishing autocross.

There was another positive moment during the day today. Amidst the chaos Krissy and Niner found the results of the static events. We were happy to find out that we got 19th in Marketing, not breaking our record in points but definitely in terms of ranking. That didn’t compare to finding out that we got 2nd place in cost, definitely a huge record in our program’s history! Not only did we have one of the lowest costing cars we also had a perfect report to back it up!
Our team rested up for our final day at MIS. The only events on that day are endurance / fuel efficiency, which consists of a one shot race where if anything breaks you’re sent off the track. It rained for the majority of the morning, but that didn’t damper our spirits. Our team waited in line for the event, and the only scare of the day was our battery that didn’t seem to want to connect. Finally the time came. Mike and Mo suited up, while Ty and Niner pushed Lily into the racing pits. Mike would take the first 11 laps and he was given the signal to approach the starting line. His first lap was completed at a decent pace, one that would’ve conserved Lily’s fuel. But near the end of the second lap our chance to finish endurance ended with the sound of Lily’s muffler breaking apart again. Despite the reinforcements and the changes to the engine calibration, the system just could not handle the exhaust pressure. This caused us to be removed from the endurance race, ending our competition at MIS.

Overall we still had an extremely successful competition. It is to be noted that the teams that go to Michigan make the competition that much more intense, so finishing 64th overall is quite the feat. Especially since we did not compete in two dynamic events and only got one lap of endurance in. Second place in cost definitely helped us out and we’re confident that record will stand for years to come. Marketing helped out too with a top 15% finish. Design didn’t go as well as we’d hoped, but we learned some new things and brought home some points. And even though we broke our team record in autocrx we were still a little behind the competition, mainly due to the engine struggling with the muffler. Another proud moment for our program was begin able to take our whole team to a competition. There’s a lot of experience to be had and many teams don’t have the luxury to take more than a lean crew. But there’s more to gain, as we’re finally off the waitlist for Formula West! Please move to page 7 for additional details.

**Full results can be found at**

[students.sae.org/cds/formulaseries/fsae](students.sae.org/cds/formulaseries/fsae)
Where We Stand

We took down a lot of records at MIS, so let’s take a look at our new record board.

**Warrior Racing Team Records**

<table>
<thead>
<tr>
<th>Category</th>
<th>Overall</th>
<th>Design</th>
<th>Cost</th>
<th>Marketing</th>
<th>Acceleration</th>
<th>Skidpad</th>
<th>Autocross</th>
<th>Endurance</th>
<th>Fuel Economy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall</td>
<td>38th - 213.61 points</td>
<td>16th - 97 points</td>
<td>4th - $8928</td>
<td>17th - 66 points</td>
<td>59th - 5.243 seconds</td>
<td>51st - 5.887 seconds</td>
<td>62nd - 62.948 seconds</td>
<td>31st - 1903.7 seconds</td>
<td>31st - 1.423 gallons</td>
</tr>
</tbody>
</table>

270.1 points - 64th
93.36 points - 2nd
61.030 seconds - 66th

Honorable Mention - Marketing
19th out of 120 teams (top 15%) - 61.7 points

Next Stop, Lincoln Airpark!

Even though there’s a lot of experience and quality results to take away from Formula Michigan, our team is primed to knock Formula West out of the park. After what seemed like an eternity of being on the waitlist for the competition, Warrior Racing is now officially representing the number 102! At the Michigan International Speedway we performed exceptionally well in the static events and we’re confident that we can do that and a little more at Lincoln. We know the one thing that plagued our vehicle, and solutions have already been implemented on RW9 to eliminate that as a factor. Lily has been doing nothing but racing since competition, and we have yet to come across any other issues. We’re doing everything and then some to make sure that all we have to do is present and race at Formula West, and when we do that you can guarantee this season will shatter that record board. Wish us luck!
**Farewell Warrior Racers!**

The end of competition also meant the end of several members’ time on our team. Asaa Harajli, Mateus Boas, and Alex Delfim have sadly had to go separate ways due to academic and work related reasons. Asaa Harajli was a member of the Power 10, the ten individuals who returned from the previous season and designed our record breaker Lily. He held the responsibilities of the cooling captain and near the end of his time began delving into the business side of the program. As he finishes his final classes of his undergraduate he will still be around to loan his manufacturing skills in the development of the next Road Warrior. His infectious smile and unbreakable positive attitude will be missed, but we’re grateful he was with us for the past two years.

Alex and Mateus were exchange students from Brazil and joined Warrior Racing early this year. They worked with Pratik on starting assignments in the brakes subsystem with the guidance of its captain, Ty. Over the season the brakes team became an efficient group of members, constantly manufacturing and testing the system. We’re happy that Alex and Mateus were able to join us at MIS before they moved to different states for academic opportunities. They will be missed, and the brakes team will never be the same. But rumor has it that if you say “its time to bleed the brakes!” three times Alex and Mateus will appear in the shop waiting with shop towels and a bottle of brake fluid.

**The Café Takes Down Another Record!**

We set a whole bunch of goals in the beginning of the season, one of which was a fundraising amount for the café. After about a year we’re extremely proud to say we exceeded that amount! A few quick stats on how we got there:

- 3500 cans of pop (not including tea, coffee, water, or Gatorade)
- 550 Arnold Palmers
- 700 hot pockets
- 500 bosco sticks
- infinite number of poptarts
Huge thanks to our sponsor Cammand Machining for rapidly fabricating replacement wheel centers! Their quick turn around allowed Lily to run at competition!

Our team looked sharp at MIS thanks to the support of EmbroidME! Once again they came through with some excellent competition polos!
Warrior Racing would like to thank Great Lakes Metal Finishing for hard anodizing our suspension components! They look sharp of Lily!

Thank you Reger Manufacturing Company for machining our replacement rotors for Road Warrior 9! They’re still in the process of being fabricated, but our Brakes team is excited to test them on RW9!
Warrior Racing would like to thank Moto—Heaven / Hel Performance for providing our team with soft lines for our brake system. You can't see them too well in the picture, but that's because they've been installed and working perfectly in RW-9!

We weren't the only ones who had a big event this past month! One of the team's we sponsor and support, Just Walk It, just had their Relay for Life a couple of weeks ago. We're thankful for all of the help we receive, but we're glad we can give back to awesome organizations like this!
Our team’s success is made possible through the generous donations and support from the following companies. Without them our team would not have the resources needed to provide invaluable hands on experience and to manufacture our formula cars. From all members of our team, thank you Warrior Racing sponsors!
Wayne State

Woodward

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Andrew Murrell
Sanket Sirpotdar
Jim Vito
Angela Childrey
The Niner Family
Dave Chegash

Contact Information & Media Sites

5050 Anthony Wayne Drive
Suite 1530
Detroit, MI 48202
Office Phone - 313.577.3829
Website - lsae.eng.wayne.edu
Facebook - facebook.com/WSUWarriorRacing
YouTube - youtube.com/wsuwarriorracing
President Kristina Vujic
kvujic@wayne.edu
Business Director Adam Niner
adam.niner@wayne.edu