Looking Back as We Drive Forward

Warrior Racing is as busy as ever. Final exams are right around the corner. The design freeze deadline approaches. And the holiday madness has begun. In times like these its great to be able to take a step back and reflect on the past. What got us to this point? Where did we learn all these new things? Thankfully we’ve got a great new video to remind us of our program and our 2013-2014 season. We also know everyone’s been craving to see footage of our past car in action. So click the YouTube button or follow the link below to watch the video on our channel. Special thanks to all of our 2013 - 2014 sponsors and supporters!

http://youtu.be/s0ZLqLMsLd0

Warrior Racing would like to wish everyone the best of luck on their upcoming final exams and projects! Congrats to all those graduating this semester! And since its right around the corner, Merry Christmas and a Happy New Year! Safe travels everyone!
Deadlines Are Approaching!
The end of the year is rapidly approaching and nobody is busier than Warrior Racing right now… except for maybe Santa Claus. The Warrior Racing team has been competing with time to beat design freeze deadlines, so that they can get ready to begin the manufacturing phase this month! The entire team has been working hard but I wanted to focus on a few of the Chassis team captains for this interview.
Unable to physically sit down with Richard Le Page, Mahesh Umasankar and Brandon Horsch, the captains of the frame, suspension and ergonomics team, respectively, due to their busy schedules, I had to settle for an over email discussion. I had a few questions to ask them, a few questions that were burning in the minds of everyone who was counting on these gentlemen to perform this season. Here are their answers to those questions:

Q: Is there anything you would have changed or have liked to done, if you had more time available?
Richard: I would have liked to have more time testing components on our previous car. We have learned so much from driving our car over the last few months. Without this test time, we would have not made the progress that we have made so far. If we were able to have the car fully functioning right after our last competition in Lincoln, NE, we could have looked into more details, had more time to perform tests on certain components, and we could have made a lot more progress on our engine tune.
Mahesh: There are a few things that I would like to have done differently. First, I wish that I could have spent more time focusing on having as much adjustability in the suspension as possible. Much of my time was spent on the actual suspension geometry, so I could not add as much adjustability as I would have liked with the time that I had. Secondly, I wish I could have spent more time on the making sure the anti-roll bars were designed optimally; time was more spent on the wishbone geometry.
Brandon: If time hadn't been so constrained, I would have liked to develop an open rear end frame. A primary goal this year is to save weight, and the kind of frame I want to use has no frame members behind the rear engine mounts, instead using the engine as a mount for the drivetrain and having the suspension come forward in a "delta wing" formation. This cuts 8 tubes out of the frame completely and reduces the length of 2 more. We could easily shed 10% of the frame's weight with this method, but would have to design an entirely new suspension from the ground up.
Q: What were you able to accomplish during the time leading up to the design freeze?

Richard: I have been able to greatly improve my leadership of the Chassis team, over the last few months. Working more efficiently with my team, allowed us to make a lot of progress in our designs than previous years. Improving the Chassis team’s efficiency was definitely a challenge. As an Engineering Director, I had to spread my time over four other subsystems, work, and classes.

Mahesh: I was able to accomplish an optimal steering geometry design, and good rear and front wishbone geometry. I was also able to optimize our bell crank push rod suspension shock geometry.

Brandon: I was able to develop a frame which accommodates a taller driver than before, allows easier driver egress, improves packaging for suspension and induction subsystems, and is nearly twice as stiff as last year's frame, all while shedding 1 pound of weight.

Q: What can be improved upon to get the design done sooner for next season?

Richard: With the testing we have performed and where our car is currently, we can hop right out of the gate testing next spring. This will allow us to better test components and tune our driving skills. With these tests next year, I see no reason why Warrior Racing cannot be in with the top teams at competition.

Mahesh: A large portion of the initial months of the design process, were focused on research and learning. It took some time to get comfortable using Optimum K (suspension kinematics software) and some time was spent developing tools in excel to calculate geometry and force relations. Next year, these tools will already be there for me to work with, and I will not have to develop them from scratch. Also, we will have more experience driving the car to find out what exactly we need for good handling characteristics as it relates to the suspension.

Brandon: Having a clearly designed suspension 100% ready before beginning frame design would really help. Every time suspension changes, I have to make a matching adjustment to the frame, which prevents me from advancing as quickly as I would like and leads to the frame having a ridiculous quantity of revisions.
**Formula SAE Warrior Racing Members**
The following individuals have completed a series of introductory assignments and actively participated in the program, resulting in full time membership with Warrior Racing.

**Jesse Dye**  
*Powertrain - Induction*
Jesse is a Mechanical Engineering student and a member of the Induction team. He started out studying the intake, learning about what went right and wrong with our previous design. After he earned his full time membership, his focus shifted to the exhaust system. Moving forward, he has the responsibility of investigating the condition of past systems and ensuring they’re ready to run.

**Ashura Molla**  
*Powertrain - Electrical*
Ashura is studying Biomedical Engineering but came to Warrior Racing with an interest in the Electrical subsystem. She learned the basic techniques required to manufacture a wiring system. To earn her full time membership, she worked with other subsystem members to fabricate a wiring harness. Looking ahead, she’s ready to update the harnesses on the entire WR fleet.

**Abdulmajid Fayed**  
*Powertrain - Electrical*
Abdul is an Electrical Engineering student who joined Warrior Racing to gain a better understanding of the discipline. He worked on wiring harnesses, gaining an understanding of how all of the components interact with one another. As a full time electrical member, Abdul will be working with other subsystem members to fabricate new harnesses and learning to control the ECUs.

**Pranav Sridhar**  
*Chassis - Frame*
Pranav is pursuing his Masters in Mechanical Engineering. He took an interest in the frame design for each of the team’s cars. By analyzing the CAD models he researched and discovered new strengths and weaknesses under different conditions. Pranav is now focusing on creating fixed body panels to provide additional support to the frame, a brand new concept for Warrior Racing.
**Fabio Keuffer Mendonca**  
*Powertrain - Induction*

Fabio is a Mechanical Engineering student from Brazil, and during his time with Warrior Racing he will be working with the Induction team. His focus is the exhaust system. Through his introductory assignments he learned about all of the components and manufacturing techniques required to fabricate an exhaust. Now he is working on creating a carbon fiber muffler.

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**Filippo Caro**  
*Business - Resources*

Filippo is studying Electrical Engineering and has spent a fair share of his time in a shop. When he joined Warrior Racing, his skills helped all of our team members with safe manufacturing techniques. Currently he is working on optimizing our shop layout to increase our efficiency in the coming semester. Then Filippo will join the Powertrain Division, ready to focus on new designs.

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**Lisa Thomas**  
*Chassis - Suspension*

Lisa is pursuing her degree in Mechanical Engineering and is also a member of WSU’s tennis team. She started her membership with Warrior Racing by working on the Suspension subsystem. Lisa focused on the bellcranks, a critical component of the Road Warrior suspension. She is now expanding her understanding of the suspension system and starting her research on the dampers.

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**Brent Bode**  
*Powertrain - Electrical*

Brent is an Electrical Engineering student who’s no stranger to automotive systems. His primary project was to design a wiring system to communicate with the engine to measure RPM. He also branched into other subsystems, lending a hand where he could. As a full time member Brent will be optimizing the RPM measuring system and incorporating it into the WR fleet.
**Madeline Betterly**  
**Business - Resources**  
Madeline is a Biomedical Eng. student who decided to give the business side of the program a try. She has done a great job promoting the team’s events through flyers and media, and is working on some organization content for the team. In addition Madeline has done a great job approaching sponsors, working with Fowler High Precision Tools and making them a part of Warrior Racing.

**Muhammed Miftari**  
**Powertrain - Induction**  
Muhammed is studying Mechanical engineering and he is the most recent addition to the Induction team. His responsibilities covered the last major component of the system; the fuel tank. Through his assignments of investigating previous models, he now has an understanding of how a fuel system works and will carry that experience into future projects.

**Michael Nona**  
**Chassis - Suspension**  
Michael Nona is pursuing his degree in Mechanical Engineering and took on projects for the suspension system to earn his membership. With the guidance of the Suspension Captain he was able to complete his research on various components of the system. Now he aims to learn all of the manufacturing techniques required to take a suspension design and make it a reality.
First, thanks to Justin Bekker who took some of his time to answer few questions about the SAE chapter. Justin decided to join this new adventure of the SAE chapter because he believes he can bring new ideas and interesting events to provide networking opportunities for all students part of the chapter. It is also a chance for him to expand what he is doing outside from engineering.

The SAE chapter was founded around the same time as the SAE Baja program. Warrior Racing then carried on the responsibilities of the chapter once the Baja program concluded. Recently a Formula Hybrid program formed in the College of Engineering and it became important to create a SAE chapter that would be detached from a singular collegiate team. That is how the recent SAE Chapter of Wayne State University was created, and it will be led by Justin Bekker, Tirath Matharu, Asaa Harajli, Rachel Berlin-Allaire, and Abhijeet Govind.

The goal of the SAE chapter is to promote scientific learning as well as professional development among the members. During the next year, the members of the chapter will devote their time to plan networking events to connect members with different companies within the industry. They have already organized a social event on campus to have all the members mingle and get to know one another.

The chapter is really focusing on getting all SAE members engaged with the great opportunities SAE International has to offer. Next semester, the SAE international will offer a lecture series. The chapter will be bringing down some speakers to talk about more technical topics within the engineering field. Interested in joining SAE International? Email justin.bekker@wayne.edu to learn more!

Left to Right: Rachel Berlin-Allaire - Vice President, Justin Bekker - President, Tirath Matharu - Secretary, Asaa Harjali - Treasurer (not pictured Abijeet Govind - Program Chair)
**Warrior Racing Takes Silver**

SAE International recognizes student chapters for their commitment to managing a collegiate chapter program. They look at a team’s ability to manage finances, organize events, demonstrate leadership, and promote communications. A few weeks ago at the SAE Kick-Off event, Warrior Racing accepted the Silver Award for the past 2013 - 2014 season! Heading into our next seasons, Warrior Racing is excited to continue the success with the expanding SAE International WSU Chapter. We’re pulling all the stops and going for Gold this year!

**Kart 2 Kart Christmas Party**
December 28th at 5:00
Plenty of food, racing, and raffles.
Price - $20
RSVP by 12/17/14
Email adam.niner@wayne.edu to RSVP / learn more.

**Valentines Day Bake Sale**
February 11th in CoE lobby
12:00 - 4:00
Featuring Warrior Racing’s legendary Apple Pie along with other seasonal favorites.
Plenty of awesome raffle prizes!

**Engineering Alumni**
During the past month Warrior Racing had the opportunity to show our college’s alumni what we’ve been up to over the past year. We had a great time sharing our stories and listening to theirs. It was awesome to hear about all the other projects our fellow teams were working on and the new programs that are about to start. Special thanks to the Engineering Alumni Association for putting on the event and supporting us!

**Formula Michigan**
May 11th - May 16th
Michigan International Speedway
Brooklyn, MI
Over 100 teams registered!
Warrior Racing will be representing the number 95!
3M has shown their generous support to Warrior Racing by providing us with a wide range of tools, products, and resources. They’ve provided us with high performance tape, industrial cleaners, electrical tools, a wide variety of safety equipment, and much more! Thanks 3M!

3m.com
Fowler provided Warrior Racing with a vast assortment of measuring tools and devices. Our team is excited to put them to use as we work on our projects and manufacture the next Road Warrior!

Fowlerprecision.com

Thanks to our new sponsor IMCO Carbine Tool Inc. for donating quite a few end mills and drill bits for our manufacturing processes. These high quality components will serve the team for years to come!

Imcousa.com

Thanks to our new sponsor Inspire for providing our team with solidThinking software. It has already added value to our designs and has allowed up to validate tricky components.

Solidthinking.com
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!

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