The above picture is the 2014 car it will be the 19th car produced by Cyclone Racing. It is similar to our last car, CR-18, in many respects with most changes made to fix problems we encountered last summer at competition and to further reduce manufacturing time or complexity. I believe the car assembly in Solidworks is the most complete our team has ever produced, everything down to the wiring and plumbing is modeled. We utilized the relatively new electrical and tubing routing add-ins to accomplish this with ease. The car should see an overall weight loss of approximately 20 lbs bringing us down to a dry weight of 389 lbs.

Derek Peters
Senior |Mechanical Engineering |Technical and Project Director

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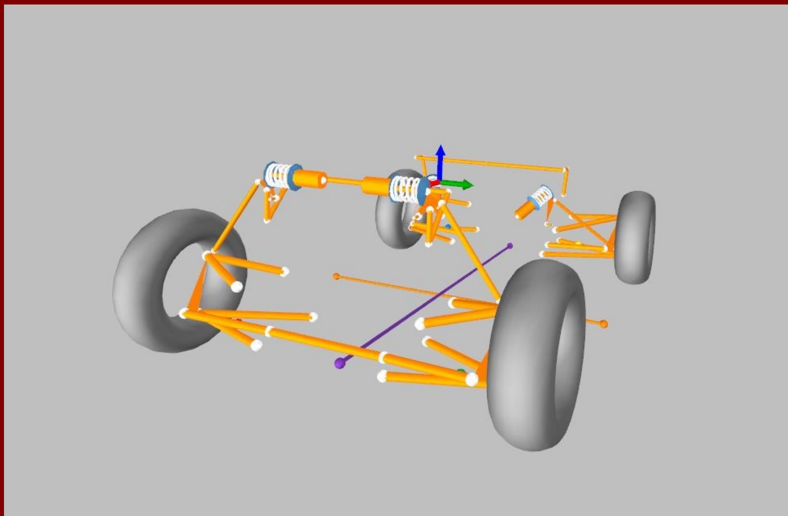


Optimum Kinematics Visualization

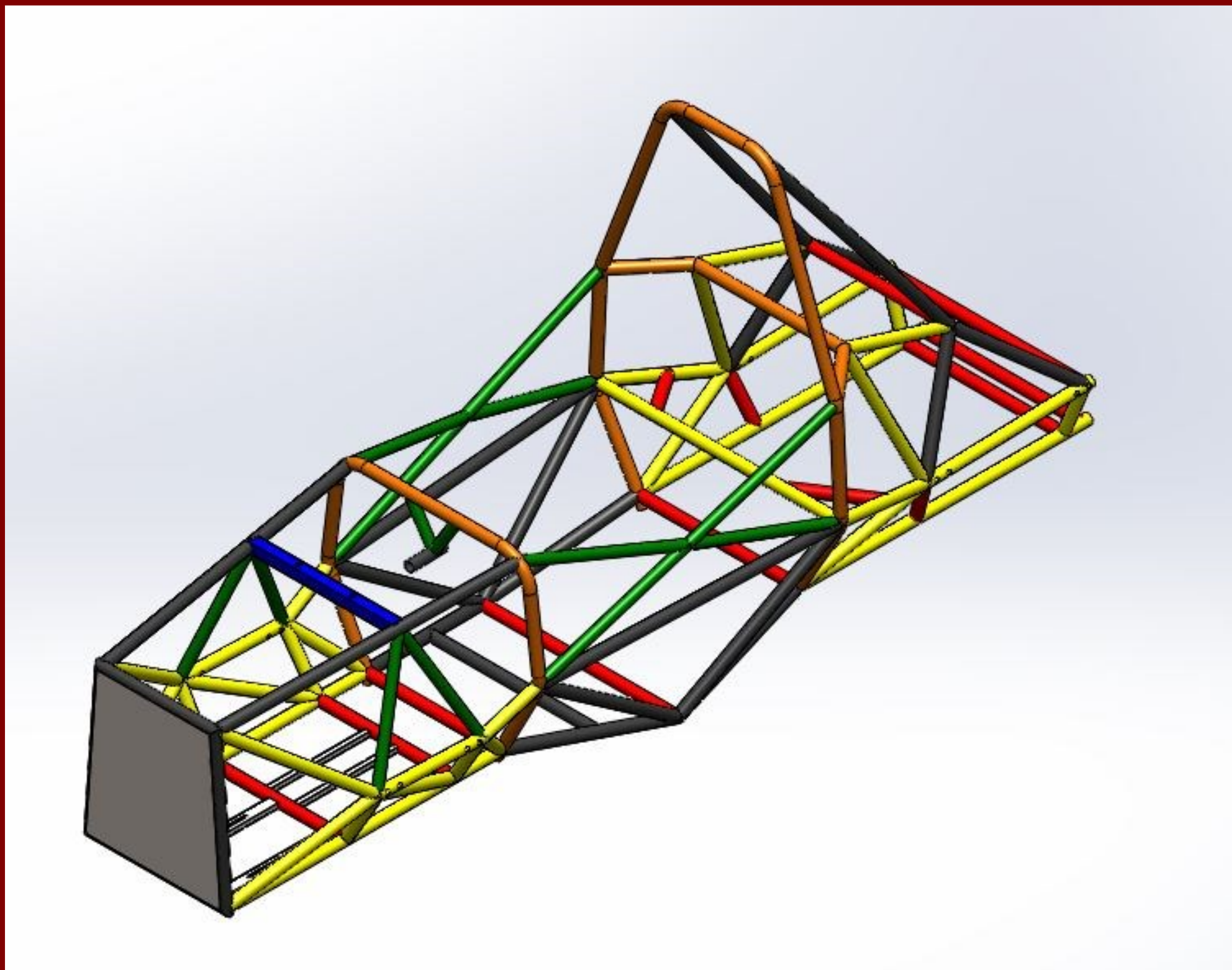
The goal of vehicle dynamics design for CR-19 is to further develop the platform that was designed last year. This year we are using some new software to further analyze the parameters of the vehicle. Some of the results of this include: moving from a 45% to a 48% front weight distribution, revised suspension kinematics, and improved the anti-Ackermann steering. The car will continue to use the 10” Hoosier LC0 tire front and rear. For damping, we have decided to use pushrod-actuated Ohlin’s dampers. They are centrally mounted for ease of adjustment. These parameters will provide a responsive, balanced, easy to drive, and even faster race car.

Chris Harrison
Sophomore | Mechanical Engineering | Vehicle Dynamics/ Suspension Team

Alex Nowysz
Senior | Mechanical Engineering | Vehicle Dynamics/Suspension Team Leader

Suspension components will continue to be produced from machined aluminum. The reduced KPI (king pin inclination) from the vehicle dynamics team allowed for spherical bearings to be used to replace the ball joints in the uprights. Spherical bearings will eliminate a number of team made parts with one purchased part, making the uprights easier to manufacture and take less time. The biggest change was in the uprights to allow the much larger bearings necessary to run the tripod joints inside the hubs. Overall these changes should help obtain our goals of reducing weight and manufacturing time.

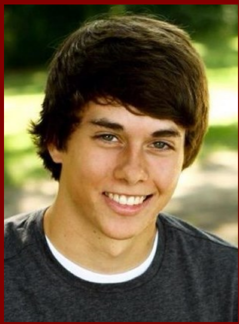
Front Suspension Assembly



Chassis SolidWorks Model

Our chassis this year will look to build upon the successes of last year. Major goals for this year were to more efficiently package all of our components along with our driver. Driver comfort for different sized people as well as rule clearances were a big emphasis. We also wanted to shed weight and eliminate all bonded panels from the design. With a huge help in supplying material and laser cutting our tubes, we owe a big thanks to State Steel and Kooima Company, respectively. We could not do it without such amazing help!

Mike Hauptmann
Sophomore | Mechanical Engineering |
Chassis Team Leader



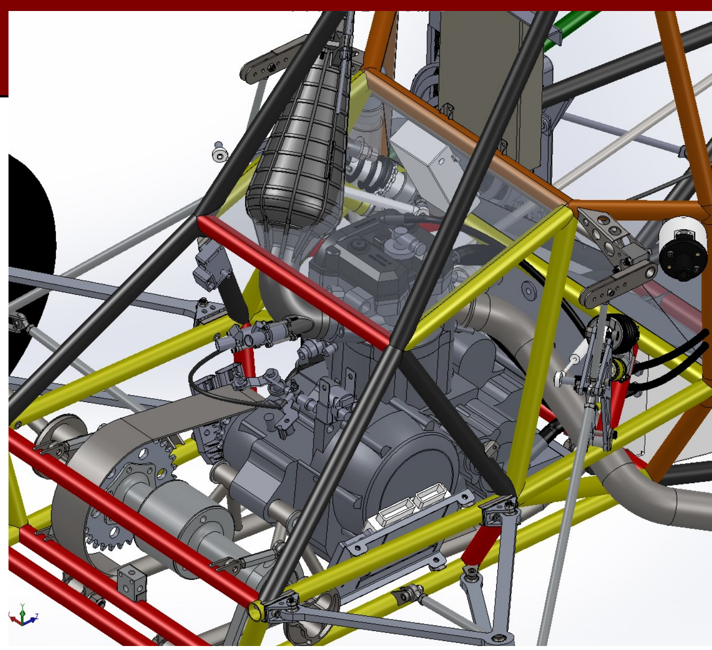
Patrick Kalgren
Sophomore | Mechanical Engineering | Engine Intake Design

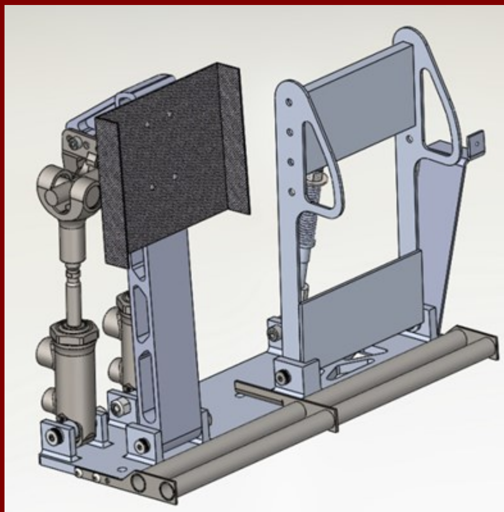
The major change to the intake is that it will be 3D printed from Ultem 9085. The Ultem 9085 material will be able to stand up to the pressures associated with an internal combustion engine intake better than ABS plastic. Because it will be 3D printed, it will reduce manufacturing and assembly time. The goal was to make the whole intake one part to avoid having to fasten or weld multiple parts together like in past years. For example, we were able to add a throttle cable holder directly to the side of the intake. We were also able to make geometry that would be nearly impossible to manufacture using normal machining techniques. The printed geometry is also a near perfect match to the CAD model meaning our CFD (computational fluid dynamics) analysis will closely match the real product.

Intake Model

Greg Bott
Senior | Mechanical Engineering | Powertrain System Director

The engine is being switched from 93 octane gas to E85. E85 provides a host of benefits for use in our competition. The increased octane allows us to run a higher compression ratio: 13.0:1 versus 11.6:1. Ethanol also possesses an evaporative cooling effect when it expands, cooling intake temperatures. This is especially useful for future applications that could include a turbocharger. However, more fuel is required per combustion event versus gasoline. This requires a complete retune of the engine mapping, which will be completed on our new engine dynamometer.





Pedal Tray Assembly

One of the goals of the controls team has been to make the systems lighter, simpler and more reliable than in immediately previous years. A complaint from the drivers of CR-17 and CR-18 was that the shifting felt mushy due to the push/pull cable shifting setup, this is being remedied for CR-19 by implementing a solid linkage shifter, similar to CR-16. Driver input and results of ergonomics testing were incorporated in the design of the pedals and steering wheel grips. We once again utilized 3D printing to create the grip profiles as it results in a tough and light grip.

Steering Wheel

Jason Labbe
Senior | Materials Engineering |Controls Team Leader

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