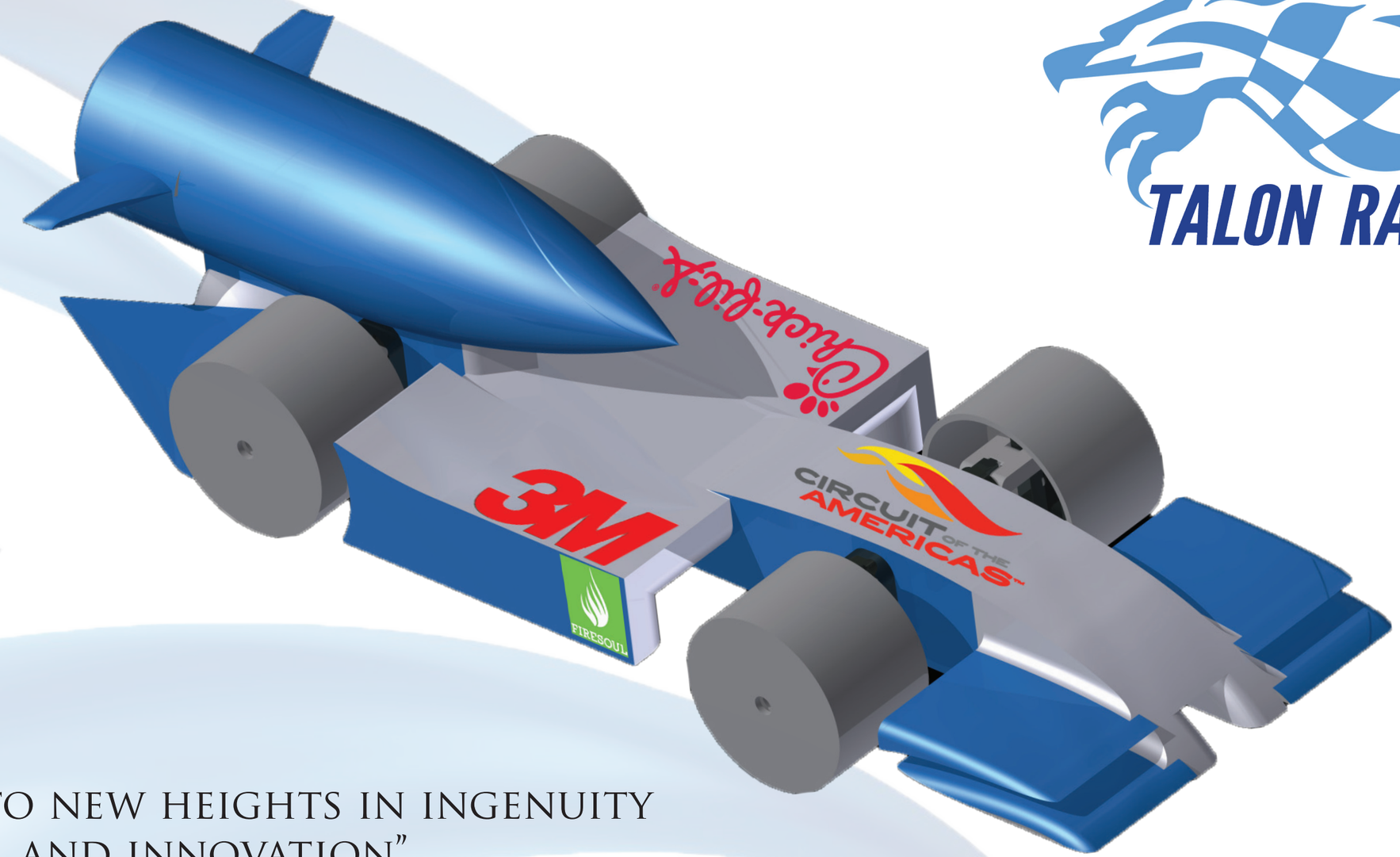
TALON RACING



"SOARING TO NEW HEIGHTS IN INGENUITY AND INNOVATION"

3M

CIRCUIT OF THE AMERICAS

DIXIE TOOL

Hoosier

KENT USA

STEMCompass

IBM

Taylor

RPM

REED PROTOTYPE & MODELING

FIRESOUL

Chick-fil-A

TEXAS WELDING SUPPLY

Snap-on

shi

ESPN

WADDELL WELDING

ALUMINUM • STAINLESS

(512) 961-0590

ASME

CENTRAL TEXAS SECTION

Table of Contents

Team Identity

Meet the team

Hannah Holder Senior
Project manager

"My Career path has shifted since F1 in schools. Before I wanted to be a roboticist. Now I want to be a race engineer for a Formula One team."

Hannah Kerns Senior
Graphic Designer

"I was extremely nervous to start F1 in schools because its outside of my skill set, but I adapted to it quickly. It helped me gain experience in Photoshop, illustrator and InDesign. This along with my schools newspaper has helped me decide that I will continue to do graphic design work in college."

Kayley Green-Tooney
Design Engineer-Pit display

"Building the pit display exercised material sciences and conducting research. F1 has helped start a path down the road for college. All of the skills I am learning now will benefit me later on in life."

James Garcia Junior
Manufacturing Engineer

"The time that I have spent on this F1 Team has been a phenomenal experience since it has not only allowed me to travel to various places but also allowing me to make friends and connections from various places around the world. I plan on furthering my education at a University to study in Mechanical Engineering and possibly Manufacturing Engineering."

Peter Glass Junior
Design Engineer- Race car

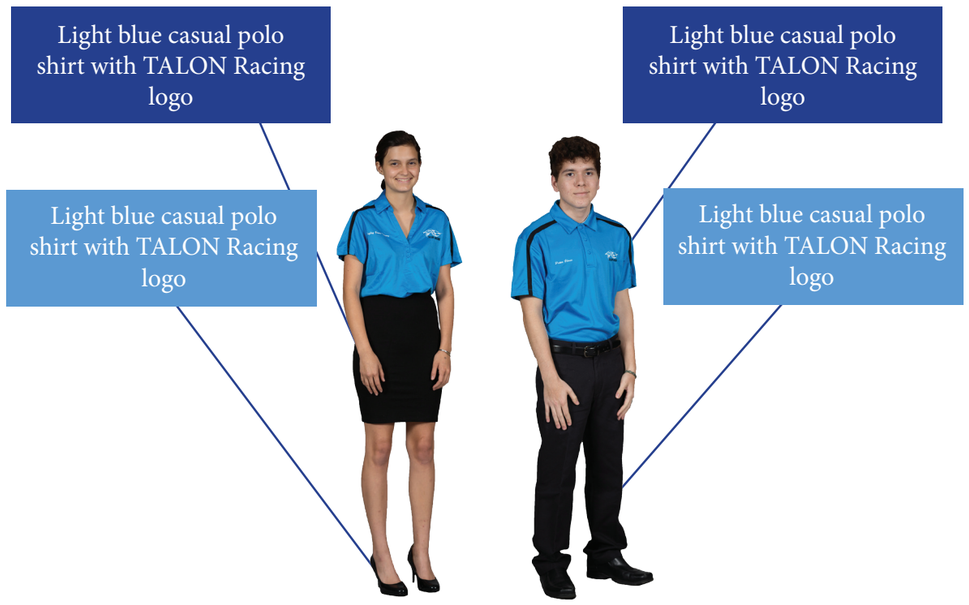
"Being on the F1 team has been an amazing experience and has taught me many useful skills that will be beneficial in my future career. I have learned the ins and outs of the process that goes into designing and making a product by a certain dead line which are skills I did not have prior."

Jose Claris Senior
Marketing Manager

"It's given me a whole new quality of experience working with a dedicated team that understands what it is to be a part of something competitive as F1. After high school I will be attending college to major in Computer Science. I would like to someday work for the government as system security administrator."

Team Uniforms

The uniform consists of a light blue casual polo shirt with our 2015 TALON Racing logo, a white button-down dress shirt with our 2015 TR Racing logo and a pit crew style racing jacket displaying stitched logos of our TR sponsors and academy business/community partners emulating a professional F1 pit crew.



Pit crew style racing jacket. Multiple sponsor logos are displayed.

Pit Display

Peter glass works on part of the pit display

Our finished pit display

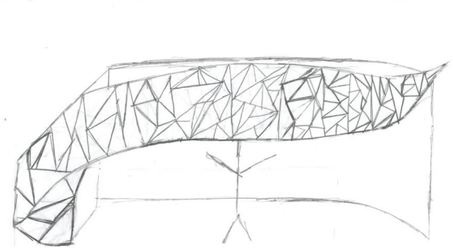
Design process

We Developed our idea off of the ability of going to worlds in Singapore. Building a square display was not in the book for this year and we decided to go after a more sleek, air flowing, design that resembled a Ferrari lounge in Singapore.

After developing a full design we had to choose the type of plastic; polycarbonate and acrylics. What we decided was a clear and clean look. Then we designed another pit display after the Marina Bay Stands after giving the whole team a chance to vote on what would best suit our image. After choosing the first design, we talked to the programer and looked at the material properties of the plastics. We then made a list of things we had to incorporate to make a more definite change.

Through research we decided to make an outline cage of our logo to prevent mishaps and to make it easier to ship and build.

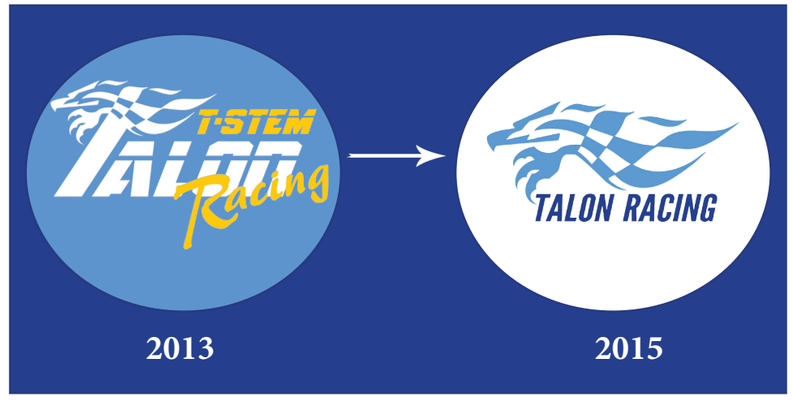
Sketches



Logo History

Rivercity, a TALON Racing sponsor, created the TR logo with input from our team. Three different logos, each getting progressively better, sleeker, and more professional illustrates our commitment to blend our school identity with our pursuit of velocity and victory.

The only consistent element of Formula 1 is evolution. This is evident in the emphasis we have placed on the team logo rather than the name, producing a more polished look.



Team Management

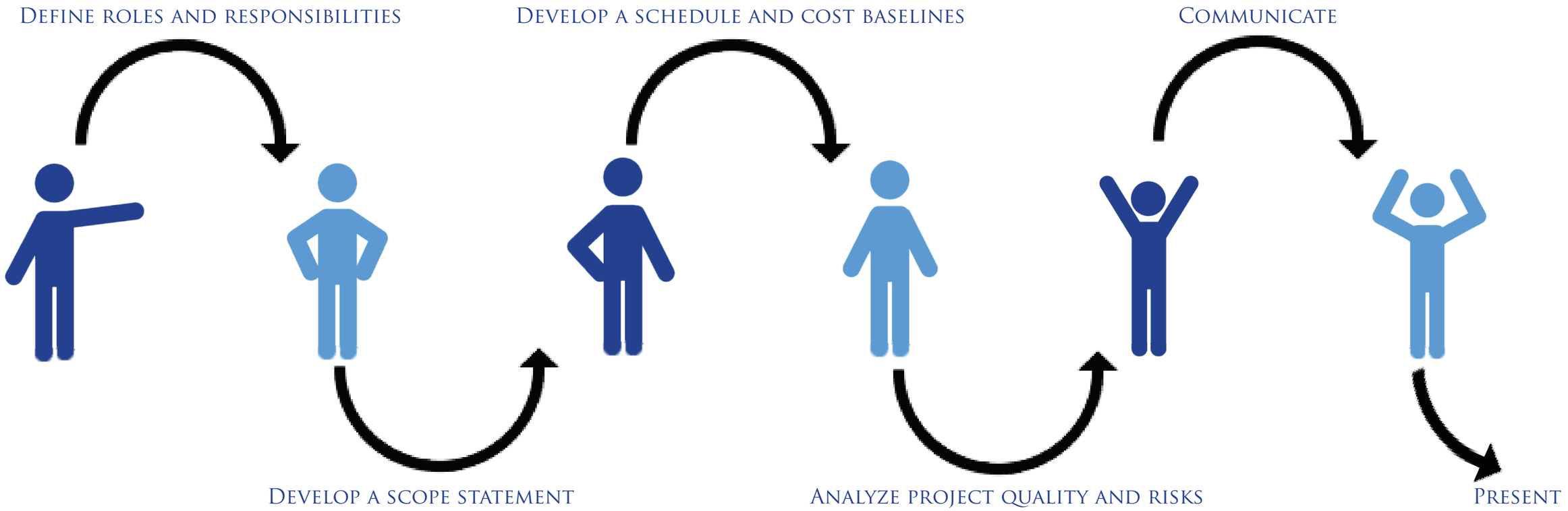
- Defining roles and responsibilities is an essential first step to maintain what each team member does. Each member should have separate goals and personal deadlines set to utilize their time wisely.
- After this first step is taken, a scope statement should be developed. Group goals should be listed here along with what the project will be.
- Deadlines are necessary to help the team work together efficiently. Cost baselines layout what types of materials and equipment will be available.
- Each team member must go over F1 guidelines to create the best presentation, car, pit display and portfolio possible.
- Communication is very important when working with tight deadlines and various components.
- Presentation is the last and final step. After utilizing all of these steps, you must present your final product.

Communication

TALON Racing team members utilize calendars, cellphones, E-Mail, Facetime, Google Chat, Facebook and text messaging to work effectively and efficiently.

Team Meetings

Mondays, Tuesdays, Wednesdays, and Fridays:
4:30-10:30
Saturdays and Sundays
1:00-11:00



Marketing

Sponsorship Process

TALON Racing secures sponsorships beginning with the Texas Regional at the Circuit of the Americas in Austin, Tx through the Nationals competition by sending out e-mail explaining who we are and what we are doing to local Austin Businesses. Once we have received a response, we set up a meeting or a phone call to explain more in depth what TALON Racing is really all about. If all goes well, then we have a new sponsor that will help us fund our team or provide "In-Kind" donations. In conclusion, we are able to secure these sponsorships by being determined to showcase our work and promote our efforts to become National Champions at the U.S. "F1 in Schools" Technology Challenge National Championship.

Promotion

The Eagles Eye, our high school paper, has printed multiple stories covering our regional to national competitions. This coverage helps get our teams name and accomplishments out for everyone in the school and their families to see.

Twitter:

@Wcatstem
We use twitter to reach out to parents and students to get the community more involved with our work.

To Whom it May Concern:

THE FORMULA ONE TECHNOLOGY CHALLENGE IN SCHOOLS

We are contacting you regarding a unique sponsorship opportunity for your company.

My name is Erwin Neira, Project Manager for the W. Charles Akins H.S. T-STEM "F1 in Schools" *TALON Racing* of Austin, TX. *TALON Racing* after winning 2nd place and the "Best Engineered Car" Award at the 2014 *"F1 in Schools"* Texas Regional, is, currently, preparing to participate in the 2015 SAE/Formula *"F1 in Schools" Technology Challenge* Texas Regional at Circuit of the Americas on Saturday, January 17, 2015.

The *"F1 in Schools" Technology Challenge* is an educational initiative aimed to help change perceptions of Science, Technology, Engineering and Mathematics (STEM) by creating a fun and exciting learning environment for young people to develop an informed view about careers in Engineering, Science, Marketing and Technology. Teams from 19 countries comprised of students ages 9 to 19 will compete in several phases of the not-for-profit multi-disciplinary challenge. Students work for months with the most advanced CAD/CAM software and high-tech machining tools to design, analyze, manufacture and test a miniature CO2 powered balsa wood F1 model car.

The members *of TALON Racing* would like to invite YOUR COMPANY OR ORGANIZATION to be a supporting sponsor of this year's *"F1 in Schools" Technology Challenge* Champion. The members of the winning team at each season's World Finals, like the 2014 winners in Abu Dhabi this November, 2014, will be granted full scholarships to the prestigious Automotive Engineering School at City College in London. We offer several sponsorship packages that include various levels of exposure on all of our *TALON Racing* and *TALON Racing Formula SAE Autocross* marketing materials including web banners on our homepage, logo patches on our team jackets and more. Below is a detailed chart of the various package offerings:

	Bronze Sponsor ($25.00-$100.00)	Silver Silver ($100.00-$250.00)	Gold Sponsor ($250.00-$500.00)	Platinum Sponsor ($500.00-$1,000.00)	Titanium Sponsor ($1,000.00 +)
TALON Racing Website	X	X	X	X	X
TALON Racing Portfolio	X	X	X	X	X
TALON Racing Presentation		X	X	X	X
TALON Racing Pit Display		X	X	X	X
TALON Racing Uniforms			X	X	X
TALON Racing's "F1 in Schools" Nationals Car					X

On behalf of the students of the *TALON Racing* Team, I thank you for your consideration in support of our efforts in this year's *"F1 in Schools" Technology Challenge.*

Please contact our *"F1 in Schools" Technology Challenge* Project Mentor for more information.
Mr. Juan M. Gonzalez
W. Charles Akins H.S. Assistant Principal
(512) 841-9916 (Office)
(512) 912 6775 (Mobile)
jmgonzal@austinisd.org
www.wcharlesakinshst-stemacademy.com

Respectfully,Erwin Neira, Project Manager

STEMCompass 2014 Platinum Sponsor
Google 2013 Platinum Sponsor
FIRE & SOUL 2014 Titanium Sponsor
Chick-fil-A 2014 Titanium Sponsor
CIRCUIT OF THE AMERICAS 2013 and 2014 Titanium Sponsor
2014 Silver Sponsor
Austin Independent School District

Texas Sales and Use Tax Exemption Certification
74-6000064

Sponsors

TALON RACING

KDK Harman Foundation

$10,000

$4,000

CIRCUIT OF THE AMERICAS™

$2,5000

3M

$5,000

$1,500

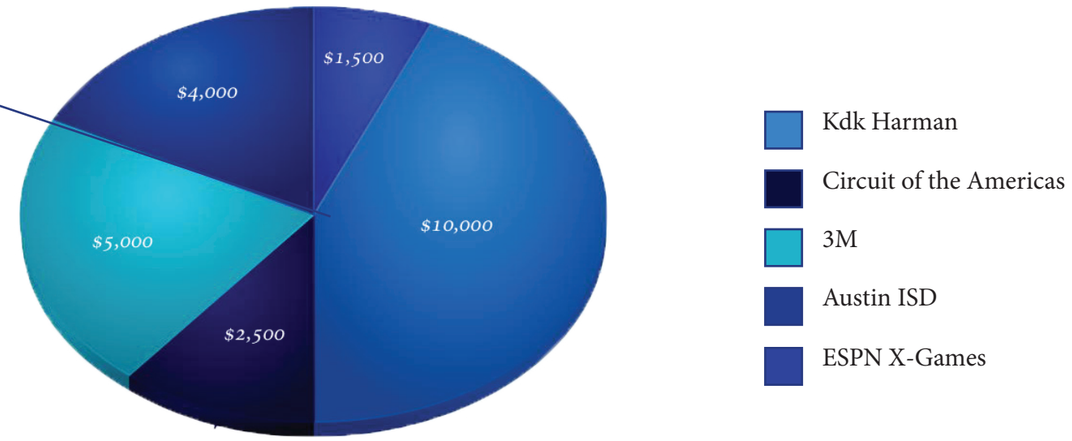
GAMES

Budget

KDK Harman

In 2011, the Foundation made a decision to refine its grantmaking focus to re-imagine how, when and where young people learn. The KDK-Harman Foundation believes that we must dramatically rethink the whole day for students so that learning experiences are seamless and unrestricted by walls, clocks, or calendars. KDK-Harman Foundation's vision for learning builds on a foundation of core academics by leveraging community resources to incorporate strategies such as hands-on learning, working in teams, and problem-solving. Before, after-school and summer programs are a few of the places in and out of the classrooms that are already using these learning approaches to engage students and increase their chances for success.

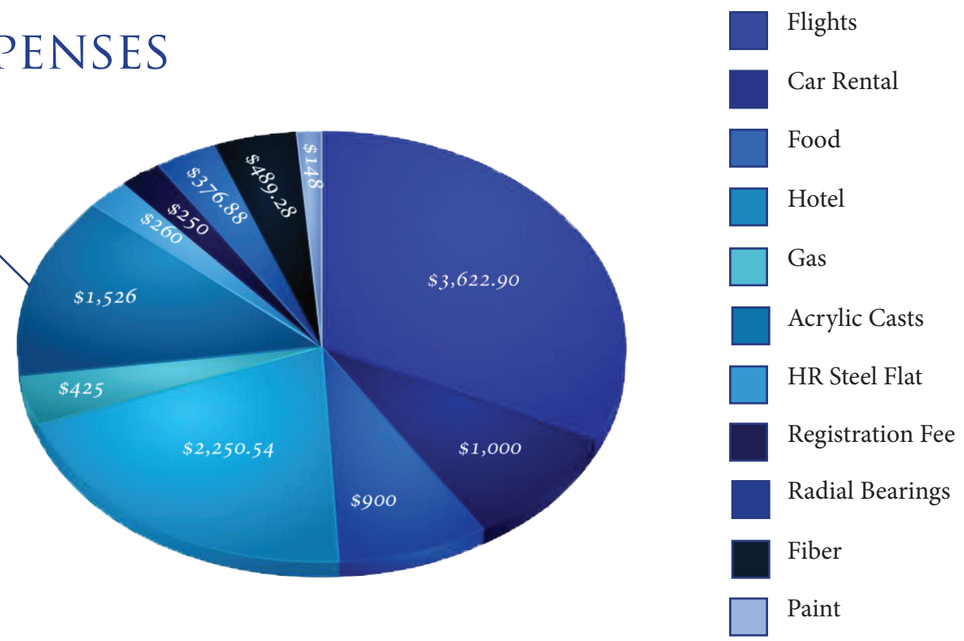
Income



Acrylic Casts

ACRYLITE® cell cast acrylic sheet is made to exacting standards. It offers excellent optical characteristics, thickness tolerances, light stability, and low internal stress levels for consistent performance.
Characteristics: ACRYLITE® sheet is a lightweight, rigid thermoplastic material that has many times the breakage resistance of standard glass and is highly resistant to weather conditions. ACRYLITE® cell cast can be easily sawed, machined, thermoformed, and cemented and is ultraviolet light absorbing up to approximately 360 nanometers. Because of its unique properties, ACRYLITE® cell cast is ideal for a wide range of applications.

Expenses



R.A.D.I.O.S

Research

"Data Gathering Phase" is characterized by the investigation of published information and/ or experimentation associated with the topic of study. The Research Phase selects data and facts that can be organized by similarity of themes and serve as basis for information interpretation during Analysis Phase.

Analysis

Can be defined as "Data Interpretation Phase. Here, data that is organized and gathered during Research Phase will be interpreted based on research findings- what data suggests? Patterns are sought to develop conclusions which become design criteria for the Design Phase.

Design

With the proposed solutions and established design criteria from Analysis Phase, a blue print or detail plan is developed. The design must outline objectives in accordance with all applicable standards and requirements established by the constraints. Instructions on how the proposed solution will be implemented, will be in the form of specifications, drawings, or a report.

Implementation

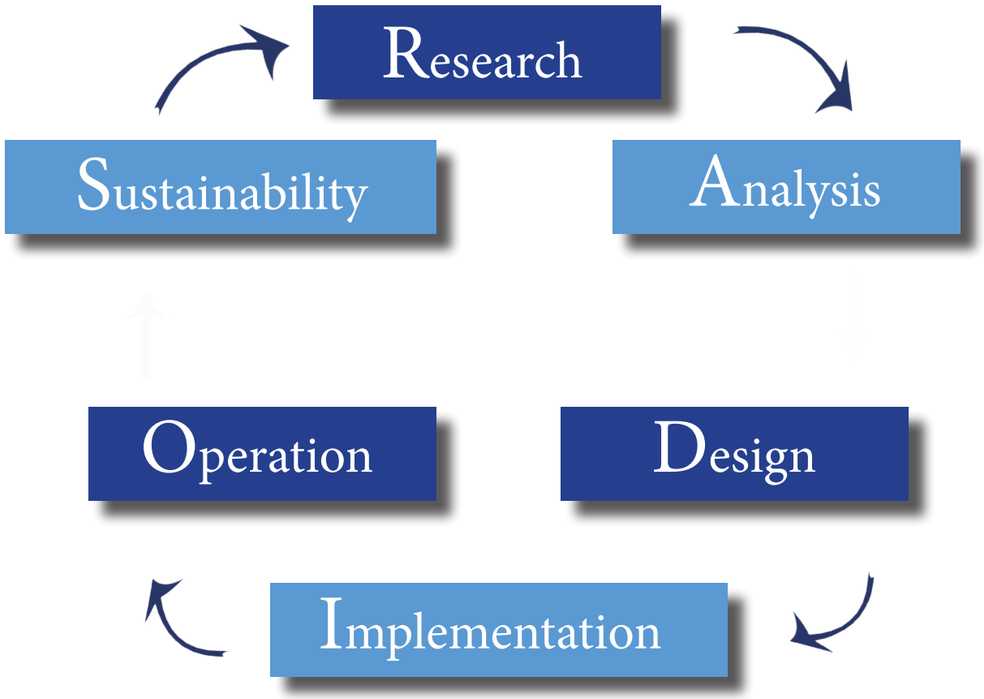
Once a project moves into this phase, the project team and the necessary resources to carry out the project should be in place and ready to perform project activities. The project team and specifically the project task leader's focus now shifts from planning the project to participating in the project. The Implementation phase is the longest phase of the project and requires most energy and resources for its completion

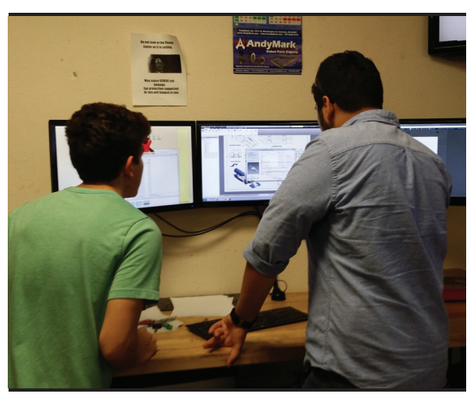
Operation

In this phase, a systematic performance analysis of the applied solution is evaluated against the outlined objective in the design phase. Information collected through this exercise is used to ensure that all problems associated with the applied solution are investigated and corrected.

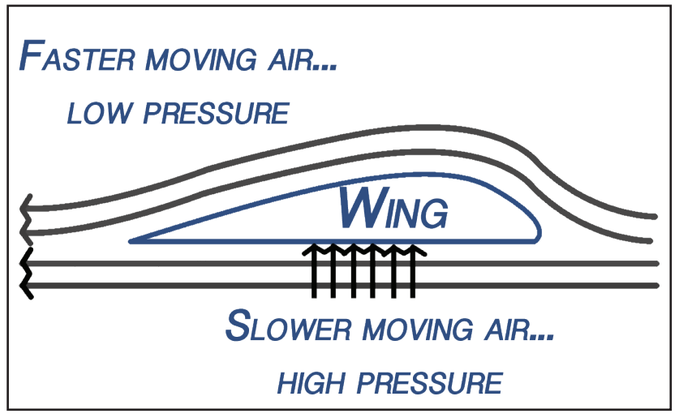
Sustainability

Because of the project context concept imbedded in the R.A.D.I.O.S. model, it is expected that sustainability is not an independent component of the designs, rather a core value integrated in their novel design ideas.





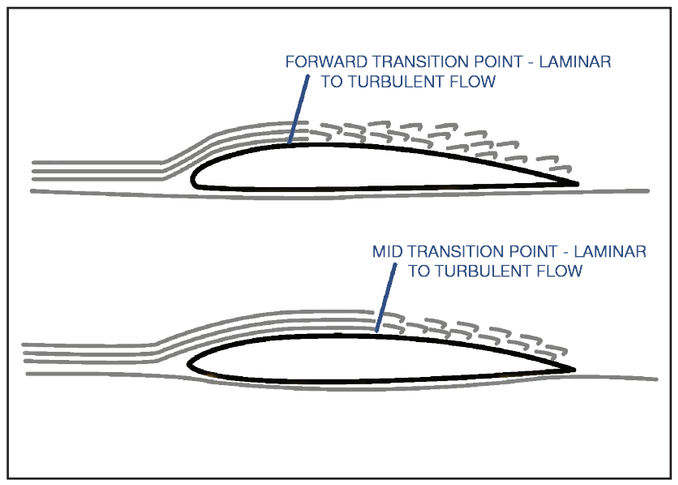
Research and Analysis



Bernoulli's Principle

Bernoulli's Principle states that the faster the air travels, the lower the pressure is. The opposite is also true.

Analysis: The research suggests that this principle should be considered when analyzing Lift and Downforce to develop a design criteria for a fast moving car. TALON Racing determined that the highlighted design criteria below will provide the most efficient design concepts for an aerodynamic car design.



Laminar Flow

Laminar Flow is the smooth, uninterrupted flow of air over the contour of wings. The highest point of air flow on an Aerofoil is called the Transition Point. This is where air Transitions from Laminar Flow to Turbulent Flow, inducing higher Drag coefficients due to Surface Friction.

Analysis: Extend Laminar Flow by increasing surface contact before the Camber or drop off. A small Camber would be the most beneficial at the transition point, the highest point of airflow, for decreasing Surface Friction Drag and Turbulent Flow.

Drag

Frontal pressure is caused by air attempting to flow around the front of a car.

Flow Detachment is the inability to fill the air hole left by the back of a car.

Analysis: Frontal Pressure and Flow Detachment:
Ensure the Most Efficient Continuity of Airflow design by utilizing:

-AIrflow Channels
-NACA Ducts
-Rocket Ogive

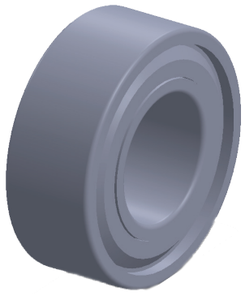
Lift

Lift is the attempt of air to move upwards from high pressure to low pressure.

Analysis: Knowing this, we utilized shorter surface lengths underneath the Aerofoils to create lift through higher pressure underneath the Frontal Aerofoils and back Wings.

Design Theory

Bearings

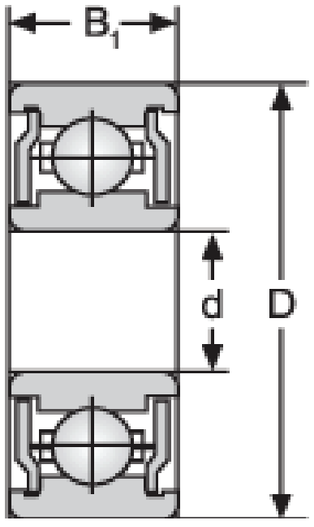


Boca Bearings

SR144NC-ZZ #3 L55 Radial Bearings

0.1250 x 0.2500 x 0.0937 Inches

These Stainless Steel, Ceramic Hybrid bearings, containing ceramic ball's with stainless steel races, are specially designed for relatively clean operating environments. TALON Racing chose to utilize Ceramic hybrids due to the fact that they are, by design, lighter, capable of achieving higher RPM AEs and sustaining higher operating temperatures than traditional bearings.



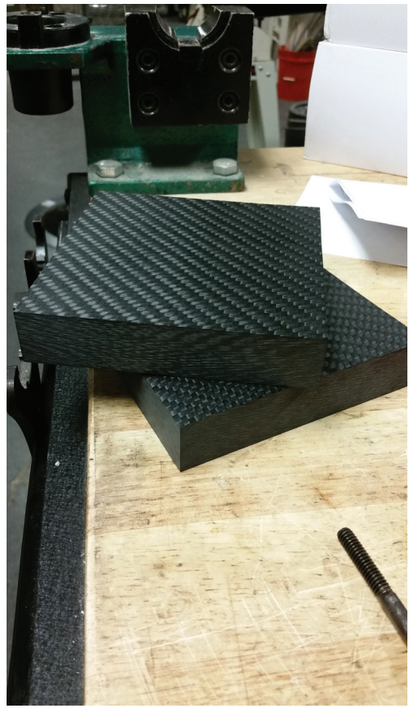


Plate - Twill - Matte/Matte - 5 x 5 x 1.0 inch (437-0505)

Machinable Block - Ultra Thick Carbon Fiber Plate

Bearings

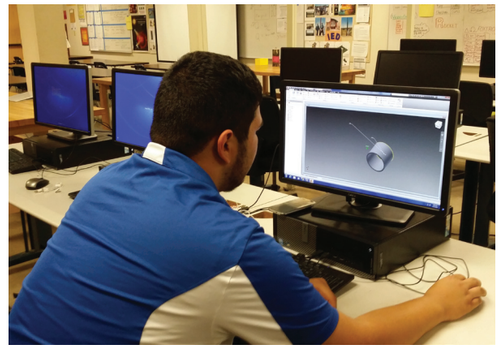
Hybrid	Steel	Ceramic
More durable than Ceramic but faster than steel	Strong and durable but low RPMs	High RPMs but not durable

Wheels

ABS Plastic	Carbon Fiber
1.05 density Higher bulk modules, smaller modules of elasticity	*1.4 density* Higher tensile strength, higher modules of elasticity

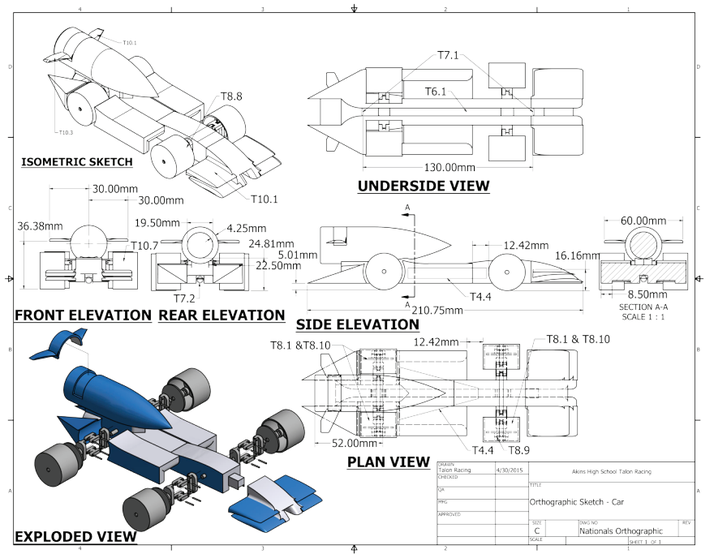
Suspension

TALON Racing determined

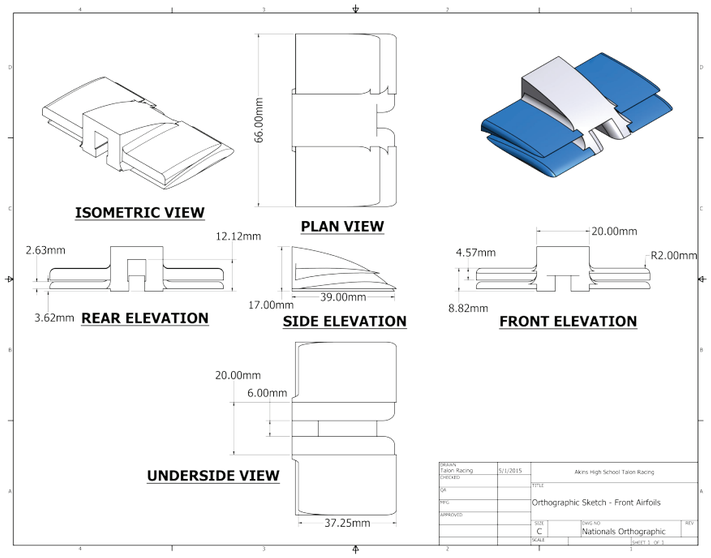


Design

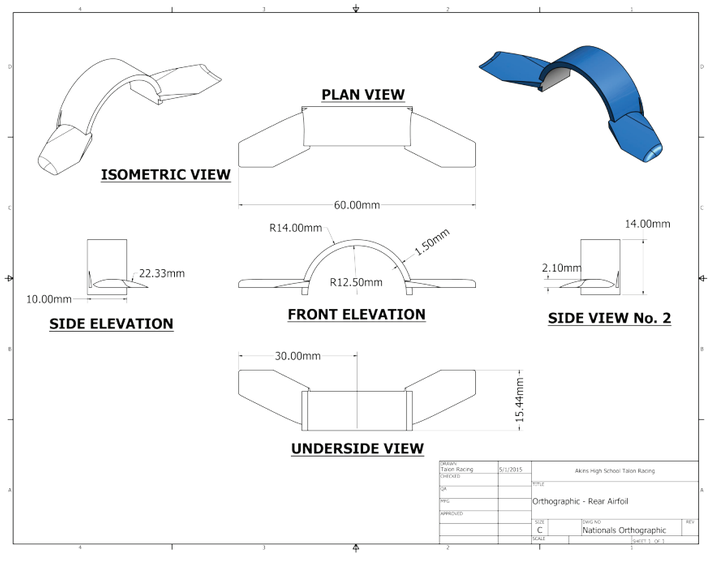
Full car body



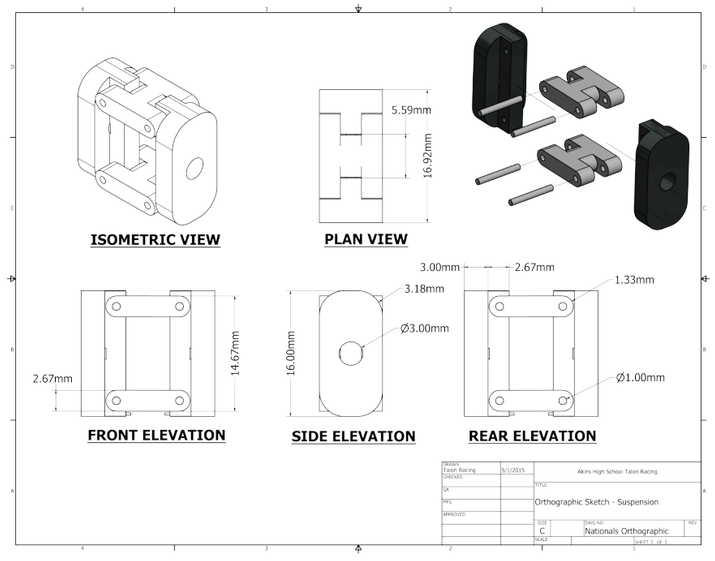
Front Aerofoil



Back Aerofoil



Suspension



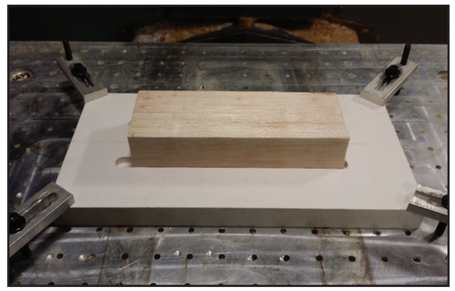
With the proposed solutions and established design criteria from the analysis phase, a blueprint or detail plan is developed. The design must outline objectives in accordance with all applicable standards and requirements established by the constraints. Instructions on how the proposed solution will be implemented will be in the form of specifications, drawings or a report.

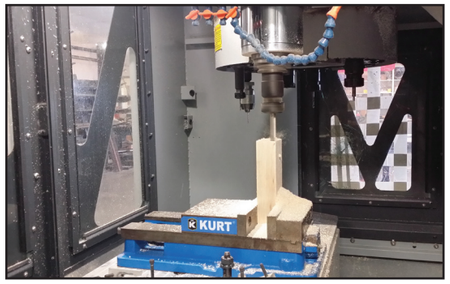
Implementation

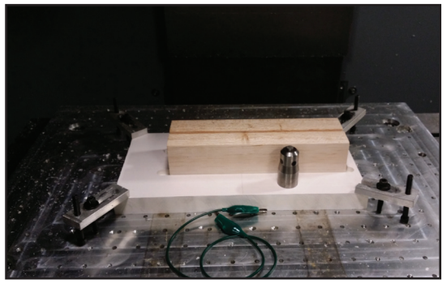
Computerized numerical control (CNC) allows you to cut a variety of materials using different types of tool bits. Going further into the types of materials that you can cut is a wide range from woods, plastics (ex. polycarbonate, acrylic, ABS, Delrun, ect) and metals (aluminum, steel, iconel, titanuium, ect.) We do mostly plastics, woods tons of aluminum and a very light amount of steel and composite materials such as the carbon fiber that we are using for our wheels. Tool bits that we use range from a two inch “Fly cutter” to a 1/32 flat/ball end mill.

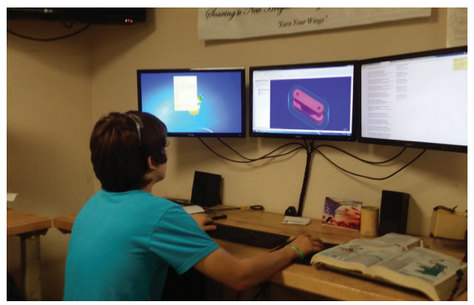
Miller Multimatic Welder: this is a welder that has allowed us to do various types of welding whether it be TIG, MIG, Stick and Aluminum welding. Our pit display had sections that were MIG welded together for structure.

To use Aurasma: 1. Download the app. 2. Create an account. 3. Search for AkinsTALONRacing channel 4. Tap the follow button, and finally scan the image with device.





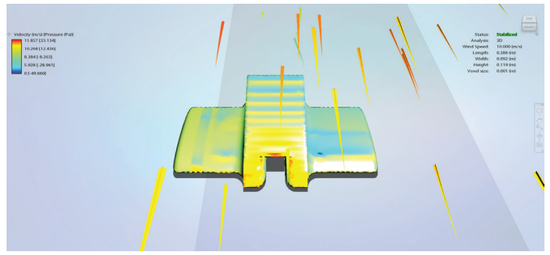




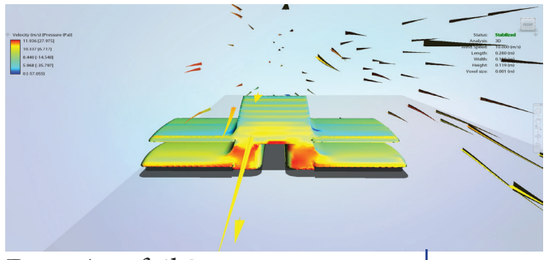
CAD (Computer Aided Design): Is a computer program that is used to create two or three dimensional representations of physical objects. It is used in many of the projects that the team does in Mechatronics. Inventor and Solidworks is used.

CAM (Computer Aided Manufacturing): is a computer program that is used to program various tool paths with specific tools to create physical objects. In Mechatronics, MasterCAM X6 issued.

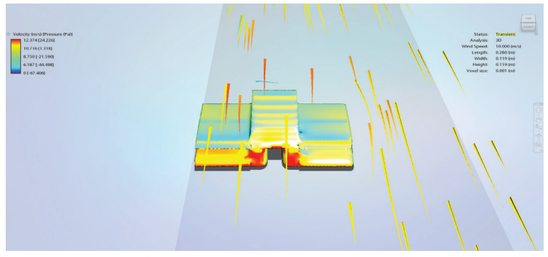
Operation



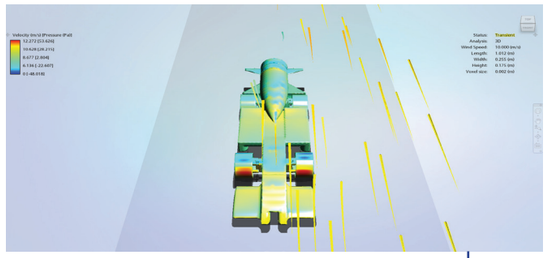
Front Aerofoil 1



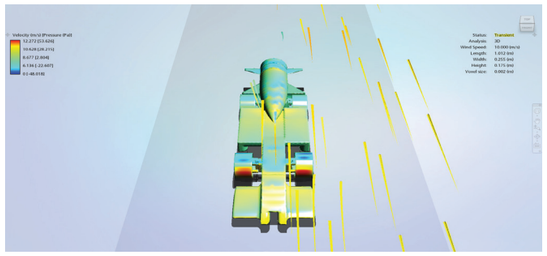
Front Aerofoil 2



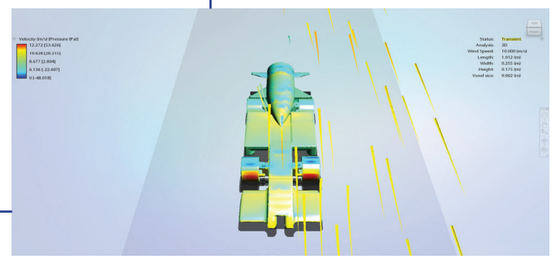
Front Aerofoil 3



Rear Aerofoil 1

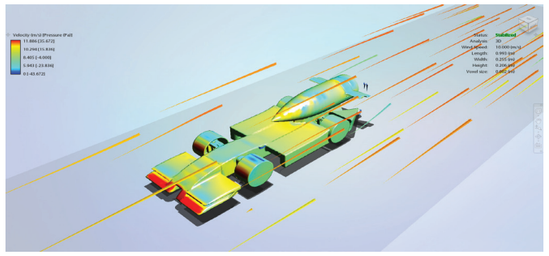


FA1 RA1 Test **.49/.061/.63**



FA1 RA1 Test **0.4/0.5/.04**

Drag Coefficient/Drag Force/Average Drag Coefficient



FA3 RA1 Test **.44/.056/.55**

In this phase, a systematic performance analysis of the applied solution is Evaluated against the outlined objectives in the Design Phase. Information collected through this exercise is used to ensure that all problems associated with the applied solution are investigated and corrected.

Sustainability

Mentor John Ivey helps Kayley Green-Tooney with the pit display. They are using an oxyaceteylene torch to heat the bars for a bend curve to put in the acrylic display.

W.Charles Akins H.S. TALON Racing integrates "sustainability" as a core value into their novel design ideas by strengthening their capacity to continuously improve upon their unique designs through collaboration, mentoring and opportunity that expose our members to multiple methodologies and manufacturing skill sets.

Our Graduate Mentors

John Ivey

2012 Akins Graduate, Industrial Andons

Andres Rocha

2012 Akins Graduate, Reed, Prototype and Machining (RPM)

2014 Akins Graduate, Texas A&M University class of '18

Steph Furgeson

2014 Akins Graduate, Texas A&M University class of '18

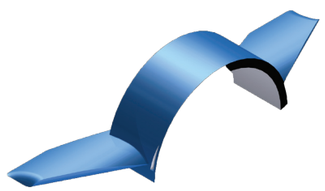
Michael Feser

The team met Sebastion Peters at regionals for F1 in schools and learned that he was certified in TIG welding. We asked for him to help us develop our skills in TIG welding and he also helped us with our FSAE project.

In this photo, Sebastion Peters is helping Peter Glass with his FSAE project.

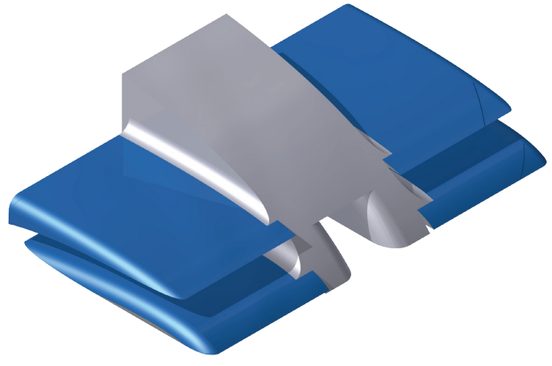
Tungsten Inert Gas (TIG) welding is an arc welding process that uses a non-consumable tungsten electrode to produce the weld.

Aerofoils



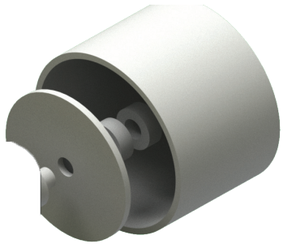
TALON Racing used a Double Wing design for the Front Aerofoil. The Lower Wing is designed with a small Camber to reduce the turbulent flow behind the Mid-transition point as the Laminar Flow over the wing dissipates.

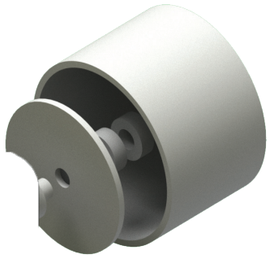
The top wing assists the continuity of airflow over the wheels. The overall design takes advantage of the concept of Continuity of Airflow to reduce Flow Detachment and utilize frontal pressure to create a counter placing downforce to lift.

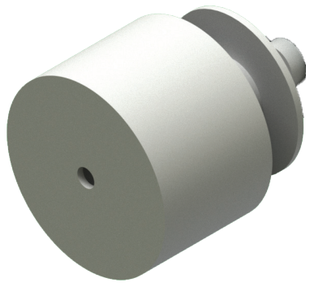


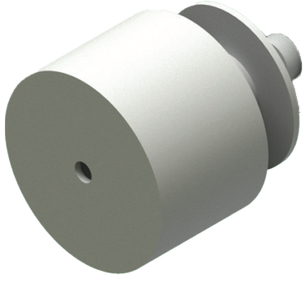
TALON Racing designed a single wing for the Rear Aerofoil that maintains Laminar Flow and produces Lift.

Wheels







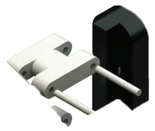


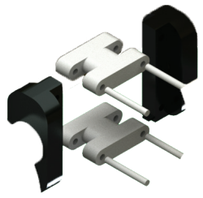
In the past TALON Racing has used Polycarbonate. It served as our primary objective of keeping a realtively low mass while still having a rigid material.

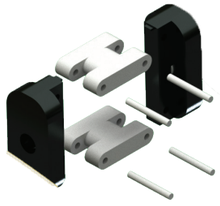
The material we now use is Carbon Fiber. This material hunts down even more on weight while keeping the same if not stronger rigidity.

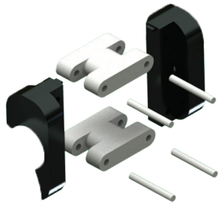
The material we now use is Carbon Fiber. This material hunts down even more on weight while keeping the same if not stronger rigidity.

Suspension







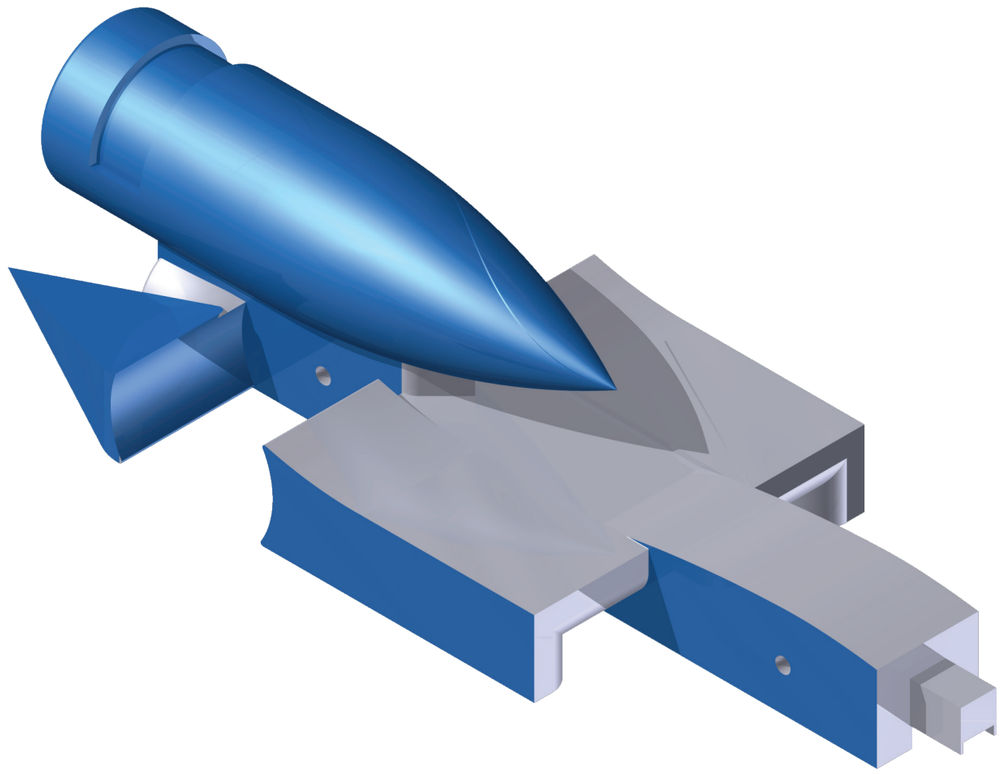


Suspension System
The design criteria developed by TALON Racing to maximize Lift and mitigate downforce through innovative front and back Aerofoil designs as well as designs for the most efficient Continuity of Airflow over the car body may result in the wheels lifting off the track.

Rules and regulations state that all four wheels must stay on the track at all times during the race; therefore, an additional design criteria would call for the inclusion of a springless Suspension system.

Our CNC milled springless aluminum 6061suspension system will have free-moving pivot points that will allow the wheels to stay on the track at all times during the race, while the car body lifts due to the impact of aforementioned wing and car body design criteria.

Body



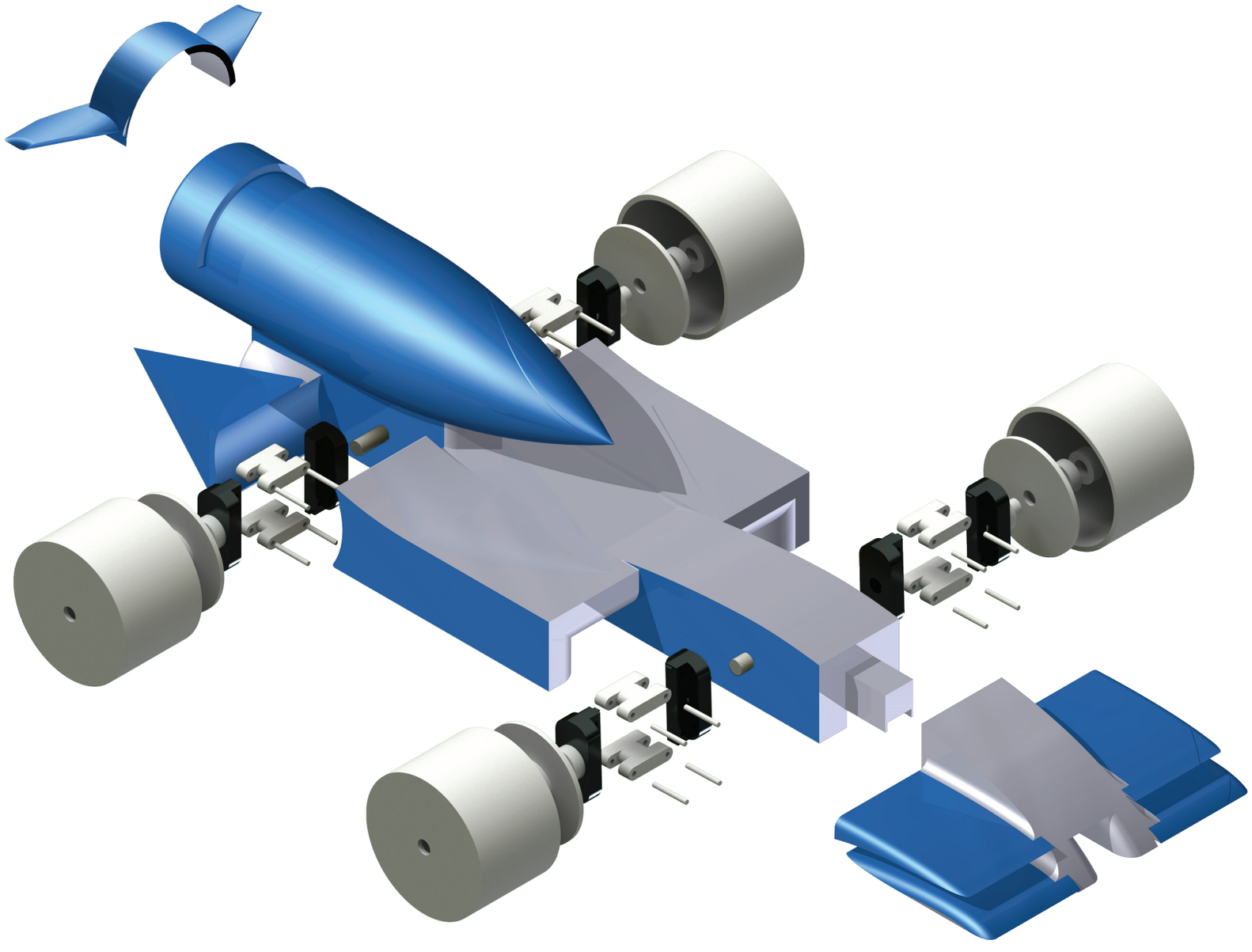
To ensure the most efficient continuity of Airflow, TALON Racing utilized the following design elements:

1. NACA Ducts or Airflow Channels underneath the Side Pods of the car funnel the air trapped behind the Front Wheels into the Back Wheels to aid their forward rotations.

2. A Rocket Ogive splits the air evenly creating a less turbulent Airflow over the middle of the car.

3. Lofts behind the Back Wheels reduce Flow Detachment.

Full Body



To ensure the most efficient continuity of airflow, TALON Racing utilized airflow channels, a rocket Ogive shape as well lofts behind the back wheels.

Airflow channels derived from the concept of NACA ducts of the TALON Racing team incorporated airflow channels underneath the side pods of the car to funnel air trapped behind the front wheels to the back wheels to aid forward rotation.