
TRAXELERATION
DESIGN PORTFOLIO
GULF NEWS
Indo Chic
Nikon
Purisvally
ANTA

Bold Inception

Contents

What We Stand For

Goal

-To [redacted] on F1 in schools history, not only as a collection of talented and hardworking individuals, but also as a [redacted], competent and innovative team.
-To resemble an actual Formula One team in all aspects.
-To have [redacted] along the journey, together.

Mission

-To [redacted] at the competition itself.
-To emerge as more [redacted] that we were yesterday.
-To look back upon the event with fond memories of having [redacted] as a team much like a well oiled machine.
-To incorporate the [redacted] gained during the course of the project in our future careers.

Vision

-To provide a [redacted] professional look, that still presents individuality as a team.
-To leave a [redacted] upon the future generations of our school to embolden them to take up the challenge.

A portfolio of legendary proportions

The Legacy of Our Own High School

Ever since two of our members did the first ever caution race in our school, a passion welled in all of us to excel at this technological challenge. Our school has a great track record of winning in the past competitions and as the top position team in our school, we aim to uphold that legacy.

Team adrenaline won the best portfolio award in the 2014 National Finals while Team Prototype participated for both 2013 and 2014 National Finals and placed fourth in both. As one of the first teams in school, Prototype provided invaluable information and shared their experience.

Team Zinc placed third overall in the 2014 Nationals and scored the best portfolio award in the Nationals 2013. They had also received the amazing chance of being able to participate in the F1 in Schools World Finals 2015 held at Singapore. They provided a lot of inspiration and became a goal that we aimed to top.

The school faculty have also always been there to assist us. For that, we express heartfelt gratitude and hope to make them proud in the National finals.

BERNIE ECCLESTONE

The F1 Supremo' who commercialized Formula One Racing and changed it forever, can be compared to our zeal of changing the perception of F1 in schools forever.

Enigmatic Team

MICHAEL SCHUMACHER

The most successful driver in Formula One history won his laurels because of active teamwork, which is what we as a team aim to do, to produce a successful car.

Team Organization

To ensure that Team Trooleration functions in the most flawless and smooth manner possible the following interrelated departments were setup within the team which were responsible for project elements coming under their respective jurisdictions. Each and every team member was expected to give his full dedication and sincerity towards the job undertaken by him. He is expected to make critical contributions to justify his role.

Research | Marketing | Identity | Design | Manufacturing

Overlapping of Roles - Role Interactions

This specific characteristic of our project plan advises to a very important ideal that, Trooleration follows expression of opinion. Even though Trooleration is internally divided into smaller sections, for ease of project management, each member is free and most welcome to express his thoughts on the work which another department is in charge of. For example, I was one of our design engineers idea to contact a newspaper agency to facilitate our marketing campaign.

Enigmatic Team

*ROHAN RAJAN - Team Manager

He is in charge of the smooth functioning of the team. He is also in charge of effective division of labour and meeting deadlines. He gives his best to ensure that the team maintains a competitive edge.

Critical Contributions

- Portfolio Content
- Project Management Strategies
- PE Concept
- Risk Aversion Strategies

*KARTHICK SHANKAR - Graphic Designer

He can be adjudged as the most creative member of the team. His unparalleled imagination forms the very core of Trooleration - 'Jubilant by Design'. He is in charge of effectively using the plethora of available computer software for giving a bold and elegant look for Trooleration.

Critical Contributions

- Team Identity
- Verbal Presentation
- Portfolio Designs
- PE Banners and Brochures

*DEV KHARE - Design/Manufacturing Engineer

With cutting edge software, technology and machinery at his fingertips, he is in charge of making the most aerodynamically advanced car possible. He works closely with Gautam to design a masterpiece.

Critical Contributions

- Design of Final Car
- Wheel System
- CAM Analysis
- Painting

*GAUTAM RAM - Design/Manufacturing Engineer

He is a member with very keen insight on manufactured cars as well as aftermarket capability specialist. How a car will actually perform once manufactured. He meticulously adheres to the regulations and works along with Dev to deliver an astounding car.

Critical Contributions

- CFD Analysis
- Assembly Process
- Research Concepts and Ideas
- Post-Manufacture

*AHSAN FUZAIL - Resource Manager

He is in charge of planning and taking care of the team's budget. He looks for ways to spend as little as possible while still maintaining required quality and performance standards.

Critical Contributions

- Budget Control Protocol
- Industrial Visits
- Sponsorship Algorithms
- Contingent Expenditure

*ALAN ALEXANDER - Marketing Manager

Exposure and publicity is his area of work. He tries to promote the team as much as possible by means of social media or through promotion campaigns.

Critical Contributions

- Marketing Brochure
- Gulf News Collaboration
- Prospect Campaign
- ANTA Collaboration

Research | Marketing | Identity | Design | Manufacturing

Team structure, effective member contributions and role interactions

Team Name

The first mark of identity of anything in the universe, be it living or inanimate, is a name. Rightly so, it requires attention and care so that we churn out it as to the face of whatever it does. Traxeleration was the result of [illegible] discussions. After plenty of suggestions and team polls, we finalized [illegible]. It symbolizes what really happens during the race— [illegible]. Traxeleration is considered an amalgamation of what F1 in Schools really is all about.

TRAXELERATION

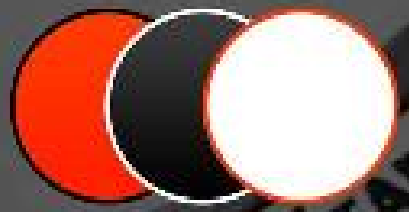
Team Colours

The [illegible] in choosing the colours. Since the colours are quite essential in deciding the identity of the team, all team members were required to give valuable and noticeable contributions in this aspect. [illegible] have been selected as our team colours. Such is the case as we wanted a step to from the more conventional schemes such as Red and Black, Blue and White, etc. The Nike Vapor [illegible] football shoes were the source of inspiration.

[illegible]

Black represents perception and depth

White represents perfection



Team Slogan

The slogan is what we want the people outside TI to gain from the team. We want to show others how [illegible] it is to be a part of F1 in schools. It represents INGENUITY AND CREATIVITY.

BE DIFFERENT.
BE SPEED.

Team Logo

The team logo is the [illegible] and like with what we want to convey to the public. It is based on wind symbolism and has a rich meaning. Another professional concept in the logo is the fact that it doesn't have a single colour. Most teams make one logo and keep it the same throughout. But, we have made a vector image so that the colour can be changed according to the situation's need. The main purpose of this logo is to show that we are Traxeleration. Nothing More, Nothing Less.

Logo Development

The logo was developed through a number of phases. We tried any and all types of logos and continually improved the designs over the years to get to the current artistic beauty.

Original Designs Original Concepts

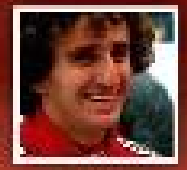
This was the first logo that we made back in 2012. It started out as an [illegible] different concepts of logos. This logo particularly symbolizes the direction along with aerodynamic design.

Due to the complexity of the previous logo, we changed it to a more conventional type of logo that people would easily be able to recall.

In 2014, we were competing at the internationals yet again and thus needed a more professional look which looked more mature than the rather childish logo that we had.

New season of 2015 demanded improvement and innovation. As such, we came up with the concept of interwoven letters and designed something original.

After a lot of development, our Graphic Designer, Kathie, designed the final logo which truly depicts precision and smart, as explained in numerous ways.



ALAIN PROST

His smooth and relaxed nature behind the wheels translates into his sleek identity. The helmet that he used had the three colours of the French flag, signifying the importance of the colour scheme in F1.

Image Missing...

Nascent Graphics

JUAN MANUEL FANGIO

The characteristic way in which he drove his car built his spectacular identity which is the way in which we aim to build our identity by being different.

The Element of TRAX

The element of TRAX has been something that has been inherent in our identity ever since the inception of Transteration. It underlines the four objectives of our identity. These 4 simple, but meaningful words have helped us exceed our capabilities.

Think
Reach
Amaze
Note

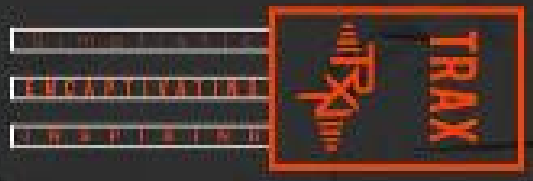
Over time, the word TRAX has also become a sort of a nickname which people use to fondly refer to us.

The Essence of TRAX Graphics

A transistor is a semiconductor device used to amplify and switch electronic signals and electrical power. It is composed of semiconductor material with at least three terminals for connection to an external circuit. The three terminals stand for key aspects of graphics which are:

Insightful
Conceptualising
Inspiring

These three terminals, when connected to a creative mind as the power source, can amplify the capabilities of the graphic segment of the team and deliver exhilarating and fascinating results.



Graphics Consistency

To ensure consistent branding across all aspects of the competition, the team set out the elements that should be incorporated into all the teams products, from posters and brochures to the portfolio and the car. We made sure that all formal documents related to sponsorship and marketing had a watermark with our team logo to symbolize professionalism. Even our logo is not confined to the limit of having one colour as mentioned before. This interference without got of out having limits and the graphics section certainly adheres to that.

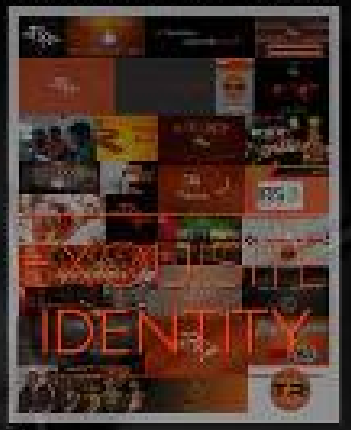
Competition Uniform

Our competition uniforms were designed around three main factors – eye-catching looks, comfort and climate. Travelers on Racing's goal with uniform was to emulate a Formula 1 team but also still wanting to be set apart from all the other teams. After some extensive research, we collaborated with our sponsor ARTA Sports to decide that sports clothing was the best option for such a scenario. It's helped us to deliver a vibrant, yet elegant image.

Posters and Propaganda

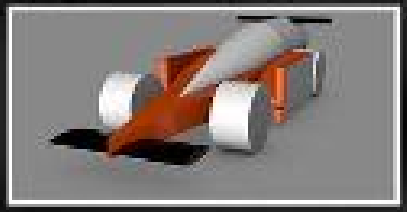
Propaganda is essential for any F1 in schools teams. We pride ourselves in having some of the best designed posters which show off just how skilled Transteration is – while counting for the hard work and effort put in by the members.

The variety of posters that are shown explicitly identifies us as a team that loves to connect with the masses.



Car Graphics

How the team is represented and virtually marketed is through our car. Therefore the presentation of this is key to promote and impact the eye and interest of our supporters.



The exquisite symbolism of graphics and its unique language

Generating Potential

We at Trans-oration bel ieve in continuous project management and evaluation to keep track of our progress and to assess our flaws. We thereby have incorporated many strategies into our team structure to keep its functioning smooth and fluid.

Phase 1 : Stockpile and Research

The first phase of our project is all about raising funds and acquiring knowledge for phase 2. Accumulation of resources is imperative for any successful project. We have recognized this requirement and hence have taken great pain in ensuring that this phase succeeded. It was therefore decided that a systematic and effective strategy was required to approach various companies for sponsorship. We have therefore devised algorithmic approaches to achieve this.

Research about various project elements is necessary to ensure project success. While research about design, manufacture and post manufacturers consideration integral part of our of this phase, we have also recognized its need for other areas such as graphics and marketing strategies.

Phase I was allowed to exceed into the time frame of phase 2 to ensure optimum results. For communication, we mainly used a program called TeamViewer and Google Hangouts along with conventional means like telephone and SMS.

Phase 2 : Execution

The second phase of our project is all about making use of our resources and knowledge to obtain the desired end product. Execution was spread over all aspects of the project design, manufacture, graphics, promotion and documentation. In this phase also, effective use of available funds and time management was implemented.

Execution of each project element was undertaken by the respective department who would finally present progress to the entire team, which on authorization was subsequently put into action.

Phase 3 : Inspection

The third phase of our project can be considered as the least time consuming. Yet, the final and greatest of our project will be taking its 'X Factor' without this third phase. This phase can also be considered as an inspection phase where went through all our projects and made sure that they were in perfect order. We also did our verbal presentation practice and tweaking during this phase as well as the 'Competition Build Up' Marketing via our social media platforms. It was at this time that we approached our Diamond sponsor Gulf News and started our #PREPARES campaign during our National Finals preparation.

Risk Management

Every project has its inherent risks, but what is important is how the team comes up with solutions to those risks to ensure smooth functioning. Given below are few of the highlighted risks of our project.

*The Academics Scenario

This has been considered as the single most inherent risk within our project. We as students in our final year of schooling have a range of priorities related to our higher education.

These include seminars, school examinations, SATs etc. which clash with our working routine for RTI in Schools, thus creating imbalances in our flow of work. To ensure that this does not happen, we have decided that time is the major deciding factor needs to be heavily conserved. More about this is given in how we dealt with the risk of lack of time.

*The Time Scenario

Time, if managed properly, could propel a team to greatness. If managed poorly, it will have doing a shoddy job and ultimately not letting you showcase a team's true talent and ability. Time Management is thereby quite important.

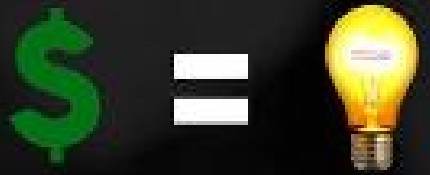
The risk of time is also intertwined with financial risks and academic responsibilities risks. For instance, if we do not get enough funding when we need it the most, then when we do actually receive that funding, it will be too late to get any good as from the resources are unutilized.

Also, academic responsibilities do swallow up alot of our time and hence suitable measures of compensations also need to be taken up. We thereby devised a plan which was foil proof at not affecting our academics. This included the 1 hour a day, 30 min in school schedules we decided to make maximum use of time. (See page 8)

$$\sum_{i=A}^{Z} PLAN_i$$

*The Financial Scenario

Regular funding and sponsorship can well be considered as the backbone of any teams functioning. We thereby categorised this as a potential project risk as we have seen many teams fail despite having a wealth of technical ability and talent. The team deemed it necessary to find ways in which the risk could be averted. One possible way was to have a strong culture of obtaining in-kind sponsorships, which is much more easier to obtain than monetary sponsorships.



JEAN TODT

The unique way in which he managed his team ensured that Ferrari was one of the most sought after team, especially during the Schumacher era. We follow his example by managing with diligence and resourcefulness.

Traversing Obstacles

CHRISTIAN HORNER

As one of the people responsible for Red Bull's incredible success, his brilliant man management and tactics ensured that his team won 4 championships. This shows the type of project management that we aim to employ to win the National Finals.

Quality Control

Central to any team management is quality control. We as a team believe that quality needs to be upheld in all aspects of our project, be it design, manufacture, marketing, etc. However quality is a concept that plays along with time and cost factors as well. For example, one of our earlier race cars designs showed great results on CFD and hence was decided to 3D print it for our final car. But it proved unsuccessful and the final car was not just worse economical.

We still persisted with the design, and had it printed in a material that would be cheaper and hence stay within our budget (quality compromised). This race car ultimately resulted in breakages on the final race day of the Qualifiers which taught us a valuable lesson.
Quality was especially upheld in the following areas:

- Design
- Manufacture
- Verbal Presentation
- Design Portfolio

Project Weeks	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Months	JUN				JUL						AUG					SEP		OCT
Team Identity																		
Marketing and Social Media																		
Sponsorship																		
Research and Development																		
Manufacturing and Testing																		
Portfolio Documentation																		
Pit Display																		
Verbal Presentation																		

Predicted Project Course

Actual Project Course

Project Management Evaluation

The timeline given consists the entire course of our project since initial preparations in late June.
As noticed from the timeline, we deviated a lot from our projected plan and this is our overall plan requires continuous revisions to keep up with time become current status.

The raising of sufficient funds required for the competition took much longer than anticipated. The strategy of approaching large corporations was not successful as we anticipated and hence taken as a process learning one. A revised strategy enabled the team to target local businesses successfully and the team was better able to connect and collaborate with businesses who wanted local exposure in Dubai.
(See Page 6)

Project Revision Strategies

The fundamental plan revision strategy we employed for the most fundamental variable in our project was our Budget Control Process (BCP).
The was an innovative scheme which was headed by our team's Resource Manager the results of which was continuously scrutinized by the entire team.

This was for obvious reason as changes made just affected every department of the team. This program was internally to keep our budget flexible and acceptable to the changing financial realities of the team (in terms of funds raised).
The was conducted every 2 weeks which not only kept us updated on our financial status, but also, and more so on our overall progress as well.

The working rule of this protocol is:
- Information to be observed from team departments regarding potential immediate expenses as per progression on the project.
- Comparison of total expenditures as per data from team departments.
- Comparison of this projected total expenditure with total funds currently available.
- Follow up on potential sponsors with whom talks have had given progress.
- Calculation of revised budget based on data collected.
- Submission of revised budget to team for review.

The BCP was in itself a revision strategy as it affected all the departments. The team was then required to change working mode to adhere to the revised budget.

Headstrong Marketing

Without clever marketing people won't know the potential. This is the reason why we made marketing a key focus for the team. To aim was to have our team identity become recognised in our local communities, our regions, our states and across UAE. We also took our marketing game one further by placing our team on the worldwide stage and linking our team to the global community. Team brand awareness and Return of Investment forms the backbone of any IT in School's team's marketing strategy. We also thereby pay close attention to three key elements. Effective team branding was required to ensure that the public knew what Traxeleration is all about. We thereby conducted the following actions in order to build up our brand image as well as ensure effective Return of Investment.

Phases of Marketing

*Phase 1 : The Startup

We started our campaign by approaching awareness about Traxeleration via our facebook page. We were quickly able to amass over 500 likes, thus ensuring that the public was in the loop. We simultaneously moved on to twitter and gathered a mass following there as well.

*Phase 2 : Full Fledged Campaign

a) After the team got the initial publicity that we needed, we began to routinely bring people up to date with posts.
b) We also gave away custom neat, brave aluminum merchandise. This included key chains, t shirts, arm bands, caps etc. This generated, not only a good fan following, but also developed a sense of relatability.
c) Publicity in school was of no issue as we put up a plethora of posters/brochures before any event and thus let the community know that we are all in it to win it.

Branding and Return on Investment

*Cookery Competition

Three of our members participated in a cookery competition just as the second preparation started. This was an innovative way to get the name of the team out to the students of the school.

*Badges

*Social Media

*School Football Team Jersies

We also sponsored our school's football team by being a key participant in the CBSE Athletic tournament. This further helped the outreach of the team brand. They also donated brochures at the event.

*Competition Day Marketing

The t-shirts and competition items such as the water bottles, pit display etc carried big logos and provided free media publicity to both the team and the sponsors.

*Gulf News Report

Gulf News published a full team picture as well as a report on 28th October 2016. The report included details about the team and our plans for the national finals.

*Radio Appearance

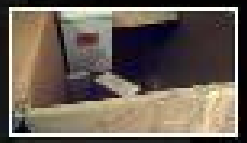
Two of our members were lucky enough to be invited on air on City 1016 for a live interview. They spread the name of Traxeleration far and wide on that show.

*Parisvaly Perfume Sale

As part of the association signed with Parisvaly, we agreed to sell some of their own products to ensure they retain a profit by sponsoring our team.

*The Fragrance of Speed

Our sponsor Parisvaly perfumes designed a customized perfume for Traxeleration. We sold this at an event in school and it was sold out within a matter of hours.



*Gulf News Advertisement

To further increase marketing outreach and sponsor exposure, we planned to run a series of 3 advertisements, ahead with charts on 14th October. As of 5, we plan to run the second one after the competition.

*Nikon Camera Sale

To assist us with our funding, we collaborated with Nikon and arranged a sale of cameras. It's been a fabulous partnership. (See Page 9)

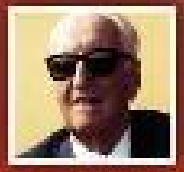
*Miscellaneous ROI

- Advertisements of sponsors in the slideshow on the LED screens on loop.
- Company Logo on pages of the Portfolio.
- Advertising to sponsors website on our facebook page, twitter etc.
- Company Logo in preferred space on the Uniform.

TOTO WOLF

Being one of the eminent marketing personalities of Mercedes Benz ensured that Mercedes reached out to the world and everyone knew what the three-spoked logo was all about. Following this example, we wish to skyrocket our marketing sector so that everyone knows about Traxeleration!

Encaptivating Collaborations



ENZO FERRARI

Ferrari is today one of the most reputed organizations in motorsport racing, yet at the time of its inception, its founder Enzo Ferrari had to take help from various sponsors in order to make his dream come true. The dream of winning the National finals also required the help of our sponsors and we are very grateful for that.

Throughout the course of this competition we've had the chance to collaborate with the biggest establishments in their respective industries. This sharpened many of our skills and exposed us to the professional world.

Gulf News

Gulf News is a major sponsor name with information on the United Arab Emirates. Being part of the Emirates' national newspaper, it has over and beyond the website which makes it one of the most digital platforms for marketing. We recently collaborated with Gulf News, with GMC Motors being our Marketing Partners. They gave us huge publicity by publishing a report on this team. They also sponsored us to run advertisements of which one is ready and which not just gave the team further publicity but also proved to be a huge benefit to our sponsors in terms of ROI.

GULF NEWS

ANTA Sports

Anta Sports is amongst the world's reputed sportswear companies being the fifth largest sportswear company in the world. Their account range is viewed all around the world. The team was thus ecstatic when we came to hear that ANTA had decided to collaborate with us and become our Uniform partners. We were provided with T-shirts, jackets, shoes and track pants.

Anta's marketing manager also advised us on what type of uniforms would look stylish for effective publicity which we adhered to while selecting our uniforms.

ANTA

Keep Moving...

Fotokad

Fotokad is a photo company in the UAE in the field of advertising. They are also well known with their high quality merchandise they produce. We considered ourselves privileged to have gotten an opportunity to collaborate with Fotokad. Fotokad became our merchandise partners and provided us with high quality merchandise which was a great asset to our team identity and even marketing philosophy.

fotokad

Nikon

When photography and cameras pop through your mind, you automatically think of Nikon. That's how much of an image they have across the globe in the cameras' photography and videography. We were quite excited to hear that Nikon had agreed to collaborate with us by agreeing to provide us their new "They advised us on the best motor of to choose for movements of subjects in the frames. In addition to this, the also gave us 360° their DSLR series of cameras which were of great use in our marketing campaign.

Nikon

Parisvally Perfumes

We also collaborated with Parisvally Perfumes, a reputed perfume establishment in the UAE. They gave support as well as financial for marketing strategy which was introduced the article in the Program of Speech - Transformations even exclusive perfume. We worked closely with their designers at Parisvally who advised us on matters considering mixed flavored types of fragrances as well as the overall packaging of the perfume bottle. We are very grateful to Parisvally Perfumes for their support, other support towards the unique marketing concept.

Parisvally

Verbal Skills with Hani Mashnouk

A Toastmasters champion and an expert in the field of public speaking, Mr. Hani Mashnouk had been invited for our verbal presentation. Being a former World Toastmasters verbal presentation judge, Mr. Mashnouk had immense experience which he shared with us. During our session with him, we're extremely grateful to Mr. Mashnouk for all his support. He had given us a lot of tips on our verbal presentation skills.

An account of our greatest sources of help and support.

Driving Resources

F1 in schools can be considered as an engineering company and hence it is very obvious how the skills in resource management will be very essential to not become a reality. We have categorised the issues and hence point specific attention to the:

Time as a Resource

A very important factor which all team members adhered to was good time management and adequate use of time. However as grade 8 students academics take up a lot of our time which makes it impossible to have any other way to achieve the additional time while not compromising on our academics. We did this through two ways:

'1 Hour a Day'

The academic year was divided into 3 terms. The main objective of this strategy was to spend 1 hour a day for the needs of F1 in schools. This ensured slow but steady progress towards our goal.

'30 Minutes in School'

Every school day has a 30 minute lunch time and a 15 minute gap between the first and second period. The main objective was to use about 20 minutes of this time for the purpose of F1 in schools, thus ensuring a maximum of 100 minutes of extra time every week.

Resource Control

One of the most important concerns in the minds of a resource manager is the unwanted scenario of having to overspend. Such a situation arises in cases where there are no background checks conducted before purchasing. This leads to:

→Time consumed in which we could easily purchase without checking the price tag
→Unwanted and unexpected expenditure

We considered the variables involved in these issues above and realized that the problem could be tackled by implementing the following strategies:

→Product research was made mandatory. Before a product was purchased, the concerned team member was required to know all the different product price ranges before researching and then a decision is given by the resource manager.
→Purchases were to be made within the set constraints so as to ensure that, if any reduction of price takes place due to time constraints already put in place, was made. This was again regulated by the Resource Manager.
→The team's resource manager has informally outlined a list of items which are not part of team expenditure. This ensures that team members do not spend for items other than those of relevance for F1 in schools.

Sponsorship Packages

For the purpose of approaching our potential stakeholders for sponsorship, we have designed a marketing brochure which has everything of relevance to the competition and all information about various sponsorship packages we share.


DIAMOND
AED 15000+


RUBY
AED 10000+


EMERALD
AED 5000+


TOPAZ
AED <5000

Sponsorship Acquirement Algorithm

For majority of the companies we obtain from database, we have created a systematic and effective strategy was required to approach various companies for sponsorship. We have therefore devised 2 algorithms to approach companies in which we use this:

Algorithm 1
1. Email
2. Call - follow up
3. First Meeting
4. Post meeting follow up
5. Final Meeting

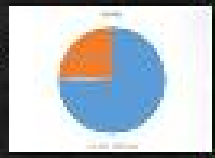
Algorithm 2
1. Walk in to the company
2. If - the spot meeting which if not possible, relevant contact details are obtained
3. Call - follow up
4. First Meeting/ follow up meeting
5. Post meeting follow up
6. Final Meeting

Budget

As soon as not on scale? our budget went through a series of revisions owing to changing financial status of the team. The difference between the projected budget and the actual budget was quite substantial due to inexperience of the team's spending policy which has compromised greatly.

Funds (Sources)

The funds required by the team were acquired through a variety of sources. However these did not account for the team's entire budget as many project elements were given to us through in kind/ goods/ services. It is assured that our decision to keep monetary funds remained at a minimum.



COLIN CHAPMAN

He was an influential design engineer, inventor, and builder in the automotive industry, and founder of Lotus Cars. His radical research ideas fueled Lotus F1's drive to success. We are aiming to employ this kind of innovative strategies to ensure that our resource management will always remain a plus point for us.

Inumerable Prototypes

TX16 - Codename : Glepnir

As our understanding of Tawe in design grew, we experimented with the front of the CO_2 canister and the nose. We decided to make a plastic nose cone which could withstand the heavy impact endured during launch. This model was quite simplistic, but its full potential was yet to be discovered.

"To all great designs there lies a failure that helps shape them"

TX17 - Codename : Zephyr

Our innovated wing system is shown here. The car however, was quite bulky and needed to be toned down. Another major innovation was the hight of the canister holder, which was minimized so as to be able to impact the whole car evenly and ensure a smooth run.

"Recreation is more important than change. Who knows what you might end up making"

TX22 - Codename : Comet

Made on far more than speed and stability, our final car is truly a masterpiece. The efficient usage of thrust provided by the canisters is what makes this car our final decision. After building on the TX19 we created a nose that was refined, more stable and innovative. The design is simplistic, powerful, elegant, and mind-numbingly fast.

"Perfection is not attainable, but if we chase perfection we can catch excellence."

TX19 - Codename : Mustang

Our regionals car which was the 5th fastest car at the event inherently had flaws owing to breakages of the front wing system and wheel system. Even though its nose was aerodynamic, it ended up being to fragile and it was thus decided that improvements were to be made.

"It is easy to complicate a design, but it is exceptionally difficult to facilitate it."

TX08 - Codename : Stingray

To follow up previous failures we created a car with a very sleek finish. This car performed much better but we ended up not using it as this was also quite complex. An innovation we had here was the structure in front of the wing which was built upon to achive perfection.

"An idea is truly utilized when executed perfectly"

Fruitful Analysis

Coanda Effect

To reduce low pressure drag behind the car, we want the airflow to [illegible] low pressure zone possible. The most suitable technique for our application is [illegible] we want the air to stick to the body for as long as possible before separating and creating the low pressure wake. The best car type for this is semi-turbulent, as it sticks to a body much longer than laminar airflow. Therefore, to make the airflow semi-turbulent, we should incorporate small dimples or a rough surface finish so that the boundary layer will hold the body for longer, reducing the wake, reducing the low pressure and consequently reducing formed drag. However, it should be noted that we are trying to reduce as much drag as possible, including skin friction.

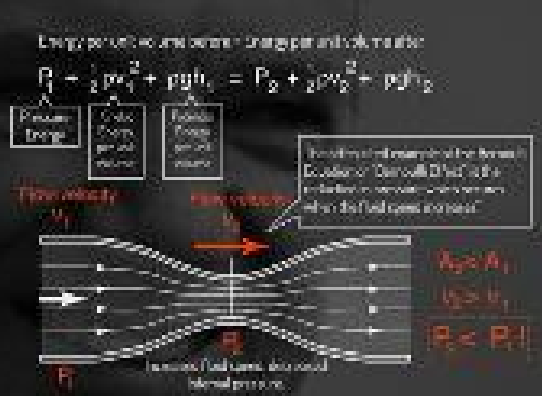
Upthrust vs. Downthrust

Upthrust is the force that is created by the car to make it hover the ground. Downforce (or downforce) however, is the exact opposite. It helps the car stay on the road, [illegible] and is created by the shape of the car.

According to the Laws of Static Friction, force of friction is directly proportional to normal reaction. By generating upthrust, normal reaction is reduced which thus gives less force of friction. This can lets the car was designed to provide upthrust.

Bernoulli's Theorem

The Bernoulli Equation can be considered to be a statement of the conservation of energy principle appropriate for flowing fluids. In the high velocity flow through the constriction, kinetic energy must increase at the expense of pressure energy.



Skin Friction

The friction caused by the surface of the body due to interaction with flowing air is called skin friction. It forms one of the most important aspects of resultant forces on the car. In order to reduce this force, it is necessary to use a smooth sanding technique, along with solid and glossy layers on the paint necessary.

Rolling Resistance

Rolling resistance is a function of the weight of the car. From the [illegible] wheels and the tyres and [illegible] resistance. For the running surface of the wheels, it is necessary to choose the smooth as and offset material for both the wheels as well as the ball bearings.

Thrust

Whilst there is a balance of vertically between variables, the amount of thrust is not a variable that can be controlled by the team. The lighter the car, the greater its acceleration will be greater (determined solely when the same force is present). In the Finals, the [illegible] the rotational and forward motion, the thrust must be directed through the car's centre of gravity. If the thrust is applied above the centre of gravity of the car, a moment is created which would result in a down force on the front wheels or up force on the rear wheels. The further the thrust is away from the centre of gravity, the less efficient the transfer of thrust into forward motion. This is why the car has a ladder of thrust is placed lower than normal.

$$a = \frac{F}{m}$$

Since F is constant,

$$a \propto \frac{1}{m}$$

Drag Force

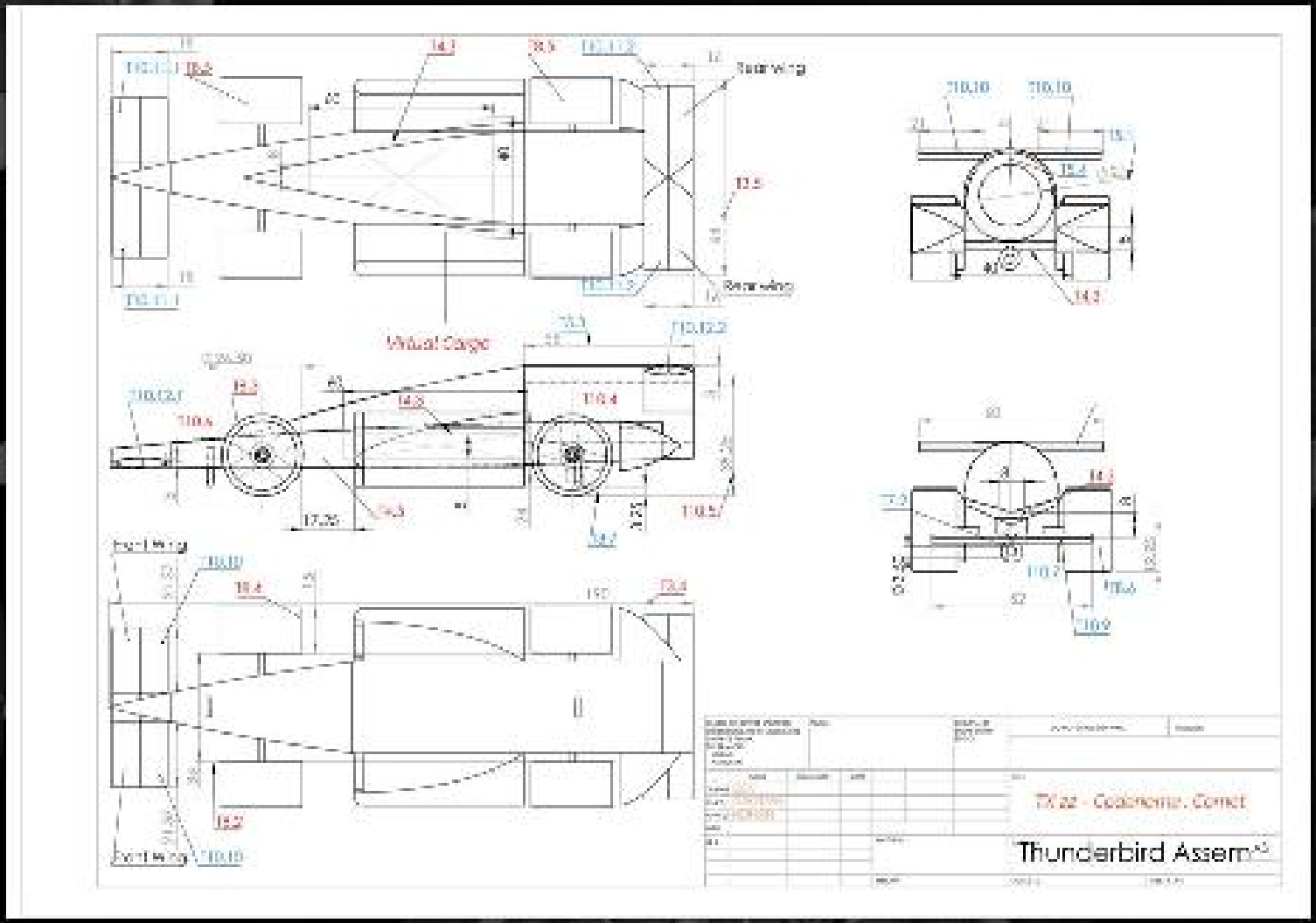
Drag force is the single most resistive force that resists forward motion in an F1 car. Drag force is a function of air density and the car's drag coefficient, cross sectional area and its velocity.

The drag coefficient is highly dependable on the aerodynamics of the car. How the car performs on the track depends on how the car's shape. Through research, we have found out [illegible] the [illegible] affecting the performance of the car.

ADRIAN NEWEY

His revolutionary design ideas ensured that Red Bull driver Sebastian Vettel went on to win 4 championships, netting Newey 4 constructor's award on the way. Design ideas like his are what we aim for to win the National Finals.

Flawless Drawings



Orthographic drawings with flawless markings.

Experimenting Ideas

Component Testing

*Side-Pods

The side pods use a more streamlined shape compared to the shape of the gpc. To accommodate the side sticker, the side pods have a side plate which the F1 aerodynamic

a) The side pod 1
It has a less aerodynamic shape and does not cover the back wheel to a great extent and has a high ghost drag value.

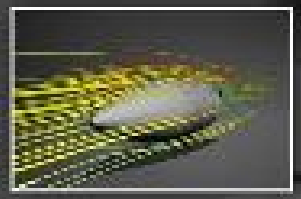
b) Trial side-pod 2
It has a very aerodynamic shape but does not cover the wheels at the bottom and thus, not used

c) Final side-pod
Rather than the standard block, the canister has a side plate like feature for the Fin school's logo and is connected to the main car body by a conduit like feature for superior aerodynamics. The bottom has a reduction to direct air away from the back wheels and divert it to the center of the car.

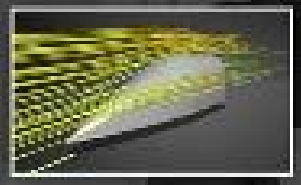
*Canister Holder

After running stringent tests on numerous car side holder shapes, we are proud that the design presented below outperformed the rest. The final one is more aerodynamically acute. Its more streamlined form has a lower drag coefficient. It is also incorporated at a lower height, which reduces moment of force over the car. Finally, it provides up thrust, which reduces weight of car on track.

a) Trial Canister Holder
It has the shape of a tin foil, not streamlined aerodynamically acute. Also, the the height of the holder adds to more drag and is detrimental to the front.



b) Final Canister Holder
Its lower height and ability to provide optimum make this cars far holder our final pick.



*Front Nose

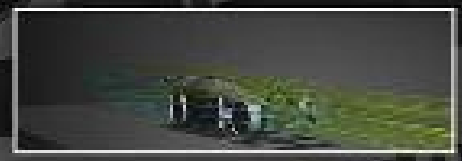
Conventionally, Fin schools teams use the angle of attack of the wings to ensure that the wind flows over wing in our type on horizontal. This can be considered as an angle where the wing is in relation to the direction of the wind. If the wing is not parallel to the direction of the wind, it is said to have an angle of attack. The angle of attack is the angle between the chord line of the wing and the direction of the oncoming air. The chord line is an imaginary line that runs from the leading edge to the trailing edge of the wing. The angle of attack is important because it affects the amount of lift and drag that the wing produces. As the angle of attack increases, the amount of lift produced by the wing also increases, but so does the amount of drag. This is because the wing is pushing more air out of the way, which creates more resistance.

This is a test comparison of whether the front nose has an angle of attack or not. Hence, changing the wing angle of attack for the wing in design such a high angle of attack results in higher drag.

Virtual Car Testing

For the constant improvement of F1 in schools cars, testing is absolutely necessary. We had a good amount of holes in the manufacturing cars for testing was not really a concern. But due to the [illegible] of models designed by our 2 eminent design engineers, we had to narrow down our selection to the best ones. Thus, before manufacturing began, we ran [illegible] on our car virtually.

Since our models were designed in both Autodesk Fusion 360 and Solidworks, we had the advantage of being able to [illegible] with both the software. The more convenient to us was running the test on Solidworks. Systematically following the principle, we were able to get optimum results – some that are of engineering standard and the correct one.



SEBASTIAN VETTEL

A four time world champion, Sebastian Vettel is a person who likes to see his car being tested right in front of his eyes before taking it out on the track. This underlines our testing philosophy. Everything needs to be cross checked if we are to achieve SUCCESS.

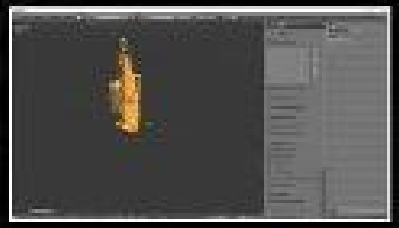
Relentless Testing

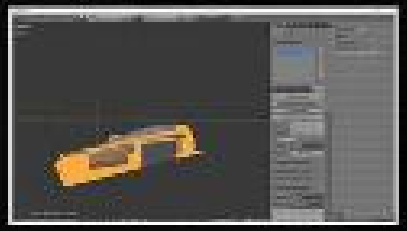
ARYTON SENNA

The Late Ayrton Senna is well known for his analysis of the track before he drove his car on it. In a similar fashion we believe that we a team needs to analyse the manufacturing process throughly before going ahead with it. This will ensure success, just like Senna's world

G-Code Generation

A machining assembly was created consisting of all the required parts of the car body. This was then saved as an STL file and opened in BlenderCAM. blender CAM is an open source solution for artistic CAM - Computer aided machining - a g-code generation tool. Blender CAM is an addon for the free open-source Blender 3D package. This provides an interface to generate the G-code

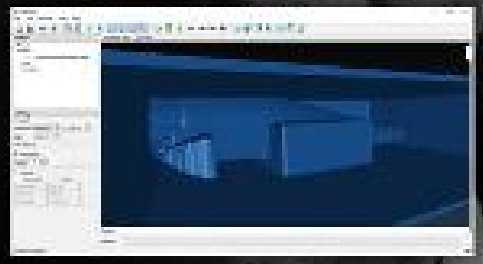




CAM Analysis

Since, we gave our files to a company named Trinity Holdings for manufacturing, we initially thought we didn't require CAM software or CAM testing. But, we soon realized that, manufacturing requires a whole array of commands and sequences. On further inspections, we came to understand that all of our prototypes were not manufacturable.

The canister holder extruded out in a very aerodynamic shape but the result was that it became very difficult in coordinates which machine primarily leverages. Thus, we skipped down the need for that car. Since then, we've been analyzing every prototype using two software - CAMWorks and GRASSmonkey Pro. This gave us a good picture of whether manufacturing was possible or easy for a car and thus we didn't have to waste time in sending cars back and forth for machining.



A Sample of the Final Car's G-Code

```
(Block-name: using the Haas 4/40 Machine post processor)
(Post_Build_3D_Block.cps)
(G-code generated with : BlenderCAM and NC library)
N10 G17 G21 G90
(Tool change)
N20 G0 Z10
N30 G1 F1 M03
N40 G0 X0.000 Y0.000 Z10.000 M03
N50 G00 X-0.000 Y-0.000
N60 G01 Z-0.000 F600
N70 G01 Y-0.000 F1.7-0.000
N80 G01 X-0.000 Y-0.000
N90 G01 X-0.000 Y-0.000 Z-0.000
N100 G01 X-0.000 Z-0.000
N110 G01 Y-0.000 Z-0.000
N120 G01 X-0.000 Y-0.000 Z-0.000
N130 G01 Y-0.000 Z-0.000
N140 G01 X-0.000 Y-0.000 Z-0.000
N150 G01 Y-0.000 Z-0.000
N160 G01 X-0.000 Y-0.000 Z-0.000
N170 G01 Y-0.000 Z-0.000
N180 G01 X-0.000 Y-0.000 Z-0.000
N190 G01 Y-0.000 Z-0.000
N200 G01 X-0.000 Y-0.000 Z-0.000
N210 G01 X-0.000 Y-0.000 Z-0.000
N220 G01 Y-0.000 Z-0.000
N230 G01 X-0.000 Y-0.000 Z-0.000
N240 G01 X-0.000 Y-0.000 Z-0.000
N250 G01 Y-0.000 Z-0.000
N260 G01 X-0.000 Y-0.000 Z-0.000
N270 G01 X-0.000 Y-0.000 Z-0.000
N280 G01 Y-0.000 Z-0.000
N290 G01 X-0.000 Y-0.000 Z-0.000
N300 G01 Y-0.000 Z-0.000
N310 G01 X-0.000 Y-0.000 Z-0.000
N320 G01 X-0.000 Y-0.000 Z-0.000
N330 G01 Y-0.000 Z-0.000
N340 G01 X-0.000 Y-0.000 Z-0.000
N350 G01 Y-0.000 Z-0.000
```

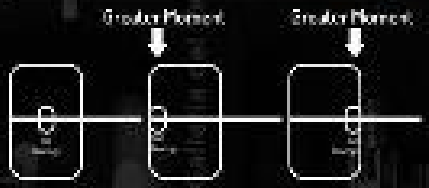

Efficient CAM analysis

Effective Construction

Throughout our journey to the Czech Republic we have considered the manufacturing stage as one of the most important components of the project. We pride ourselves on having the best looking car and the most accurate car at the event, which is why we take the manufacturing process so seriously. Many processes and specification checks have been administered throughout the entire process to ensure the highest final quality of our car.

Machining and 3D Printing

For the machining of our car we have decided to use a basic CNC machine to reduce cutting times. While the basic machine has many more features, it still has capabilities and accuracy comparable to the more advanced machines. Toolpaths have all been the 5 axis contour feature but we have also had limited success using other 3 axis methods. The primary advantage in continuous machining is the precision and accuracy obtained of the more complex parts our car design. We used a 3D printer to manufacture our front and rear wings and our wheels. These were designed using CAD software and converted to Stereolithography (.stl) files for the 3D printer. We selected the printing orientation to minimise any support structures and each was also sanded by hand.



Post-Manufacture

The most stage in the manufacturing process was the most crucial aspect ensuring the overall accuracy and finish of the car. We moved directly to a final 800 grit sandpaper as the car was already quite smooth due to the 5 axis machining. The front nose cone and the rear aerofoil were then attached using a high strength mixture of clear superglue and araldite. Lastly, a clear polyurethane spray paint was the main colour coat that was used. Decals were then applied accordingly. The most stage consisted of the assembly of the car. The wheels were attached along with the electronics of the car.

Wheel System

We took a different approach to the wheels for the National Finals by having a twin wheel bearing system.

The wheel was made as light as possible to reduce rolling inertia. The placement of the bearings along depth of wheel was something we paid careful attention to. The bearings are mounted to the wheel at the center of wheels depth to reduce moments acting either of its sides. This will lead to a more uniform distribution of load. The car was then checked according to the specifications to ensure overall accuracy within the competition rules.

Materials Chosen

Plastic Parts (Except Wheels): PLA is a commonly used plastic components (Poly lactic acid)

*Prepared from renewable resources and biodegradable.
*Non-toxic during natural use.
*Easier to be molded. Requires less temperature and pressure *No heated bed, unlike the plastic
*Temperature range 180 – 230 C
*High strength of material
*Fine features possible

Wheels: Nylon was used as PLA has a higher density (1.38 g/cm³) whereas nylon has density of 1.15 g/cm³ making it more suitable to make lighter wheels.

Axles: Axles are made of carbon fibre due to its high strength and extremely low weight. Having the hexagonal structure aim for to most of graph to loads at very high strength.

Ball Bearings: Stainless steel was chosen as it has good scoring results and was economically viable. We had a counter rotating bearing system which has greater stability and ensured the rotational energy was not lost due to the wobble of the wheels.

Why Lighter Wheels?

Lighter wheels would have lower moment of inertia and thus less rolling energy would be needed. Thus more rotation thrust would convert to kinetic energy of the car rather than the rolling motion of the wheel.

$$K_{wheel} = \frac{1}{2}I_{wheel}\omega^2$$
$$= \frac{1}{2}(\frac{1}{2}mr^2 + \frac{1}{2}mr^2)\omega^2$$
$$= \frac{1}{2}(mr^2)\omega^2 = \frac{1}{2}I_{wheel}\omega^2$$
$$= \frac{1}{2}mv_{cm}^2 + \frac{1}{2}I_{wheel}\omega^2$$
$$= K_{translation} + K_{rotation}$$

Since angular velocity is constant, the KE only due to rolling almost stays the same.

FERRARI FACTORY

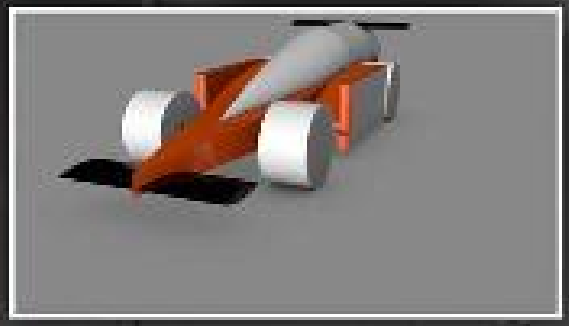
Ferrari Factory is one of the most iconic car manufacturers in the world. It is one of the most successful racing teams in the world. They have built a reputation of bringing cars with class manufactured and outstanding performance. We, Traxeleration are very fortunate to be able to visit this factory and see how they have become so successful.

Manufacturing great masterpieces requires skill, one that Traxeleration has

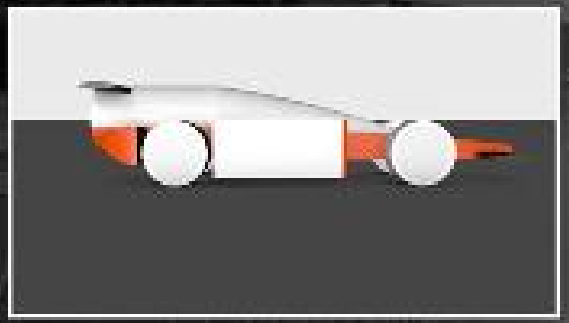
Newtonian Renders

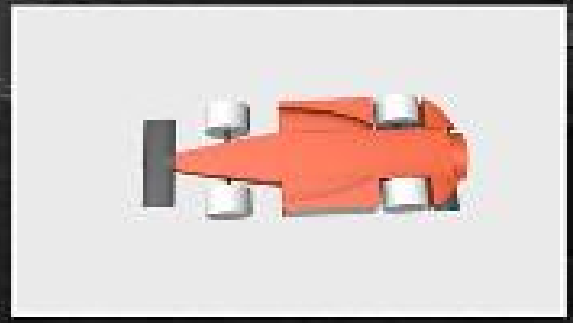
MERCEDES FACTORY

Mercedes Benz is known for its spectacular colouring schemes and realistic car renders which is one of the reasons why it receives alot of attraction to its concept cars.
We follow a similar ideology at Travelcration. We believe that having spectacular renders could give us spectacular attention.



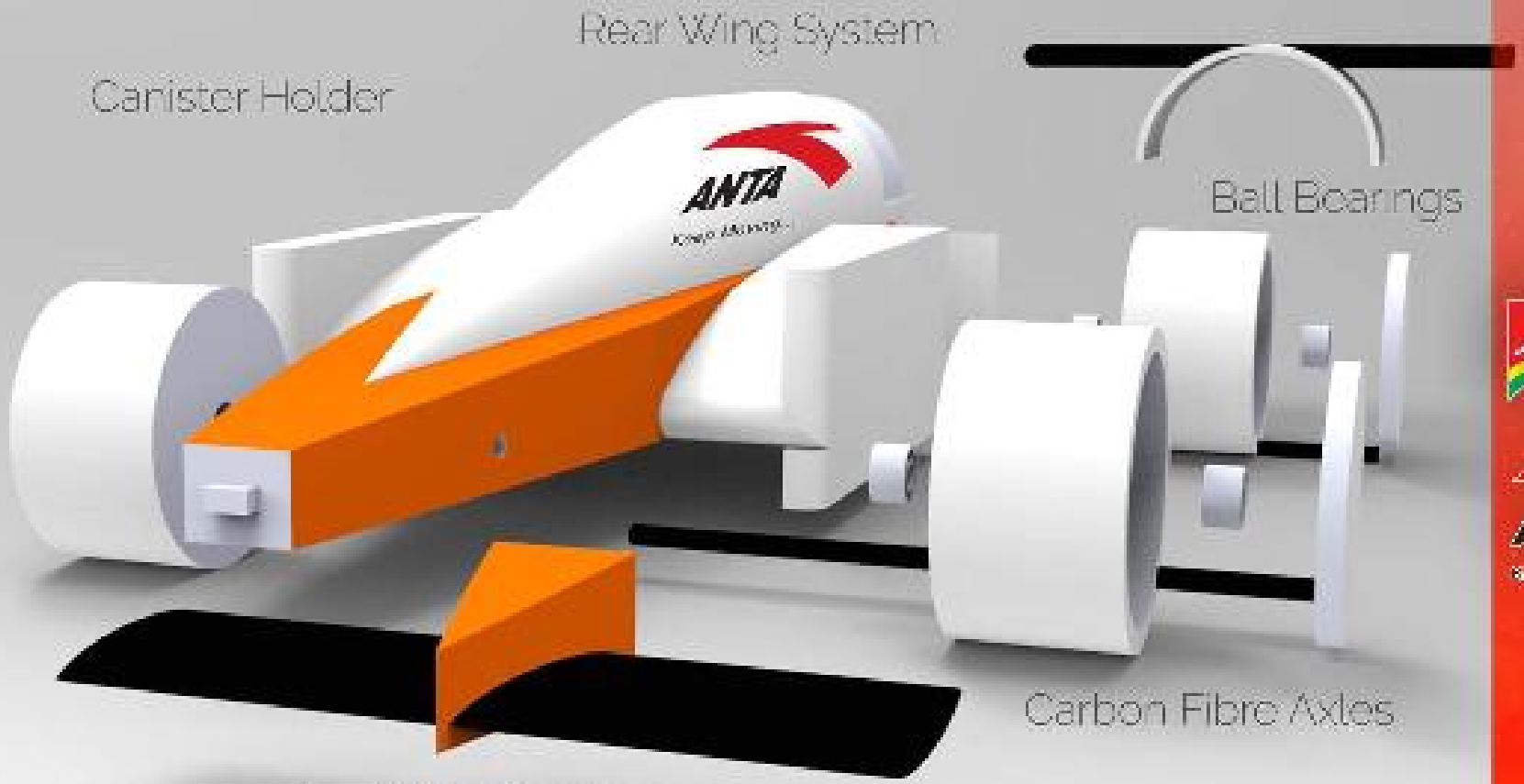
These Photorealistic Renders were rendered using the technologies of Cinema 4D





Witness a masterpiece... From multiple angles!

Calculated Views



Exuberant Experiences

ANDREW DENFORD

He is the founder and initiator of FI in Schools, the competition we know and love. Initiating such a brilliant competition that tested all the skills of a student requires ample experience in the field, which is what we have gained through this.

Adventure comes from the Latin word advenire, which means "to happen" "to come". It is something that happens everyday. It is what comes when we open the door. But if we do so when we think about adventure, where is all the emphasis if the meaning points towards such a quotidian event? Where are all those fears that we usually attach to that word? And what about the excitement? This competition has taught us so much with the core fact being that the experience and adventure of FI in Schools is indeed endless. The members of Traxeleration have picked up a really unique skill set in all respects.

Team Work

The core concept of this astounding competition is team work. Rome wasn't made in a day and it certainly wasn't made by one man. Every core concept of FI requires a whole team to fulfil to the fullest and we're proud to say that Traxeleration has excelled at team work. We learn to depend on teammates and complete our tasks and also ensure the efficiency of every individual. We were always there for our teammates and backed them up at every fork or turn in the road. This truly helped in unlocking the innate potential that everyone had and stay true to the genius inside of them.

Role Interactions

Even in certain segments such as design, completely inexperience members of the team were able to contribute critical and valuable ideas for development. Role overlaps are pretty common and we used that to the best of our advantage. Everyone pitched in, not matter what the scenario. Though certain members may not be into a particular field, the vision of the brain is endless. The possibilities that can be conjured up by one member is truly infinite. Now what if we used that, multiplied by 6 super genius brains? It gives birth to a skill-set of excellence, individuals work with diligence and in their own diverging paths, converge into one unimaginable team - Traxeleration.

Elegant, Minimalistic Designs

Team Traxeleration is a strong supporter of minimalism, as seen evidently in the design portfolio. Really harsh and bright designs may seem exciting first, but they gradually lose professionalism - something that our team lives by. Our designs are meant to inspire people and instill in them a passion for FI in Schools. Through countless number of failures and infinitely many trial runs, we have perfected our art and skills so that we can deliver the best among the best.

Citizens of the Future

This competition inspires the every single team to use FI to learn about physics, aerodynamics, design, manufacture, branding, graphics, sponsorship, marketing, leadership/teamwork, media skills and financial strategy and apply them in a practical, imaginative, competitive and exciting way. We are going to be the future doctors, engineers, nurses, leaders etc. and this competition acts as a stepping stone to propel us towards a great future. Team Traxeleration strives to stand out of the ordinary and be the difference that the world wants to be.

Corporate Professionalism

One cannot survive in the modern world if he doesn't have good corporate standards. The competition enables us to do just that. We make busines plans and adhere to budgets to ensure the maximum smoothness of our work. We learn how to meet sponsors and to 'sell' our brand. We learn various ways by which we can convince the sponsors that we are worth their money. We can truly say that Traxeleration is a brand that has excelled beyond expectations.

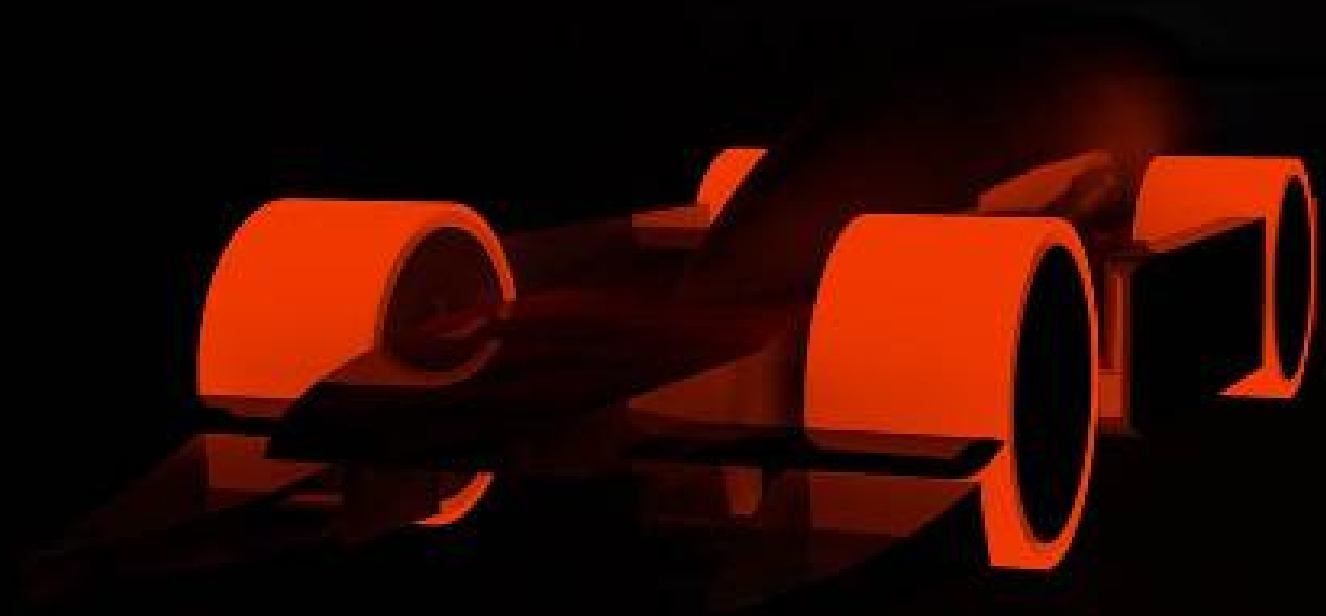
Afterword

Nearing the end of the portfolio which symbolises the end of our old journey and the beginning of our new non-stop adventure, we would like to salute every single person who has supported the team through this magnificent journey. Its been a long a tough one, but definitely one that we would remember for the rest of our lives. We would like to thank the FI in Schools organisation and our Our Own High School Al Warqa'a for providing the opportunity for sitting in this amazing roller coaster ride. With that, Traxeleration signs off from its journey to reach the Qualifyrals and hopes to participate in the National Finals. Let us all try to live by our morals and ideals so that we can emerge as better citizens of the world.

BE DIFFERENT. BE BE SPEED.

An experience which is going to last a lifetime.

Part Speed. Part Elegance. Part Innovation.
All TRAX.



TRAXELERATION

BE DIFFERENT × BE SPEED