



**down**  
positive locking mechanisms:

- Correctly installed safety wiring
- Cotter pins
- Nylon lock nuts (DIN 934, DIN 934, DIN 934 or equivalent) temperature locations (80°C or less)
- Pre-stress torque lock nuts (DIN 934, DIN 934 or equivalent, or

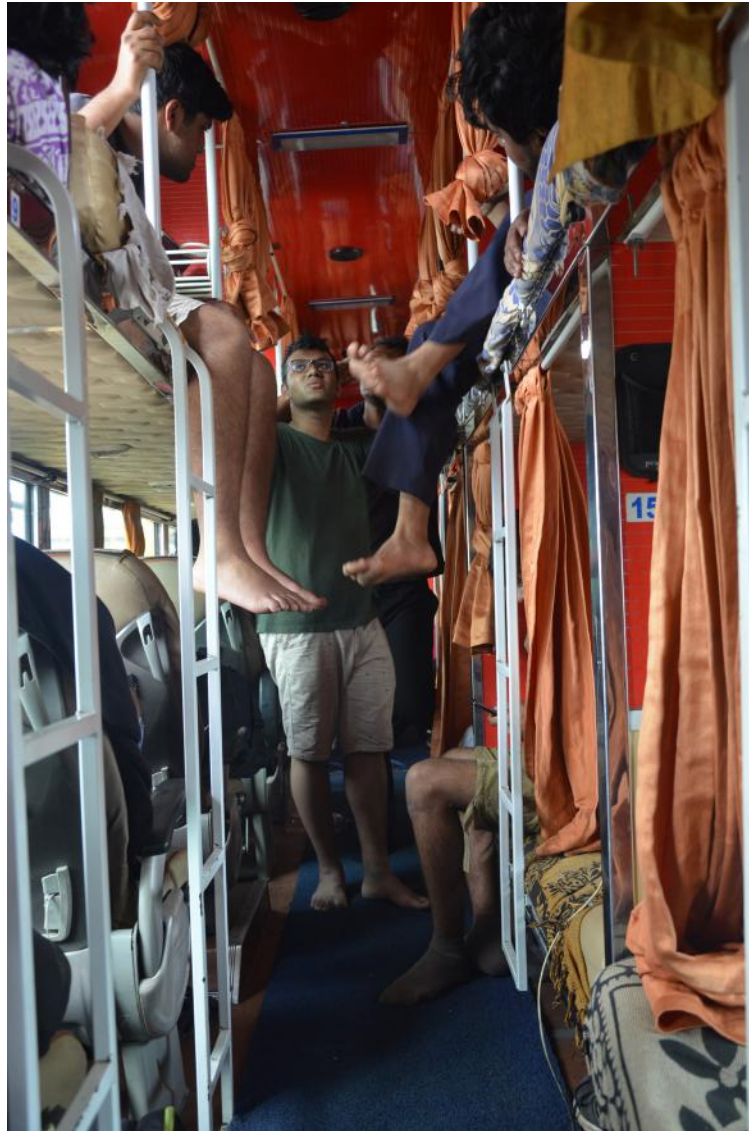
**TEAM  
DEFIANZ  
RACING**

**NEWSLETTER**

APRIL 2020

# MEMORIA

THE BEST OF OUR MEMORIES TOGETHER



## ***Value for money!***

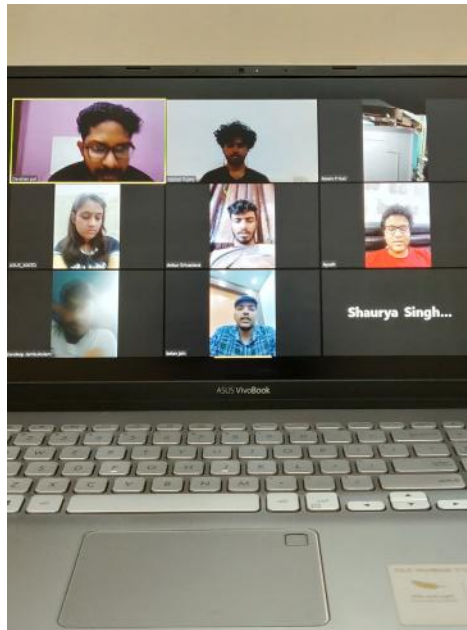
Depicted in this photo is the team's ride that took the team from Coimbatore to Pondicherry in the aftermath of FS Bharat'19.

Arranged at the last moment from an unknown travel agency in Coimbatore, we were not sure of what to expect. It was a pleasant surprise seeing an entire double decker bus with all modern amenities (that came at a very reasonable cost too)

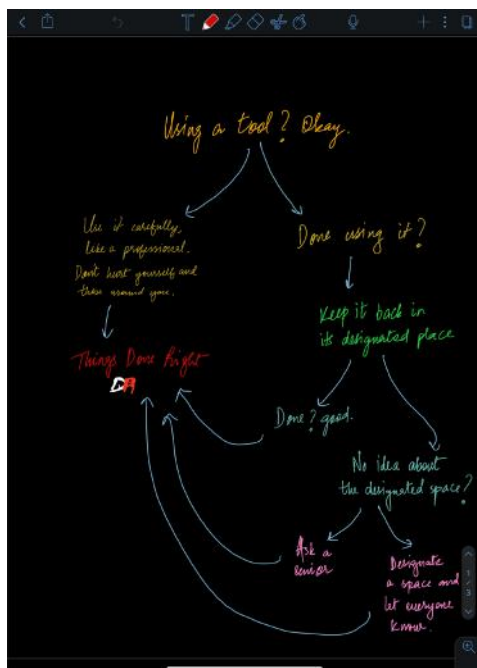
What followed was a 7 hour journey full of stories and enjoyment. Perfect for team bonding!

# UNFILTERED

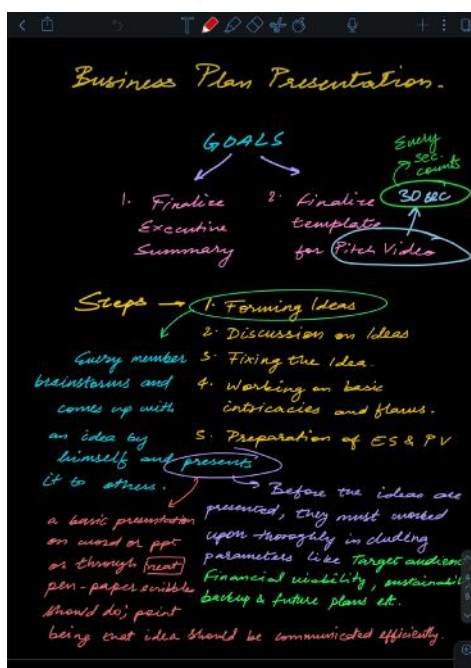
## EVERY PICTURE TELLS A STORY



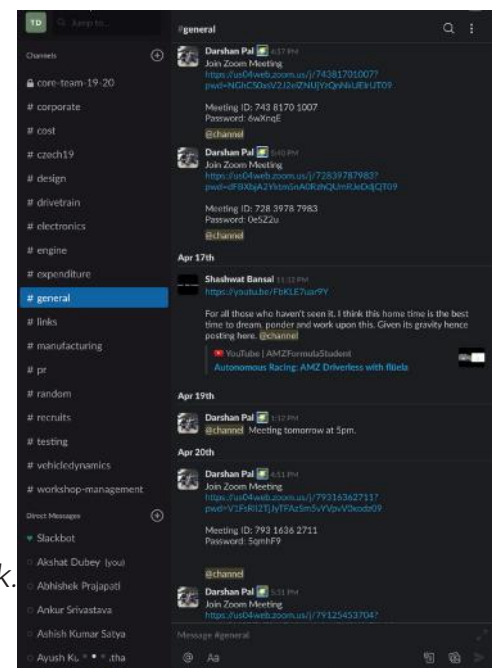
Team meeting in progress on zoom.



A few notes from team brainstorming sessions.



A screenshot from slack.





# TEAM UPDATES

## LOCKDOWN EDITION

### •FSEV

The team will be participating in **4th Annual Formula Student Electric Vehicle Concept Challenge**, which will be conducted on the **18th and 19th of July, 2020**. The competition is organized by Curiosum Tech Private Limited, under the Formula Bharat banner and shall be **hosted online** due to the COVID-19 pandemic. One of the primary objectives of this initiative is to provide interested teams considering the electric category in Formula Bharat 2022 with a **2 year lead** to design their vehicle, procure resources, manufacture the prototype and gain testing time leading to an improvement in the level of Indian FS Electric teams participating in the Global Formula Student competition.

The 4th Annual FSEV Concept Challenge aims to provide teams with an opportunity to conceptualize and design a Formula Student Electric Vehicle which meets the **Formula Bharat 2021 Rules** Package. Students will have to prepare documents / presentations for the following categories involved in the challenge:

FMEA Report	75
Procurement Strategy Report (PR)	75
Team Management Report (MGMT)	50
Design Specifications Sheet (DSS)	50
Delivery on Electric Package* Design and Thermal Management	100
Q&A session	50
<b>TOTAL</b>	<b>400</b>

### •Working From Home

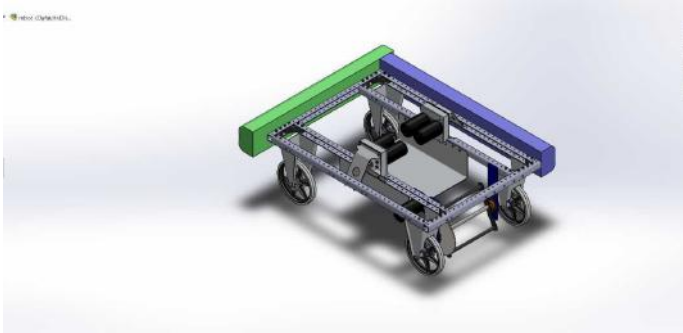
Switching over to an electric vehicle is a historic moment in TDR's legacy. The team is firing on all cylinders as we prepare to embark on this new journey, even if the conditions aren't the most comfortable owing to unprecedented pandemic situation.

Members have left no stone unturned when it comes to **Research and Development on Electric Vehicles and its subsystems**.

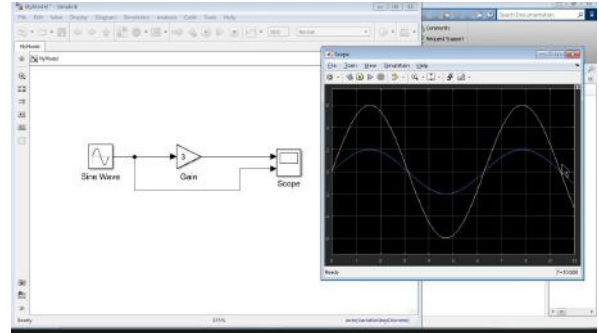
New recruits are putting in hours to learn simulation software like LT Spice, MATLAB and SolidWorks under the guidance of seniors.

Meetings are being religiously conducted on **Zoom and Google Meet** for regular team updates pertaining to the studies being undertaken and progress of simulations, detailed discussions involving (but not limited to) **roadmap for the future and seamless knowledge transfer**.

The Software department is consistently focusing upon building the coding skills in algorithms, data structures and Machine learning.



Bot design by a team member for an electronics side project.



MATLAB project by a growing powertrain member

## •Battling COVID-19

Our sponsors like Fraxus Solutions Pvt Ltd and Creative Tools who have generously supported us are stepping up to fight the pandemic as well. **They're manufacturing face shields, face masks, ventilator valves PPEs and sanitizing tunnels** to help the frontline workers and do their bit for the society. The team is extremely delighted to be collaborating with **companies that go above and beyond when the need arises!**



3D printed facemasks manufactured by fraxus solutions pvt. ltd.

## •Farewell

The month of April brings about one of the most emotionally trying moments of working in a team which is no less than a family, the **farewell of 4th years**. Even more so this time as the ritual farewell party got cancelled due to the ongoing pandemic. The team expresses its gratitude to **all seven of our 4th years** who've given so much to this team's legacy and we wish them nothing but the best for all their endeavours. We hope to carry the mantle passed onto us with the same spirit and passion as they did.

# MEET YOUR MEMBER



**Darshan Pal**  
A.K.A 'Mukes' bhaiya  
**Mechanical - 3rd yr.**  
**Team Manager**

*"Discipline is equivalent to freedom."*

I wondered many a times about what will happen to my future?  
What will I do?  
How will I become more mature?  
How will I tackle my future?  
How can I be a part of bigger things?

To all the questions above I had a **simple answer**: Team Defianz Racing, the team which taught me everything from using a grinder to making technical decisions to managing and leading the team.

I joined TDR family in my **second semester** and to be honest, I didn't even know "T" about technical in my interviews but my keenness to work with a team got me selected in TDR and I learnt the best out of Team Defianz.

As of now, I **lead the Powertrain** department and am the **Team manager**.

A small note to my juniors: you've got this rare opportunity, **utilise it wisely**. It will be a great experience.

# ROLLING BACK THE DAYS



## Tushar Girotra Batch of 2019

Pursuing Master's degree in  
Automotive Engg. (CTU & HAN)

I joined the team in my **1st semester as a Powertrain member** but soon found myself in the **VD side of the team**.

Joining in the manufacturing phase meant that I started with the more of practical side of things which involved procurement from the markets and getting things manufactured on time.

I remember my first component, which I was made responsible for, was the **pedal box**. Learning from my excellent seniors, I slowly saw myself looking at interconnectedness of the sub systems which eventually **made me the department leader**. All this while I wasn't just learning how to engineer things in a balanced way but was also **learning about myself**. Considering the scope and size of this text, just consider your progression in an FS team as a **black box which will for sure bring out a better 'you' at the end of your Bachelor's**. Coming to 2018, I was leading the team for the FBharat 2019, where things were going quite rough, but the team was trying it's best to deal with the reality. Eventually, we couldn't nail the competition but for sure the team members had a lot to learn. For me the biggest thing was to **learn to cut down on perfecting things**, and hence I am quite grateful today that I had the opportunity to be a part TDR and am currently on the journey to 'perfecting' the change (sarcasm intended).

For the current team, yes, this situation had not been expected, and that too when the team was all set to attend FS East or even FSG. But **nothing is permanent, and everything has something positive to look at**. Consider this time as the time that you never thought could come to you, as the time which limits us and makes us cut on our design decisions, as a time which you wanted to just do a little more of that weight reduction, etc. On another note, once the team is going on the right track, you just need to **trust your fellow team members** and know that every team member plays a crucial role to fill the gaps of others. This team is and will be your everything once you graduate, hence, live it to the maximum and don't get distracted!

I think that's a lot to say, I believe my juniors now know better than me and are learning from new mistakes. Alles Gute!



# MOTORSPORT BUZZ

*Our little effort into bringing you the highlights from the world of motorsports.*

## FORMULA 1

As the world continues to battle the coronavirus pandemic, Formula 1's rulemakers have opted to extend the factory shutdown period by a further four weeks. The World Motor Sport Council have now ratified another extension, taking the total shutdown period to 63 days. April has seen the Formula 1 online portals stream historic, fan favourite races and conduct an **Esports Series**.

**Ferrari driver Charles Leclerc** stormed to victory in the Chinese Virtual Grand Prix to make it two wins from two since he began competing in the Virtual GP series. It is his second win on the trot in the F1 Esports Virtual Grand Prix series after he took victory on his debut two weeks ago at the Albert Park track in Melbourne.



**Pirelli tyre chief Mario Isola** is back on the frontline – as he has been for 30 years – in his role a **volunteer ambulance driver and paramedic**. He's dedicating 10-12 hours daily as there is a shortage of drivers in his native country Italy, which also happens to be one of the worst affected countries by the pandemic.

**F1 CEO Chase Carey** provided an update to fans on the latest developments on the 2020 F1 calendar, with the Austrian GP intended to be the first race of the season to be held from 3-5 July. It is expected that the early races would be without the presence of any fans, which has also been confirmed by the SilverStone circuit.





## MOTO GP

The outbreak of COVID-19 has forced the opening **11 rounds of the season to be either cancelled or postponed**, with the campaign now set to start at the end of July at the earliest.

On Wednesday, MotoGP governing body FIM confirmed that a revised **calendar won't feature the Finnish, German and – for the first time in history – Dutch GPs**, while essential track works in Qatar have ruled it out of a slot in 2020.

Most of the **remaining races for the season are expected to be held behind closed doors**, with a reduction to a skeleton crew of teams personnel.

## Formula E

FE has announced cost cutting measures in response to the coronavirus pandemic, including **delaying the introduction of the facelifted Gen2 Evo bodykit** by one season.

The revised Gen2 car will now debut in 2021-22, which would only give it a one-year runout before the Gen3 rules arrive.

A decision to delay the introduction of the **Gen3 Formula E car will not be made until June or July**.

## DTM

**Audi has announced it will pull out of DTM** at the end of the season, leaving **BMW as the series' only manufacturer**.

This **isn't a result of COVID-19**. Rather electricity; Audi states that it wants to focus its efforts on electric and customer racing programmes – such as its **Formula E and stripped out GT3 and TCR car efforts**. No doubt the dire economic consequences of the current global coronavirus pandemic have also helped give them a nudge too, but it's another DTM stalwart to fall.



Audi Sport in DTM.

# FS madness on Facebook!

**Pat Clarke**, One of the most influential and well respected Formula Student judges recently landed in deep water on the FSAE facebook resources page where he passed a controversial comment which was perceived as being highly distasteful by the fellow members active on the page. Although Pat Clarke **claimed his comment to be in light humour**, he was called out for it and also **threatened extensively** by a few active members. End result, Pat Clarke decided to **close this facebook forum** that he had maintained for several years to provide valuable resources to budding FSAE participants.

**The Team would love to hear out your take** on this issue and whether such comments, even if posed in light humour, are acceptable in the modern community or not.



## TERRIFIC INNOVATIONS

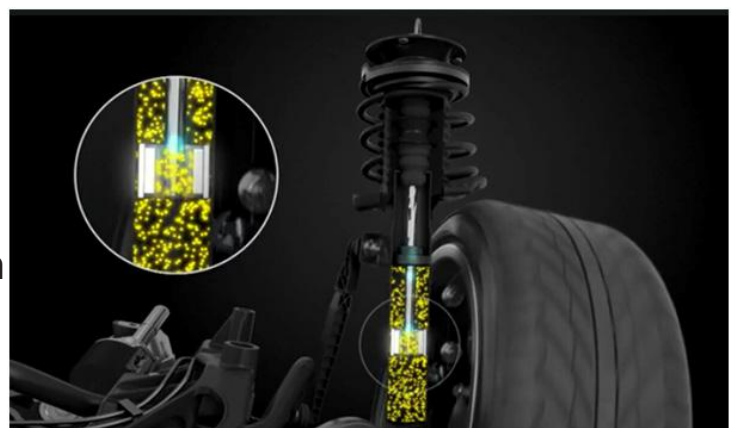
### MAGNETIC RIDE CONTROL

**Magnetic Ride Control (MRC or MagneRide)** is a suspension technology that adapts and adjusts the shock absorbers of a vehicle in real-time in response to changes in terrain in order to **deliver optimal shock damping** for the best possible driving experience.

Magnetic Ride Control is unique in that it does not use mechanical valves or small moving parts that are prone to wear. Instead, a Magnetic Ride Control shock absorber uses the following components:

- A monotube damper filled with magnetorheological fluid located at each wheel of the vehicle.
- A set of sensors.
- An electronic control unit (ECU) responsible for coordinating the entire system.

The MRC dampers are filled with **magnetorheological fluid** that is a mixture of easily-magnetized iron particles in a synthetic hydrocarbon oil. For the third generation of the technology, each monotube damper contains a piston with **two electromagnetic coils** which are capable of creating a variable magnetic field across the fluid passages.



When the magnets are off, the fluid travels through the passages freely; when the magnets are activated, the **iron particles in the fluid create a fibrous structure** through the passages in the same direction of the magnetic field which causes the viscosity of the fluid to increase, resulting in a stiffer suspension.

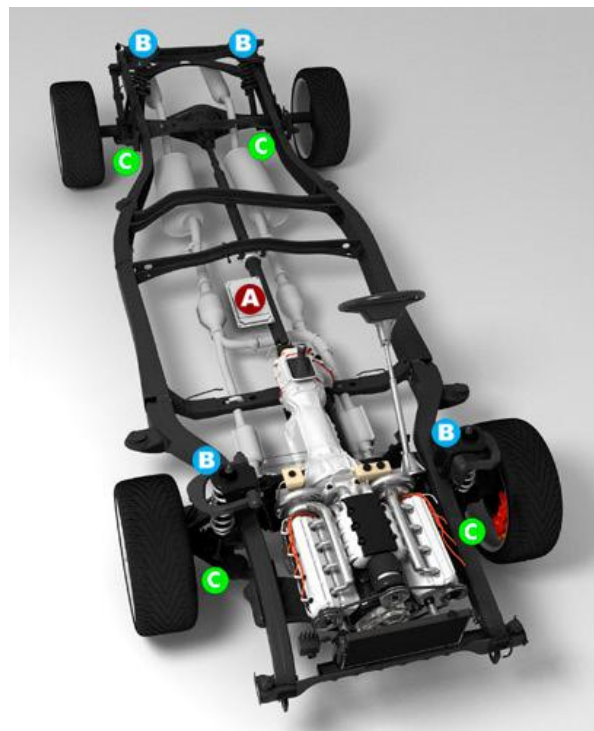
If the sensors sense any body roll, they communicate the information to the ECU, which in turn compensates by changing the strength of the current to the appropriate dampers.

The primary benefits of Magnetic Ride Control are:

- High precision
- Extremely fast response
- Low-velocity damping control
- Ability to "draw" force-velocity curve

The end result is excellent **chassis responsiveness, poise, and control that doesn't sacrifice everyday ride quality or comfort.**

**The 2020 Corvette Stingray** comes equipped with version 4.0 of Magnetic Ride Control with the biggest change to the system being the use of accelerometers rather than position sensors to measure wheel height.



### The MagneRide System

**A Computer Control Unit**

**B MagneRide Dampers**

**C Motion Sensors**

MagneRide is a sophisticated **Computer Controlled** suspension system that provides ultimate performance in any driving situation.

**MagneRide Dampers** (shocks) contain Magneto Rheological (MR) fluid that when exposed to magnetic energy undergo a change in effective viscosity, and as a result, a change in the amount of damping.

As MagneRide **Motion Sensors** detect a bump, pothole or obstacle, magnetic energy is adjusted on a millisecond-by-millisecond basis (about 300 times faster than the blink of an eye) to provide optimum damping for both comfort and control.

### MagneRide Benefits

- Automatically adjusts to road surface
- Rapid response to any road condition
- Maximum handling and feel
- Safe and secure even when towing
- Smooth ride quality
- Fewer components than traditional damping systems



# DEEP DIVE - BRAKE CALIPERS

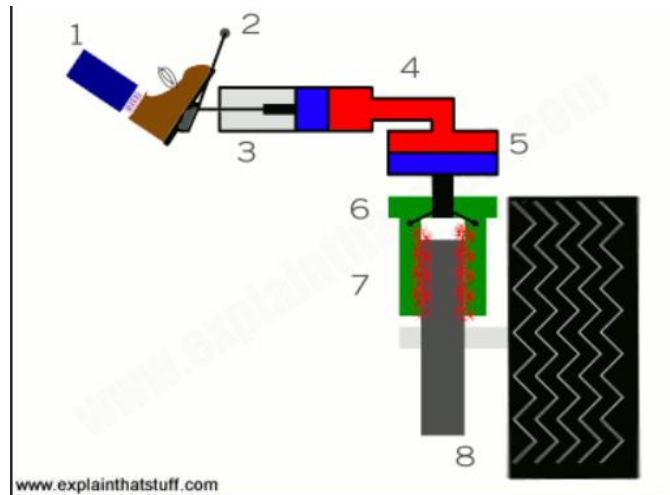
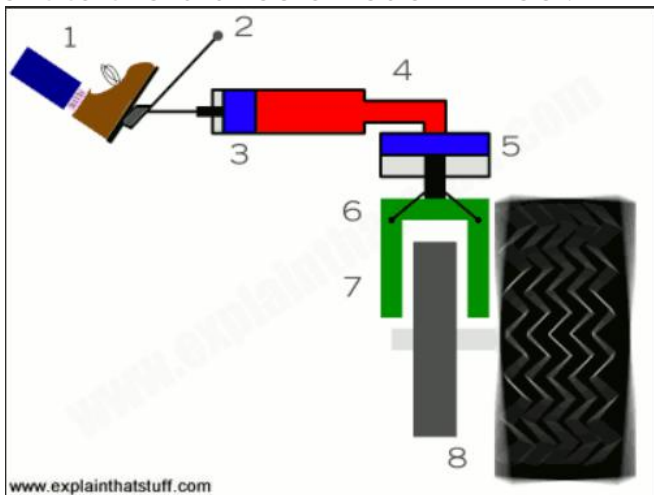
Like a decent remote-control car, your vehicle has a few basic functions: move forwards and backwards, turn left and right, and stop. Of course, **stopping a one-ton-plus car requires more than simply letting off the throttle**, and slamming it in reverse might destroy the transmission. Your car's brake system has come a long way since Bertha Benz, Karl Benz's wife, invented brake pads in 1886.

A car in motion has a lot of kinetic energy, which is energy of motion. To stop a car, the brakes have to get rid of that kinetic energy. **They do so by using the force of friction to convert that kinetic energy into heat.**



Brake disc turning red hot due to conversion of kinetic energy into heat.

When you press your foot down on the brake pedal, a connected lever pushes a piston into the master cylinder, which is filled with hydraulic fluid. That hydraulic fluid gets squirted along a system of pipes into other, wider cylinders positioned next to the brakes on each wheel.



Diagrammatic representation of hydraulic action on pressing the brake pedal.

This hydraulic system multiplies the force of your foot on the brake pedal into enough force to apply the brakes and make the car stop. The brakes themselves are usually one of two types: disc brakes or drum brakes. Disc brakes consist of a brake disc, a brake caliper, and a brake pad.

**Older cars and trucks used drum brakes**, where the motion of the wheels is slowed by friction between a rotating drum and brake shoes mounted inside the drum. This friction caused heat and gases to build up inside the drum, which often resulted in a loss of braking power known as **brake fade**.

Because the brake pads in disc brake systems are external to the disc rather than contained within a drum, they are more easily ventilated and heat doesn't tend to build up quite as fast.

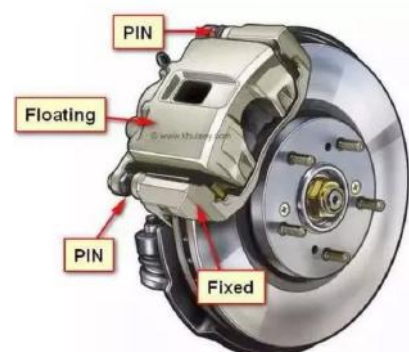
For this reason, drum brakes have been largely **replaced in modern vehicles by disc brakes.**

Brake calipers are essential to your car's ability to stop and are arguably one of the most important automobile brake parts. Most cars today have disc brakes, at least for the front wheels, anyway. But a lot of cars and trucks are now using disc brakes in the rear, too. In a disc-braking system the car's wheels are attached to metal discs, or rotors, that spin along with the wheels. **The job of the caliper is to slow the car's wheels by creating friction with the rotors.**

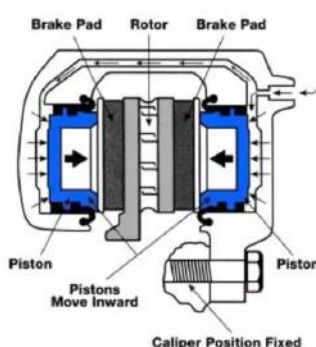


The brake caliper fits over the rotor like a clamp. Inside each caliper is a pair of metal plates bonded with **friction material - these are called brake pads**. The outboard brake pads are on the outside of the rotors (toward the curb) and the in-board brake pads on the inside (toward the vehicle). When you step on the brake, **brake fluid from the master cylinder** creates hydraulic pressure on one or more pistons in the brake caliper, forcing the pads against the rotor. The brake pads have high-friction surfaces and serve to slow the rotor down or even bring it to a complete halt. When the rotor slows or stops, so does the wheel, because they're attached to one another. Stopping a speeding car can **heat the brakes to 950° F or more!** To withstand such heat, brake pads must be made of special materials that won't melt at such high temperatures. Some of those special materials include composites, alloys, and ceramics.

There are two main types of calipers: **Floating (or sliding) calipers** and **Fixed calipers**. Floating calipers move in and out relative to the rotor. Fixed calipers, as the name implies, don't move, but rather have pistons arranged on opposing sides of the rotor.



*Floating brake caliper.*



*Fixed brake caliper.*

# OUR PRECIOUS SPONSORS

## FEATURED SPONSOR

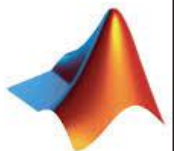


**Mr.Philippos Matthai**, who runs the SpeedSport automotive workshop, provides the best possible mods your car can have. With more than 20 years of experience in the field of motorsports, he really knows what it takes to **unleash the true power from a vehicle**; be it a superbike, a rally car, a vintage jeep or a formula student vehicle.

## UNLEASHING THE BEAST!

We welcome **SPEEDSPORT AUTO** on board as our **DYNAMOMETER PARTNER** for yet another season!

We thank everyone at the workshop for being a major pillar in the **development of our powertrain department** and the entire team as a whole.





# CONTACT Us

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