

INFINITI



DEMO VERSION



DEPARTMENT OF MECHANICAL ENGINEERING

VISION

To become a recognised knowledge hub in Mechanical engineering by moulding professionally competent and socially responsible engineers.

MISSION

- To create a conducive learning platform for students to excel as professionals, through quality technical education and training.
- To involve students in socially committed projects and programs to broaden their knowledge and integrity.
- To mould students with good leadership qualities, ethical values and life-long learning.



PROGRAMME SPECIFIC OUTCOMES (PSO)

- Apply the knowledge of thermal sciences, mechanical design, and manufacturing principles for analysing and evaluating problems in the domain of Mechanical Engineering.
- Apply the knowledge gained through multidisciplinary learning, to solve real life problems.
- Effectively use modern technology tools such as CFD, CAD/CAM and 3-D printing in Mechanical Engineering practice.

PROGRAMME EDUCATIONAL OBJECTIVES (PEO)

- Apply technical knowledge and skills to find feasible solutions in Mechanical Engineering domains and allied industries.
- Evolve as responsible professionals capable of solving socially relevant problems and pursue higher education and research.
- Exhibit professionalism, team work, and ethical attitude through continued learning to accomplish organisational goals.



**OUR
PATRON**



**CMI
FOUNDER**





Rev. Fr. John Paliakara CMI
EXECUTIVE DIRECTOR

Congratulations to the Mechanical Engineering Department for producing the newest issue of their departmental magazine, Infinity 6.0. It's worth acknowledging that they were the trailblazers in creating a departmental magazine in our college, and they have been consistent in publishing it every year since then. The essence of engineering is rooted in problem-solving, and mechanical engineering specifically requires practical creativity, a hands-on understanding of the work involved, and strong interpersonal skills such as networking, leadership, and conflict management. The production of a product is only one aspect of the equation; comprehending how to collaborate with people, ideas, data, and economics is what truly defines a mechanical engineer. I hope that this magazine, in its own unique way, provides readers with an insight into these qualities. My warmest wishes to the team accountable for this inventive initiative.



Rev. Fr. Jay Payyappilly CMI
JOINT DIRECTOR

It gives me great pleasure to write a few words about the Mechanical Engineering Department's Departmental Magazine, "Infinity 6.0." As one of the most diverse and versatile engineering fields, a Mechanical Engineering degree provides our students with a plethora of career opportunities. Our ME Department is doing everything possible to ensure that our students are prepared to start their careers on the right foot. It is truly inspiring to witness the ME Department excelling in all aspects of college life. I hope that this magazine, through its various pages, showcases the best that Mechanical Engineering has to offer and becomes an invaluable resource for all who read it. My best wishes to everyone who made this magazine possible.



Rev. Fr. Antony Davis CMI
JOINT DIRECTOR

I am glad our students successfully brought the fifth edition of INFINITY magazine. The main goal of INFINITY is to provide aspiring engineers with a comprehensive platform to showcase their technical knowledge and pen down innovative ideas. It demonstrates the Mechanical Engineering Department's dedication to outcome-based education and an improved student-teacher learning process. I wish the department continued success in its efforts to raise the quality of teaching and bring laurels to the institute. This magazine's Editorial Board deserves praise for accomplishing the dream of a quality magazine for the department.



Dr. Sajeev John
PRINCIPAL

I am thrilled to write a few words about the sixth release of Infinity, the Mechanical Engineering Department's departmental magazine. The department has always encouraged initiatives led by students, and this latest one is no different. I would like to take this opportunity to commend the departmental staff and students for their accomplishments in all aspects, and I would like to give a special shoutout to the editorial team for their successful publication of Infinity 6.0.



Dr. Sio M.T.

**HEAD OF DEPARTMENT OF
MECHANICAL ENGINEERING**

It gives me immense pleasure to congratulate the entire team on the successful publication of the sixth edition of our technical magazine, INFINITY. This achievement is a testament to the hard work, dedication, and passion that the students and staff of the Mechanical Department have put in to make this project a reality.

The latest edition of INFINITY is a true reflection of the creativity, knowledge, and expertise of our students and staff in the field of mechanical engineering. The articles, research papers, and technical reports are of the highest quality and are a valuable contribution to the academic community.

I am proud to have been a part of this amazing team of talented individuals, who have demonstrated their commitment to excellence through this publication. The insights and perspectives shared in this magazine will undoubtedly inspire future generations of mechanical engineers, and I am confident that it will serve as a valuable resource for years to come.

I would like to take this opportunity to extend my heartfelt appreciation to the entire team for their hard work and dedication towards making this edition of INFINITY a great success. Your enthusiasm, dedication, and commitment have set an example for others to follow, and I am truly grateful for your efforts.

Once again, congratulations to all the students and staff of the Mechanical Department at Christ College Of Engineering for their contribution towards the sixth edition of INFINITY. I am confident that we will continue to achieve great success in the future and make our institution proud.



Mr. Sanjiv K. S.

ASST. PROFESSOR

DEPARTMENT OF MECHANICAL ENGINEERING

I'm happy to announce the latest version of the Mechanical Engineering Department's technical magazine, named INFINITY, for the year 2023. I would like to convey my appreciation to the Management, Principal, Vice-Principal, Head of the Department, faculty, and students for their continuous assistance throughout the magazine's creation. Additionally, I want to acknowledge the student editorial team for their diligent efforts in completing the magazine on time, and I hope everyone enjoys reading it.



Alan Penny
CHIEF EDITOR

I am thrilled to share my heartfelt appreciation to everyone who contributed to the successful completion of the sixth edition technical magazine INFINITY. It is a matter of great pride to have served as the chief editor for this outstanding publication, and I am humbled by the dedication and hard work of everyone involved.

First and foremost, I extend my sincere gratitude to the committee members who put in long hours to ensure the magazine's high-quality standards were met. Your attention to detail and willingness to go above and beyond to achieve perfection is truly commendable. Thank you for your invaluable support and commitment to making this edition a success.

I would also like to express my deep appreciation to the staff members who have worked tirelessly behind the scenes to make this magazine a reality. Your invaluable contributions have helped to bring the magazine to life, and your expertise and guidance were instrumental in its success.

Finally, I would like to extend a special thank you to our principal, whose unwavering support has been crucial to the success of INFINITY. Your encouragement, guidance, and leadership have been instrumental in making this edition a success, and we could not have done it without you.

Once again, thank you to all those involved in making the sixth edition of INFINITY a reality. I am truly grateful for your hard work, dedication, and support.

Our Department Faculty.



Dr. Rajeev John



Dr. Sijo M. T.



Dr. Arun Augustine



Dr. Vishwanath Kaimal



Mr. Reynold Jose



Mr. Dony Dominic



Mr. Roshan David



Mr. Girishankar T. R.



Mr. Sanjesh K. S.



Mr. Paul J Alengadan



Ms. Aswathy P. Sajeew



Mr. Jackwin Vincent



Mr. Sunil Paul

Technical Staff



Mr. Joy E. T.



Mr. Bijoy Jose



Mr. Shijin K. M.

EDITORIAL BOARD



S. N. SHK. S.
STAFF EDITOR



SANJAY KUMAR
MAGAZINE EDITOR



JOEL JIJU
CO - EDITOR



MADHAV MENON
DESIGNER



CLINT E VINCENT
DESIGNER



RAHUL P. R.
DESIGNER



JOSPAUL S AMBOOKEN
DESIGNER



SHON SEBASTIAN
CONTENT HEAD



ALAN RAJU
CONTENT HEAD

RPM EXCOM'22



REYNOLD JOSE
FACULTY IN CHARGE



RINOYSAJUM
SECRETARY



ANLIN VARGHESE
JOINT SECRETARY



VICTOR VINCENT
TREASURER



RIKSON RAPHEL
TECHNICAL HEAD



KRISWIN JOSE T
EVENTS HEAD



SANJAY KUMAR
MAGAZINE EDITOR



SOBIN M P
CORE MEMBER



ANTONY BABY
CORE MEMBER



AALWIN SUSSAN
MEDIA HEAD



ASHIK AJITH



JOSHUA VARGHESE



MRIDHUL C V



VIVEK GOVIND

18 THE P12 SHUTTLE BY CANDELA

20 DUAL CLUTCH TRANSMISSION:

22 ASTRON OMEGA 1 ENGINE

24 AUTOMATION

26 AUTONOMOUS MARINE VESSELS

28 ANTI-LOCK BRAKING SYSTEM

30 SOLAR BALLOONS

32 FUEL CELL AIRCRAFT

34 HYDROSKIN

36 THE AVADI MA250

38 BENEFITS OF TOROIDAL PROPELLERS

THE MATERIAL SCIENCE OF 3D PRINTING 41

BIONICS 43

JAMES WEBB: SPACE TELESCOPE 44

WHY SPORTS ENGINEERING ? 46

METAMATERIALS 48

ECU REMAPPING 50

WHY THERE AREN'T DIESEL MOTORCYCLES 52

THE BOEING TTBW 54

4D AND 5D PRINTING 56

COMPUTATIONAL FLUID DYNAMICS 58

R.P.M. GALLERY 60

The P12 Shuttle by Candela



The P12 Shuttle is an electric water taxi developed by the Swedish company Candela. It is a revolutionary vessel that uses hydrofoils to reduce energy consumption and increase speed, making it one of the fastest and most efficient water taxis in the world.

The P12 Shuttle is a 12-passenger vessel that measures 8.2 meters in length and 2.4 meters in width. It is powered by an electric motor that produces 60 kilowatts of power and has a top speed of 30 knots, or 56 kilometers per hour. The electric motor is powered by a battery pack that can be recharged using renewable energy sources such as wind or solar power.

The hydrofoils on the P12 Shuttle lift the boat out of the water at high speeds, reducing drag and increasing efficiency. This technology allows the boat to travel further and faster on a single battery charge, making it an environmentally friendly and cost-effective alternative to traditional water taxis.

The P12 Shuttle is also equipped with advanced technology to ensure a smooth and comfortable ride for passengers. The

boat is equipped with a computer-controlled gyro system that keeps the vessel stable even in rough water, reducing the likelihood of seasickness. The boat also features an advanced noise reduction system that minimizes noise levels, making for a quiet and peaceful ride.

The P12 Shuttle has several potential applications, including ferrying passengers between urban centers, transportation to and from islands, and as a tourist attraction. The vessel has already been deployed in several cities around the world, including Stockholm, Paris, and Venice, and has received widespread praise for its innovation and efficiency.



One of the significant advantages of the P12 Shuttle is its environmental friendliness. The boat produces zero emissions, making it an excellent alternative to traditional gasoline-powered boats that can pollute the waterways. The P12 Shuttle also has a low noise profile, making it an ideal option for areas where noise pollution is a concern.

In conclusion, the P12 Shuttle is a remarkable achievement in marine engineering, combining speed, efficiency, and comfort in a single vessel. It represents a significant step forward in sustainable transportation, and its potential applications are vast. The P12 Shuttle is an example of how innovative technology can be used to address the challenges of urban transportation while minimizing environmental impact.

-RINOY SAJU

DUAL CLUTCH TRANSMISSION: A SMART WAY TO SHIFT GEARS

-P HARIKRISHNA

A DUAL CLUTCH TRANSMISSION (DCT) IS AN ADVANCED TYPE OF AUTOMATIC TRANSMISSION THAT FEATURES A DUAL CLUTCH MODULE AND TWO INPUT SHAFTS. WITH A GEAR PRE-SELECTION PROCEDURE AND OVERLAPPING OF CLUTCH ENGAGEMENT, DCT PROVIDES HIGH-QUALITY GEAR SHIFTING WITHOUT SACRIFICING FUEL EFFICIENCY AND RIDING COMFORT.

A WELL-DESIGNED CLUTCH ENGAGEMENT CONTROLLER IS CRUCIAL TO ACHIEVE A FAST AND SMOOTH GEAR SHIFTING WITHOUT NOTICEABLE TORQUE DISTURBANCE. IN THIS RESEARCH, A NEWLY DESIGNED CLUTCH-TO-CLUTCH SHIFTING CONTROLLER IS PROPOSED THAT SATISFIES BOTH OBJECTIVES OF FAST CLUTCH-TO-CLUTCH SHIFTING AND SMOOTH GEAR SHIFTING. THE CONTROL LAW IS IMPLEMENTED IN A LINEAR CONTROL METHOD THAT EXPLICITLY SEPARATES THE CONTROLLING OF THE TWO CLUTCHES. THE SIMULATION RESULTS SHOW THAT THE PROPOSED CLUTCH-TO-CLUTCH CONTROL LAW REDUCES THE AVERAGE MAGNITUDES OF THE OUTPUT TORQUES BY 32.5% AND PROVIDES A ROBUST AND RELATIVELY SIMPLE CONTROLLER.



A DUAL-CLUTCH TRANSMISSION OFFERS THE FUNCTION OF TWO MANUAL GEARBOXES IN ONE, PROVIDING A MORE COMFORTABLE AND EFFICIENT DRIVING EXPERIENCE. IN A CONVENTIONAL MANUAL TRANSMISSION, POWER DELIVERY CHANGES FROM ON TO OFF TO ON DURING GEAR SHIFT, CAUSING A PHENOMENON KNOWN AS "SHIFT SHOCK" OR "TORQUE INTERRUPT." A DUAL-CLUTCH GEARBOX, BY CONTRAST, USES TWO CLUTCHES THAT OPERATE INDEPENDENTLY. ONE CLUTCH CONTROLS THE ODD GEARS, WHILE THE OTHER CONTROLS THE EVEN GEARS. BY PRE-SELECTING GEARS, DCTS CAN SHIFT SEVERAL TIMES FASTER THAN IS POSSIBLE WITH A MANUAL TRANSMISSION.

DUAL CLUTCH TRANSMISSION IS AN INNOVATIVE AND EFFICIENT SOLUTION FOR MODERN CARS THAT OFFER FAST AND SMOOTH GEAR SHIFTING WITHOUT SACRIFICING FUEL EFFICIENCY AND RIDING COMFORT. A WELL-DESIGNED CLUTCH ENGAGEMENT CONTROLLER IS ESSENTIAL TO ACHIEVING THE BEST PERFORMANCE OF DCT. THE PROPOSED CLUTCH-TO-CLUTCH SHIFTING CONTROLLER PROVIDES A SIMPLE AND ROBUST SOLUTION THAT REDUCES THE AVERAGE MAGNITUDES OF THE OUTPUT TORQUES BY 32.5%. DCT IS BECOMING INCREASINGLY POPULAR IN MODERN CARS, AND IT WILL CONTINUE TO PLAY A SIGNIFICANT ROLE IN THE FUTURE OF THE AUTOMOTIVE INDUSTRY.

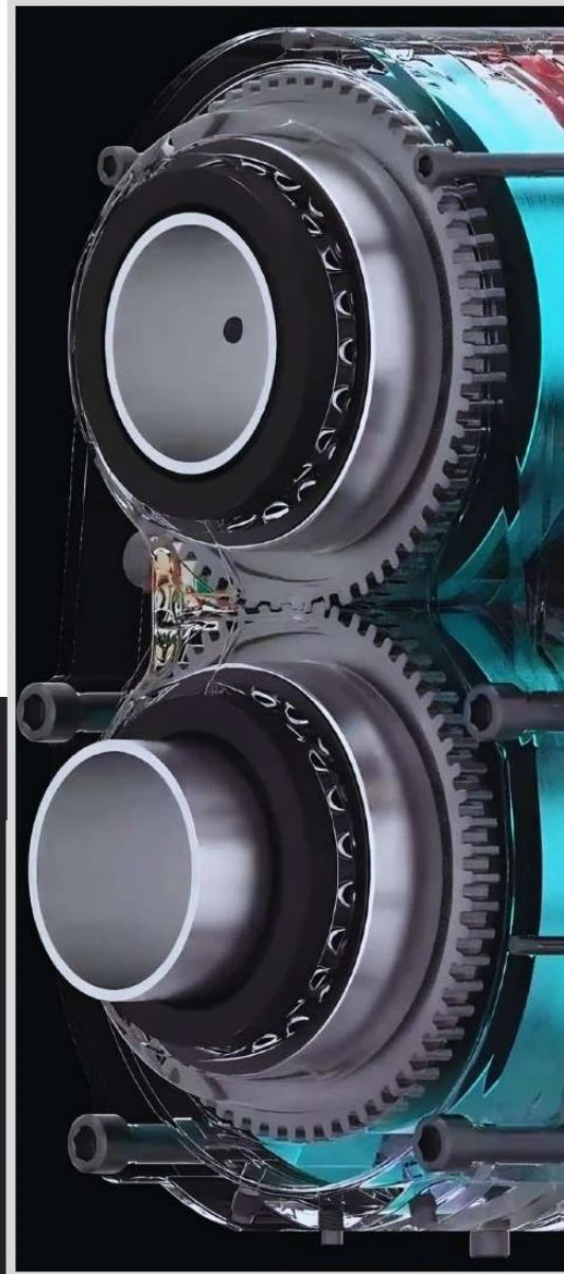
READY TO DESTROY ICE ENGINE!! ASTRON AEROSPACE- OMEGA 1 ENGINE

-JOEL JIJU

"While much of the world is hearing the death knell for the internal combustion engine, one company thinks they have a solution that will allow the suck, squish, bang, blow to continue, at least a little while longer. While large automobile companies like Audi, Hyundai, and Mercedes-Benz have announced that they have ceased research and development of IC powerplants, Astron Aerospace are in the midst of creating an all-new engine architecture unlike anything else on the market. With the usual dramatic claims of greatly improved power-to-weight, efficiency and low emissions, will this be the next big thing, or vapourware never to see the light of day?

While Astron has not signalled any intention to develop an engine for motorcycles, the claimed compact size and weight would seemingly be tailor-made for a two-wheeled application, especially since the weight and bulk of the current crop of batteries for electric motorcycles is one of the factors holding the segment back from hitting the mainstream. Thousands of pounds of batteries are acceptable in a Tesla when the power output is so prodigious and the overall weight of the vehicle is already in the thousands of pounds, but when the typical motorcycle weighs 500 pounds or less, adding any significant weight with batteries kills the performance and range very quickly. Astron sees their engine as being suitable for everything from aerospace, generators, military applications, and as a range extender for electric vehicles.

The Astron Omega 1 is truly a unique design, which, if it works, does seem to be a possible contender for the saving grace for IC engines. What Astron has done is separate the four strokes in a four-stroke engine into two separate chambers with a pre-chamber in between. The layout consists of two main shafts stacked vertically and connected with synchronizing gears so that they spin at the same RPM in opposite directions. Four rotors run on the two shafts in two pairs, one stacked pair on the front end taking care of the intake and compression strokes, the other pair on the back end taking care of com-





bustion and exhaust strokes. Between the two sets of rotors is a rotary disc valve and a pre-chamber.

The two lower rotors both have a paddle running in their own chamber, and the two upper rotors are solid except for a notch that meshes with the lower rotor paddles. Air is introduced into the front end chamber ahead of the paddle, and as it rotates, the paddle compresses the air as it comes up against the upper solid rotor. When the notch in the upper rotor is exposed, a port in the side of the chamber opens up, allowing the compressed air to flow into the prechamber. The paddle meshes with the notch, then the cycle starts again.

Meanwhile, in the pre-chamber, fuel is introduced via an injector. The mixture is then allowed into the rear chamber by the rotary valve, and a pair of glow plugs ignite the mixture. The resulting flame propels the paddle on the rear lower rotor around until the exhaust port is exposed, and the burnt gasses are expelled from the rear chamber.

The result is an engine with no reciprocating parts, and Astron claims that with precise machining, no sealing issues such as those found in a Wankel rotary engine. The detailed exploded view does not appear to have any seals except those for the four large bearings. Astron Aerospace claims the Omega 1 weighs 35 lbs. (15.9 kg), produces 160 horsepower, 170 lb-ft of torque, idles at 1000 RPM, and redlines at 25,000 RPM. They have built a running prototype, and they claim that the engine can run on a variety of fuels, with extremely low emissions (zero in some cases).

Automobile and motorcycle manufacturers are currently scrambling to perfect the all-electric vehicle to meet the low-emissions, no fossil fuel demands of governments worldwide, but it seems there are some who are still championing the cause of internal combustion. If Astron Aerospace can bring the Omega 1 (or 2 or 99) to fruition, there may well still be some life left in the fuel burners yet.



around the clock, without the need for breaks or rest periods. They can perform repetitive tasks with consistent accuracy and speed, reducing the risk of errors and delays. Automation can also streamline processes, allowing businesses to operate more efficiently and with greater output.

Another benefit of automation is its potential to reduce labor costs.

AUTOM

Automation refers to the use of technology to perform tasks without human intervention. With advancements in technology and the rise of artificial intelligence and robotics, automation is becoming increasingly prevalent across many industries. While automation has the potential to improve efficiency and productivity, it also raises concerns about job displacement and the role of humans in the workforce.

One of the most significant benefits of automation is its ability to increase productivity. Automated systems can work

Automated systems can perform tasks that would otherwise require human labor, saving businesses money on wages and benefits. This can also lead to increased profitability and allow businesses to invest in other areas of their operation.

However, the rise of automation also raises concerns about job displacement. As machines become more capable of performing tasks that were once done by humans, some jobs are becoming obsolete. This can lead to unemployment and a loss of livelihoods for those whose jobs are automated. It also raises questions about the future of work and the role of humans in the workforce.

In addition to job displacement, automation also raises concerns about the impact on job quality. While some jobs may become obsolete, others can be transformed, requiring workers to adapt and learn new skills. This can lead to a skills gap, where workers lack the skills needed for the jobs of the future. It is important for businesses and policymakers to consider the impact of automation on job quality and to invest in education and training programs to ensure that workers are equipped with the skills they need.

Another concern raised by automation is the potential loss of human touch in certain industries. For example, the rise of automated customer service systems may lead to a decrease in personalized customer interactions. It is important for businesses to consider the balance between efficiency and the importance of human interaction in certain industries.

ATION



Overall, automation has the potential to bring significant benefits to businesses, but it also raises important social and economic concerns. It is important for businesses, policymakers, and individuals to consider these issues and work together to ensure that the benefits of automation are realized while minimizing the negative impact on workers and society as a whole.

-ASHIYA JOSE

AUTONOMOUS MARINE VESSELS FOR OCEAN EXPLORATION

- SHON SEBASTIAN

Autonomous marine vessels have revolutionized ocean exploration by enabling scientists and researchers to gather data from remote and challenging locations without risking human lives. These unmanned vessels are equipped with advanced sensors, communication systems, and navigational tools that allow them to operate independently for extended periods of time. In this article, we will explore the innovations and future directions of autonomous marine vessels for ocean exploration.

Innovations in Autonomous Marine Vessels

Over the past few decades, there have been significant advancements in the development of autonomous marine vessels. These innovations have enabled researchers to explore the deepest and most remote parts of the ocean, unlocking new discoveries and insights about our planet.

One of the most significant innovations in autonomous marine vessels is the use of artificial intelligence (AI) and machine learning algorithms to improve navigation and data collection. AI systems can learn from previous data sets and adapt to changing environmental conditions to optimize their performance. For example, autonomous underwater vehicles (AUVs) can use machine learning

algorithms to detect and classify different types of marine organisms or to identify potential areas for geological exploration.

Another significant innovation is the development of hybrid autonomous vessels that can switch between autonomous and remote-controlled modes. This allows researchers to intervene and take control of the vessel in real-time if necessary. These hybrid vessels are particularly useful in situations where the vessel needs to navigate through narrow or challenging passages or when it needs to avoid obstacles or potential hazards.

Future Directions in Autonomous Marine Vessels

The future of autonomous marine vessels looks promising, with several areas of research and development showing great potential. Here are some of the future directions for autonomous marine vessels:

Increased Autonomy: Researchers are working on developing more autonomous vessels that can operate for longer periods of time without human intervention. This will allow them to explore more remote areas of the ocean and gather more data than ever before.

Improved Energy Efficiency: There is a growing focus on developing autonomous marine vessels that are more energy-efficient and sustainable. This includes the use of renewable energy sources such as solar and wind power, as well as the development of more efficient battery systems.

Enhanced Data Collection: The development of more advanced sensors and imaging systems will allow autonomous marine vessels to collect more accurate and detailed data about the ocean and its ecosystems. This data will be crucial for understanding climate change, ocean currents, and marine life.

Collaboration and Coordination: Researchers are exploring new ways of coordinating and collaborating between multiple autonomous marine vessels. This will allow them to cover larger areas of the ocean and work together to achieve common goals, such as mapping the ocean floor or tracking the movements of marine mammals.

Conclusion

Autonomous marine vessels are transforming the way we explore and understand the ocean. With innovations in AI, machine learning, and hybrid technology, these vessels are becoming more autonomous and capable of exploring deeper and more remote parts of the ocean. The future of autonomous marine vessels looks promising, with exciting developments in energy efficiency, data collection, and collaboration on the horizon. As we continue to unlock the mysteries of the ocean, autonomous marine vessels will play a crucial role in helping us understand and protect our planet.

Anti-lock Braking System also known as threshold braking system (ABS) is an automobile safety system which prevents the locking of wheels during braking and avoids uncontrolled skidding. The modern abs system allows steering during braking which gives more control over the vehicle in case of sudden braking. The main advantages of using ABS systems on vehicles is that it provides better control over the vehicle and decreases stopping distance on dry and slippery surfaces. Since in ABS installed vehicles the chance of skidding is very less and hence it provides a better steering control during braking. Without ABS systems, even a professional driver can fail to prevent the skidding of the vehicle on dry and slippery surfaces during sudden braking. But with the ABS system, a normal person can easily prevent the skidding of the vehicle and get better steering control during braking.

It works on the principle of threshold braking and cadence braking. Cadence braking and threshold braking is a technique in which a driver applies the brakes



Anti-Lock Braking System (ABS)

and releases it before locking up the wheel and then applies the brakes and releases it again before locking. This process of applying and releasing the brakes on the wheel is done in pulse form to prevent it from locking and stopping skidding of the vehicle. The driver practices this technique to achieve better control over the vehicle during instant braking and stops skidding of the vehicle.

ABS has four major components

1. Speed sensors
2. Valves

3. Pump
4. Controller

Speed Sensors:

It is used to calculate the acceleration and deceleration of the wheel. It consists of a toothed wheel and an electromagnetic coil or a magnet and a Hall Effect sensor to generate signal. When the wheel or differential of the vehicle rotates, it induces a magnetic field around the sensor. The fluctuation in this magnetic field generates voltage in the sensor. This voltage generated sends signals to the

controller. With the help of the voltage the controller regulates the acceleration and deceleration of the wheel.

Valves:

Each brake line which is controlled by the ABS has a valve. In some of the systems, the valve works on three positions.

1. In position one, the valve remains open; and pressure from the master cylinder passed through it to the brake.

2. In position two, the valve blocks the line and separates the brake from the master cylinder. And this prevents the further rise of the pressure to the brakes. Valve operates in second position when the driver applies the brake harder.

3. In position three, some of the pressure from the brake is released by the valve.

The clogging of the valve is the major problem in ABS. When the valve is clogged, it becomes difficult for the valve to open, close or change position. When the valve is in inoperable condition, it prevents the system from modulating the valves and

controlling pressure to the brakes.

Pump

Pump is used to restore the pressure to the hydraulic brakes after the valve releases the pressure. When the controller detects wheel slip, it sends signals to release the valve. After the valve releases the pressure supplied from the driver, it restores a desired amount of pressure to the braking system.



Controller

The controller used in the ABS system is of ECU type. Its main function is to receive information from each individual wheel speed sensor and if a wheel loses its traction with the ground, a signal is sent to the controller, the controller then limits the brake force (EBD) and activates the ABS modulator. The activated ABS modulator actuates the braking valves on and off and varies the pressure to the brakes.

-NEHAR FASAL M

Solar Balloons: The Future of Air Travel?

When you think of hot air balloons, you might imagine a leisurely, romantic ride through the skies. But what if hot air balloons could be used for more than just recreational purposes? What if they could be used as a form of sustainable transportation? Enter the solar balloon. Unlike traditional hot air balloons, which are powered by propane or other fossil fuels, solar balloons harness the power of the sun to lift off and stay aloft.

How do solar balloons work? The basic concept is simple: a large, lightweight balloon is filled with air and then heated by the sun. As the air inside the balloon heats up, it becomes less dense than the surrounding air and begins to rise. By controlling the amount of heat inside the balloon, the pilot can control its altitude and direction.

One of the main advantages of solar balloons is their sustainability. Unlike traditional hot air balloons, which emit carbon dioxide and other pollutants, solar balloons are completely emissions-free. They also require less fuel, since they rely solely on the power of the sun. Another advantage is their versatility. Solar balloons can be used for a wide range of purposes, from tourism to scientific research. They can also be used in remote areas where traditional forms of transportation are unavailable or impractical.

Of course, solar balloons are not without their challenges. One of the main issues is their dependence on the weather. Solar balloons can only fly on clear, sunny days, and even then, they are subject to wind and other weather conditions. This means that they may not be a practical form of transportation in all areas.

Another challenge is their size. Solar balloons are typically much larger than traditional hot air balloons, which can make them more difficult to launch and land. They also require large and more specialized equipment for maintenance and storage.

Despite these challenges, many experts believe that solar balloons have a bright future as a form of sustainable transportation. With advances in technology and materials, solar balloons may become more efficient and easier to use in the years to come. Who knows – we may one day see fleets of solar balloons crisscrossing the skies, carrying passengers and cargo in a more sustainable way than ever before.

A solar balloon typically consists of a large envelope made of a thin, transparent material such as polyethylene or Mylar, which can capture the solar radiation and convert it into heat. The balloon is filled with ordinary air, but as the air inside warms up, it becomes less dense than the surrounding air and rises up, creating a buoyant force that can lift the balloon. To control the altitude and direction of the balloon, a small opening at the bottom or top of the envelope can be used to release some of the hot air, while a tether or a wind vane can guide the balloon's path.

One of the main advantages of solar balloons is their low cost and accessibility. Unlike traditional balloons that require expensive helium or hydrogen gas, solar balloons can be made from cheap and widely available materials, such as trash bags, plastic wrap, or even bubble wrap. They can also be easily assembled and disassembled, allowing for portable and reusable designs that can be shared among enthusiasts or students. Moreover, solar balloons are silent and non-polluting, making them ideal for observing wildlife, monitoring the environment, or conducting aerial photography without disturbing the natural habitat.

Another benefit of solar balloons is their versatility and educational value. By experimenting with different sizes, shapes, colours, and materials, one can learn about the principles of thermodynamics, fluid dynamics, aerodynamics, and solar energy. Solar balloons can also be used to measure atmospheric variables such as temperature, humidity, pressure, and wind speed, or to carry small payloads such as cameras, sensors, or experiments.

-ALAN BENNY

FUEL CELL AIRCRAFT: THE FUTURE OF AVIATION?

-ALAN RAJU

In recent years, the aviation industry has been facing increasing pressure to reduce its carbon footprint and find more sustainable way of operating. One solution that has been gaining traction is the use of fuel cell aircraft, which use hydrogen as a power source instead of traditional fossil fuels.

Boeing and Airbus have both announced plans to design and launch hydrogen-fueled aircraft by 2035. Airbus has even introduced a concept called ZEROe, which includes hybrid hydrogen aircraft designs.

So why are fuel cell aircraft seen as a promising solution? For one, they have the potential to produce zero emissions. When green hydrogen is used to generate electricity in a fuel cell, the only byproducts are water and warm air. This is a stark contrast to traditional aircraft engines, which produce significant amounts of carbon dioxide and other pollutants.

Hydrogen also has a high specific energy, meaning it has a high energy content per unit of weight. In fact, its specific energy is 2.8 times higher than that of traditional liquid fuels. However, hydrogen has a much lower energy density at normal atmospheric pressure and temperature, making it more difficult to store and transport. Liquid hydrogen has an energy density of 8,491 kJ/L when cooled at 20 K, which is 3.7 times lower than liquid fuels. This means that hydrogen takes up four times more volume on an aircraft than traditional fuels





In addition to the environmental benefits, fuel cell aircraft also offer the potential for lower operating costs. While the initial investment in the technology may be higher, hydrogen fuel is expected to be cheaper in the long run compared to traditional fossil fuels due to its abundance and the potential for renewable sources of production. This could lead to lower ticket prices for consumers and increased profitability for airlines.

Fuel cell aircraft also have the potential to revolutionize air travel by enabling longer flight ranges and faster speeds. Hydrogen fuel cells offer high power density and can produce more electrical energy per unit of fuel compared to traditional combustion engines. This means that fuel cell aircraft could potentially fly longer distances without refueling, making them ideal for intercontinental travel.

Despite these challenges, there are advantages to using hydrogen. Liquid hydrogen is an excellent coolant, and precooled jet engines could use this property to cool the intake air of hypersonic aircraft. It could even be used to cool the aircraft's skin itself, particularly for scramjet-powered aircraft.

The key to making fuel cell aircraft a reality is the availability of cheap, green energy to produce the hydrogen. This is already happening in some parts of the world, where wind and solar power are being used to produce hydrogen. In the future, it's possible that this hydrogen could even be used to produce sustainable aviation fuel (SAF).

Moreover, fuel cell aircraft technology has the potential to be applied to other modes of transportation, such as cars, buses, and trains. This would further reduce carbon emissions and promote sustainability across multiple industries.

Overall, fuel cell aircraft represent a promising solution for reducing the environmental impact of air travel while also improving efficiency and performance. As the technology continues to develop and become more widespread, it could revolutionize the aviation industry and pave the way for a more sustainable future.

-ESTIN JOSE

HYDROSKIN

-SOBIN M. P.

Hydroskin is a zero-emission cooling technology that is designed to revolutionize the way cooling systems work. Developed by the British company, Hydrosol, the technology is based on the principle of evaporative cooling, which is a natural process that involves the evaporation of water to cool an area. The Hydroskin system uses a special polymer membrane that has a unique structure, allowing water to pass through it while blocking the passage of air. When the membrane is exposed to air, it creates a layer of water droplets that evaporate, creating a cooling effect. This process is known as adiabatic cooling and is highly efficient in reducing the temperature of an area.

Moreover, Hydroskin has a significant impact on improving the indoor air quality of buildings. Unlike traditional air conditioning systems that recirculate the same air, Hydroskin technology provides fresh air by drawing it through the evaporative process. This process helps remove pollutants and allergens from the air, making it healthier and safer to breathe. Improved indoor air quality can also increase employee productivity and reduce the risk of illness, making it a vital factor in the design and operation of modern buildings.

One of the significant advantages of Hydroskin is its ability to work without the need for electricity or refrigerants, making it a zero-emission technology. The system works by using the natural energy of water, and it does not produce any harmful gases or waste products.

The Hydroskin technology has several applications, including cooling data centers, industrial facilities, and commercial buildings. It is also suitable for use in outdoor areas such as sports fields, parks, and outdoor events.

One of the significant benefits of Hydroskin is its cost-effectiveness. The system requires no electricity or refrigerants, which means that it has a lower operating cost than traditional cooling systems. It is also easy to install and requires minimal maintenance, making it an attractive option for businesses and organizations looking to reduce their energy costs.

Hydroskin also has environmental benefits. As a zero-emission technology, it helps reduce the carbon footprint of businesses and organizations. It is also highly efficient in reducing the temperature of an area, which helps reduce the need for air conditioning systems that can be energy-intensive and harmful to the environment.

In conclusion, Hydroskin is a highly innovative and efficient cooling technology that has the potential to revolutionize the way cooling systems work. Its ability to work without electricity or refrigerants, its cost-effectiveness, and environmental benefits make it an attractive option for businesses and organizations looking to reduce their carbon footprint and energy costs. As the demand for sustainable technologies continues to grow, it is likely that Hydroskin will play an increasingly important role in the future of cooling systems.



Hydroskin Glove

THE AVADI MA250 ADVANCING THE AUTOMOTIVE INDUSTRY

-JOSPAUL S AMBOOKEN

The MA250 engine is an internal combustion engine designed and developed by the Engine Division of the Combat Vehicles Research and Development Establishment (CVRDE) located in Avadi, India. It is a high-performance engine that has been primarily developed for use in tanks and other armored vehicles.

The MA250 engine is a V-type engine with a displacement of 14.2 liters. It has a maximum power output of 1,000 horsepower (hp) at 2,300 revolutions per minute (RPM) and a peak torque of 3,500 Newton-meters (Nm) at 1,800 RPM. The engine is capable of reaching a top speed of 75 kilometers per hour (km/h) and can accelerate from 0 to 32 km/h in just 7.5 seconds.

The engine is designed to operate in harsh environments, including extreme temperatures and dusty conditions.

The engine block is made of cast iron, and the cylinder heads are made of aluminum alloy. The MA250 engine uses a twin-turbocharger system, which ensures that the engine can maintain its power output even at high altitudes.

One of the unique features of the MA250 engine is its fuel injection system. The engine uses an electronically controlled unit injector (ECUI) system, which optimizes the fuel injection process and ensures that the engine runs efficiently. The fuel injection system is also designed to reduce emissions, making the engine environmentally friendly.

The MA250 engine has undergone rigorous testing and has been certified by the Centre for Military Airworthiness and Certification (CEMILAC) in India. It has also been tested by international agencies, including the United States Army, which has certified the engine for use in armored vehicles.

The MA250 engine is a significant achievement for the CVRDE and the Indian defense industry. It has proven to be a reliable and high-performance engine that can meet the demands of modern armored vehicles. The engine has also been designed with the future in mind, with features that ensure it can be upgraded and adapted as technology advances.





The development of the JWST has been a long and complex process, with the project starting in 1996. The telescope has faced several delays and budget overruns, but the scientific community is eagerly awaiting its launch. Once in space, the JWST will be a game-changer in the field of astronomy, opening up new possibilities for research and discovery.

The telescope is also equipped with an array of advanced scientific instruments, including a Near Infrared Camera (NIRCam) and a Mid-Infrared Instrument (MIRI). These instruments will allow the telescope to observe the universe in infrared light, which can penetrate through cosmic dust and reveal details that are not visible in visible light.

One of the main goals of the JWST is to study the formation of stars and galaxies in the early universe. By observing the light emitted by these objects, astronomers can learn about the conditions that existed billions of years ago, and how the universe has evolved over time. The JWST will also be used to study the atmospheres of exoplanets, which are planets outside our solar system. By analyzing the light that passes through an exoplanet's atmosphere, scientists can determine the planet's composition and potential habitability.

James Webb

Space Telescope

-ROSHAN BABU



The James Webb Space Telescope (JWST) is a space observatory set to launch in 2021, with the goal of advancing astronomical research and discovery. Named after James E. Webb, a former NASA administrator, the telescope is a collaborative effort between NASA, the European Space Agency (ESA), and the Canadian Space Agency (CSA).

The JWST has several advanced features that make it superior to previous telescopes. For instance, it has a mirror that is 6.5 meters in diameter, which is more than twice the size of the Hubble's mirror. This larger mirror will allow the JWST to collect more light, resulting in sharper and clearer images of celestial objects.

WHY SPORTS ENGINEERING ?

RINOY SAJU M

Sports engineering is a fascinating field that combines engineering principles with the science of sports. Its aim is to develop new technologies and techniques to help athletes perform better, reduce the risk of injury, and enhance the overall sports experience for both players and spectators. In this article, we will explore some of the latest developments in sports engineering.

One of the most exciting areas of sports engineering is the development of wearable technology. Wearable sensors and devices can provide athletes with real-time feedback on their performance, allowing them to adjust their techniques or training regimes accordingly. For example, sensors embedded in clothing can track an athlete's movements and provide data on their posture, balance, and muscle activation. This information can help athletes improve their technique, reduce the risk of injury, and optimize their training programs.

Another area of sports engineering that is rapidly developing is sports equipment design. Advances in

materials science and engineering have led to the development of lighter, stronger, and more durable equipment. For example, carbon fibre composites are now widely used in the design of sports equipment such as tennis rackets, bicycles, and golf clubs. These materials offer a high strength-to-weight ratio, allowing for improved performance and reduced fatigue for athletes.

Sports engineering is also playing a vital role in the design of sports facilities. Engineers are using cutting-edge technology to design and build stadiums and arenas that are not only visually stunning but also environmentally sustainable. For example, some stadiums use solar panels and wind turbines to generate their own power, while others use rainwater harvesting systems to reduce water consumption.

The application of robotics in sports is another exciting area of sports engineering. Robotics can be used to develop training aids, such as robots that can mimic the movements of a tennis player or a basketball player. These robots can provide athletes with more realistic training scenarios, helping them t

A full-page background image of a soccer player in a blue jersey running with a yellow and blue soccer ball. The image is overlaid with a large, diagonal, semi-transparent watermark that reads "DEMO VERSION".

to improve their skills and performance. In addition, robots can be used to monitor athletes' movements during training and competition, providing coaches and medical staff with valuable data on an athlete's physical condition.

Finally, sports engineering is also making sports more accessible for people with disabilities. Advances in prosthetics and assistive technology are enabling people with disabilities to participate in sports and physical activities in ways that were not possible before. For example, prosthetic legs that incorporate sensors and microprocessors can provide amputee runners with greater stability and control, allowing them to run faster and more efficiently.

In conclusion, sports engineering is a rapidly developing field that is revolutionizing the way we play and watch sports. From wearable technology to sports equipment design, from stadium construction to robotics, sports engineering is helping athletes perform better, reducing the risk of injury, and making sports more inclusive and accessible for everyone.

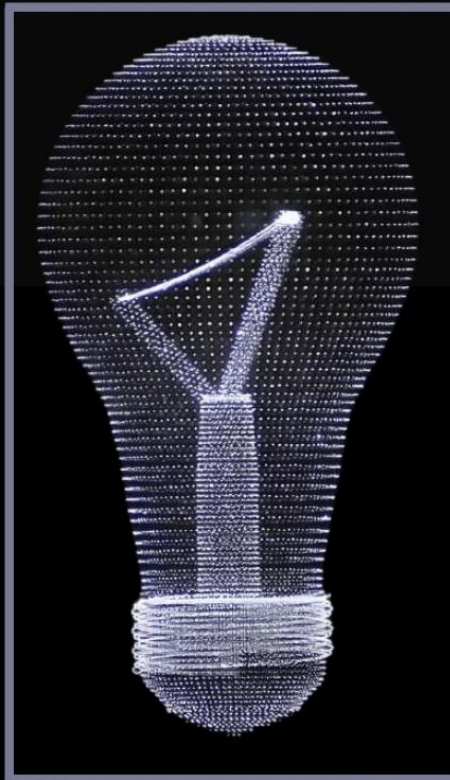
METAMATERIALS

Ebin Babu V

Metamaterials are a class of artificial materials that can exhibit electromagnetic properties not found in nature, such as negative index of refraction or electromagnetic cloaking. The concept of negative index material was first introduced by Victor Veselago in the 1960s, and it became a reality at the turn of the century.

A metamaterial is typically composed of many small individual elements, or "meta-atoms," that interact with electromagnetic waves at a size much smaller than the wavelength. These unit cells are constructed from conventional materials like metals and dielectrics, but their shape, size, geometry, and arrangement can affect light in unconventional ways, such as creating resonances or unusual values for macroscopic permittivity and permeability.

Examples of metamaterials include negative index metamaterials, chiral metamaterials, plasmonic metamaterials, and photonic metamaterials.

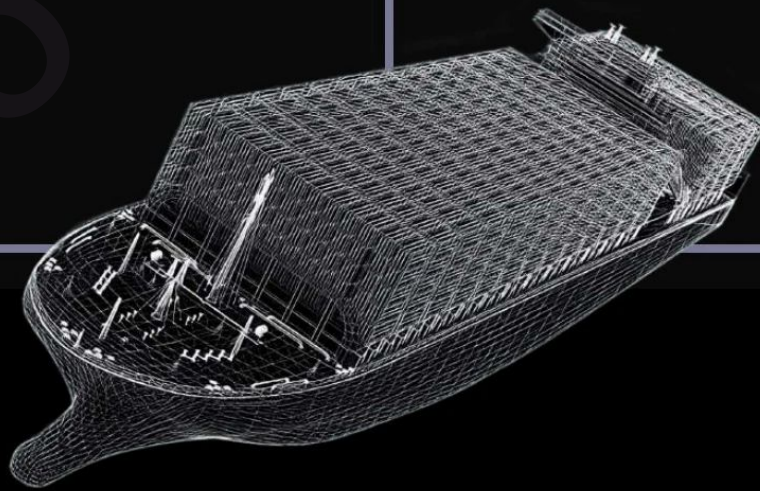


Metamaterials that operate at microwave frequencies typically have a unit cell size of a few millimetres, while those operating in the visible part of the spectrum have a unit cell size of a few nanometres.

Metamaterials are also inherently resonant, meaning they can strongly absorb light at a certain narrow range of frequencies, which can block or absorb a particular colour in the spectrum. Unlike conventional materials, where electromagnetic properties arise from the response of atoms or molecules, metamaterials' properties are determined by the configuration of the smaller objects that make them up. However, despite not appearing at an atomic level like conventional materials, a metamaterial can be designed to allow an electromagnetic wave to pass through it as if it were passing through a conventional material.

Moreover, the electromagnetic properties of a metamaterial can be accurately tuned on a very small scale because they depend on the composition and structure of the small (nanoscale) objects that make it up. Recent years have seen significant developments in optical metamaterial design, engineering, and fabrication, creating excitement among researchers and consumers alike.

Visible metamaterial products are being developed and commercialized at an astonishing rate. As metamaterial technology continues to advance, we can expect a technological revolution that will transform the world around us. Metamaterials also have potential applications in energy harvesting. By manipulating the flow of energy, they can be used to create more efficient solar cells and other energy-harvesting devices.



metamaterials have the potential to create invisibility cloaks. While this might sound like science fiction, researchers have already demonstrated the ability to cloak objects from certain wavelengths of light. This technology could have applications in defense, as well as in creating more immersive virtual and augmented reality experiences.

In conclusion, metamaterials are one of the most exciting and promising fields of science today. They have the potential to revolutionize a wide range of industries and technologies, from medicine to energy to defense. While they are still in the early stages of development, it is clear that we are only just scratching the surface of what these materials can do. The future of science fiction is here, and it is in the form of metamaterials.



ECU

REMAPPING



ALWIN THOMAS

ECU remapping, also known as chip tuning or engine tuning, is the process of altering the electronic control unit (ECU) settings of a car's engine to improve its performance. This process can be applied to cars with different numbers of cylinders, including those with 4-cylinder engines.

The ECU is a computer that controls various functions of the engine, such as fuel injection, ignition timing, and turbo boost pressure. By modifying the ECU settings, it is possible to increase the power and torque output of the engine, as well as improve its fuel efficiency and drivability.

When it comes to 4-cylinder engines, ECU remapping can be especially effective because these engines tend to be smaller and more compact than larger engines, such as V6 or V8 engines. This means that any improvements in power and torque can have a more significant impact on the overall performance of the car.

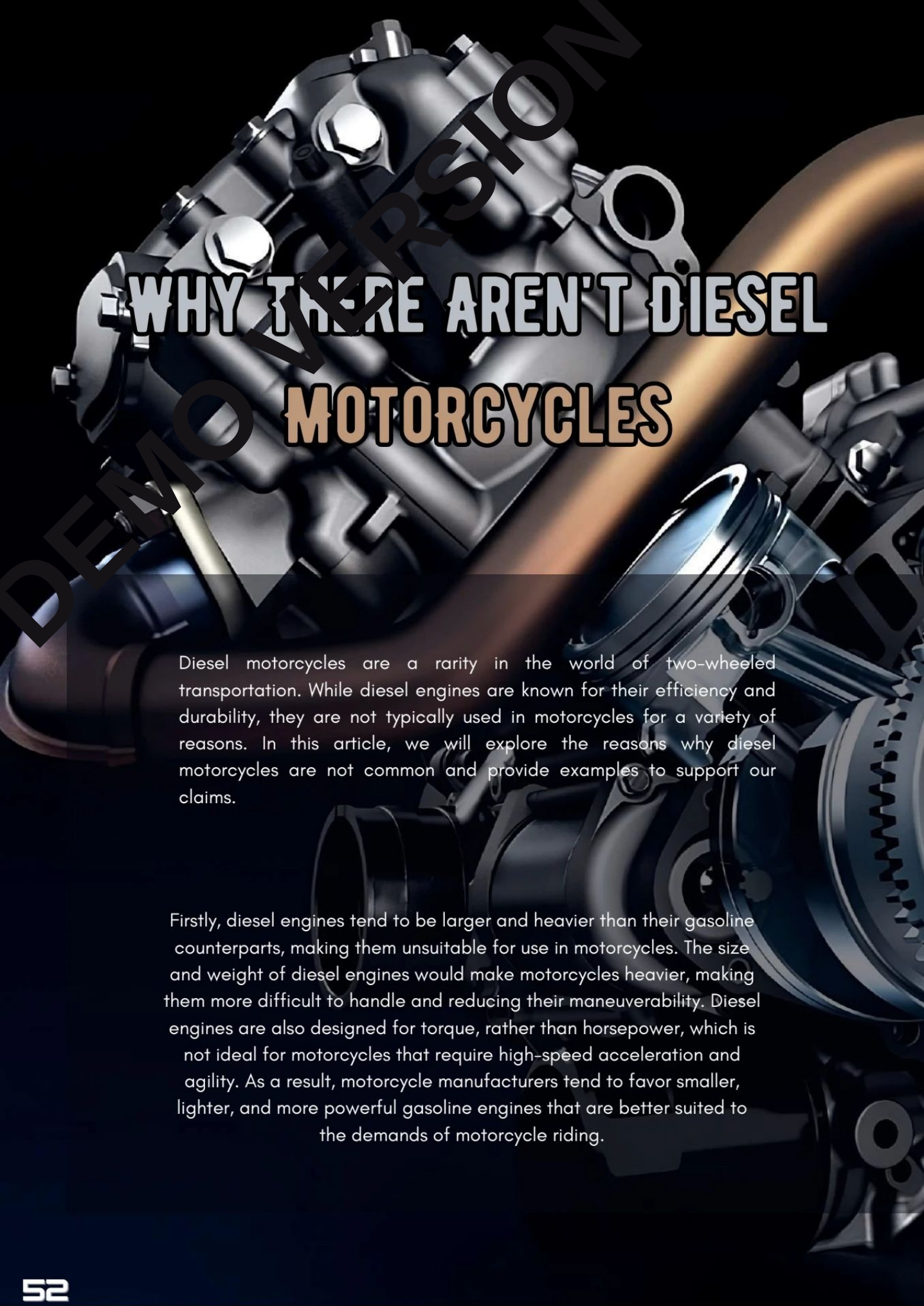
One of the most common ways to remap a 4-cylinder engine is to increase the turbo boost pressure. Turbocharging is a popular method of boosting the power output of a small engine, and increasing the boost pressure can lead to significant gains in horsepower and torque. However, the process of remapping differs for cars with and without turbochargers.

For cars with turbochargers, remapping often involves increasing the boost pressure and fuel injection timing. This results in more power and torque from the engine, but also requires modifications to the exhaust and cooling systems to handle the increased heat generated. On the other hand, for cars without turbochargers, remapping involves adjusting the fuel injection and ignition timing to optimize the engine's performance. This can result in improvements to power output, torque, and fuel efficiency, but the gains are typically less dramatic than with turbocharged cars.



When remapping any car, it is important to ensure that the modifications are compatible with the vehicle's components and systems. Remapping can put extra strain on the engine and other components, so it is essential to ensure that they can handle the increased power output. It is also important to choose a reputable remapping company with experienced technicians who understand the complexities of remapping.

However, it is important to note that ECU remapping should only be done by a qualified professional. The process involves making changes to the complex electronic systems of the car, and if not done correctly, it can cause damage to the engine or other components.



WHY THERE AREN'T DIESEL MOTORCYCLES

Diesel motorcycles are a rarity in the world of two-wheeled transportation. While diesel engines are known for their efficiency and durability, they are not typically used in motorcycles for a variety of reasons. In this article, we will explore the reasons why diesel motorcycles are not common and provide examples to support our claims.

Firstly, diesel engines tend to be larger and heavier than their gasoline counterparts, making them unsuitable for use in motorcycles. The size and weight of diesel engines would make motorcycles heavier, making them more difficult to handle and reducing their maneuverability. Diesel engines are also designed for torque, rather than horsepower, which is not ideal for motorcycles that require high-speed acceleration and agility. As a result, motorcycle manufacturers tend to favor smaller, lighter, and more powerful gasoline engines that are better suited to the demands of motorcycle riding.



Secondly, diesel engines produce more vibration and noise than gasoline engines, which can be uncomfortable for riders. Motorcycles are already noisy machines, and the addition of a diesel engine would only make things worse. Moreover, vibrations from the engine can be distracting for the rider, reducing their ability to concentrate on the road. This can be dangerous, especially at high speeds.

Thirdly, diesel engines tend to be more expensive to produce than gasoline engines. While diesel engines are generally more fuel-efficient than gasoline engines, the added cost of production makes them less cost-effective for motorcycles, which are typically lower-priced vehicles. This is especially true for small and medium-sized motorcycles.

In conclusion, while diesel engines have many advantages over gasoline engines, their bulky and heavy design makes them unsuitable for use in motorcycles. Additionally, the high vibration and noise levels of diesel engines would make for a poor riding experience. Furthermore, the lack of demand for diesel motorcycles and the stringent emissions regulations in many countries make it economically unviable for manufacturers to produce them. As a result, gasoline engines remain the preferred choice for motorcycle manufacturers, providing a balance between power, weight, and fuel efficiency. While it is possible that advances in technology may make diesel motorcycles a feasible option in the future, for now, it seems unlikely that we will see them on the roads anytime soon.

MENON MADHAV HARIKISHEN

The Boeing TTBW



The Boeing Transonic Truss-Braced Wing (TTBW) airliner is looking to rewrite the rulebook on how planes are designed. Originally conceived in 2010, the design is in its fourth phase of testing and evaluation. If all goes to plan, Boeing predicts we could see planes like this taking to the skies as soon as 2030 - 2035. Here's what you need to know about the TTBW.

What is the TTBW?

Boeing unveiled a ground-breaking new concept back in January last year. The Transonic Truss-Braced Wing (TTBW) airliner looks to rewrite the rule books on aircraft design, and could give us a glimpse into the future of flying.

Working in collaboration with NASA, the Boeing concept plane features a lightweight, ultra-thin and more aerodynamic wing design, engineered to offer the best fuel efficiency in the skies. The TTBW concept is designed to fly up to Mach 0.80, a similar speed to current jetliners and faster than any previous truss-braced wing concept.

From tip to tip, the wingspan of this concept plane comes in at 170 feet (51m). While that's big, it's not as big as the wingspan of an A350 (212.4 ft / 64.75m) or even the 787 Dreamliner (197 ft / 60m). However, this is no widebody aircraft, as it's seen as an evolution of the Boeing 737 class of planes. Compared to the 737 MAX 8, for example, the TTBW exceeds its wingspan by some 53 ft (16m).

- The Future Of Passenger Planes?

AJWIN ANTONY

And it's not just the size of the wingspan that makes all the difference here.

The TTWB uses a modified wing sweep and an ultra-thin design, which reduces induced cruise-drag of the high aspect ratio wing. As a result, the plane is expected to deliver a 9% fuel burn saving over conventional tube-and-wing jets when operating on flights of up to 3,500 nm. To enable this huge narrowbody wingspan, Boeing is planning to employ a technology that we've seen proven on something a whole lot bigger. The folding wingtips of the 777X have become its trademark feature, but the TTBW takes this one step further.

The wings would fold almost in half, with support provided by the truss being reliant on the cantilever design used in aircraft today.

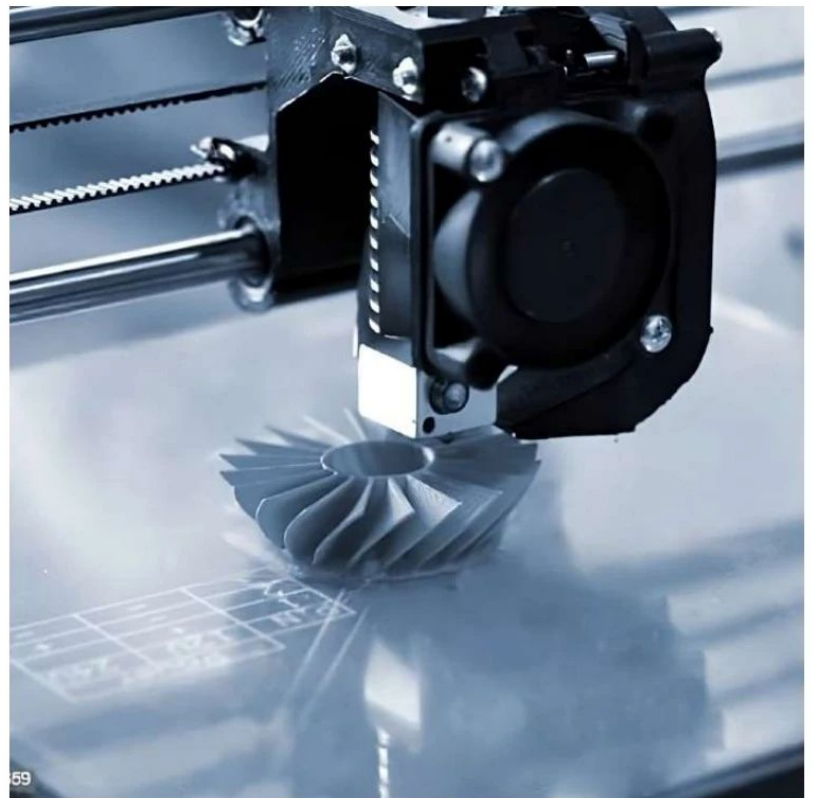
Will we ever see the concept fly?

While Boeing and Airbus often unveil concepts which, in practice, never make it off the ground, the researchers are confident this is a design modification that will eventually make it to the mainstream. Boeing has been working on a TTBW design since 2010, via the partnership known as the Boeing and NASA Subsonic Ultra Green Aircraft Research (SUGAR) program, and now sees airliners using this concept taking to the skies in 2030 - 2035.



ADD AND SUB PRINTING

-ANTONY PAUL



4-D PRINTING 5-D PRINTING

4D printing is an ongoing research concept. 4D printing is a process in which a 3D printed object is converted into another structure through the influence of stimuli such as temperature, light, water, heat, etc. 4D printing was first introduced by the Self-Assembly Lab at MIT, headed by Skylar Tibbitts, and a reference. The working of 4D printing has some similarities with that of 3D printing. In 3D printing, a material is directly converted into a static structure, while in 4D printing, smart material replaces the material used in 3D printing, which is converted into a static structure. This structure is then converted into a dynamic intelligent structure, influenced by stimuli. For example, a single-strand material containing smart material dropped into a vessel containing water will be affected by the water, resulting in a change of shape.

4D printing is mainly used in four sectors. In the healthcare sector, we can manufacture 4D printed proteins, such as self-reconfiguring proteins. Additionally, in the medical field, we can design programmed stents using 4D printing. In the piping system, pipes can dynamically change their diameter in response to speed and water quantity, and any cracks or fractures can be healed automatically. In the furniture sector, Self-Assembly furniture is created using 4D printing. Any particle or wooden board can turn into a sleigh bed frame by adding stimuli such as water or heat. In the fashion sector, a single dress's texture and material can be changed automatically in response to the climatic change in the region.

The notion of 5D printing originated from the research and development in 3D printing. 5D printing was first coined by some American universities and first executed by the Mitsubishi Electric Research Lab, headed by William Yerazunis. In 5D printing, the material is constructed using five different axes, making the structure more intricate and stronger. The two major components in 5D printing are the printing head and printing bed, which move through different axes. The printing head can move through x, y & z axes, while the printing bed can only move through two axes. During printing, these two components can move simultaneously. 5D printed items are stronger than 3D printed items, and they require less material than 3D printed items.

As 5D printing is an ongoing research concept, it has limited applications. In the dentistry field, many surgical equipment items are intricate in structure. Using 5D printing, we can easily manufacture complicated equipment such as dentures and dental implants. Nowadays, many parts of the human body can be artificially made, such as artificial bones that require proper structure and accurate finishing in curved parts. 5D printing can provide high accuracy for these parts. 5D printing is also used in the prosthetics sector, as the artificial body parts replacing legs, hands, etc., need to be strong. Construction and automobile sectors also prefer 5D printing because the components used in these sectors should be stronger.

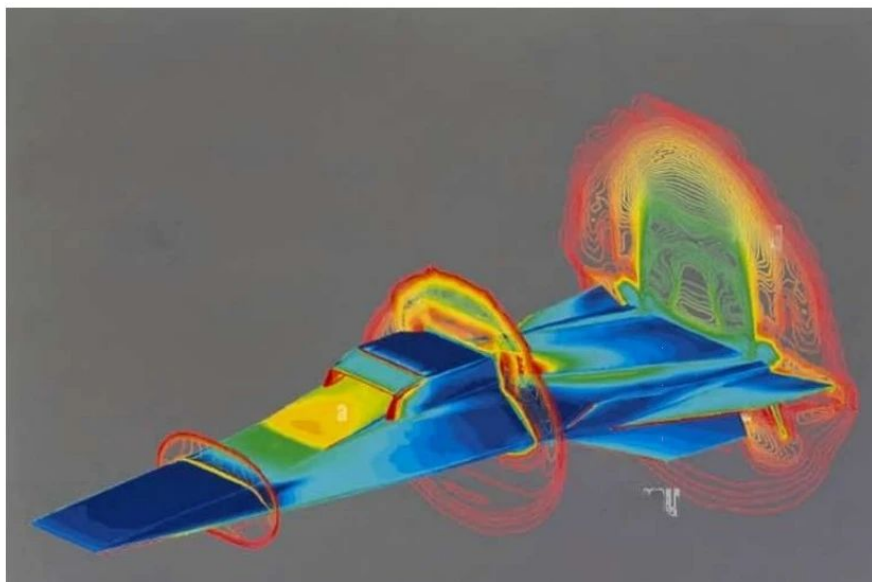
THE ROLE OF COMPUTATIONAL FLUID DYNAMICS IN MECHANICAL ENGINEERING

-JOSHUA JACKSON

Mechanical engineering has been revolutionized by the advent of computational fluid dynamics (CFD). CFD is the simulation of fluid flow and heat transfer processes using numerical analysis and algorithms. The use of CFD has greatly improved the design and optimization of mechanical systems, from engines to aircraft. In this article, we will explore the role of CFD in mechanical engineering and how it has impacted the industry.

CFD is a branch of fluid mechanics that uses numerical analysis to solve and analyze problems related to fluid flow and heat transfer.

It involves the use of algorithms and software to create a virtual simulation of fluid behaviour. CFD has become an essential tool for mechanical engineers, allowing them to study the effects of fluid flow on mechanical systems without the need for physical testing.



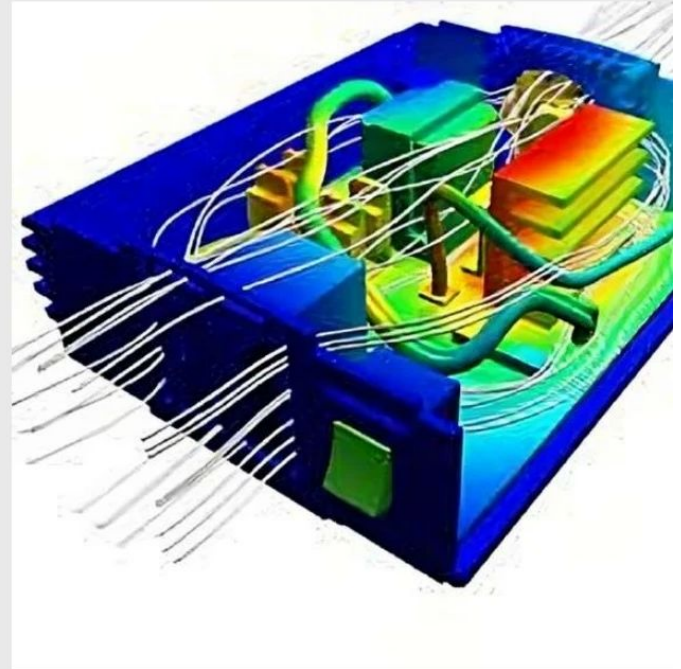
CFD has found applications in a wide range of mechanical engineering fields. CFD is an important factor in designing and optimizing aircraft and spacecrafts. It helps engineers study the behavior of air around wings, engines, and other components, allowing them to improve performance and reduce drag. CFD is used to study fluid flow in biological systems, such as blood flow in arteries and veins. It helps researchers better understand diseases and develop new treatments.

CFD is used to design and optimize automotive components, such as engine blocks, cylinder heads, and exhaust systems. It helps engineers optimize airflow, reduce drag, and improve fuel efficiency. CFD can also be used to design and optimize power plants, including gas turbines and wind turbines. It helps engineers study the behavior of fluid flow in turbines and improve efficiency.

CFD is used to study fluid flow in biological systems, such as blood flow in arteries and veins. It helps researchers better understand diseases and develop new treatments.

CFD allows engineers to test and optimize designs virtually, reducing the need for physical testing and prototyping. This leads to cost savings and faster design iterations. It enables engineers to optimize fluid flow and heat transfer, leading to improved performance and efficiency. CFD simulations provide accurate predictions of fluid behavior, allowing engineers to make informed design decisions.

Computational fluid dynamics has revolutionized the field of mechanical engineering, providing engineers with a powerful tool to study and optimize fluid behavior in mechanical systems. The benefits of CFD are numerous, including cost savings, improved performance, and greater accuracy. As the technology continues to evolve, we can expect to see even greater advancements in the field of mechanical engineering.



DEMO VERSION



RPM PHOTO GALLERY

RPM



DEPARTMENT OF MECHANICAL ENGINEERING



2019-23 BATCH



2020-24 BATCH

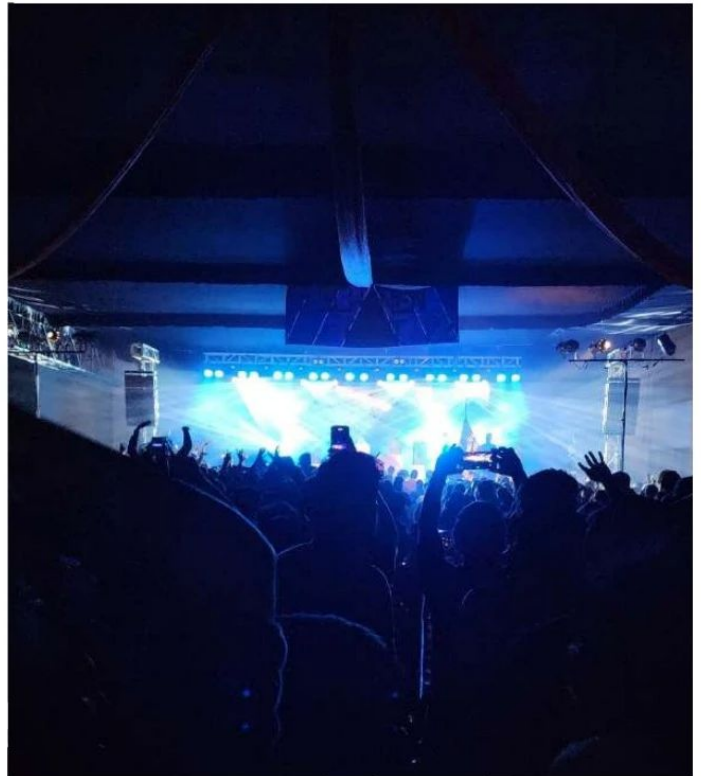


2021-25 BATCH

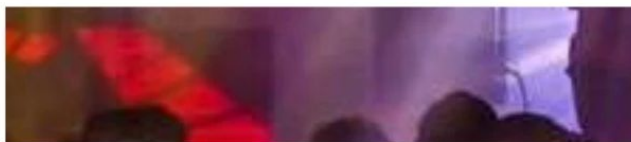


2022-26 BATCH

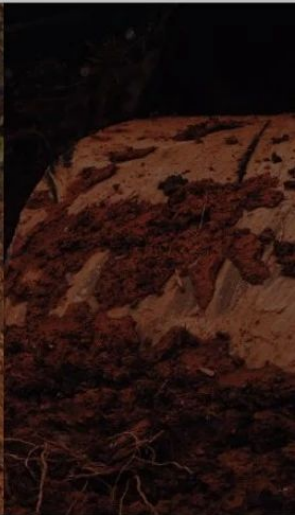
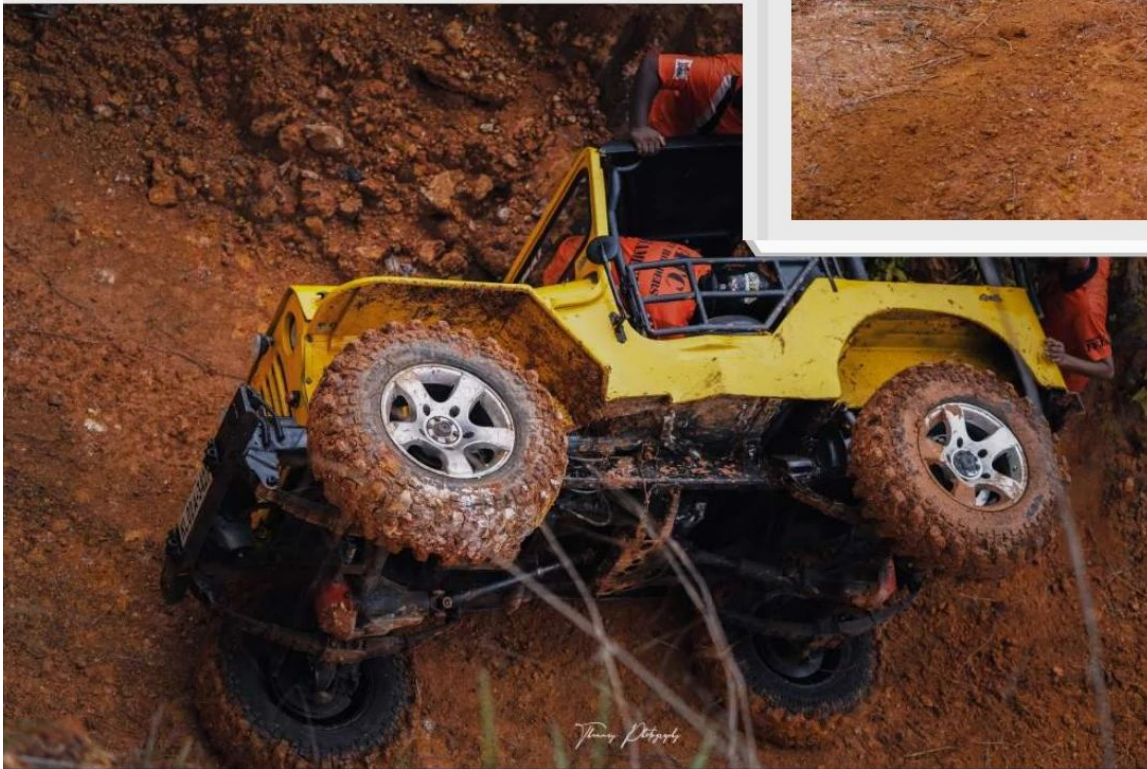
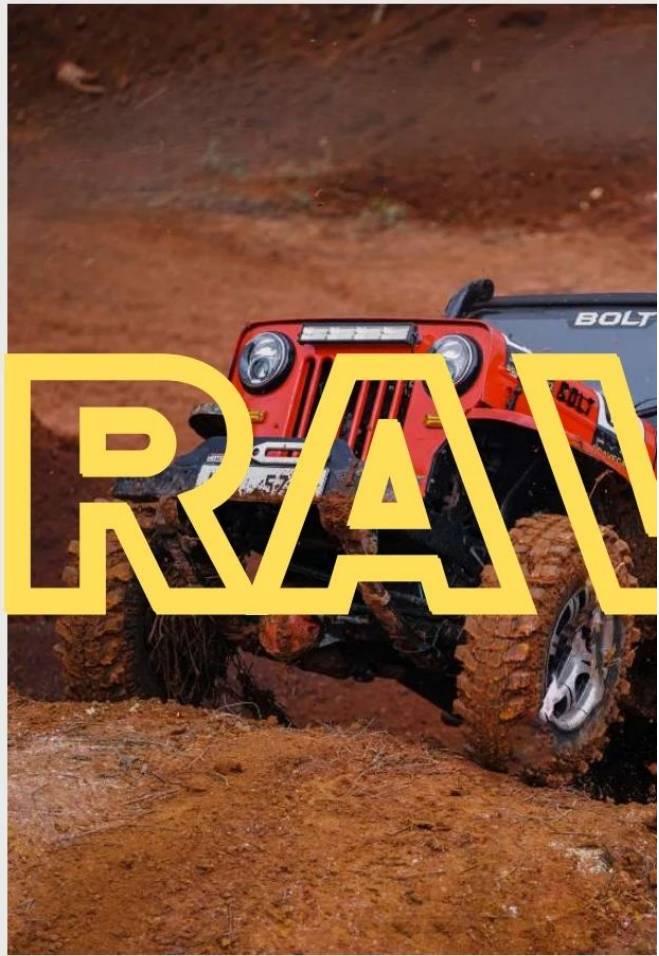
MASCHINEN

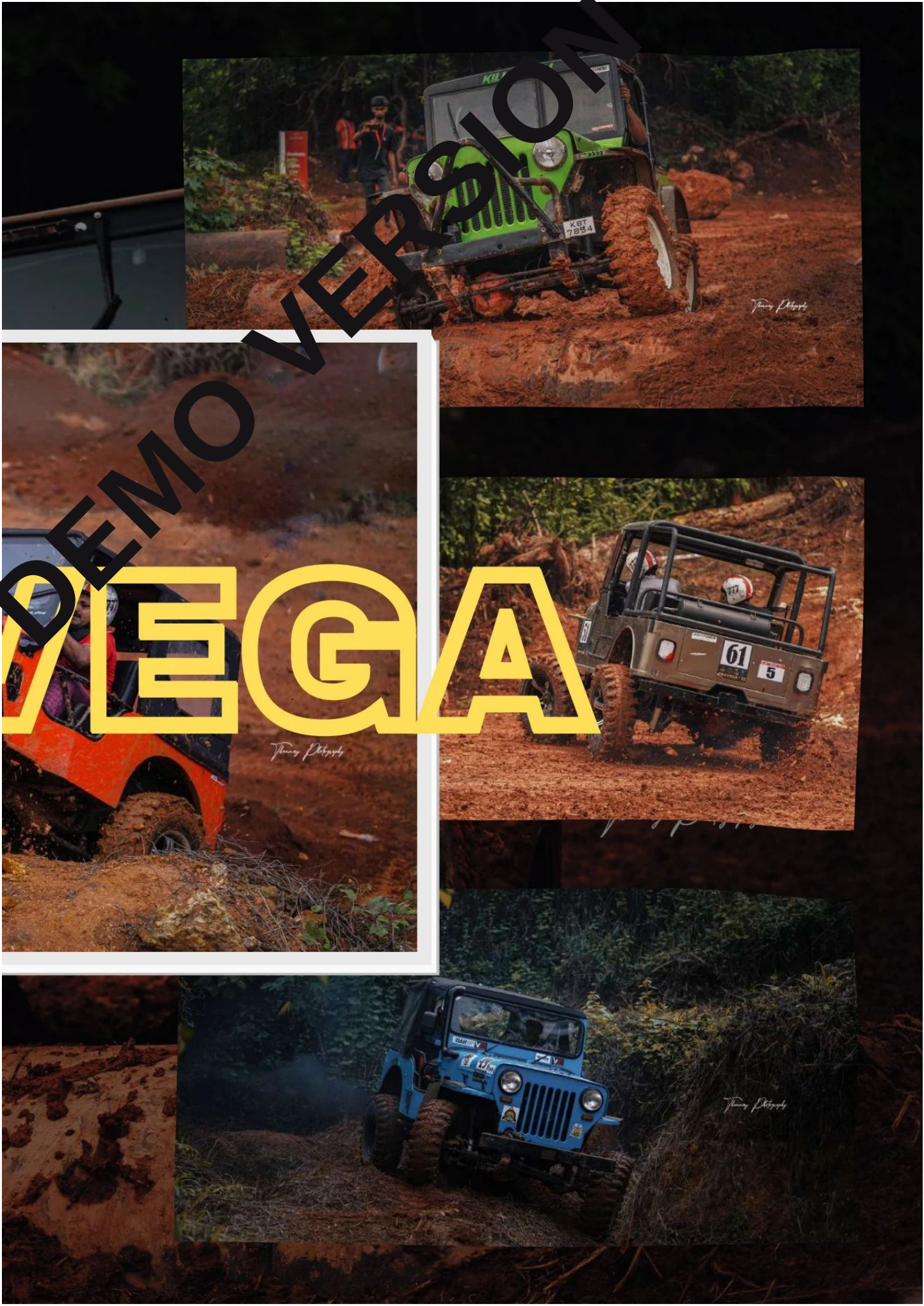


FEST '22



THE FESTIVAL OF MACHINES





TECHLETICS '22



M A S C I N E N F E S T ' 2 2





"From the time of stepping into this college, there's no other place that has made me as close to home as the RPM Association. From the highly supportive staff members to the brothers and sisters who I know will stand by my side through thick and thin..."

"Infinity is a glimpse at this family's dedication and consistency..."

-Secretary RPM
