GEARED

BI-ANNUAL NEWSLETTER-CUM-MAGAZINE

DEPARTMENT OF MECHANICAL ENGINEERING

DAVIET

Dayanand Anglo-Vedic Institute
of Engineering and Technology

Inside this issue

FROM THE DESK OF HEAD OF THE DEPARTMENT

Dear readers,

It gives me immense pleasure to present the inaugural edition of Geared, the bi-annual newsletter-cum-magazine of the Department of Mechanical Engineering of DAV Institute of Engineering and Technology. The newsletter-cum-magazine had been conceived to disseminate the activities of the department among all the stakeholders while simultaneously giving the students a platform to present their research and knowledge through technical articles.

In this continuously evolving world on technology front, it is important to remain abreast with the current trends. The department is determined to provide the best of technical education to its students aimed at creating employable professionals and entrepreneurs. Regular use of Industry Week, an innovative practice conceived to enhance the skill, employability and entrepreneurial acumen of students, is one such exercise aimed at providing skill oriented education by bringing industry and academia in close proximity. Student activities, effective classroom teaching with judicious use of technology and focus on holistic development are some of the key features of education in the department.

I request all the faculty, staff and students of the department to contribute original and informative articles to the magazine so that it can be a treat to readers. Further, all are also requested to submit their achievements in professional, academic, co-curricular and extra-curricular fronts to Dr. Gurveen Singh, the editor of the *Geared* for incorporation into subsequent issues which will act as a source of motivation for others to emulate. I specifically request the students' clubs of the Department such as ASHRAE Student Branch, Tech Lit club and Robotics club to submit their activities regularly in the newsletter. Suggestions are highly solicited from everyone for improving and making the magazine more informative for readers.

I congratulate the entire editorial board for their painstaking efforts in bringing out this inaugural issue and I am sure it will now become a regular periodic feature of the department.

Best Wishes

Dr. Gaurav Kumar Dhuria
Associate Professor and Head of the Department

MECHANICAL ENGINEERING

About the Department

Department of Mechanical Engineering was established in 2003. Mechanical engineering is the discipline that applies the principles of engineering, physics, and materials science for the design, analysis, manufacturing, and maintenance of mechanical systems. It is the branch of engineering that involves the design, production, and operation of machinery. It is one of the oldest and broadest of the engineering disciplines.The engineering field requires an understanding of core concepts including mechanics, kinematics, thermodynamics, materials science, structural analysis, and electricity. Mechanical engineers use these core principles along with tools like computer-aided design, and product life cycle management to design and analyse manufacturing plants, industrial equipment and machinery, heating and cooling systems, transport systems, aircraft, watercraft, robotics, medical devices, weapons, and others.

OUR VISION

" To be nationally recognized in providing mechanical engineering education, leading to well qualified engineers who are innovative, research oriented and immediate contributors to their profession and successful in advanced studies. "

OUR MISSION

- To impart quality cum value based technical education aimed at enhancing technical skills of the students leading to excellence in research, innovation and creative competence resulting in effectively responding to the needs of the society/industry.
- To prepare professionally competent engineers having academic and entrepreneurial leadership acumen coupled with effective communication skills, teamwork, professional ethics and global awareness required for engineering profession and society in general.

PROGRAM EDUCATIONS OBJECTIVES

The educational objectives of the Mechanical Engineering Program are to produce engineers whose careers and professional behavior are marked consistently by:

PEO 1: Their ability for a successful career in industries engaged in Mechanical and related engineering fields for solving real time problems maintaining ethical and moral values.

PEO 2: Their ability to shoulder managerial responsibilities and leadership positions resulting in creation of new entrepreneurs.

PEO 3: Effective technical communication, creativity and a commitment to continuing education aiming research for serving the community.

PROGRAM SPECIFIC OUTCOMES

Mechanical Engineering Program Students will be:

PSO 1: Able to apply learned principles in the various domains of manufacturing, design, thermal and fluid sciences to solve engineering problems utilizing conventional and modern technology.

PSO 2: Able to conceive and develop new ideas on product design and development with the help of modern tools.

PSO 3: Equipped with requisite managerial and technical skills for accomplishing efficient and safe industrial practices.

PROGRAM OUTCOMES

After the completion of Engineering Programme, the graduates will be able to:

PO1. Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization for the solution of complex engineering problems.

PO2. Identify, formulate, research literature, and analysis complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for public health and safety, and cultural, societal, and environmental considerations.

PO4. Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools, including prediction and modelling to complex engineering activities, with an understanding of the limitations.

PO6. Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

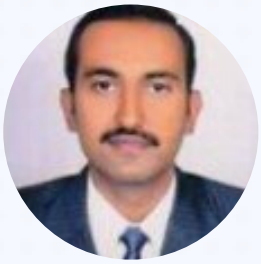
PO9. Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communicate effectively on complex engineering activities with the engineering community and with the society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12. Recognise the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

KNOW THE FACULTY



Name: **Dr. Gaurav Kumar Dhuria**
Designation: Associate Professor & Head of Department
Qualification: Ph.D., M.Tech
Experience: 17 Years
Research/Interest Area: Advance Materials & Manufacturing Processes

Name: **Dr. Sanjeev Saini**
Designation: Assistant Professor (Workshop)
Qualification: M.Tech, Ph.D.
Experience:21 Years
Area of Research/Interest: Residual Stress in Hard Turning, Industrial Engineering

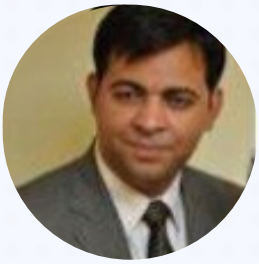
Name: **Mr. Pankaj Sadana**
Designation: Assistant Professor
Qualification: B.Tech, M.Tech, Pursuing Ph.D.
Experience: 13 Years
Area of Research/Interest: Machine Design.

Name: **Mr. Ramandeep Singh Johal**
Designation: Assistant Professor
Qualification: B.Tech, M.Tech.
Experience: 14 Years
Area of Research/Interest Advance Manufacturing Technology, Automobile Engineering & Industrial Automation.

Name: **Dr. Devinder Priyadarshi**
Designation: Assistant Professor & Controller of Examination
Qualification: MS, Ph.D.
Experience: 14 Years
Area of Research/Interest: Metrology, Advance Materials. Nano composites & Manufacturing.

Name: **Mr. S K Uppal**
Designation: Assistant Professor
Qualification: B.Tech. (Hons.), M.Tech. (with Distinction) Pursuing Ph.D.
Experience: 15 Years
Area of Research/Interest:Robotics and Automation.System Dynamics & Control. Tribology, Mechanical Design.

Name: **Mr. Ankush Kohli**
Designation: Assistant Professor
Qualification: B.Tech, M.Tech, Pursuing Ph.D.
Experience: 07 Years
Area of Research/Interest: CAD/CAM, Bio Mechanical Engineering.



Name: **Mr. Chetan Darshan**
Designation: Assistant Professor
Qualification: B.Tech, M.Tech, Pursuing Ph.D.
Experience: 10 Years
Area of Research/Interest: Machine Design.Effect of Process Parameters on Hard Turning.

Name: **Mr. Aman Maini**
Designation: Assistant Professor
Qualification: B.Tech, M.Tech, Pursuing Ph.D.
Experience: 21 Years
Area of Research/Interest: Robotics and Automation, System Dynamics andcontrol.

Name: **Dr. Gurveen Singh**
Designation: Assistant Professor
Qualification:B.Tech, M.Tech, Pursuing Ph.D.
Experience: 7.5 Years
Area of Research/Interest: Welding Technology, Industrial engineering.

Name: **Mr. Sunil Kumar**
Designation: Assistant Instructor Workshop
Qualification: B.Tech.,M.Tech.
Experience: 14 years
Area of Research/interest: Manufacturing Processes

Name: **Mr. Om Prakash Sharma**
Designation: Assistant Instructor Workshop
Qualification: Diploma
Experience: 24 years
Labs Handeled: Machine Shop

Name: **Mr. Rajesh Mehra**
Designation: Assistant Instructor Workshop
Qualification: Diploma
Experience: 20 years
Lab Handeled: Carpentary and Welding Shop

Name: **Mr. Balbir Singh**
Designation: Lab Technician
Qualification: Diploma
Experience: 23 years
Labs handeled: IAR, EMM, MMM,SOM,TOM,FM-1, MV, FM/C LAB

Name: **Mr. Pawan Kumar**
Designation: Lab Technician
Qualification: Diploma
Experience: 14 years
Labs handeled: AT, RAC, CG, IAR, CAD/CAM, SOM, MV, AE

IMPORTANT EVENTS & ACTIVITIES

Industry Week

by Moyukh Datta Roy

In a bid to augment academia-industry interaction, coupled with the purpose of infusing need-based sense of learning from the view point of industry relevance, a week long program “Industry Week” was observed by the Department of Mechanical Engineering at DAVIET, Jalandhar from September 23-27, 2019. The event was inaugurated by Sh. K.S. Dhody, Former Executive Director, SMI ISUZU Ltd., Rupnagar. The event included an Industry Expert Lecture series in which Sh. K.S. Dhody, Sh. Ankit Gupta, Manager, Larsen and Tourbo MHPS Turbine Generator Pvt. Ltd., Surat, Gujarat and Sh. Vikram Motwami, Managing Director, Edmount Research and Development briefed the students about current trends in technology.

Dr. Gaurav Kumar Dhuria, H.O.D. Mechanical engineering, said that the events in the week will help the students acquire much needed skills not just for being employable but also for creating employment opportunities for the youth. Dr. Manoj Kumar, Principal, DAVIET stated that changing times demand continuous change in the way learning is imparted to students, more so in the academic realm dealing with Science and Technology.

Workshops were conducted on Robotics, Mechatronics and Electric Vehicles. Congratulations to Sh. Pankaj Sadana and Sh. S.K. Uppal, the coordinators and all the colleagues in the department for the great team effort in organizing such a successful event.

ASHRAE STUDENT BRANCH

by Moyukh Datta Roy

Department of Mechanical Engineering of DAVIET has installed ASHRAE Students' Branch. ASHRAE, the American Society of Heating, Refrigerating and Air-conditioning Engineers, is the premier international body in the HVAC&R field, with more than 56,000 members from over 132 nations. The installation ceremony of the student branch was presided over by the Chief Guest Mr. S.C. Popli, Advisor-Business and Skill Development, Daikin Air Conditioning India Pvt. Ltd., Gurgaon. Mr. Dinesh Rawat, Co-ordinator of ASHRAE India chapter, was also present on the occasion.

Speaking at the inaugural ceremony, Dr. Gaurav Kumar Dhuria, Head of Mechanical Engineering Department as well as Student Branch Advisor of DAVIET ASHRAE Students' Branch, welcomed the elite gathering and congratulated the students for getting associated with this global organization on refrigeration and air conditioning. Later during this occasion, Mr. S. C. Popli delivered an expert talk on the "Current trends in Air Conditioning accompanied by a case study of Daikin India", explaining the inverter technologies currently being used in the industry along with the processes involved in setting them up.

Mr. Dinesh Rawat apprised the students about the various student welfare programs being regularly conducted in ASHRAE including project funding, scholarships and journal publishing.

Dr. Manoj Kumar, Principal DAVIET congratulated the department for this initiative and extended his best wishes to the student members for a fruitful association and learning in the ASHRAE students' branch.

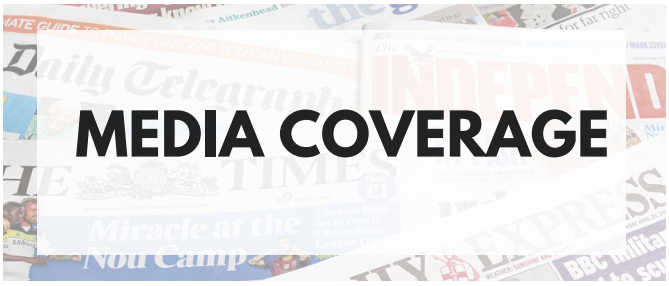
GROUP DISCUSSION SESSIONS

Written by Moyukh Datta Roy

Department of Mechanical Engineering of DAVIET had organised a few group discussion sessions on 21 August,2019. The goal of the event was to improve the G.D. skills of the students as it one of the necessary skills required during placement/internship interviews. Several agendas were discussed by the students of both 3rd and 5th semester students. The sessions were moderated by Dr. Gurveen Singh.

After 2 intense G.D. sessions with heavy participation from all the students present, 3 emerged as winners. Following are the students who won :

1) Maninder Singh - 5th Sem
2) Ankit Sehdev and Rachit Suri - 5th Sem
3) Raj Mohan - 3rd Sem



Dainik Bhaskar

डेविएट के प्रांशु को मिला बेस्ट स्टूडेंट का अवॉर्ड

जालंधर| इंडियन सोसायटी फोर टेक्निकल एजुकेशन की ओर से गुरु नानक देव इंजीनियरिंग कॉलेज लुधियाना में स्टूडेंट कन्वेंशन करवाई गई। पंजाब, जम्मू एंड कश्मीर, हरियाणा, हिमाचल प्रदेश रीजन के स्टूडेंट्स इसमें शामिल हुए। डेविएट के प्रांशु नागपाल को बेस्ट स्टूडेंट अवॉर्ड दिया गया। उसने एमरजिंग ट्रेंड्स इन इंजीनियरिंग पर प्रेजेंटेशन दी। प्रिं. डॉ. मनोज कुमार, डीन एकेडेमिक्स डॉ. सुधीर शर्मा, डिप्टी डीन एकेडेमिक्स रमनदीप सिंह जौहल ने उसे सम्मानित किया।

24-10-2019

5 students of DAVIET get handsome package

JALANDHAR: DAV Institute of Engineering & Technology's students 5 B.Tech Students who would pass out in the year 2020 have been placed with JARO Education at a Salary Package of Rs.12.00 LPA.The names of Selected Students are Armaan Gill,Chirag Rohilla, Sehajpreet Randhawa, Shivansh Sharma and Pranshu Nagpal. Sushil Prashar (Head, Department of Training and Placement) and his Team Vishav Kapoor, Ratish Bhardwaj and Kalpana Sharma) appreciated the hard work put in by students .Dr. Manoj Kumar, Principal DAVIET congratulated the students on their success. He highlighted that DAVIETians have always beenpassionate about placements

Punjab Kesri

12-12-2019

वेएट के 5 विद्यार्थियों का 12 लाख केज पर जारो एजुकेशन में चयन

पूरथला, 11 दिसम्बर न. 282/12): डी.ए.वी. यूट ऑफ इंजीनियरिंग कॉलॉजी, जालंधर अपने के उच्चवल करियर को ूत करने के लिए प्रतिबद्ध है। ट के 5 विद्यार्थियों का 12 लाख ज पर जारो एजुकेशन में चयन जारो एजुकेशन भारतीय शिक्षा अग्रणी कम्पनियों में से एक ऑनलाइन प्रबंधन के माध्यम भिन्न प्रकार के प्रबंधन कार्यक्रमों शकश करके पढ़ने वालों की ों को पूरा करती है। चयनित के नाम अरमान गिल, चिराग ा, सहप्रीत रंधावा, शिवांश शर्मा ांसु नागपाल हैं और ये छात्र मई के महीने में जारो एजुकेशन को करेंगे।

ट्रेनिंग व प्लेसमैंट सैल के सुशील पराशर ने अपनी टीम कपूर, रतिश भारद्वाज और क शर्मा के साथ विद्यार्थियों को क कड़ी मेहनत की सराहना की। कहा कि बच्चों को कम्पनी से पहले हर तरह की परीक्षा के तैयार करने के लिए कॉलेज विशेष प्रयास किए जाते हैं उ बच्चों को पहले से ही रिटन ग्रुप डिस्कशन और इंटरव्यू की करवाई जाती है। डा. मनोज प्रिंसीपल डेविएट ने छात्रों को सफलता पर बधाई दी।

HYPERLOOP

INDIA

INDIA'S 1ST HYPERLOOP PROJECT

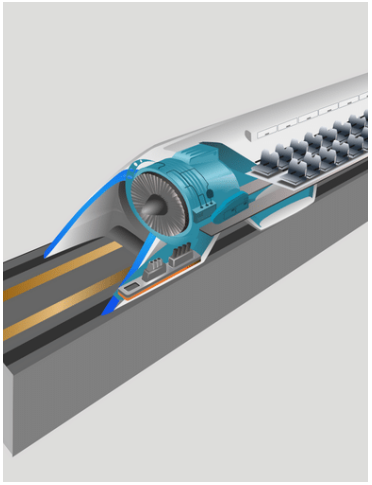
Mumbai to Pune
(Estimated time of journey: 25 minutes)

BY RAJ MOHAN

In July 2019, the Indian Government gave the final nod for construction of a Hyperloop train between Mumbai and Pune. While several countries worldwide have unveiled plans to build this version of a high-speed train for years, India might take the lead in doing so.

Conventional means of transportation tend to be some mix of expensive, slow, and environmentally harmful. Road travel is particularly problematic, given carbon emissions and the fluctuating price of oil. As the environmental dangers of energy consumption continue to worsen, mass transit will be crucial in the years to come.

Rail travel is relatively energy efficient and offers the most environmentally friendly option, but is too slow and expensive to be massively adopted. Hence, Hyperloop will step up in the future as the primary mode of transportation in the near future.



INTRODUCTION

WHAT IS HYPERLOOP?

Hyperloop is a new form of ground transport currently under development by a number of companies. It could see passengers travelling at over 700 miles an hour in a floating pod which races along inside giant low-pressure tubes, either above or below ground.

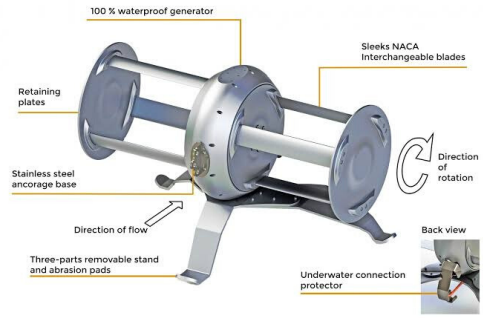
DETAILS

WHAT MAKES HYPERLOOP DIFFERENT?

There are two major differences between Hyperloop and traditional rail. Firstly, the pods carrying passengers travel through tubes or tunnels, from which most of the air has been removed to reduce friction.This should allow the pods to travel at high speeds, that could lead up to 750 miles per hour. Secondly, rather than using wheels like a train or car, the pods are designed to float on air skis, or use magnetic levitation to reduce friction.

The basic idea of Hyperloop as envisioned by Elon Musk is that the passenger pods or capsules travel through a tube, either above or below ground. To reduce friction, most of the air is removed from the tubes by pumps. Overcoming air resistance is one of the biggest uses of energy in high speed travel. Airliners climb to high altitudes to travel through less dense air. In order to create a similar effect at ground level, Hyperloop encloses the capsules in a reduced-pressure tube, effectively allowing the trains to travel at airplane speeds while still on the ground.

Hydrokinetic Turbines



$$P_{output} \propto V_{Vane}{}^{2}, \rho_{water}$$

$$P_{output} = \frac{1}{2} \rho_{water} * A_{Vane} *] V_{Vane}{}^{3}$$

BY ANKIT SEHDEV

It is estimated that there are almost 1.4 billion people across the world that do not have the access to electricity. The geographical positions in rural and distant areas do not permit these localities to be connected to any national or regional electricity grid. The most common solution available to the problem is the use of gasoline generators. But these are polluting and expensive in the long run. Considering these facts, the use of green technologies is picking up pace. Renewable energy solutions are gaining popularity in domestic households as people are becoming more aware. But the existing renewable sources of energy such as solar and wind systems do not represent optimal energy sources due to their intermittent production, resulting from weather variations. Also, these systems use only about 12%-35% of their full capacity. However, being technologically advanced, there is still one area that gets under the radar every time one talks of developing green technology viz. The River.

Hydrokinetic turbine is not a new concept but recent developments in the field have led to it being a worthy alternative to solar or wind systems. These turbines are basically zero head in stream turbines as they do not rely on potential energy stored in water, but instead use the kinetic energy of water to rotate the vanes of a turbine. No dams or head differential is required because these use the natural state of river. Hence infrastructure cost almost shrinks to zero. The energy produced by these turbines is directly proportional to the velocity with which vanes of the turbine are moved, thus vary from river to river.

Also this system is much more predictable and reliable than its counterparts because the river flows 24 hours a day. Also its flow can easily be predicted. This system provides continuous production of electricity which leads to the usage of less number batteries and serves as an excellent emergency power backup system. Idénergie turbines specifically use “Shaft-less” rotors which prevent water seepage into the generator, reducing the maintenance cost.

Moreover, these turbines are easy to install as these are installed on a steel rope beneath the water. Darrieus type turbines are used for these systems, which are capable of producing 2-6 KWh/day [river velocity of 1.2m/s] viz. 16 times that of a 250W solar panel. In case of slow river velocities, the embedded motor can help initiate necessary movement and hence produce power. Peak power generated by these turbines can be as high as 12KWh. Free hanging nature of these turbines and their upward rotational mechanisms decrease the chances of debris accumulation. The “green” nature of these turbines is reflected in the use of noble metals such as Aluminum and other environmentally friendly components that can be recycled at the end of their service-life. These turbines are designed so that they don’t require a permanent structure and hence have minimal impact on the aquatic fauna. According to studies carried out by Alden Laboratories, these turbines represent no harm to river ecosystem. Instead as these systems extract energy from flowing water, to reduce its velocity, the fishes naturally avoid the vanes of turbine resulting in 98% survival rate. So at the end its responsibility of us, the engineers, to develop such technologies which can help save the planet and our future generations.

CYBERTRUCK

The Flagship of Pickups

By Moyukh Datta Roy

In an era when everyone is very aware of the climate changes, everyone is trying his best to reduce his carbon footprints and vouch for sustainable development. People are banning the usage of plastics, are going green, recycling products and moving towards sources of sustainable energy viz. solar and wind energy. People have also started to switch from gas vehicles to electric vehicles. Talking of electric vehicles, the first automobile company that comes to our mind is undoubtedly Tesla Motors. The company was started in 2003 and since then has changed people's perspective of electric vehicles. Most recently, the company launched their first electric pickup truck – The Cybertruck. The truck became an immediate internet sensation and went viral on social media in no time. The design of the vehicle is the key reason why the truck was so much talked about. Although the appearance of the vehicle is quite unorthodox and different, it is a brilliant piece of automobile engineering. Let us have a look at what all it has to offer.

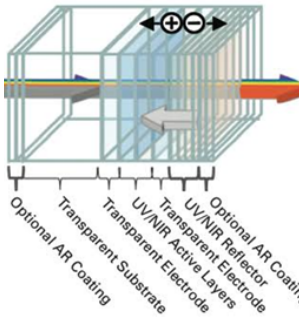
Tesla created the Cybertruck to launch a totally new variety of trucks. At the beginning of the launch event in Los Angeles, Tesla owner Elon Musk mentioned how trucks have looked the same for almost the last hundred years, and how that needed to change. The $39,900 Tesla vehicle is made out of 3 mm thick steel, with a frame-less exoskeleton structure. This makes the vehicle extremely hard and durable. The structure provides a surface strong enough to withstand a blow from a sledgehammer. Tesla has used transparent ceramic armor instead of glass for its windows and windshield, making the vehicle bulletproof, another sterling feature.

Apart from the high durability of the vehicle, the unique design also is very aerodynamic. Also, there are no curves on the body as well as on the windshield, which makes it much easier to produce the parts of the vehicle. The Cybertruck also doesn't need a paint shop, which further reduces the production cost and time. The vehicle can reach up to 500 miles (804 km) per charge, which is way more than what is available in the vehicles in that price range. The vehicle has an autopilot mode, and over 2870 Litres of cargo capacity, making it extremely efficient and a high utility vehicle. Also, the Cybertruck can accelerate from 0-60 miles per second in 2.9 seconds, which is more than even a Porche 911. These factors put the Cybertruck way ahead of any competitors and make it a desirable vehicle for those looking for a very efficient vehicle at a reasonable price.

Mass production of the vehicle is going to start in 2021. It is believed that it will become a stiff competition to Ford F150 Raptor, the most commonly used pickup truck in U.S.A. Musk has said that Tesla plans to add a solar panel in order to make it a self-powered vehicle, which will provide an additional 15 miles per day. The very unusual looking vehicle might have earned a lot of negative reviews for its appearance, but over 146k pre-bookings were made within the first 24 hours of its launch. Considering the fact that Tesla spent $0 on its marketing and paid endorsements, that is a quite staggering figure. That is also a genius marketing move, letting internet do all the publicity.

Electric cars are the future and Cybertruck is what I believe to be the future of the pickup trucks. The Cybertruck will definitely revolutionize the automobile sector. If other companies do not adopt this design or come up with a similar one for their upcoming pickup trucks, they will soon be thrown out of the competition, or worse, go bankrupt. Personally I admire the bold move of Tesla for designing such a highly unconventional style of vehicle. Even though it does not have a good appearance, its low cost, high efficiency, high utility and safety factors will surely make it a huge success. Looking forward to seeing this vehicle hit the roads in 2021.

Transparent Solar Panels



BY VIVEK THAKUR

In August 2014, researchers at Michigan State University created a fully transparent solar concentrator, which could turn any window or sheet of glass into a photovoltaic cell. The schematic figure shows its components and how they work together. The thickest layer (toward the left) is the glass, plastic, or other transparent substrate being coated; the multiple layers of the PV coating are toward the right. At the core of the coating are the two active layers—the absorptive semiconductor materials that get excited by sunlight and interact, creating an electric field that causes current to flow. Sandwiching those layers are electrodes that connect to the external circuit that carries the current out of the device. Since both electrodes must be transparent, which is not the usual reflective metal, a layer on the back of the cell can be added to reflect sunlight of selected wavelengths, sending it back for a second pass through the active layers.

Finally, anti-reflective coatings are used on both outside surfaces to reduce reflections because any light that reflects 10% of the total light, doesn't go through the device. A combination of molecular engineering, optical design, and device optimization is used as a holistic approach to designing the transparent device.

Cost and Utility :
The original model costs only £175 per square meter. One of the great things about these panels is that while they are transparent, they also control the glare and reduce thermal gain, which is a huge factor when it comes to reducing energy use within a building.

Efficiency :
Before they can even be considered to be put in use, they need to be efficient. Compared to the conventional solar panel's 15 percent efficiency, these transparent panels are only 5 percent efficient.

Solar Air Conditioning

BY TUSHAR SINGH

The concept of air conditioning was given in 1902 by Willis Haviland Carrier, while he was experimenting with laws of humidity control. Today, in this fast paced world, over 50% of Greenhouse gas emissions are generated by heating and air conditioning. A normal air conditioner emits nearly 2.5-5 tonnes of Greenhouse gas every year, thereby contributing to 50-60% of electricity bills.

The new solar air conditioning technique enables us to drastically reduce the CO2 emissions and the electricity bills. A provided solar panel is used to heat up the water, which is further transported to the solar air conditioning unit which is even further divided into 2 compartments. The first compartment consists of a heat exchanger, which is similar to that of a car radiator. Simultaneously, the air is provided into the 2nd compartment into a desiccant wheel, which is one of the most important part of the system. The Desiccant wheel absorbs the moisture from the second compartment and moves up to the first compartment. There, it is made to dry out by hot air generated by heat exchanger. The hot air is then further exhausted. The desiccant wheel thus generates a cool dry air, which is then fed into the home, which further lowers down the temperature inside the house.

Rotocasting

BY SHUBHAM RAWAT

Rotocasting/Rotational Molding involves a heated hollow mold which is filled with a charge or shot weight of material. It is then slowly rotated, usually around two perpendicular axes, causing the softened material to disperse and stick to the walls of the mold. In order to maintain even thickness throughout the part, the mold continues to rotate at all times during the heating phase to avoid sagging or deformation. Over time, improvements in process control and developments with plastic powders have resulted in a significant increase in usage.

Rotocasting, by comparison, uses self-curing resins in an unheated mould, but shares slow rotational speeds as in rotational molding. Spin casting should not be confused with self-curing resins or white metal in a high-speed centrifugal casting machine.

Types of Rotocasting Machine

1) Shuttle Machine
2) Rock and Roll Machine
3) Swing arm Machine

Shuttle Machine :

Most shuttle machines have two arms that move the molds back and forth between the heating chamber and cooling station. The arms are independent of each other and they turn the molds bi-axially. In some cases, the shuttle machine has only one arm. This machine moves the mold in a linear direction in and out of heating and cooling chambers. It is low in cost for the size of product produced and the footprint is kept to a minimum level compared to other types of machines. It is also available in smaller scale for schools and prototyping.

Rock and roll Machine :

This is a specialized machine designed mainly to produce long narrow parts. Some are of the clamshell type, (one arm), and others are shuttle-type (two arms). Each arm rotates the mold 360 degrees in one direction and at the same time tips and rocks the mold 45 degrees above or below the horizontal level in the other direction. Newer machines use forced hot air to heat the mold. These machines are best for large parts that have a large length-to-width ratio. Because of the small heating chambers, heating costs are lesser than that of bi-axial machines.

Swing-arm Machine :

The swing-arm machine can have up to four arms, with a bi-axial movement. Each arm is independent, since it is not necessary to operate all arms at the same time. Each arm is mounted on a corner of the oven and it swings in and out of the oven. On some swing-arm machines, a pair of arms is mounted on the same corner, thus a four-arm machine has two pivot points. These machines are very useful for companies that have long cooling cycles or require a lot of time to demold parts. It is a lot easier to schedule maintenance work or try to run a new mold without interrupting production on the other arms of the machine.

DIGITAL TWINS

BY SHIVAM GUPTA

A digital twin is a live digital representation of a physical asset. It is a cyber-physical mockup that represents both the physical instance and its broad business context in which it operates, from its inception to its end.
It is a combination of data and intelligence that represents the structure, context and behaviour of a physical system. It offers an interface that allows a person to make predictions about the future. These are very powerful digital objects that can be used to optimize the physical world, significantly improving operational performances and business processes. A complex system produces massive amounts of data. Data analytics extend the data to be predictive and tell us when something will happen — a failure, for instance. But data analytics does not say anything about how to improve a product to avoid the failure. However, a digital twin — a 3-D digital model of a physical system, tells us so.

The Future of Digital Twins

- What a digital twin produces, when bundling data with intelligence, is a view of the each asset's history and its potential future performance. This continuum of information leads to early warnings, predictions, ideas for optimization, and most importantly a plan of action to keep assets in service longer.
- Also, it sends commands to machines in response to their forecasts.
- Reduces asset downtime and maintenance costs.
- Improves plant and factory efficiency.
- Reduces cycle times, and increased market agility.

IMPORTANT NOTICE

Technical Magazine Section of *Geared* will be theme oriented from next issue onwards. Articles, Surveys, technical reports and reviews/research papers are invited from faculty, staff, alumni and students of the department as per the details appended here-under:

Topics for the forthcoming edition : i) New and Innovative manufacturing opportunities amidst COVID 19
ii) Current trends in Automation and Robotics

Last date for submission of content : June 10, 2020

Where to submit : mechanicalnews21@gmail.com

From the next issue onward, students are also encouraged to submit their projects executed during 6th and 7th semester along with a brief description of the project in about 300 words. The same will be given due consideration for the coverage in the magazine.

Some basic things to be kept in mind :

1) Article should be original.

2) Plagiarism must be avoided.

3) Brief biography of author along with a photograph must be attached to the file.

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Student Editor-in-chief

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