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MECHNOTIMES NEWSLETTER

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Vision of the Chandigarh Engineering College

To become a leading institute of the country for providing quality technical education in a research based environment for developing competent professionals and successful entrepreneurs.

Mission of the Chandigarh Engineering College

- 1. To provide state of the art infrastructure and engage proficient faculty for enhancing the teaching learning process to deliver quality education.
- 2. To give a conductive environment foe utilising the research abilities to attain new learning for solving industrial problems and societal issues.
- 3. To collaborate with prominent industries for establishing advanced labs and using their expertise to give contemporary industry exposure to the student and faculty.
- 4. To cater opportunities for global exposure through association with foreign universities.
- 5. To extend choice based career options for students in campus placements, entrepreneurship and higher studies through career development program.



DEPARTMENT OF MECHANICAL ENGINEERING

Vision of the Department

To emerge as centre of quality education for creating competent mechanical engineers catering to the ever-changing needs of industry and society.

Mission of the Department

M1: To provide quality education by constantly updating departmental resources and using effective teaching learning methodology.

M2: To promote research practices in the field of mechanical engineering in pursuit of academic excellence and for the benefit of society.

M3: To establish industrial collaborations for imparting contemporary knowledge to keep pace with the technological challenges in the interdisciplinary and core areas of mechanical engineering.

M4: To provide opportunities to the students for global exposure through international collaborations.

M5: To nurture students through pre-placement training programs to succeed in campus placements and to provide guidance for entrepreneurship and higher studies.



EDITOR'S COLUMN

Students and faculties are an integral part of the college network. Their mutual interaction contributes to the holistic development of the education and social system. Just as the mirror reflects our outer personality, our inclination towards different activities reflects our inner personality.

As we all know, a newsletter mirrors a department-Its vision and mission. It also highlights events, activities and academic prowess and achievements.

Here, we release the departmental newsletter for the month April-June. It incorporates the prolific activities conducted by the department to unleash the innate talent and skill of our students breaking down the barriers of virtual platform. We feel extremely overjoyed to share glimpses of the activities taken by our zealous students with the teachers as their sailors during the period.



AISHNA MAHAJAN EDITOR-IN-CHIEF MECHNOTIMES

FROM EDITORIAL'S BOARD

Welcome to Issue 1 of Volume 6 of the Mechnotimes of Mechanical Department Newsletter of Chandigarh Engineering Colleges, Landran. We are really proud and exuberant that each quarterly issue of this Newsletter acts as a recap of the events and expert lectures which were hosted by our department. This forms a line of order at working, in a discipline manner as well as builds the teamwork which is very important as an individual skill. It forms a culture among students in terms of working. The reader will definitely be able to see to paragon vision of the department. We hope that this Culture of releasing the newsletter continue forever and may become quoted example for all to follow.

Nishant Thakur B.Tech 6th Sem (1902875)

Aditya Yadav B.Tech 6th Sem (1902789)

Kaustubha Srivastava B.Tech 6th Sem (1902851)

INDUSTRIAL VISIT TO "CHEEMA BOILERS LIMITED"

- The Department of Mechanical Engineering, Chandigarh Engineering College, Landran organized an Industrial Visit to Cheema Boilers Limited for the students of 6th semester on 13th May 2022.
- Cheema Boilers Limited has a state of the art manufacturing unit and is one of the world's premier engineering solutions company, manufacturing boilers and allied products.
- The students observed the manufacturing process, material handling and testing procedures followed during the manufacturing of boilers. The engineers from Cheema Boilers Limited briefed the students about these processes and answered their queries.



INDUSTRIAL VISIT TO "SML ISUZU LIMITED"

- The Department of Mechanical Engineering, Chandigarh Engineering College, Landran organized an Industrial Visit to SML ISUZU Limited for the students of 4th semester on 06th May 2022.
- SML Isuzu Ltd. is a commercial vehicle manufacturer since 1985. It has over 33 years of experience in producing light & medium commercial vehicles to meet the Indian customer needs. SML Isuzu Ltd. is a first company to manufacture and supply state of the art fully built Buses, Ambulances and customized vehicles.
- During the visit, the students were apprised about the manufacturing process being followed at the Chassis plant of SML Isuzu Ltd. The students witnessed the state of art manufacturing setups like CNC, DNC machines along with robots used in manufacturing. They also visited the assembly line and learned about the whole assembly process from the engineers of SML Isuzu Ltd.
- This visit was very informative for students especially who have keen interest in automobiles.



SEMINAR ON "STRATEGY TO CRACK COMPETITIVE EXAMS"

The Department of Mechanical Engineering organized a seminar for students of Mechanical Engineering on April 20, 2022. This seminar was conducted by Mr. Gunjan Chaudhary from Made Easy. The topic of this seminar was "Strategy to Crack Competitive Exams". During this session the students learned about different competitive examinations, their eligibility criteria and various strategies for effective preparation and cracking these exams.



INDUSTRIAL VISIT TO "P2P ANALYSIS & SOLUTIONS"

- The Department of Mechanical Engineering, Chandigarh Engineering College, Landran organized an Industrial visit to P2P Analysis & Solutions for the students of 4th semester on 09th April 2022.
- During this visit, students were apprised about the use of CAD and CAE and its application in various industries. Er. Pritam Parkash, of P2P Analysis & Solutions explained an ongoing project of design and analysis of electric bicycle, which was designed using Catia software and its structural analysis, was performed using ANSYS software.



ATOMIC HABITS

By- Gursehaj Singh Sem-4th (2003061)

- 1. Start your day with thanking GOD for everything.
- 2. Wake up before 5:00 am.
- 3. Eat healthy food.
- 4. Plan your day well.
- 5. Try to gain knowledge about changing world and how you can change yourself.
- 6. Take some risks in life to get your best prime.
- 7. Have faith in yourself.
- 8. Only listen to those you are willing to be their where you are planning to be.
- 9. Use social media less.
- 10. Give yourself some personal time.
- 11. Follow 5'C 1. CONSISTENCY
 - 2. CONFIDENCE
 - 3. COURAGE
 - 4. CONTROL
 - 5. CHOICE

THE COUNTERINTUITIVE NATURE OF GASES

By- Yuvraj Sem-4th (2003092)

" Gases are distinguished from other forms of matter, not only by their power of indefinite expansion so as to fill any vessel, however large, and by the great effect heat has in dilating them, but by the uniformity and simplicity of the laws which regulate these changes. "

James Clerk Maxwell

I want you to know that we are all surrounded by gases, in case if you have forgotten. These tiny molecules are constantly exerting forces on everything they interact with. They are also exerting force on our body, but we don't notice it much because the push is the same from every direction—if I hold up a piece of paper, it doesn't move because it's getting pushed equally from both sides. Each one of us is getting pushed by air all the time, and we hardly feel it at all. Air pressure is just a measure of how hard all those tiny molecules are hitting on a surface.

So far so good, but what if I tell you that these so called tiny particles of gases have enough power to drive rockets, automobiles, aircrafts, spacecraft and even huge power plants. You would say 'WHAT! That seems impossible'. Well, nothing is impossible for gases who are governed by simple Ideal Gas Law. **Ideal Gas law** also called general gas equation, gives the relationship between pressure (P), volume (V) and temperature (T). It is a good approximation of the behaviour of many gases under several conditions.



Mathematically, it is given as PV = nRT

Where, P = Pressure

- V = Volume
- n = no of moles
- R = Universal Gas constant (Avogadro's number N_A times the Boltzmann constant k)
- T = Temperature

It says that for a fixed mass (or no. of molecules) of gas the pressure is inversely proportional to the volume (if you double the pressure, you halve the volume (Boyle's Law)), the temperature is proportional to the pressure (if you double the temperature, you double the pressure (Gay Lussac's Law)), and that the volume is proportional to the temperature, at fixed pressure (Charles's Law). It also tells that the volume of gas increases as the amount of gas increases (Avogadro's Law). It doesn't matter what the gas is, only how many molecules of it there are. And it applies not only when things heat up, but also when they cool down.

Now before moving further let me tell you about an experiment which shows the power of pressure exerted by gases on a body. On May 8, 1654, **Otto von Guericke** took two same hemispheres, 20 inches in diameter and made of thick copper. Each half had a loop attached to the outside, so that two ropes could be tied on and used to pull the halves apart. He greased the flat surfaces, pushed the



two sides together, and used his new vacuum pump to remove the air from the inside of the sphere. There was nothing to hold it together, but after the air had been removed, the two halves behaved as though they were glued to each other. Otto had realized that the vacuum pump gave him a way to see how strongly the atmosphere could push. Billions of minuscule air molecules were pushing all over the outside of the sphere, sticking the halves together. But there was nothing inside to push back. You could only pull the two hemispheres apart if you could pull harder than the air could push. Thirty horses, in two teams of fifteen, could not separate the

hemispheres until the valve was opened to equalize the air pressure. The experiment became a popular way to illustrate the principles of air pressure, and the sphere became known as a **Magdeburg sphere**, named after his home town.

Now, the thumb rule for gases to drive engines is that they should have **very high pressure and very high**



temperature, or in other words they must be **highly compressed** so as to ignite the fuel vapours, to produce hot exhaust gases.

So, now let's just come to application of gas laws in **Mechanical Engineering**. Let see how gases drive gas turbine which are used to generate huge amount of power in power plant as well as used as turbojet engines in aircrafts, rockets and jets.

In **Gas Turbine**, air (gas) is sucked through inlet at high velocity, as shown in above diagram, this air is then compressed to a very high pressure and high temperature. This highly compressed and energized gas when combined



with fuel and got ignited, combustion takes place which generates very hot exhaust gases. These exhaust gases run turbine when ejected through nozzle at very high velocity which provide thrust for aircraft to propel. These turbines (in case of power plants) run generators and it also runs the compressor of the engine.

In case of **Internal combustion engines**, these highly compressed gases when mixes with fuel vapours produces very hot exhaust gases within cylinder during power stroke and that power drives the piston downward and rotates crankshaft.

In **Refrigerator and AC**, we apply ideal Gas law and properties of steam, to absorb maximum heat during evaporation and reject minimum heat during condensation and all that done with minimum possible work on the compressor. In a refrigerator, the coolant gas is compressed which means the volume of gas is decreased that eventually increases the temperature. This hot gas is passed through the radiator, which expels the heat and the gas further expands. The expanded gas cools down by absorbing the heat from the interior of the refrigerator.

So these are few examples which shows how gases drive huge machines which makes our lives easier. But the story of gases doesn't end here, laws of gases are also used to heat things in microwave oven, in hot air balloons, to bust a popcorn, to suck water from straw, installing ventilation units in buildings, working of airbags in a vehicle and the list goes on and on. So these tiny molecules of gases aren't just what they appear to be, they are something. So next time you make sure that you don't take them for granted.

LIDAR SYSTEM

By- Nishant Thakur Sem-6th (1902875)

"Light Detection and Ranging" is fundamentally a **distance technology**. From an airplane or helicopter, LiDAR systems send light to the ground. This pulse hits the ground and returns to the sensor. Then, it measures how long it takes for the light to return to the sensor.

By recording the return time, this is how LiDAR measures distance. In fact, this is also how LiDAR got its name – Light Detection and Ranging.

LiDAR is a sampling tool. What I mean by this is that it sends over **160,000 pulses** per second. For every second, each 1-meter pixel gets about 15 pulses. This is why LiDAR point clouds create millions of points.

LiDAR systems are very accurate because it's being controlled in a



platform. For example, accuracy is only about 15 cm vertically and 40 cm horizontally.

As a plane travels in the air, LiDAR units scan the ground from side-to-side. While some pulses will be directly below at **Nadir** (The nadir is the direction pointing directly below a particular location; that is, it is one of two vertical directions at a specified location, orthogonal to a horizontal flat surface), most pulses travel at an angle (off-nadir). So when a LiDAR system calculates elevation, it also accounts for the angle.

Typically, linear LiDAR has a swath width of 3,300 ft. But new technologies like Geiger LiDAR can scan widths of 16,000 ft. This type of LiDAR can cover much wider footprints compared to traditional LiDAR.

BOOSTING EMPLOYEE ENGAGEMENT: THE KEY TO SUCCESS

By- Raghav Syal Sem-6th (1902887)

Employee engagement is a critical aspect of any organization's success. It refers to the level of investment and involvement that employees have in their work and the company as a whole. When employees are engaged, they are more productive, committed, and motivated, leading to improved job satisfaction and higher levels of performance.

One way to enhance employee engagement is through the implementation of engagement programs. These programs can be as simple as regular team building activities or as comprehensive as extensive training and development opportunities. Regardless of the specific approach, there are several key benefits of such programs.

First, engagement programs help to build a positive workplace culture. This is because they foster a sense of community and collaboration among employees, encouraging them to work together towards common goals. This can lead to increased job satisfaction and a reduction in turnover, as employees feel valued and supported in their roles.

Second, engagement programs can improve productivity and performance. When employees are engaged and invested in their work, they are more likely to put in extra effort and go above and beyond their job requirements. This can result in improved quality of work and higher levels of efficiency, ultimately benefiting the organization as a whole.

Finally, engagement programs can help to attract and retain top talent. In today's competitive job market, top candidates are looking for organizations that value their employees and provide opportunities for growth and development. Engagement programs demonstrate an organization's commitment to employee well-being and professional growth, making it a more appealing place to work.

In conclusion, implementing engagement programs is an investment in your organization's success. By promoting a positive workplace culture, boosting productivity, and attracting top talent, these programs can have a significant impact on your organization's bottom line. Start exploring your options and make employee engagement a priority today!

ELECTRIC LOCOMOTIVES

By- Kaustubha Srivastava Sem-6th (1902851)

An "Electric Locomotive" is a railway vehicle that can move along rails and push or pull a train attached to it using electric power drawn from an external source, usually from overhead cables or a third rail.

Electric Locomotives do not have a conventional "engine" in them as we have seen in a <u>diesel locomotive</u>, but use the electricity collected from the outside source to power traction motors which turn the wheels. Electric Locomotives are of three types: Those which can work on

- DC (Direct Current),
- AC (Alternating Current)
- AC and DC Bi-current

Electric Locomotives, though high on electrical engineering, work on the single principle of drawing current from external sources and then after sufficiently "modifying" it, feed it to the traction motors.

The process of "modifying" the raw current drawn from outside into "usage" power includes a complicated process of conversion, reconversion, smoothening and transformation of the current to varying values of frequency, Voltage, Current etc.

Working Of Three-Phase Locomotive:



25 kV overhead AC supply is stepped down with the main transformer in the locomotive and fed to a front end (line) twin 4-quadrant line converter where AC is converted to DC through Pulse Width Modulation(PWM) thus achieve unity power factor.

This supply is linked with an input side converter through DC link which is a reservoir of energy.

Drive converter (VVVF Converter) converts DC supply into 3 phase which is then fed to 3 phase traction motors.

Gate turn off (GTO) thermistors are used in converter/inverter.

The output of Drive converter (inverter) is Variable Voltage Variable Frequency (VVVF) supply which helps in controlling the starting and running torques of three-phase traction motors to suite traffic requirements.

DIGITAL TWINS

By- Aditya Yadav Sem-6th (1902789)

A digital twin is a virtual model of a physical object. It spans the object's lifecycle and uses real-time data sent from sensors on the object to simulate the behaviour and monitor operations.

Digital twins will allow mechanical engineers to virtually test products and control equipment or tools



from different companies. It will also make it possible to create and test a multitude of complex digital twin designs across a variety of industries.

With all major cloud providers (Microsoft, Google, AWS) offering expanded digital twin capabilities in the last two years, it seems probable that digital twin technology will shift from add-on IaaS tools to a native PaaS system. If (or when) that happens, it will be much easier for organizations to integrate digital twinning on any platform.

Another bonus?

Digital twin technology can help create accurate, even predictive maintenance and lifecycle schedules, allowing engineers to proactively adapt their plans and designs.