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MAY-2024 | VOLUME-2 | ISSUE-5

ISSN (Online): 2584-2749

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Scientists

Technocrats

Engineers

Mathematicians

**CAREER
PLANNING
COMPANION
FOR
GRADE 8 TO 12
STUDENTS**

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About the Magazine

ENTECH is a magazine that comes out every month. It is for teenagers between the ages of 13 and 18. The magazine focuses on Science, Technology, Engineering, and Mathematics (STEM). It helps teens find out what they are interested in and what they love. ENTECH shows them how to turn their passion into a career. The magazine has short articles. These are written by professionals, innovators, researchers, and teachers.

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From the desk of Editor

Life-Changing Treatments with RNAi Therapies

Imagine a world where diseases that once seemed untreatable are now curable. Our own cells possess the ability to heal. This may sound like science fiction, but thanks to a groundbreaking technology called RNA interference (RNAi), it is becoming a reality. In this editorial, we will explore how RNAi therapies are transforming the field of medicine and offering hope for life-changing treatments.

RNA interference, or RNAi, is a natural biological process that occurs within our cells. It involves a molecule called RNA (short for ribonucleic acid) that plays a vital role in the production of proteins, the building blocks of life. RNAi works by silencing or "turning off" specific genes responsible for causing diseases. By targeting the root cause of these diseases at the genetic level, RNAi therapies have the potential to revolutionize modern medicine.

So, how does RNAi therapy work? Scientists have developed tiny molecules called small interfering RNA (siRNA) that can specifically target and bind to the messenger RNA (mRNA) molecules responsible for producing disease-causing proteins. Once bound, the siRNA molecules trigger a process that leads to the degradation of the mRNA, effectively preventing the production of harmful proteins. This precise and targeted approach holds great promise for treating a wide range of diseases, from genetic disorders to viral infections and even cancer.

While RNAi therapies hold immense promise, it's important to note that they are still in the early stages of development and clinical trials. The road to widespread use and accessibility may be long, but the potential benefits are worth the wait. As a teenager, you have a unique opportunity to witness and contribute to the future of medicine. The STEM skills you acquire today could shape the advancements in RNAi therapies of tomorrow.

As teenagers, you are the next generation of scientists, healthcare professionals, and innovators. Embrace the opportunities that STEM fields offer, and be a part of the journey towards transforming lives through RNAi therapies. Remember, the power to change the world lies within each and every one of you.

Sincerely yours,

Charudatta Pathak

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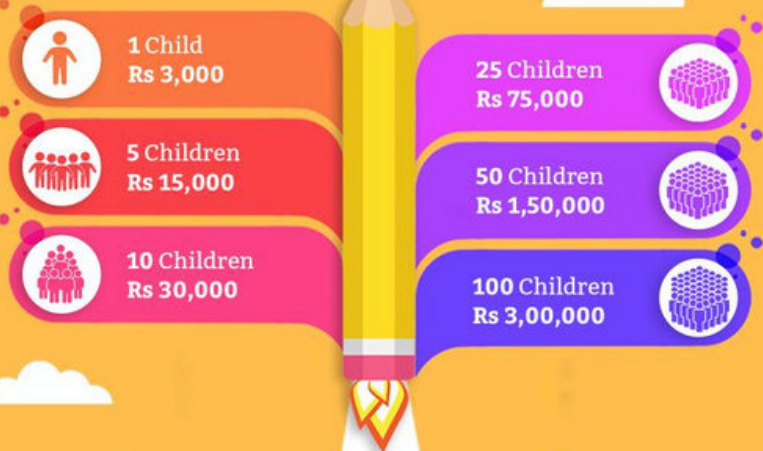
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ULTRA-PROCESSED FOOD RE-FORMULATION FOR GUT HEALTH AND ORGAN PROTECTION: PART I INTRODUCTION



Dr. Archana Ainapure

Abstract

Ultra-processed food disrupts metabolism. It increases adiposity, lowers mitochondrial efficiency, and promotes insulin resistance. It also alters growth and increases morbidity and death in humans. Companies selling consumer packaged goods (CPG) are realizing these negative effects. They have started using substitution techniques to reduce salt, sugar, and fat. However, such straightforward alternatives do not lessen the complex negative effects of ultra-processed meals.

The researcher worked with Bahrain dairy companies in the Middle East. Together, they conducted a thorough scientific analysis of their entire commercial food and beverage portfolio. They examined macronutrients, micronutrients, additives, and toxins in each product. They also studied how processing affects health. The goal was to determine the specific nature of each product's contents. The researcher formed a Scientific Advisory Team (SAT). They created a three-layered "Metabolic Matrix" based on three scientific principles: (1) safeguard the liver, (2) nourish the gut, and (3) support the brain.



The Metabolic Matrix classifies each product and offers metrics, criteria, and suggestions for formulation or modification. For these processes to be successful, real-time communication with the executive and operations teams was essential. This scientific exercise has helped the company improve health, well-being, and sustainability in their products. They have kept the flavor intact. Economic viability has been preserved. Fiscal viability remains unchanged. This process is easily transferrable, and the researcher is sharing this effort and its approaches as a proof of concept. The main goal of this endeavor is to improve customers' metabolic health and wellbeing worldwide. This will be achieved by reformulating ultra-processed food. It will also involve encouraging other food firms to do the same with their products.

Keywords

ultra-processed food, insulin resistance, metabolic health, brain health, nutrition, re-engineering, re-reformulation.

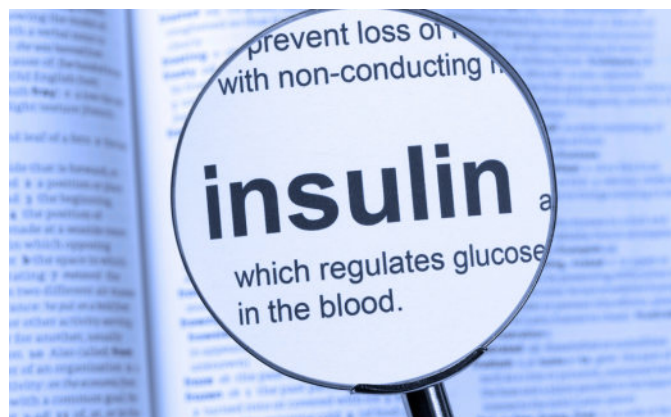
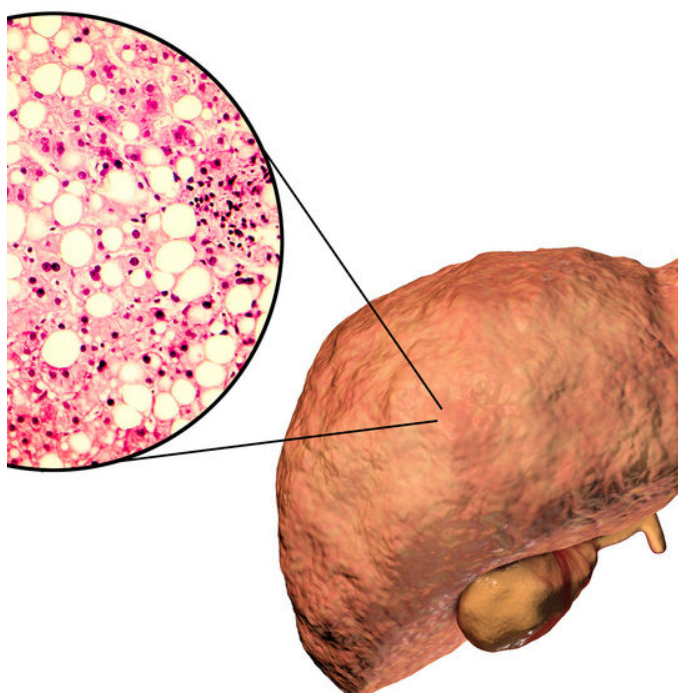
Insulin Resistance

Chronic metabolic conditions are now widespread. They affect both industrialized and developing nations. These conditions include type 2 diabetes, hypertension, and dyslipidemia. They also include cardiovascular disease, cancer, and dementia.

Additionally, polycystic ovarian disease and non-alcoholic fatty liver disease are included. The prevalence, severity, and proportion of global healthcare costs dedicated to these disorders are all increasing (1). Each of these chronic metabolic illnesses alters cellular processes. These changes lead to modified mitochondrial energetics. This results in the phenomenon of insulin resistance. Where does this insulin resistance come from, and why has it gotten worse over the past 50 years? These are the two main topics.

Chronic Illness

One common misperception among medical practitioners is that chronic illness is a natural byproduct of aging. This does not explain why type 2 diabetes and fatty liver disease are now common in young children. These conditions were previously rare in this age group. Now, children as young as the first decade exhibit the same biochemical pathways. In fact, due to abnormal fatal energy partitioning, many neonates have increased adiposity (2-4).



Another common misunderstanding is that the vices of gluttony and sloth directly contribute to the rise in obesity's prevalence and severity. The physiology of three occurrences refutes this assumption, demonstrating widespread involuntary changes in cellular biochemistry. First, captive laboratory animals are gaining weight, indicating a global metabolic insult that is not just affecting humans (5). Second, over the past 150 years, body temperature in the United States has fallen while obesity has increased. This indicates a sub-cellular impairment in mitochondrial beta-oxidation and heat production. Third, environmental obesogens in the commercial food supply threaten all vertebrate life on Earth. Some obesogens directly affect adipose tissue development. Others impact mitochondrial beta-oxidation and promote weight gain, regardless of calorie intake (6).

Metabolic Health

The idea that fat and chronic disease are the same thing is a third myth. In contrast, it is important to note that 20% of over weight, people have good metabolic health (7), a normal lifespan and health span, and the predicted biochemical aging indicators, such as normal length telomeres (8). Conversely, one or more chronic metabolic disorders are present in 40% of people with normal weight. Up to 93% of adults in the United States exhibit some form of metabolic abnormality (9), whereas only 65% of people are higher weight (10). These illnesses can also affect people of normal weight, and their incidence is rising in countries with low obesity rates. Therefore, a more extensive and potentially mysterious exposure must explain the high incidence of insulin resistance and chronic disease in societies with low obesity rates.

Non-Communicable Diseases (NCDs)

The majority of clinicians incorrectly attribute the rise in non-communicable diseases (NCDs) to fat depots that are visible externally, according to a fourth common myth. This is also incorrect, as two endocrinopathies illustrate the contrast between obesity and chronic disease. First, an Ecuadorian founder-effect cohort known as the "Little Women of Loja" becomes noticeably higher weight despite having a deficiency in growth hormone receptors, protecting them against chronic metabolic diseases, including diabetes and heart disease (11).

Patients with lipodystrophy, on the other hand, lack subcutaneous fat and exhibit significant insulin resistance, as well as ectopic fat in the liver and muscles (12). Disease arises from invisible fat, leading to ectopic fat and insulin resistance in many individuals of normal weight.

Standard American Diet (SAD)

The fifth and final myth is that the amount of food ingested in accordance with the "calories" meter is what causes chronic disease. Instead, the type of food we consume influences our insulin sensitivity. Ultra-processed foods in the Standard American Diet (SAD) promote obesity. They also change mitochondrial ATP production. This diet is also known as the Western Diet or the Processed Food Diet (13).



The NOVA classification of food processing has been recently developed, validated, and implemented. It shows that Group 4, which includes ultra-processed foods, carries the highest risks of morbidity and mortality. Many studies from different cultures reveal a link between eating ultra-processed foods and several health issues. These include obesity (14), diabetes (15), heart disease (16), cancer (17), dementia (18), and other mental health disorders (19). In essence, just as different sources of calories are not the same, neither are obesity and chronic disease (20).

Artificial Sweetener

Several substances in ultra-processed food have been linked to metabolic disturbances (21). Public health professionals (22) and business interests (23-26) have likely conducted the most research and harshly criticized sugar. The food industry creates non-nutritive sweetener substitutes to replace sugar in its recipes. Many consumer packaged goods businesses have tried to lower the sugar content of their products. They aim to improve the quality of their ultra-processed items. Several start-up companies have also founded a new Alliance to Combat Excessive Sugar (ACES) (27).

However, ultra-processed foods are harmful to human health in a number of ways, including the composition of macronutrients and micronutrients, fiber, the impact of food additives, pollutants, heat exposure, and packaging. Academic researchers have offered a methodology for the reformulation of processed foods to enhance sustainability and health (28). A more scientific approach that considers the varied metabolic impacts of food ingredients and processing is necessary to make ultra-processed food healthier. Research posed the question, "Can we make tasty food healthy?" as opposed to "Can we make healthy food tasty?"

Bahrain Dairy Experiment

Researchers have collaborated with the Bahrain dairy Executive Team to explore and reinvent their 180-item portfolio to create best-in-class (nutritious, scrumptious, cost-effective, and commercially viable) foods and beverages that support metabolic health and well-being throughout the course of 2020–2022. This re-engineering effort identified three main areas: the food's materials, its processing, and its metabolic effects.

Despite considering the cost of ingredients and procedures, the analysis did not prioritize cost; instead, the researchers aimed to provide recommendations for improving dairy's metabolic health portfolio, leaving sales and marketing to the company's management. The data shown here serves as a proof-of-concept and a guide for other businesses interested in undertaking a similar exercise for the benefit of their businesses and customers.

We will explore the MATERIALS AND METHODS in Part II of this article in next month's issue.



Data Accessibility Declaration

The article/Supplementary material contains the original contributions made for the study; further questions should be addressed to the corresponding author.

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Fig. 1: Different phases of aluminium particle under heating.



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JOURNEY OF A STEM ENTHUSIAST: FROM SCHOOL TO BECOMING A SUCCESSFUL ENTREPRENEUR



Rajendra Pethe

Mr. Rajendra Pethe is a renowned expert in the areas of business excellence, lean, kaizen management, strategy formulation, and its execution. He has been responsible for the management of green field initiatives within the automotive sector. He has experience operating on a global scale in Germany. He has enhanced the productivity, floor space utilization, inventory turnaround, ergonomics, and safety of numerous industries.

Mr. Rajendra Pethe shared his journey from school to becoming a successful entrepreneur during a conversation with Mr. Dinesh Joshi, an editorial board member of ENTECH Magazine.



WHAT INSPIRED YOU TO PURSUE A CAREER THAT COMBINES SCIENCE, ENGINEERING, AND ENTREPRENEURSHIP?

My father encouraged me to read many books, including some on science. However, my interest was more inclined towards the application of scientific principles. I loved experimenting and building things based on what I learned. One of my favorite projects was creating a model of a mini hydropower station.

As someone who has always been passionate about reading, I found great inspiration in the autobiographies of Kirloskar, Jamshedji Tata, Garware, and many others. Their stories fueled my ambition to become an entrepreneur. Despite facing challenges in the 1990s, when the Indian economy was not as open, I attempted to establish a company that produces electronic weighing machines. Although this endeavor failed, it stopped before it started. I learned valuable lessons from the experience. I decided to temporarily set aside my entrepreneurial ambitions and focus on my job, aiming to gain as much knowledge and expertise as possible.



How did your background in science and engineering shape your approach to business?

I come from a middle-class family. In my neighborhood, I saw that many of the wealthy families were either doctors, lawyers, or businessmen. After observing a big government civil hospital and a district court nearby, I decided that I didn't want to pursue a career in medicine or law. Instead, I found inspiration in the small business owners who operated fabrication shops, machine shops, and trading units. During the holidays, I admired their success and spent time observing them from a distance. I always felt that these owners were the kings of their small kingdoms. My childhood aspirations led me to believe that to own a business, I needed to understand machines, and becoming an engineer seemed like the best way to achieve this goal. Looking back, this process was not as simple as it may seem now for me.

As a role model for aspiring scientists and engineers, what advice would you give to young individuals looking to follow a similar path?

I deeply regret giving up on my business idea of creating electronic weighing scales. If only I had pushed my perseverance and risk-taking abilities further, I could have been a pioneer in that industry in Maharashtra. I allowed my fear of failure to steer me away from pursuing my passion, opting for a safer job instead.

Despite facing challenges, I didn't give up. I left my job and embarked on the journey of starting our own company with like-minded friends. We are committed to creating cutting-edge technological solutions for diverse industries.

Therefore, I urge young individuals aspiring to be entrepreneurs in the STEM field not to give up prematurely. It's critical to seek out mentors, discuss challenges, and prepare fallback plans for every potential obstacle. Books, platforms like Quora and Investopedia, university professors, and various blogs can all serve as valuable sources of mentorship and guidance.



How do you balance the innovative mindset required in STEM fields with the practical aspects of running a successful business?

It's crucial to strike a balance between creativity and pragmatism, merging the innovative spirit of STEM fields with the practical aspects of running a successful business.

Continuous Learning: Embrace the latest scientific advancements and business trends to make well-informed decisions that cater to technological innovation and market demands.

Strategic Planning: Establish clear goals and devise a roadmap for achieving them, marking key milestones for product development and business expansion.

Collaboration: Engage with a diverse team of experts to incorporate varied perspectives and skills, leading to more innovative solutions and effective problem-solving.

Risk Management: Embrace and manage the risks associated with innovation through thorough research and contingency planning.

Customer Focus: Understand your customers' needs and challenges in order to ensure that your innovations are both cutting-edge and user-friendly.

Financial Acumen: To ensure that investments in innovation pave the way for a sustainable business model, monitor the business's financial well-being.

Flexibility: Be ready to adapt when necessary, as the ability to respond to new information or market changes is vital for long-term success.

Patience and Persistence: Introducing an innovative idea to the market can be a lengthy process. Stay steadfast in your vision, even in the face of obstacles.

By integrating these elements, one can create an environment where innovation flourishes while upholding a viable business operation.

Can you share a specific moment in your journey where your passion for science or engineering directly influenced a business decision or innovation?

Originally, we designed one of our products, a truck-mounted crane, exclusively for land operations. However, my West Sales zonal manager was unable to generate the targeted revenue. During one of my reviews with him, I suggested that since the Mazgaon dock fell under his sales territory, the tugboats, maintenance, and supply ships must be using pedestal cranes. I proposed that we should target that market segment. We converted our truck-mounted crane into a pedestal crane that conformed to all offshore crane norms. This decision resulted in very good revenue at a high premium.



What are some key lessons you've learned from your experiences that young STEM enthusiasts should keep in mind as they pursue their goals?

Remember, the journey of learning and discovery is a marathon, not a sprint. Enjoy the process as much as the outcomes.

Curiosity is Key: Always ask questions and seek to understand how things work. This innate curiosity will drive your learning and innovation.

Embrace Failure: Don't be afraid to fail. Failure is often the stepping stone to success and a valuable learning experience.

Persistence Pays Off: Challenges and setbacks are inevitable. Persistence in the face of adversity is often what separates successful innovators from the rest.

Collaboration is Crucial: No one achieves great things alone. Collaborate with others to expand your knowledge and capabilities.

Ethics Matter: As you push the boundaries of science and technology, always consider the ethical implications of your work.

Communication Skills: Being able to effectively communicate your ideas is just as important as having them. Work on honing your communication skills.

Vision and Goal Setting: Have a clear vision of what you want to achieve and set specific, measurable goals to help you get there.

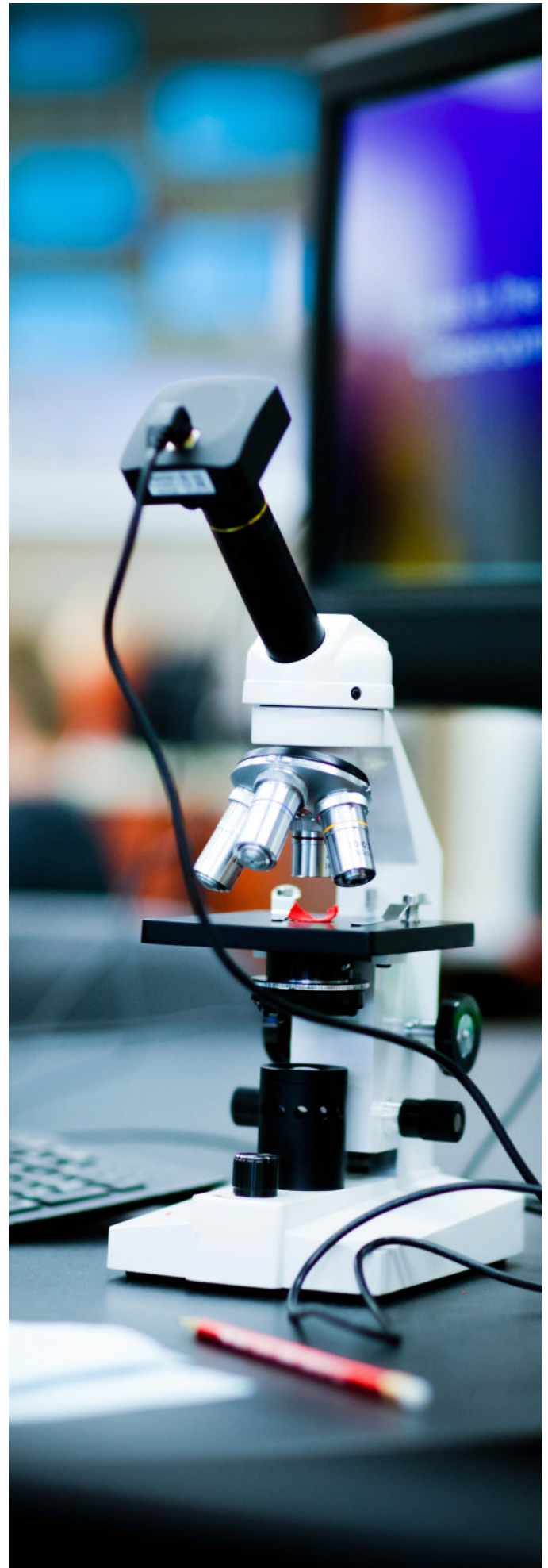
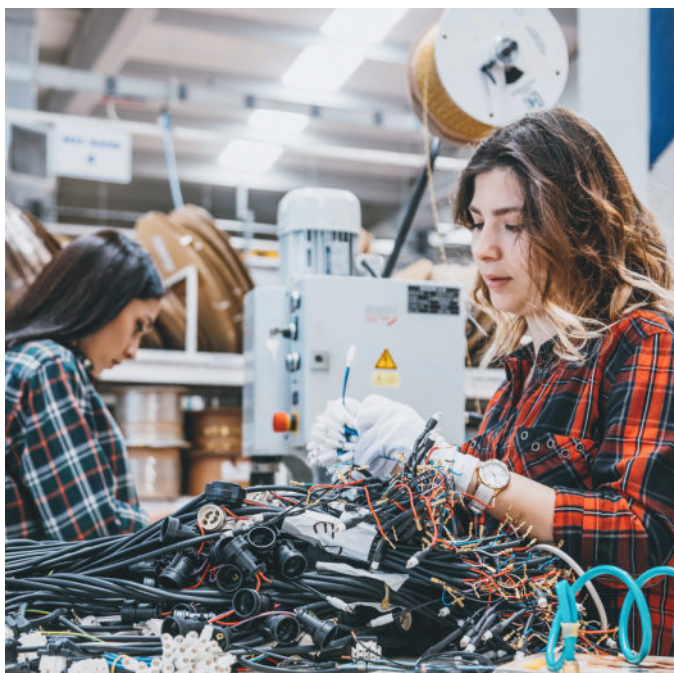
How do you stay updated with the latest trends and technologies in the ever-evolving fields of science and engineering?

The pursuit of knowledge is a lifelong journey, especially in rapidly changing fields like STEM. Never stop learning. Enrolling and actively participating in various forums is essential, as is staying updated with the latest research papers and case studies. Adaptability is crucial, as the STEM fields are constantly evolving. It's important to be prepared to adapt your skills and knowledge to stay relevant. Additionally, balancing theoretical knowledge with practical application is key to fostering understanding and driving innovation.

In what ways do you give back to the STEM community or support the next generation of scientists and engineers?

As a Factory Head at various organizations, I always strived to inspire STEM students to enroll as interns in my plant. I carefully selected challenging projects and collaborated with them to develop innovative technical solutions that were also economically viable.

I am passionate about sharing my knowledge and experience with deserving STEM students. Our organization is currently collaborating with students from a prestigious college in Pune to develop a technological solution for a persistent industry problem.



ROOFTOP SOLAR SYSTEM WORKING: A COMPREHENSIVE TECHNICAL DESCRIPTION



Shreyas Kulkarni

Rooftop solar systems, also known as rooftop photovoltaic (PV) systems, are installations that harness the power of the sun to generate electricity. These systems include solar panels, inverters, batteries, mounting, and monitoring systems. Although the concept of using solar energy to generate electricity has existed for centuries, it wasn't until the late 20th century that rooftop solar systems became more accessible and widely used.

One cannot overstate the importance of rooftop solar systems. With the increasing demand for electricity and the growing concern over climate change, renewable energy sources like solar power have become crucial in reducing greenhouse gas emissions and transitioning to a more sustainable future. Rooftop solar systems allow individuals and businesses to generate clean energy, reduce reliance on fossil fuels, and contribute to a greener planet.



KEY TAKEAWAYS

- Rooftop solar systems are becoming increasingly popular for generating renewable energy and reducing electricity bills.
- A rooftop solar system includes solar panels, inverters, batteries, and a net metering system.
- Advances in solar panel technology have led to increased efficiency and lower costs.
- Inverters and batteries play a crucial role in converting and storing solar energy for use in the home.
- Net-metering and grid-tied systems allow homeowners to return excess energy to the grid. In contrast, off-grid systems and battery storage provide energy independence.



Components of a Rooftop Solar System

A rooftop solar system consists of several vital components that combine to convert sunlight into usable electricity. The main components include solar panels, inverters, batteries, mounting, and monitoring systems.

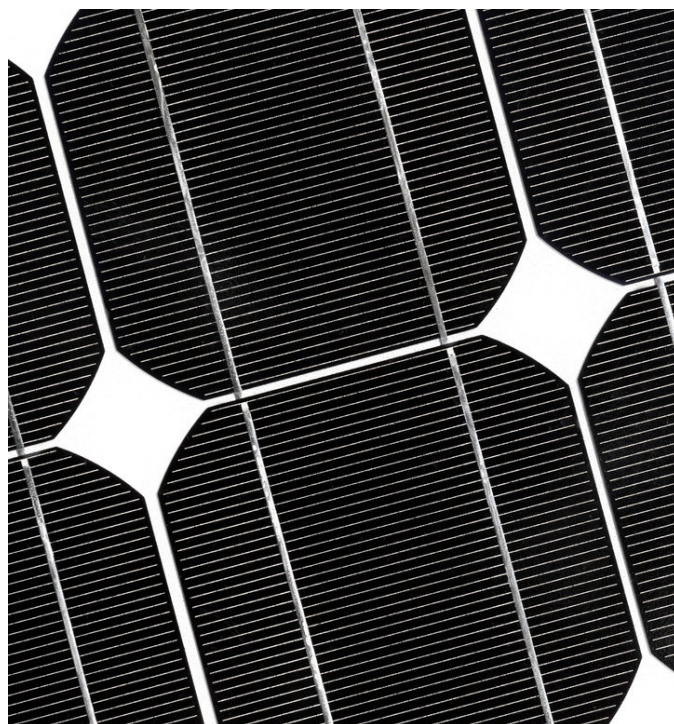
Solar panels are the most visible part of a rooftop solar system. They comprise photovoltaic cells that convert sunlight into direct current (DC) electricity. Typically, silicon-based materials form these panels, which vary in size and efficiency.

Solar panels generate DC electricity, which inverters convert into alternating current (AC) power to power appliances and devices in homes and businesses. Different inverters are available, including string, microinverters, and power optimizers.

Batteries are optional components in a rooftop solar system. Still, they can be beneficial for storing excess energy generated during the day for use during periods of low sunlight or at night. They give homeowners and businesses a backup power source and increase their energy independence.

Mounting systems secure the solar panels to the roof and ensure their correct angulation to maximize sunlight exposure. These systems need to be durable, weather-resistant, and able to withstand the weight of the panels.

Monitoring systems provide real-time data on the performance of the rooftop solar system, including energy production, consumption, and any potential issues. This allows homeowners and businesses to track their energy usage, identify areas for improvement, and ensure the system is operating optimally.



Solar Panel Technology and Efficiency

Solar panel technology has advanced dramatically since its inception. Different types of solar panels are available today, including monocrystalline, polycrystalline, and thin-film panels. Single crystal structures form the basis of monocrystalline panels, which are renowned for their exceptional efficiency. Polycrystalline panels, made from multiple crystal structures, are slightly less efficient but more affordable. We make thin-film panels by depositing a thin layer of photovoltaic material onto a substrate. They are flexible, lightweight, and less efficient than crystalline panels.

Several factors can affect the efficiency of solar panels. The angle and orientation of the panels relative to the sun play a significant role in maximizing energy production. Tree shading or nearby buildings can also have an impact on efficiency. Additionally, dust, dirt, or debris on the panels' surfaces can reduce their ability to absorb sunlight.

Advancements in solar panel technology continue to improve efficiency and performance. Researchers are exploring new materials, such as perovskite, that have the potential to increase efficiency even further. Additionally, researchers are developing innovations in panel design to maximize energy production, such as bifacial panels that can capture sunlight from both sides.



Inverter and Battery Functionality

Inverters are an essential component of rooftop solar systems. The solar panels generate DC electricity, which they then convert into AC electricity to power appliances and devices. Different types of inverters are available, each with its own advantages and disadvantages.

Larger rooftop solar systems typically install string inverters, which are the most common type. Despite their cost-effectiveness and efficiency, string inverters have a single point of failure, which means that a shaded or damaged panel in the string can negatively impact the entire string's performance.

On the other hand, each solar panel has microinverters installed to convert DC electricity into AC electricity at the panel level. This allows for greater flexibility and optimization, as each panel operates independently. However, microinverters can be more expensive and require additional wiring.

Power optimizers are a hybrid between string inverters and microinverters. They collaborate with a central inverter. Power optimizers maximize energy production by optimizing each panel's performance while still benefiting from the cost-effectiveness of a central inverter.

Batteries are optional in rooftop solar systems, but they can provide several benefits. They allow homeowners and businesses to store excess energy generated during the day for use during periods of low sunlight or at night. This increases energy independence and provides a backup power source in case of grid outages. Different types of batteries are available, including lead-acid, lithium-ion, and flow batteries, each with its own characteristics and performance.



Net Metering and Grid-Tied Systems

Net-metering is a billing arrangement that allows homeowners and businesses with rooftop solar systems to receive credit for any excess electricity they generate and feed back into the grid. When a rooftop solar system generates more electricity than it consumes, net metering sends the excess energy back to the grid, resulting in a credit for the homeowner or business on their electricity bill.

Net-metering provides several benefits. It allows homeowners and businesses to reduce their reliance on the grid and use the excess energy they generate to offset their electricity costs. It also encourages the adoption of rooftop solar systems by providing a financial incentive and making them more economically viable.

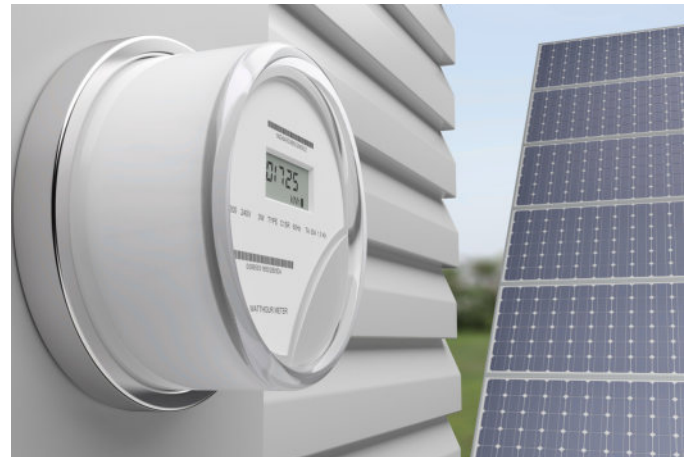
Rooftop solar systems connected to the electrical grid are known as grid-tied systems. These systems allow homeowners and businesses to draw electricity from the grid when their solar panels are not producing enough energy, such as during periods of low sunlight or at night. Grid-tied systems provide a reliable and consistent source of electricity while still allowing for the benefits of rooftop solar, such as reduced electricity bills and environmental impact.

Off-grid Systems and Battery Storage

Off-grid, or standalone systems, are rooftop solar systems that are not connected to the electrical grid. Remote areas with limited or non-existent grid access typically use these systems. Off-grid systems require battery storage to store excess energy generated during the day for use during periods of low sunlight or at night.

Off-grid systems offer several advantages. They provide energy independence, allowing homeowners and businesses to generate electricity without relying on the grid. They also eliminate the need for expensive grid infrastructure in remote areas, making them a cost-effective solution. However, off-grid systems require careful planning and sizing to ensure they can meet the energy demands of the property throughout the year.

Battery storage is a crucial component of off-grid systems. It allows for storing excess energy generated during periods of high sunlight for use when little or no sunlight is available. Batteries store the excess energy in DC form and convert it back to AC when needed. An off-grid system chooses the type of battery based on factors like capacity requirements, depth of discharge, cycle life, and cost.



Installation and Maintenance of Rooftop Solar Systems

The installation of a rooftop solar system involves several steps. Firstly, we conduct a site assessment to ascertain the roof's suitability for solar panel installation. We evaluate factors such as roof orientation, shading, and structural integrity. After completing the site assessment, we mount the solar panels on the roof using a secure and durable mounting system. Next, we connect the panels to the inverter, which transforms the DC electricity into AC electricity. Depending on whether the system is grid-tied or off-grid, the final step involves connecting it to the electrical grid or battery storage.

Regular maintenance ensures a rooftop solar system's optimal performance and longevity. This includes cleaning the solar panels to remove dust, dirt, or debris that can reduce their efficiency. It also involves inspecting the system for any signs of damage or wear and tear, such as loose connections or damaged wiring. Regularly monitoring the system's performance is also essential to promptly identify and address potential issues.

Everyday maintenance issues with rooftop solar systems include shade from nearby trees or buildings, which can reduce energy production. Tree trimming, removal, or the installation of shading devices can address this issue. Another common issue is a decrease in efficiency due to dust or dirt on the panels' surfaces. Regular cleaning can help mitigate this issue. Additionally, extreme weather events such as hailstorms or strong winds can cause damage to the panels or mounting system, requiring repairs or replacements.

Cost and Return on Investment of Rooftop Solar Systems

The cost of a rooftop solar system can vary depending on several factors, including the size of the system, the type of solar panels and inverters used, and any additional components, such as batteries. Other factors affecting cost include installation fees, permits, and labor costs.

Calculating a rooftop solar system's return on investment (ROI) involves considering the upfront costs and the long-term savings. Typically, we calculate the ROI by dividing the total savings over the system's lifetime by the initial investment. The savings come from reduced electricity bills, net metering credits, and government incentives or rebates.

Government incentives and rebates can significantly reduce the cost of rooftop solar systems and improve the ROI. Many countries and states offer tax credits, grants, or feed-in tariffs to encourage the adoption of renewable energy sources. These incentives offset the upfront costs and make rooftop solar systems more affordable for homeowners and businesses.



Rooftop Solar Systems' Environmental Benefits

Rooftop solar systems offer several environmental benefits. By generating electricity from the sun, they reduce their reliance on fossil fuels, a significant source of greenhouse gas emissions and air pollution. This helps mitigate climate change and improve air quality.

Rooftop solar systems also positively impact the environment by reducing the carbon footprint of homes and businesses. Solar power generates clean and renewable electricity that emits no greenhouse gas during operation. By transitioning to renewable energy sources like solar power, we can reduce carbon emissions and work towards a more sustainable future.

Furthermore, rooftop solar systems promote the use of renewable energy sources, which is essential in reducing our dependence on finite resources like coal, oil, and natural gas. As these resources become scarcer and more expensive to extract, investing in rooftop solar systems becomes a viable and cost-effective solution for meeting our energy needs.

Future Developments in Rooftop Solar Technology

The future of rooftop solar technology looks promising, with ongoing advancements in efficiency, design, and integration. Researchers are constantly exploring new materials and technologies to improve the performance of solar panels and increase their efficiency. One area of focus is perovskite solar cells, which have shown great potential for achieving higher efficiencies than traditional silicon-based cells.

Not only are we improving efficiency, but we are also making advancements in panel design. Bifacial panels, for example, can capture sunlight from both sides, increasing energy production. Researchers are also developing transparent solar panels that can seamlessly integrate solar power into windows and building facades, enhancing the built environment.

Another development area is integrating rooftop solar systems with other technologies, such as energy storage and smart grid systems. Battery storage technology is improving, allowing for more efficient and cost-effective energy storage solutions. Smart grid systems enable better energy usage management and optimization, allowing homeowners and businesses to maximize their energy savings.

Staying up-to-date on the latest advancements in rooftop solar technology is essential for homeowners and businesses considering installing a rooftop solar system. By staying informed about new technologies and developments, they can make more informed decisions and ensure they are investing in the most efficient and cost-effective solutions.



Conclusion

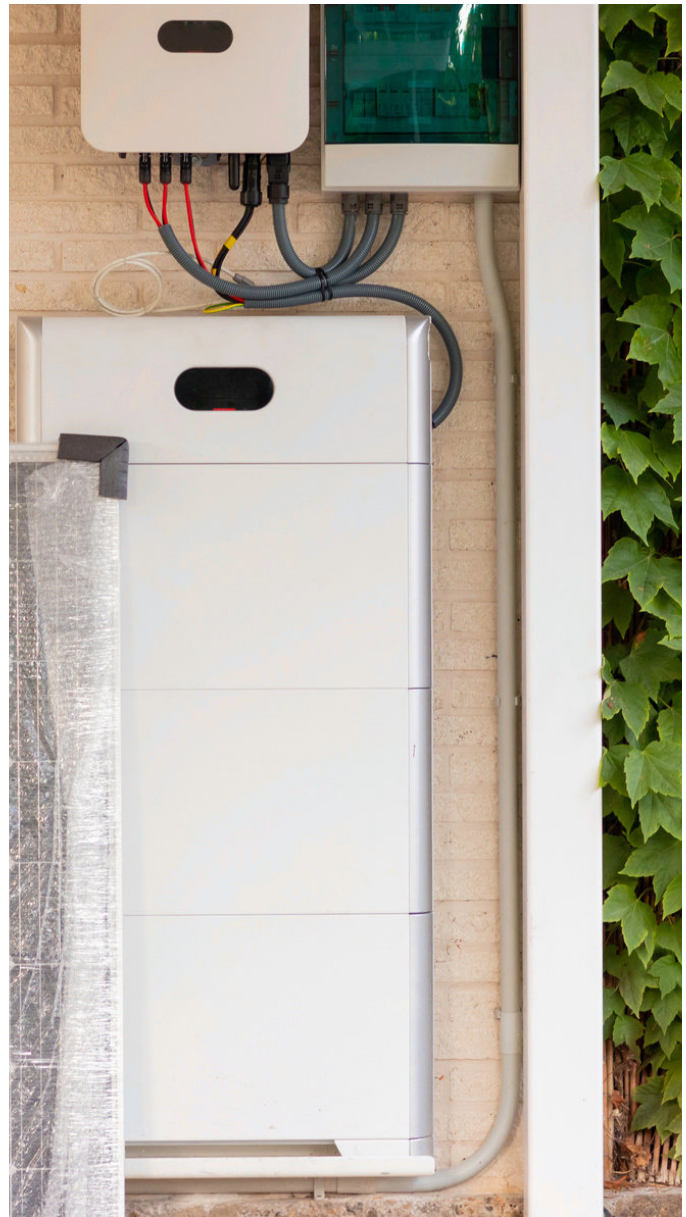
Rooftop solar systems have become increasingly crucial in transitioning to a more sustainable future. By harnessing the sun's power, these systems allow homeowners and businesses to generate clean energy, reduce their reliance on fossil fuels, and contribute to a greener planet. The components of a rooftop solar system, including solar panels, inverters, batteries, mounting systems, and monitoring systems, work together to convert sunlight into usable electricity.

Advancements in solar panel technology continue to improve efficiency and performance. Researchers are exploring new materials and designs to increase efficiency even further. Inverters are crucial in converting DC electricity into AC electricity, while batteries store excess energy generated daily. Net metering allows homeowners and businesses to receive credit for any excess electricity they generate and feed back into the grid.



Installing and maintaining rooftop solar systems requires careful planning and regular upkeep. Regular maintenance ensures optimal performance and longevity of the system. The cost of rooftop solar systems can vary depending on several factors. Still, government incentives and rebates can help offset the upfront costs and improve the return on investment.

Rooftop solar systems provide several environmental benefits, including a reduced carbon footprint and a positive environmental impact. By transitioning to renewable energy sources like solar power, we can reduce our reliance on finite resources and work towards a more sustainable future. The future of rooftop solar technology looks promising, with ongoing advancements in efficiency, design, and integration. Staying up-to-date with these advancements is crucial for homeowners and businesses considering installing a rooftop solar system.



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A BRIEF INTRODUCTION TO PRODUCTION ENGINEERING: PART I



Ojas Joshi

Hey there, curious teens! Have you ever wondered how your beloved gadgets or those captivating cars are made? Well, production engineering might just be the answer you're looking for. It's an awesome field that combines creativity, technology, and problem-solving skills to make, well, pretty much everything! If you're thinking about future career paths, let's dive into the world of production engineering and explore why it could be an amazing choice. In this article, I'll walk you through what production engineering is all about, including program objectives, outcomes, subjects, and the hands-on experiences you'll get.

Program Objectives and Outcomes

So, what's the goal of a production engineering program? Simply put, it's to turn you into a versatile engineer who can optimize production processes, improve efficiency, and ensure top-notch quality in various industries. According to ABET guidelines, the main objectives of this program are to:



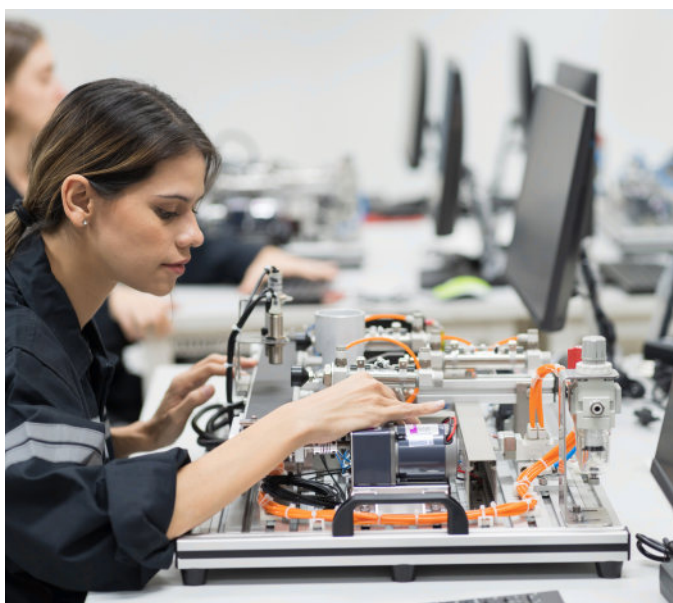
1. Apply Engineering Principles: Learn how to use engineering concepts to analyze and enhance production systems, making sure resources are used effectively.
2. Optimize Production Processes: Identify and fix bottlenecks, analyze data, and implement strategies to boost the efficiency of manufacturing systems.
3. Quality Control and Assurance: Ensure products meet industry standards and customer expectations by implementing quality control measures.
4. Enhance Safety and Sustainability: Develop strategies to maintain workplace safety, minimize environmental impact, and promote sustainable production practices.
5. Project Management Skills: Acquire the skills needed to plan, execute, and monitor production projects efficiently.

Upon graduation, you will possess the necessary knowledge and skills to effectively address real-world production challenges and make valuable contributions to a variety of industries.

Major Subjects for Production Engineering Students

Let’s dive into the subjects you’ll be studying. A typical production engineering curriculum covers a wide range of topics to give you a solid foundation in the field. Aside from engineering's foundation subjects, here are 25 major subjects that a production engineering student typically learns during their graduation:

1. Manufacturing Processes
2. Operations Research
3. Quality Assurance and Control
4. Supply Chain Management
5. Industrial Automation
6. Human Resource Management
7. Materials Science
8. Machine Design
9. Computer-Aided Design (CAD) and Manufacturing (CAM)
10. Robotics
11. Production Planning and Control
12. Metrology and Measurement
13. Thermodynamics and Fluid Mechanics
14. Mechanics of Materials
15. Engineering Mathematics
16. Electrical and Electronics Engineering
17. Industrial Engineering
18. Mechatronics
19. Lean Manufacturing
20. Six Sigma and Quality Management



21. Reliability Engineering
22. Simulation and Modeling
23. Project Management
24. Entrepreneurship and Innovation
25. Environmental and Sustainable Manufacturing

These subjects cover a wide range of topics, from the fundamentals of manufacturing processes and materials science to advanced topics like automation, robotics, and lean manufacturing. The curriculum also includes subjects related to management, such as project management, human resources, and entrepreneurship. Throughout the program, students gain hands-on experience through laboratory work and industry-sponsored projects, allowing them to apply their theoretical knowledge to real-world scenarios. This combination of theoretical and practical learning prepares production engineering graduates for diverse roles in manufacturing, consulting, and research and development.

Laboratories: Experiential Learning for Production Engineering Students

Here are 20 essential laboratories that provide experiential learning opportunities for production engineering students during their graduation:

1. **Manufacturing Processes Lab:** Equipped with various machines and tools to learn about different manufacturing techniques like machining, casting, welding, and forming.
2. **Computer-Aided Design (CAD) and Manufacturing (CAM) Lab:** Provides hands-on experience with CAD software and CNC machines for designing and manufacturing products.
3. **Robotics and Automation Lab:** Allows students to work with industrial robots, PLCs, and automation systems to understand their applications in manufacturing.
4. **Metrology and Quality Control Lab:** Equipped with precision measuring instruments and quality control tools to learn about inspection, testing, and quality assurance.
5. **Materials Science Lab:** Enables students to study the properties, structure, and behavior of various materials used in manufacturing.
6. **Fluid Mechanics and Hydraulics Lab:** Provides facilities to study fluid flow, hydraulic systems, and their applications in manufacturing processes.
7. **Thermodynamics and Heat Transfer Lab:** Allows students to experiment with heat engines, refrigeration systems, and heat exchangers to understand their principles and applications.
8. **Mechatronics Lab:** Integrates mechanical, electrical, and computer systems to teach students about automated system design and control.
9. **Rapid Prototyping and 3D Printing Lab:** Provides access to 3D printers and other rapid prototyping technologies for creating prototypes and small-scale production.



10. Industrial Engineering Lab: Equipped with tools and software for studying work measurement, ergonomics, facility layout, and process optimization.

11. Simulation and Modeling Lab: This lab allows students to use simulation software to model and analyze manufacturing systems and processes.

12. Electrical and Electronics Lab: Provides facilities to study electrical circuits, motors, drives, and control systems used in manufacturing.

13. Mechanical Vibrations and Dynamics Lab: It enables students to study vibration analysis, balancing, and noise control in machines and structures.

14. Tribology Lab: This lab allows students to study friction, wear, and lubrication in machine components and manufacturing processes.

15. Renewable Energy and Sustainability Lab: Provides facilities to study and experiment with renewable energy technologies and sustainable manufacturing practices.

16. Industry 4.0 and IoT Lab: Equipped with smart sensors, data acquisition systems, and cloud computing tools to learn about the application of Industry 4.0 technologies in manufacturing.

17. Lean Manufacturing and Six Sigma Lab: It provides a platform to learn and implement lean manufacturing principles and Six Sigma methodologies for process improvement.

18. Reliability Engineering Lab: This lab allows students to study failure analysis, reliability testing, and maintenance strategies for manufacturing systems and products.



19. Additive Manufacturing Lab: It provides access to advanced 3D printing technologies like SLS, SLM, and FDM for learning about additive manufacturing processes.

20. Project and Innovation Lab: It is a multidisciplinary space for students to work on capstone projects, research, and innovative product development in collaboration with industry partners.

These laboratories provide students with hands-on experience, practical skills, and exposure to real-world manufacturing challenges, preparing them for successful careers in production engineering.

Experiments and Experiential Learning Activities for a Production Engineering Student

Here are 20 major experiments and experiential learning activities that a production engineering student might undertake during their graduation:

1. Manufacturing Process Experiments:

- Machining experiments to study cutting forces, tool wear, and surface finish
- Casting experiments to understand mold design, solidification, and defects
- Welding experiments to study joint strength, microstructure, and distortion
- Forming experiments to analyze material behavior, springback, and formability



2. Computer-Aided Design (CAD) and Manufacturing (CAM) Projects:

- Designing and simulating products using CAD software
- Generating CNC programs and manufacturing parts using CAM software

3. Robotics and Automation Experiments:

- Programming industrial robots for pick-and-place, welding, or assembly tasks
- Designing and implementing automated assembly lines using PLCs and sensors

4. Quality Control and Metrology Experiments:

- Conducting dimensional inspections using precision measuring instruments
- Performing statistical process control (SPC) studies to monitor process stability
- Designing and executing quality audits and capability studies

5. Materials Science Experiments:

- Studying the microstructure, properties, and behavior of metals, polymers, and composites
- Conducting heat treatment experiments to modify material properties
- Analyzing material failures using techniques like tensile testing and hardness testing

6. Fluid Mechanics and Hydraulics Experiments:

- Studying fluid flow characteristics in pipes and channels
- Analyzing the performance of pumps, valves, and hydraulic systems
- Conducting experiments on heat exchangers and cooling systems

7. Thermodynamics and Heat Transfer Experiments:

- Studying the performance of heat engines and refrigeration systems
- Analyzing heat transfer in manufacturing processes like casting and welding
- Conducting experiments on insulation materials and thermal management systems

8. Mechatronics Projects:

- Designing and building automated systems that integrate mechanical, electrical, and software components
- Developing control algorithms for robotic manipulators or mobile robots

9. Rapid Prototyping and 3D Printing Projects:

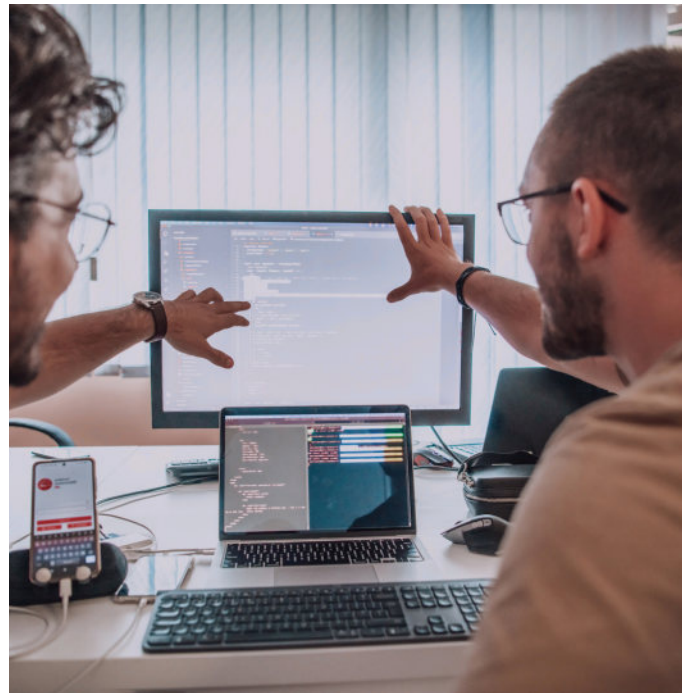
- Designing and fabricating prototypes using 3D printing technologies
- Optimizing process parameters for different 3D printing materials and techniques

10. Industrial Engineering Experiments:

- Conducting time and motion studies to improve work methods and efficiency
- Designing ergonomic workstations and analyzing manual material handling tasks
- Optimizing facility layouts using simulation and modeling techniques

11. Simulation and Modeling Projects:

- Developing discrete event simulations of manufacturing systems using software like Arena or FlexSim
- Optimizing production schedules and resource allocation using mathematical modeling



12. Electrical and Electronics Experiments:

- Studying the performance of electric motors, drives, and control systems
- Designing and implementing sensor networks for process monitoring and control

13. Mechanical Vibrations and Dynamics Experiments:

- Analyzing the vibration characteristics of machines and structures
- Conducting experiments on balancing, isolation, and damping techniques.

14. Tribology Experiments:

- Investigating friction, wear, and lubrication in machine components
- Conducting experiments on surface treatments and coatings to improve tribological performance

15. Renewable Energy and Sustainability Projects:

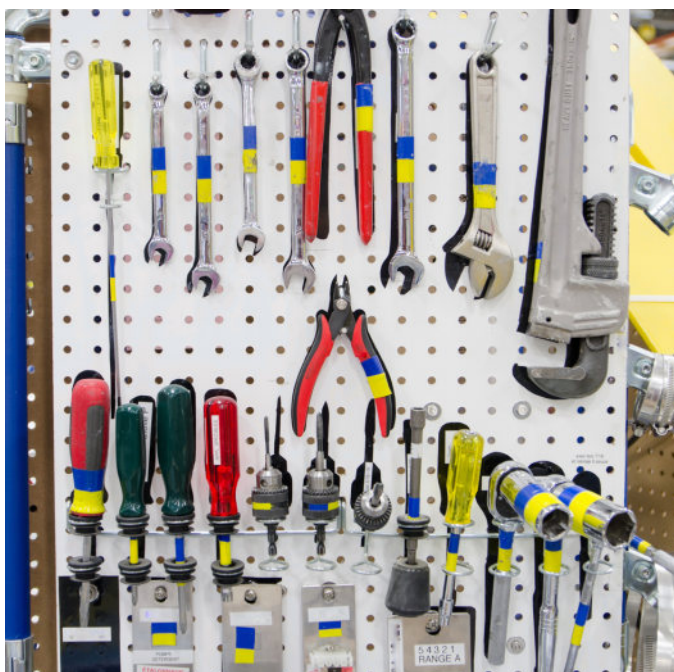
- Designing and testing renewable energy systems like solar panels or wind turbines
- Conducting life cycle assessment (LCA) studies to evaluate the environmental impact of products and processes

16. Industry 4.0 and IoT Projects:

- Implementing smart sensors and data acquisition systems for real-time process monitoring
- Developing cloud-based platforms for data analytics and machine learning applications

- 17. Lean Manufacturing and Six Sigma Projects:
 - Conducting value stream mapping exercises to identify and eliminate waste
 - Implementing lean tools like 5S, Kaizen, and Poka-Yoke to improve process efficiency
 - Executing Six Sigma DMAIC projects to reduce defects and variability
- 18. Reliability Engineering Experiments:
 - Conducting accelerated life testing and failure mode and effects analysis (FMEA)
 - Designing and implementing predictive maintenance strategies using condition monitoring techniques
- 19. Additive Manufacturing Projects:
 - Designing and fabricating complex geometries using advanced 3D printing technologies like SLS, SLM, or FDM
 - Optimizing process parameters and studying the mechanical properties of 3D printed parts
- 20. Capstone Projects and Industry-Sponsored Projects:
 - Collaborating with industry partners to solve real-world manufacturing problems
 - Developing innovative products or processes and presenting the results to stakeholders

These experiments and projects provide hands-on learning experiences that help production engineering students develop practical skills, apply theoretical knowledge, and prepare for their future careers in the manufacturing industry.



Stay tuned for the next issue, in which I will discuss the exciting job roles you can land after graduation, and highlight some major recruiters and famous production engineers who have made a mark in history.

About author : Ojas, 23, is an avid engineer with keen interests particularly in Manufacturing, Production, Industrial Engineering & Management. He has successfully completed his B. Tech-Production Engineering from VIT, Pune and is currently pursuing M. Tech in Project Management from COEP Technological University, Pune. He has worked in multiple manufacturing organisations as an intern during his engineering days and has prior work experience in leading process quality at Fabrication BU- Excavator Line in JCB India Ltd.

Apart from this, he has done multiple projects for manufacturing and operational improvement. He is a voracious reader, history enthusiast, and nurtures football and cricket as his passion.

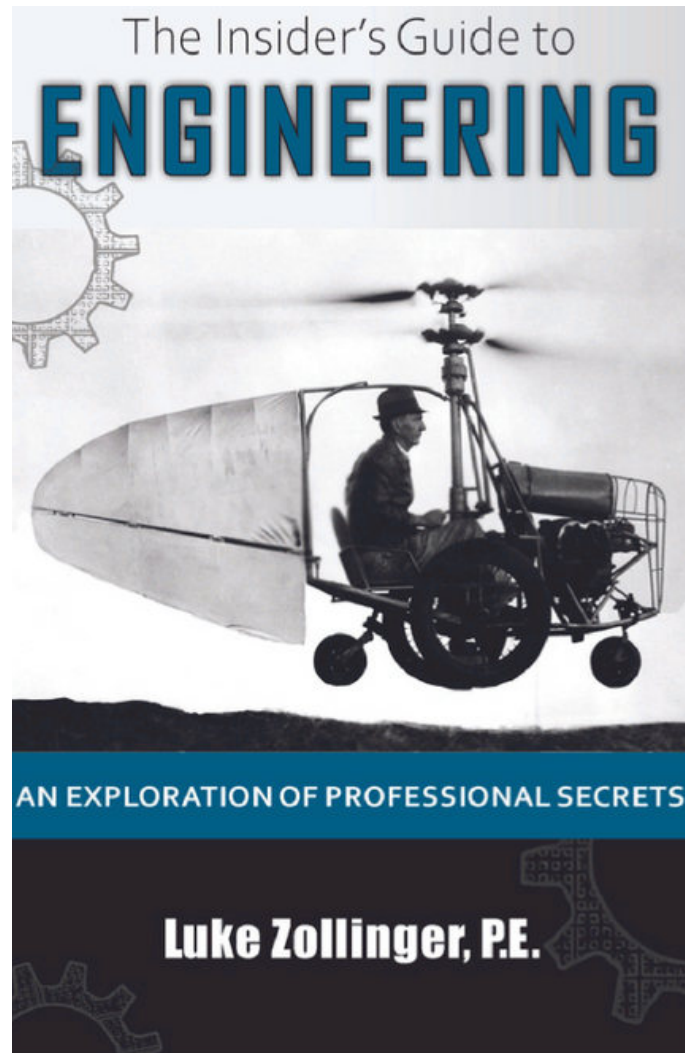
THE INSIDER'S GUIDE TO ENGINEERING BY LUKE ZOLLINGER

A Brief Summary of the Book

Engineers, engineering students, and anyone curious about the field of engineering can benefit from this book. It covers various aspects of engineering, including the differences between engineers and non-technical people, the different branches of engineering, the process of becoming a professional engineer, obtaining a patent, and insights into what motivates engineers. The content delves into the history and evolution of engineering, highlighting the shift from traditional methodologies to the impact of the digital age on the profession. It also provides practical advice and observations about the engineering field, engineers' problem-solving mindsets, and unique perspectives on social interactions. Overall, the book aims to inform and educate readers about engineering's fundamentals, provide insights into the world of engineers, and inspire further exploration of the industry.

If you are passionate about pursuing your education and career as an engineer, then reading this book will:

- Discover why engineers are different from non-technical people.
- Understand the different branches of engineering.
- Find out how to become a professional engineer and why it is valuable.
- Learn the steps to obtaining a patent.
- Expose the secret: why engineers can never make as much as sales and business people.
- Identify what motivates engineers.
- Observe a simple method to solve any technical problem.
- Pick up some useful engineering acronyms to throw out at your next big meeting.
- Consider and laugh at engineering-related



Initial Pages

The book starts with a tankful acknowledgement of Kevin Beauregard, Roberto Albertani, Ph.D., Tom Ohnstad, Cameron Crawford, Brigadier General, USA (Ret.), Todd Fronek, Larkin-Hoffman Attorneys, Mark Miller, P.E., John Parmigiani, Ph.D., P.E., Jay Cobb, Patrick DiJusto, Sahara Peterson, Andrew Durkin, Masha Shubin, Paul Cheney, Vernelle Judy, Tim Harris, Tom Doherty, Ginger Bock, and Tessa Schmitt. All of them contributed to the book's development.

Preface

The preface to "The Insider's Guide to Engineering" introduces the book as a valuable resource for engineers, engineering students, and those with an interest in engineering. It highlights the book's aim: to inform and refresh readers on the basics of the engineering profession, share interesting facts, and provide insights into various aspects of engineering. The preface outlines key topics covered in the book, such as understanding the differences between engineers and non-technical individuals, exploring the different branches of engineering, learning how to become a professional engineer, obtaining a patent, and understanding what motivates engineers.

Additionally, the preface mentions that the book contains information that will benefit all readers, offering a better understanding of the engineering field and why it operates as it does. It also teases various elements within the book, such as methods for solving technical problems, engineering acronyms, quotes about engineering, and more. The preface sets the tone for an informative and engaging exploration of the world of engineering, providing a glimpse into the engineers' unique perspectives and practices.

The book contents are organized into nine chapters. A chapter-wise summary is presented here.

Brief Summary of Chapters

Chapter 1 "Introduction to Engineering"

Chapter 1, "Introduction to Engineering," provides a foundational understanding of the engineering field. It explains that engineering is a complex field that utilizes math, science, and various methodologies to solve technical problems. The chapter explores the origins of the word "engineer" and its historical background, dating back to the 14th century, when an engineer was associated with building or operating military engines. Furthermore, the chapter emphasizes the art and science of engineering, highlighting how engineering practices make materials and processes useful.

It touches on engineers' innate qualities, such as mental power and cleverness, as reflected in the Latin origins of the word "engineer."

Chapter 1 sets the stage for readers. It introduces the fundamental aspects of engineering, including problem-solving and the historical roots of the field. The chapter highlights the essential role of engineers in creating and innovating designs for practical applications. It aims to provide a broad overview of engineering as a multidisciplinary field. Engineering plays a crucial role in shaping the technological advancements of society.

Chapter 2 "Disciplines of Engineering"

Chapter 2, "Disciplines of Engineering," explores the various branches of engineering and their unique scopes of work. The chapter emphasizes the common requirement for each discipline to innovate applications of natural phenomena for human use and convenience. It outlines the following common engineering branches: 1. Chemical Engineering: Application of engineering principles to develop and utilize new chemicals and processes based on chemical and physical phenomena. 2. Civil Engineering: Focuses on the design, construction, and analysis of structures such as bridges, roads, dams, buildings, and infrastructure development projects for both the public and private sectors. 3. Computer Engineering: Combines computer science and electrical engineering to create hardware, networks, software, and computers. 4. Construction-Engineering Management: a specialized branch combining engineering and management principles to plan and administer construction operations and projects. 5. Electrical Engineering: The study and application of electricity and electronics involving electric and magnetic forces, as well as their effects.

The chapter also introduces several other branches of engineering. These include Energy Engineering, Environmental Engineering, Forest Engineering, Geotechnical Engineering, and Industrial Engineering. It also covers Manufacturing Engineering, Marine Engineering, Materials Engineering, Mechanical Engineering, Metallurgical Engineering, and Mining Engineering.

Other fields mentioned are Nuclear Engineering, Petroleum Engineering, Acoustical Engineering, Aeronautical Engineering, and Aerospace Engineering. Additionally, the chapter discusses Agricultural Engineering, Architecture Engineering, and Automotive Engineering. Each branch is discussed in the context of its applications and specialties within the broader field of engineering.

Chapter 3 "Good Engineering Is..."

Chapter 3, titled "Good Engineering Is...", emphasizes the need to clearly define problems. It also stresses the importance of seeking viable solutions in engineering. It stresses spending time and effort to identify root causes for effective solutions. The chapter explains how crucial problem definition is in achieving successful outcomes. By defining problems and pursuing solutions, engineers can tackle challenges better and achieve favorable results in their work.

Chapter 4 "Engineering Licensure"

Chapter 4 of the book explores the topic of Engineering Licensure, emphasizing the significance of professional engineering licenses in enforcing standards that restrict practice to qualified individuals. The chapter highlights the importance of meeting specific qualifications in education, work experience, and exams to obtain engineering licensure. It discusses the role of licensure in indicating dedication, leadership, and advanced management skills in the engineering field. The chapter provides insights into licensure requirements across various states in the United States. It explains the process of obtaining licenses through comity or reciprocity. It also discusses the roles of structural engineers (SE) and professional engineers (PE). Additionally, it explores the importance of obtaining licenses for work in another state. The chapter highlights the benefits of becoming a PE for career advancement and industry recognition.

Chapter 5 "Patents"

Chapter 5 of the book explores the topic of Patents. It explores into the definition and significance of patents.

Patents are legal rights and government-granted monopolies that protect inventions. They provide the sole authority to make, use, or sell an invention for a specific period of time. The chapter outlines how to obtain a patent. It also describes the different types of patents: utility, design, and plant patents. It also explains why patents are essential for incentivizing innovation and idea-sharing. Furthermore, the chapter explores into patent limitations, the procedure for collaborating with examiners, securing patent approval, and maintaining patents. The chapter also covers the possibility of selling or licensing patents for financial benefit.

Chapter 6 "Managers, Salary, & Non-Technical People"

Chapter 6 discusses the interactions between engineers and non-technical individuals, such as managers. It addresses the dynamics of dealing with public scrutiny in engineering projects. The chapter emphasizes the importance for engineers to develop soft skills, including effective verbal and written communication. These skills are crucial for successfully working across different departments. It also addresses managing public critiques. It discusses handling expectations and the challenges of public scrutiny. Further it emphasizes maintaining a professional approach. Finally, it explores the potential pitfalls in the relationship between engineers and the general public. The chapter highlights the need for effective communication and understanding in engineering projects for successful outcomes.

Chapter 7 "The Engineer Personality"

Chapter 7 of the book focuses on "The Engineer Personality." The chapter delves into the characteristics that define the stereotypical engineer, emphasizing traits such as a preference for precision, attention to detail, and a logical and rational approach to problem-solving. It references studies and articles that describe engineers as individuals who strive to avoid criticism, exhibit a need to be right, and possess high integrity in personal and professional relationships.

The chapter also delves into the perception of engineers by their spouses and the general public, emphasizing their practicality, perfectionism, and quiet demeanour. Furthermore, it explores the challenges engineers face in social interactions, their frugality, and their unique perspective on people and social events.

Chapter 8 "Engineering Acronyms"

Chapter 8 of the book "The Insider's Guide to Engineering" focuses on Engineering Acronyms. The chapter delves into the world of engineering abbreviations, providing insight into useful acronyms that engineers often use in their field. The chapter aims to provide readers with a practical understanding of common engineering abbreviations, enabling them to utilize them effectively during technical discussions and meetings. Moreover, the chapter intends to enhance the readers' familiarity with engineering terminology, fostering clear communication and efficient collaboration within the engineering community.

Chapter 9 "Conclusion"

Chapter 9 of the book "The Insider's Guide to Engineering" discusses the conclusion to the content. It reflects on the diverse, challenging, and universally applicable nature of the engineering industry, highlighting its valuable contributions to the global market. The chapter emphasizes the continuous need for innovative solutions to solve complex problems and the historical significance of engineering projects. Furthermore, it touches upon the evolution of engineering over time, particularly with the impact of the digital age on traditional practices. The conclusion also offers advice to engineers and engineering supervisors, emphasizing the importance of communication, perseverance, prioritization, and simplicity in daily engineering work. Throughout the chapter, there is a focus on the dynamic and ever-evolving nature of the engineering field.

Aside from that, the book has useful appendices: Sample Patent Drawings, Engineering Quotes, The Practical Alternative, and Who Says Engineering is Boring.

The book concludes with Photo Credits, References and About the Author.

Thanks for reading!

Check out ENTECH magazine at [entechonline](http://entechonline.com)

Luke Zollinger is a licensed mechanical and civil engineering professional. His engineering experience includes tandem rotor helicopters, bridges, heavy construction, structural engineering, and airport design. He currently is the general manager and chief engineer for a research and development company, which involves ballistic tests, blast testing, and other unconventional things.

Luke Zollinger has recently published a book titled "The Insider's Guide to Engineering." Dynamic Press is the publisher of this book, which is available for purchase at their website, <https://www.dynamicpressbooks.com/>.

EMPOWERING YOUNG MINDS: A JOURNEY OF SELF-DISCOVERY AND GROWTH

The Goregaon Sports Club Education Initiative hosted a thought-provoking session on May 18, 2024. A diverse panel of experts from STEM, Humanities, Commerce, Finance, AI and ML, Fashion, and Law participated. The event attracted a full house of students and parents. It aimed to spark a conversation about cultivating a growth mindset, understanding aptitude, and embracing readiness to learn.

Panel Discussion

The panel discussion, moderated by seasoned educator and expert in law, Dr. Suman Kalani, featured a range of experts who shared their insights on the importance of teamwork, self-discovery, and the need to avoid imposing one's aspirations on children. A thought-provoking exploration of the complexities of growing up and the importance of fostering a growth mindset in young minds captivated the audience.



NEP 2020

The session began with a lively discussion on the unique features of the NEP2020. The final or fourth year, filled with projects, experiential learning, and internships, can propel students towards becoming potential employees or promote their career advancement.

The experts emphasized the importance of understanding one's strengths and weaknesses, as well as how this understanding can help shape a child's educational and professional trajectory. The panel also touched upon the significance of teamwork and collaboration, highlighting the value of working together towards a common goal.

The conversation then shifted to the topic of evolving mindsets and the importance of being open to new experiences and learning opportunities. The experts shared personal anecdotes and real-life examples of how making mistakes helped them navigate challenges and achieve their goals. The panel's stories inspired the audience and motivated them to adopt a similar approach in their own lives.

The experts emphasized the need for parents to support their children's interests and passions rather than forcing their own desires upon them. The panel encouraged parents to create a nurturing environment that fosters creativity, curiosity, and a love for learning.

Conclusion

The event ended with a Q&A session. The audience at Goregaon Sports Club could ask questions and engage with the panelists. The highlight was that the audience left inspired and motivated. They were encouraged to adopt a growth mindset and support their children in their journey of self-discovery.

In conclusion, the Goregaon Sports Club Education Initiative's session was a resounding success. Experts shared their insights, and parents and students engaged in meaningful conversation. The event reminded everyone of the importance of a growth mindset. This includes understanding aptitude and embracing readiness to learn. The panelists said, "The greatest discovery of all time is that a person can change their future by merely changing their attitude."

Panelists

AMEE VORA

Dr. Ameer Vora, an academican, researcher, actress, poet, and classical dancer, is currently the principal of Devi Prasad Goenka School of Management and the former vice principal of NM College. Her areas of interest and specialization include advertising, marketing, and management. Aside from that, Ameer Maam is a well-known theater artist.



Dr. Suman Kalani

Dr. Suman Kalani, Associate Professor and Vice Principal at SVKM's College of Law, is a law graduate with a master's degree from UOM and a PhD from SNTD. She has authored legal textbooks and received awards for her scholarly contributions. Her approach to teaching law stems from her belief that lawyers' role as social engineers is to emphasize their potential to foster peaceful societies through pro-active compliance and dispute resolution via dialogue and mediation. She has ideated and designed various value-added courses for law students, enabling them to meet industry expectations with ease.

Dr. Anupama Harshal

Dr. Anupama Harshal Wadavlikar is an esteemed educator and researcher with 22 years of teaching experience. She holds a Superheroes Against Superbugs Fellowship and is a STEM teacher trainer. She is also an Indo-US Foldscope Grant Awardee. Dr. Wadavlikar earned her doctoral degree from Hindustan Lever Research Centre in collaboration with Topiwala National Medical College and B. Y. L. Nair Hospital, Mumbai. Notably, she initiated the Science Honors program at KC College and contributed to various research projects. She has previously worked as a project manager for the Project Manav-Human Atlas Initiative. As a consultant at Kotak Education Foundation, she conducts teacher training programs and empowers scholarship initiatives.

Dr. Neena Nair

Dr. Neena Nair, a highly experienced academician, has been teaching at Cosmopolitans Valia College since 1998. She holds MA and PhD degrees in English literature, specializing in children's literature and mythology. Her inspiring approach to teaching stems from her belief that teaching is a sacred responsibility. She sees it as more than just a job. To her, teaching is a form of service with the power to transform lives. This is especially true in a country where education is a privilege.

Mrs. Suvidha Patil

SUVIDHA PATIL is a fashion designer who has empowered thousands through her versatile career in fashion and interior design. Suvidha Patil is the founder and chairman of the International Society of Fashion Technology (ISFT). She is also the director of the Spark School of Design. She serves as a member of the academic council on the board of studies at Ramanand Arya D. A. V. College.

Dr. JATIN D. BOTADRA

Dr. Jatin BOTADRA is a software and data security professional, philosopher, and Indology researcher with an interest in astrology! He has degrees in almost every field—technology, philosophy, yoga, mythology, astrology, and Jainism—all from the University of Mumbai. He has been CEO at The Cybertech for the past 32 years, having pan-India offices and running India's biggest data recovery lab.



HOW IT IS MADE:

THE LEAD ACID BATTERY - PART 8

PLATE CURING

CURING

The pasting stage involves applying active material to the grid. The grid acts as both a mechanical support and an electrical conductor. This step creates the plate. The plate is the main component of a lead-acid battery.

There are two ways to combine grids and active material as necessary:

Belt pasting is a technique used to paste individual panels resulting from grids' melting process.

In Drum pasting continuous strips of grids are produced with expansion, punching, or continuous casting systems.

BELT PASTER

It has a cotton strip. This strip supports the grids when pasting. There is also a hopper. It comes with toothed and paddle rollers. These rollers feed the paste onto the grid.

Two grids are set in a straight line on a mechanical separator. They are placed on a cotton belt. This belt moves them to the area where paste (active material) is applied. After that, they go to the transfer line. The belt then goes through scraping, washing, and pressing areas. This process gets the belt ready for the next pasting cycle.

An automatic system feeds the hopper. It has level control and rotating rollers. This system doses the right amount of active material. The material is used on the grid below.

This system works well with melted grids. It has a belt made of layered needled cotton. Even when the belt touches the paste, it hardly sticks to it.



Belt paster

Curing Chamber

To optimally perform the procedure above, machines suitable for reproducing diversified cycles are proposed. For preparing tetrabasic sulphate, curing must occur at about 70°C with high humidity (steaming cycle). To prepare tribasic sulphate, use a lower temperature of 55°C. Maintain the same moisture levels during the curing cycle. For drying, high temperatures of 85°C and low humidity levels are required. The machine has steam generators and fans. These components help equalize the air conditions around the plates.



GRID STRIP DIVISION SYSTEM

The pasted grids are put into a machine. This machine has timing systems and cutting blades. It cuts the individual grids by slicing through their connection points. The machine has a bench for holding and supporting the cut grids. There is another bench for aligning the grids side by side. This preparation is for their next treatments.

DRYING TUNNEL

After stacking, the plates quickly go through a special drying tunnel. This prevents them from sticking to each other. The tunnel heats the surfaces of the plates quickly. But, it keeps the core of the plates below 60 °C. This is done to dry any paste residues on the surface that could cause sticking during stacking.



STACKING SYSTEM

A stacker with suction picks up the plates from the drying tunnel. It separates the plates and straightens them at the edges. Then, it moves the plates to where they are prepared for packaging. Here, two devices that can adjust their height pick up the plates. They stack the plates into packages. These packages are then gathered and placed on a pallet.

A double amount of lowering devices is required. We use one to prepare the package and the other to unload and restore operations. At this point, the plates have a lead grid. This grid offers mechanical support and helps with electron flow. Inside, there's a mix of different materials (Pb, PbO, PbO₂, PbSO₄, H₂SO₄, H₂O). Also included are specific additives for either negative or positive plates. These components are crucial. They form what is known as the active material.



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Call for Articles

Invitation to Share Your Expertise in ENTECH Magazine

Are you passionate about inspiring and educating the next generation of scientists, technocrats, engineers, and mathematicians?

Do you have valuable expertise that you want to share with young minds?

Look no further than ENTECH Digital Magazine.

ENTECH is a monthly publication that aims to inspire and educate budding scientists, technocrats, engineers, and mathematicians from class 8 to 12. We believe in the power of knowledge and strive to provide engaging content that sparks curiosity and fosters a love for STEM subjects.

We are currently accepting article submissions for our upcoming issues. Whether you have insights on the latest technological advancements, practical tips for aspiring engineers, or fascinating stories from your own scientific experiments – we want to hear from you! Our article word count ranges from 500 to 3000 words, allowing ample space for in-depth exploration of your chosen topic.

To share your expertise with our readership, simply reach out to our editor by filling the form on our website at address:

<https://entechonline.com/contact-us/call-for-articles/>

Include a brief summary of your proposed article along with any relevant credentials or experience. We value originality and creativity, so feel free to think outside the box when it comes to your submissions.

By contributing to ENTECH Digital Magazine, not only will you be able to showcase your knowledge and passion but also make a positive impact on young minds eager to learn. Join us in shaping the future generation of scientists and technologists by sharing your expertise today!

Warm regards

Editorial Team

Calling for Contributions!

Introducing ENTECH Magazine, a breath of fresh air in the world of STEM publications! Our mission is to nurture the passion for science, technology, engineering, and mathematics among teenagers. We believe that knowledge should be accessible to all without any unnecessary distractions. That's why we are committed to providing a clutter-free reading experience by keeping our magazine free from irritating pop-ups and logins.

At ENTECH Magazine, your privacy is our top priority. We have no intention of collecting any personal information from our readers or monetizing it in any way. We rely on the support of our dedicated readers to keep us alive and provide high-quality content that inspires and educates.

By contributing to ENTECH Magazine, you are not only helping us continue our mission but also ensuring that teenagers across the globe have access to valuable STEM resources. Join us on this exciting journey as we empower young minds and shape the future of science and technology together!

Scan the QR code below and contribute INR 10 or more!



Editorial Team
ENTECH Digital Magazine

Exciting opportunity to join the ENTECH Magazine Editorial Board and inspire future STEM enthusiasts!

ENTECH is an upcoming publication specifically designed for aspiring Scientists, Technocrats, Engineers, and Mathematicians. Our target audience consists of students aged 13 to 19 who are fascinated by careers in Science, Technology, Engineering, and Mathematics (STEM).

We aim to empower and inspire these young minds by providing them with valuable insights, educational resources, and real-life success stories from professionals in the field.

We are currently looking for experts for a valuable addition to our editorial board.

Board members will have the opportunity to shape the content direction of ENTECH magazine and contribute their insights on various topics related to STEM education. This opportunity presents a momentous occasion for individuals to exert a substantial influence on the forthcoming cohort of STEM enthusiasts.

Additionally, being part of our editorial board will offer exposure within the industry and provide networking opportunities with like-minded individuals who are passionate about promoting STEM education.

Our commitment requirement is flexible and manageable. Editorial board members can contribute articles or reviews while aligning with their existing commitments.

Together, let's inspire young minds towards a bright future in STEM!

If you would like more information about this exciting opportunity, please don't hesitate to reach out by filling out the form on our website at address:

<https://entechonline.com/join-us/join-editorial-board/>

We would be happy to provide more information and answer any questions you may have.

Warm regards

Editorial Team

Join ENTECH magazine as a Guest Editor for our Special Issue!

ENTECH is specifically designed for aspiring Scientists, Technocrats, Engineers, and Mathematicians aged 13 to 19. Our mission is to provide them with inspiring content that showcases the endless possibilities and exciting careers within STEM.

We aim to empower and inspire these young minds by providing them with valuable insights, educational resources, and real-life success stories from professionals in the field.

Guest editors will have the opportunity to propose a special theme-based issue that aligns with their expertise and our target audience's interests. This is an excellent chance to share insights and contribute directly to shaping young minds' understanding of STEM education and careers.

Guest editors will be featured prominently in the special issue, which will enable them to gain visibility among our readership through their author bios and acknowledgements.

Let's work together towards inspiring the next generation of STEM enthusiasts! To express interest or discuss potential themes, please fill out the form at link:

<https://entechonline.com/join-us/join-as-guest-editor/>

We would be happy to provide more information and answer any questions you may have.

Warm regards

Editorial Team

A Unique Opportunity to Become a Channel Partner of ENTECH Magazine!

ENTECH digital magazine is specifically designed for aspiring Scientists, Technocrats, Engineers, and Mathematicians in the age group of 13 to 19. We understand the importance of fostering curiosity and passion for STEM subjects among young learners.

Currently, we are looking for stakeholders in STEM education like scientific equipment, stationary, laptops, PCs, tablets, and DIY kit manufacturers or suppliers, book publishers, educational consultants, career counsellors, educational camps, tours, and workshop organizers as channel partners of ENTECH digital magazine.

Our esteemed channel partners will be provided a dedicated space on our website and a special mention in our monthly digital magazine. A small contribution from stakeholders in STEM education will help us stay alive and provide quality content to young aspirants in STEM education.

Let's work together towards inspiring the next generation of STEM enthusiasts! If you are interested in becoming a channel partner, please feel free to reach out by filling out the form at our website address:

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We would be happy to provide more information and answer any questions you may have.

Warm regards

Editorial Team

ENTECH Exhibition

Exciting Opportunity to Showcase Your STEM Education Initiatives!

ENTECH magazine is specifically designed for aspiring Scientists, Technocrats, Engineers, and Mathematicians in the age group of 13 to 19. We understand the importance of fostering curiosity and passion for STEM subjects among young learners. By organizing this exhibition together, we can provide them with a platform to explore various STEM disciplines and discover exciting career opportunities.

We are seeking organizations that are leaders in the field of STEM education and can propose innovative ideas for the exhibition. The exhibition will not only help to create an impactful event but also give an opportunity to connect with a highly receptive audience that is eager to learn about the latest advancements in Science, Technology, Engineering, and Mathematics.

ENTECH magazine will provide extensive promotion through our online platforms, ensuring maximum visibility for the organization. This collaboration will not only showcase our commitment towards shaping future generations but also position the organization as a thought leader within the industry.

There can be a special track at the exhibition in which students can showcase posters or projects on STEM subjects.

Let's work together towards inspiring the next generation of STEM enthusiasts! If you are interested in volunteering as an organizer or a team member, please feel free to reach out by filling out the form below. We would be happy to provide more information and answer any questions you may have.

please feel free to reach out by filling out the form at our website address:

<https://entechonline.com/join-us/submit-exhibition-proposal/>

Warm regards

Editorial Team

Join ENTECH Magazine in Organizing a Conference on STEM Education!

ENTECH magazine is specifically designed for aspiring Scientists, Technocrats, Engineers, and Mathematicians in the age group of 13 to 19. We understand the importance of fostering curiosity and passion for STEM subjects among young learners. By organizing this exhibition together, we can provide them with a platform to explore various STEM disciplines and discover exciting career opportunities.

ENTECH is specifically designed for aspiring Scientists, Technocrats, Engineers, and Mathematicians aged 13 to 19. Our mission is to provide them with inspiring content that showcases the endless possibilities and exciting careers within STEM.

We are inviting proposals for organizing a conference on STEM education. The objective of the conference is to inspire these young minds by providing them with valuable insights and educational resources to pursue rewarding careers.

Individuals, groups, NGOs, organizations, schools, colleges, and other stakeholders in STEM education can propose a conference agenda that encompasses innovative teaching methodologies, emerging technologies, career guidance, and real-world applications of STEM subjects. There can be a special track at the conference in which students can present papers or showcase posters on STEM subjects.

Organizing a conference with us will provide an opportunity to gain exposure among our dedicated readership base and network with other influential professionals in the industry. We are committed to publishing a special issue on proceedings of the conference for the rapidly growing community of aspiring scientists, technocrats, engineers, and mathematicians.

Let's work together towards inspiring the next generation of STEM enthusiasts! If you are interested in volunteering as an organizer or a team member, please feel free to reach out by filling out the form at our website address:

<https://entechonline.com/join-us/submit-conference-proposal/>

We would be happy to provide more information and answer any questions you may have.

Warm regards

Editorial Team

Call for News / Announcements

Calling for News / Announcements for our monthly magazine, ENTECH. ENTECH is a magazine dedicated to inspiring and empowering budding scientists, technocrats, engineers, and mathematicians in the age group of 13 to 19. Our aim is to provide valuable resources and insights to students who aspire to pursue a career in these fields.

All stakeholders in STEM education can share information with us about new discoveries, technological advancements, upcoming events or competitions, educational opportunities, admission schedule, entrance examination schedule, or any other relevant updates by filling out the form at our website address:

<https://entechonline.com/contact-us/submit-news/>

We would be happy to provide more information and answer any questions you may have.

Warm regards

Editorial Team

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**Are you a stakeholder in the world of STEM education, such as
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Look no further!**

ENTECH is a cutting-edge publication specifically designed to inspire and empower young minds aged 13 to 19 in the fields of science, technology, engineering, and mathematics (STEM).

With a dedicated focus on teenagers and their passion for science, technology, engineering, and mathematics (STEM), ENTECH Magazine offers you a unique opportunity to showcase your products and services directly to this highly influential demographic.

Not only do we offer prime advertising space within our digital publication, but we also provide opportunities for sponsorships and partnerships.

Don't miss out on this unique opportunity to connect with the future leaders of innovation.

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**Warm regards
Director
Coneixement INDIA (OPC) Pvt Ltd, Pune**

Calling nominations for “APP of the month”

Don't miss out on reaching the next generation of innovators!

Introducing ENTECH Magazine, the ultimate platform for inspiring and empowering young minds in the fields of STEM! We are calling nominations for proposed "APP of the Month" feature, providing an exclusive opportunity for your product or service to directly reach and engage with the highly influential teenage demographic.

With a dedicated focus on teenagers and their passion for science, technology, engineering, and mathematics, ENTECH Magazine is at the forefront of providing captivating content that educates and excites. Our publication is a trusted resource for young minds aged 13 to 19, offering them a chance to explore the latest advancements in STEM.

By being featured as our "APP of the Month," you will gain unparalleled exposure to a targeted audience hungry for innovative solutions. Imagine the impact your product or service could have on shaping the future of these aspiring scientists, engineers, and tech enthusiasts!

Don't miss out on this incredible opportunity to showcase your offerings directly to this influential demographic. Join us at ENTECH Magazine and position your brand as a leader in inspiring the next generation of STEM enthusiasts. Nominate your app today by filling out the form available on our website at address:

<https://entechonline.com/contact-us/submit-app-of-the-month/>

We would be happy to provide more information and answer any questions you may have.

Warm regards

**Editorial Team
ENTECH Digital Magazine**

Calling nominations for “Book of the month”

Don't miss out on reaching the next generation of readers!

Introducing ENTECH Magazine, the ultimate platform for inspiring and empowering young minds in the fields of science, technology, engineering, and mathematics (STEM).

Our mission is to provide teenagers aged 13 to 19 with valuable content that fuels their curiosity and passion for these subjects.

With a dedicated focus on this influential demographic, ENTECH Magazine offers you an unparalleled opportunity to showcase your publication directly to the next generation of innovators.

We are currently calling for nominations for our “Book of the Month” feature. This is your chance to get your book in front of thousands of young readers who are eager to expand their knowledge and explore new ideas. Our readers trust us to curate the best content that aligns with their interests and aspirations.

Don't miss out on this incredible opportunity! Submit your nomination today and let us help you reach a passionate audience of young minds hungry for knowledge. Together, we can inspire the next generation of STEM leaders.

You can nominate your book by filling out the form available on our website at address:

<https://entechonline.com/contact-us/submit-book-of-the-month/>

We would be happy to provide more information and answer any questions you may have.

Warm regards

**Editorial Team
ENTECH Digital Magazine**

