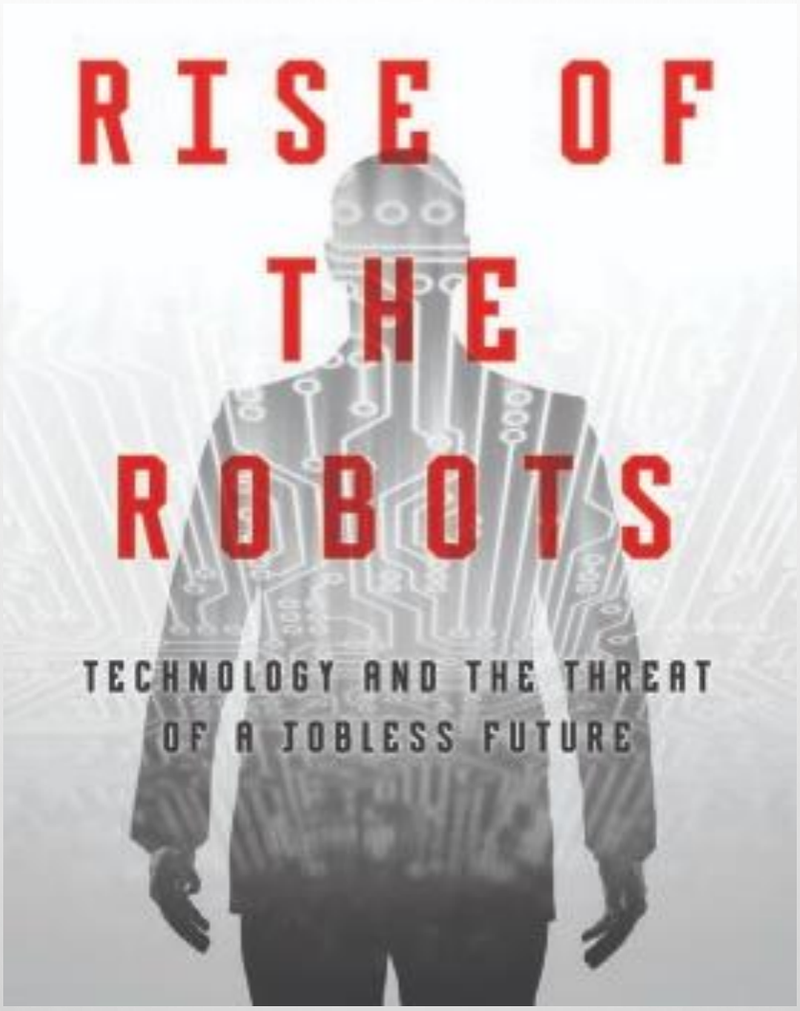
VOL 3 | ISSUE 2 | JULY 2018

MECHZINE

GET TO KNOW THE WORLD !



R.V.R. & J.C. COLLEGE OF ENGINEERING, GUNTUR, A.P.
KNOWLEDGE IS POWER
Estd 1985

A STUDENT INITIATIVE TECHNICAL MAGAZINE

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CONTENTS :

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Alumni Article

HYDROFORMING PROCESS

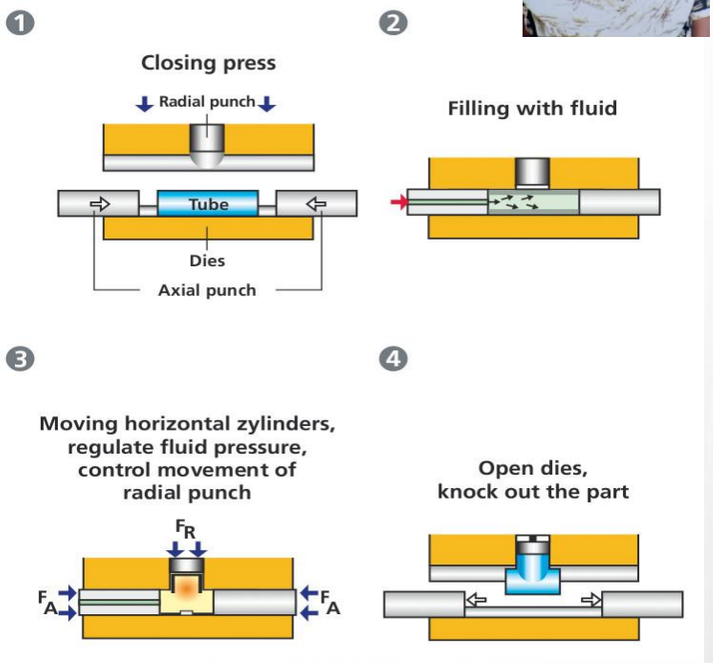
- Anusha Chamakura, Research Scholar

What is Hydroforming Process

Internal high-pressure forming (hydroforming) is a methodology for the manufacture of hollow metal components. Hydroforming was developed in the late 1940's and early 1950's to provide a cost effective means to produce relatively small quantities of drawn parts or parts with asymmetrical or irregular contours that do not lend themselves to stamping. Virtually all metals capable of cold forming can be hydroformed, including aluminum, brass, carbon and stainless steel, copper, and high strength alloys.

Working Principle of Hydroforming Process

A hydroforming press operates like the upper or female die element. This consists of a pressurized forming chamber of oil, a rubber diaphragm and a wear pad. The lower or male die element, is replaced by a punch and ring. The punch is attached to a hydraulic piston, and the blank holder, or ring, which surrounds the punch. The hydroforming process begins by placing a metal blank on the ring. The press is closed bringing the chamber of oil down on top of the blank. The forming chamber is pressurized with oil while the punch is raised through the ring and into the forming chamber. Since the female portion of this forming method is rubber, the blank is formed without the scratches associated with stamping. The diaphragm supports the entire surface of the blank. It forms the blank around the rising punch, and the blank takes on the shape of the punch. When the hydroforming cycle is complete, the pressure in the forming chamber is released and the punch is retracted from the finished part.



HYDROFORMING ADVANTAGES

- Inexpensive tooling costs and reduced set-up time.
- Reduced development costs.
- Shock lines, draw marks, wrinkling, and tearing associated with matched die forming are eliminated.
- Material thinout is minimized.
- Low Work-Hardening
- Multiple conventional draw operations can be replaced by one cycle in a hydroforming press.
- Ideal for complex shapes and irregular contours.
- Materials and blank thickness specifications can be optimized to achieve cost savings.
- Click here for more on our Hydroforming Services.

How is Hydroforming Different?

The uniqueness of this metal forming method lies in the fact that it makes use of pressurized hydraulic fluids to form metal components. As part of this process, a flat metal disc is placed on to a mechanically driven mandrel. The hydraulic oil or fluid is pumped into the chamber behind a rubber diaphragm that is the counter pressure to the rising mandrel. This causes the metal to draw until it takes the shape of the mandrel. The metal can then be removed from the mandrel in its formed condition.

The need for secondary finishing operations is minimum. Both convex and concave shapes can be attained using this metal forming method. While metal stamping has been the conventional method of choice for metal forming, there is little doubt today that hydroforming is the definitive future of metal forming. We provide hydroforming solutions that quite literally 'stamp out' all the drawbacks associated with the metal stamping process. Usage of a mix of hydroforming and metal spinning processes to produce structurally strong, tight tolerance components for industries such as: commercial food equipment, industrial machinery, industrial pumps, metal furniture, aerospace and defense, waste storage industry, HVAC industry and many more. If you are looking at procuring high-quality metal components to exacting specifications at reasonable costs, then this metal forming technique is perfectly geared to your needs

Student Article

UNDER WATER WELDING

-G.Chihnita, Y17ME062

How Does Underwater Welding Work?

Few are aware of underwater welding. This welding process comes as a surprise to many as electricity and water appear to be a hazardous and incompatible combination. However, underwater welding is a profitable field and one of the most well-paid occupations for commercial divers.

Also called hyperbaric welding, underwater welding was invented in the early 1930s and is still used for maintaining and repairing fully or partially submerged marine structures. Inland hyperbaric welders can work on small seacraft, dams and bridges. On the other hand, offshore welders have to work on ships, oil rigs, pipelines and underwater habitats. They may even have to perform welding work on nuclear power facilities.

What is Underwater Welding?

Underwater welding process is quite similar to welding on land. Both types of welding employ the same basic equipment and techniques. Hence, many underwater welders get trained to become professional welders before learning commercial diving. There is no doubt that underwater welding is a dangerous occupation. However, with the right precautions and safety standards, many risks can be significantly mitigated.

Risks

Most people know that salt water is a good conductor of electricity. Water poses the risk of electrocution since it can act as a conducting path for current. Hence, we avoid wet surfaces that may be close to the sources of electric power. Underwater welding, therefore, can be perilous. Although this is one of the threats involved in the occupation, it is by no means the biggest risk. You might be surprised to learn that other factors pose a far greater threat.

Types of Underwater Welding

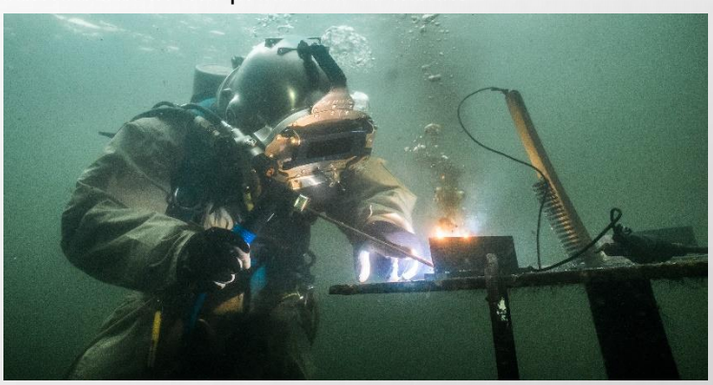
There are two basic categories of underwater welding:

Dry Welding

People normally visualize underwater welding as a job that is performed with the diver fully submerged. This is true to some extent. However, most underwater welding is done under dry conditions. In dry welding, a hyperbaric chamber is deployed to provide a dry environment. Instead of being done in the presence of water, dry welding is performed in a dry atmosphere that composes of a mixture of gases. Dry welding ensures higher quality and reliability. However, hyperbaric chambers do not come cheap and underwater welders may not always have access to them. Therefore, under some circumstances, diver-welders must rely on wet welding when dry welding is not possible.

Wet Welding

Wet welding can be performed based on a number of factors. It depends on the urgency of repairs and level of access to the welding region. However, it is best to consider wet welding as a last resort. There are a number of reasons for this. First, there is the obvious risk of welding in the presence of water. There is also the risk of quality issues due to wet welding. The welded joint may cool down too quickly due to rapid heat dissipation to the surrounding water. Quick cooling increases the risk of cracking and other joint defects. For the most reliable, durable and defect-free welded joints, the cooling rate must be carefully controlled. This is not possible while the process is carried out in the presence of water.



Underwater Welding Dangers

Underwater welders face much greater dangers compared to land-based welders since there are many variables that can complicate matters. Different factors must be considered for safety purposes, such as gas pressure, water pressure, diving equipment, specialized welding equipment, restricted space, power supply and more. Underwater welders work in remote and dangerous locations, such as offshore oil rigs and pipelines. Although this work is financially rewarding, it is also one of the most dangerous jobs. The fatality rate for underwater welding is one of the highest even among the most dangerous occupations. If proper care is not taken, a small mistake can easily lead to death or long-term health complications. Project managers and engineers should coordinate with underwater welders to address safety concerns.

The following are the greatest dangers faced by diver-welders.

Drowning.

If the scuba gear fails in any way, the diver can drown if he or she is too deep below the water surface.

Explosions.

Combustible mixtures can be created from flammable gases like oxygen and hydrogen. If these pockets grow too large and are ignited, the resultant explosion can be lethal. This poses a serious risk to diver-welders. But keep in mind that land-based welders also face the risk of an explosion if they are working in a poorly ventilated space. To prevent the build-up of combustible gases, the welding space should be well ventilated for both surface and underwater welders

Electric shock.

Electrocution remains a serious threat due to the large currents involved in welding. All equipment used for underwater welding must be waterproof. Keep the equipment well maintained. Make it a habit to always test the equipment prior to use. Make sure that there are no leaks in any equipment. Equipment should also be properly insulated. As you can expect, underwater welding equipment will be slightly different as compared to land-based welding equipment. Wet welding requires double insulation for wires. Alternating current is never used in wet welding. Only direct current is utilized. A knife switch is also present to turn off the power to the welding stinger.

Lung, ear and nose damage.

You should be careful of spending too much time deep underwater. This can lead to long-term health issues related to the nose, lungs and ears.

Decompression Sickness.

This is also called diver's disease. This occurs due to the inhalation of gases at different pressures. Decompression sickness can prove to be fatal in extreme cases. Marine wildlife. Although shark attacks are not too common, divers must be wary of sharks and other deadly marine animals.

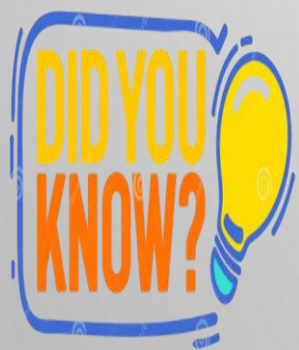
- **UPCOMING GUEST LECTURES**

* Guest Lecture on **"Mechanical Systems in Satellites"** organized by RAJMEA on 17th Jul, 2018

Guest speaker
Sri D.V.A. Raghava Murthy,
Former Project Director,
Small Satellites,
ISRO, Bangalore

* Guest Lecture on **"NDT Practices In Industry"** organized by RAJMEA on 10th Dec, 2018

Guest speaker
Sri G. Vijaya Kumar,
C.E.O,
Synergy Systems



❖ *The snowboard was invented by an engineer?*

With some engineering twists and turns along the way, the snowboard has become a marvel of geometry, chemistry, and biomechanics. Since the snowboard allows deft turns, ski manufacturers have quickly adopted some of the snowboard innovations, enabling skiers to turn with less effort.

❖ *Engineers design running shoes for protection, performance, and comfort?*

Engineers understand how much force travels from the ground through the shoe to the foot. Through the work of engineering, weight is distributed throughout the whole foot -- heel to toe.

The rise of Machines and AI
The Future has Lots of Robots, Few Jobs for Humans

- Dr.C.Tara Sasanka, Assistant Professor

Over time, we've grown reliant on automated technology. It's found in almost every part of our lives, from automatic doors in retail, to factory line robots, to business process automation in the office.

"And beyond automation, artificial intelligence is a now daily reality, too. The dreaded robot takeover seems to be looming ever closer."

We have chatbots handling customer service, AI in our back pockets, and increasingly 'smart' homes. But how did we get here?

Three laws of robotics

Following this physical bot creation, Isaac Asimov created the famous three laws of robotics in the early 1940s. (Which he used in his own works of fiction.) These rules were then accepted by other writers who used them in their science fiction pieces as well. The three rules dictate the ways a robot must act with regard to humans:

One: A robot may not injure a human being or, through inaction, allow a human being to come to harm.

Two: A robot must obey orders given it by human beings except where such orders would conflict with the First Law.

Three: A robot must protect its own existence as long as such protection does not conflict with the First or Second Law.

We experience the wonder of AI daily, be it on Twitter, in emails, in our video games or elsewhere. We have artificial intelligence assistants in our phones, in our cars and in our homes. All this in the youth of the technology, too.

The future of automation

The history of automation, despite a few bumps along the way, has seen a lot of success in a short period of time. It continues to grow and evolve today, providing us with more innovative solutions, interactive AI, and assistance in unravelling the secrets of the universe. It's impossible to know if all the science fiction writers after him were right about a future robot rebellion. What's clear is that the future looks to be automated. As exciting as current and future tech is, we shouldn't forget the history of automation or the work that it has taken to get us where we are today.

The robots haven't just landed in the workplace—they're expanding skills, moving up the corporate ladder, showing awesome productivity and retention rates, and increasingly shoving aside their human counterparts. One multi-tasker bot, from Momentum Machines, can make (and flip) a gourmet hamburger in 10 seconds and could soon replace an entire McDonalds crew. A manufacturing device from Universal Robots doesn't just solder, paint, screw, glue, and grasp—it builds new parts for itself on the fly when they wear out or bust.

While researchers predicted the rise of robots will bring about benefits in terms of productivity and economic growth, they also acknowledged the drawbacks that were expected to arise simultaneously. Economists claiming, Robots could take over 20 million manufacturing jobs around the world by 2030.

To be continued.....

The Airplanes and Flying Objects - Maharshi Bhardwaj

The achievements of the sage Maharshi Bhardwaj are described in the texts called "Purana". He was one of the Seven Great Sages or Rishi. His wisdom is recognized up to the present day. In the distant past, in the Mahabharata and in the Ramayana, aeronautic inventions were used - a domain which was highly advanced at that time. Maharshi Bhardwaj discovered and wrote about the way in which airplanes or space ships appeared and disappeared and the way in which they traveled from one planet to another

Guide to your world of robotics: LEGACY BOTS !

LEGACY ROBOTS

The robots that built the groundwork for today's portfolio.

BIG DOG (2004)

The first legged robot to leave the lab, Big Dog navigated rough terrain using sensors and its control system.

RHEX (2007)

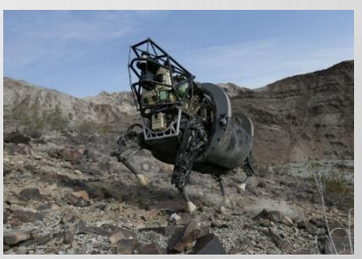
A passively-stable six-legged robot with remarkable mobility on rough terrain.

SANDFLEA (2012)

A small robot designed for reconnaissance, Sand Flea drove like an RC car on flat terrain, but could jump 10 m into the air to leap buildings in a single bound.

LS3 (2012)

A quadruped robot designed to follow soldiers and carry their gear over rough terrain.

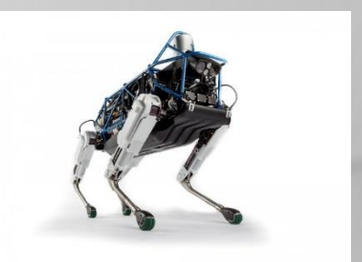


WILDCAT (2013)

The fastest quadruped robot on Earth, Wild Cat ran 32 km/h while maneuvering and maintaining its balance.

SPOT CLASSIC (2015)

A quadruped robot designed for indoor and outdoor operation that laid the groundwork for the robust dynamic robot control seen on Spot today.



Made of Cardboard, This Rs 10 School Bag Doubles As a Desk For Rural Kids!

Every morning, carrying a burden of neatly arranged books wrapped in plastic in one hand and an umbrella on the other, eight-year-old Ganesh Sanas walks almost three kilometres dodging the monsoon showers to reach his school in Satara, Maharashtra. Once inside, he moves around the classroom, touching the floor with his feet in search of a dry corner to keep his books, and sit. Sometimes, he even comes early to get the best spot.

For him, and thousands more in rural parts of India, an opportunity to study while seated on a chair, with the books on the desk, is a luxury. On the contrary, something as simple as stationery, desks and chairs, for many of us are necessities.

"Things that we take for granted are often the most crucial. A desk, chair or a blackboard might sound to be the most basic requirement in a school, and yet, hundreds of schools in rural India are devoid of them. This was our attempt to break that bubble and bring forth a sustainable solution," says Shobha Murthy, who is changing the scenario with a desk worth Rs 10. Founder of a Mumbai-based NGO, Aarambh, Shobha has been working in the education sector, especially disadvantaged schools for the past 22 years. Her work in various urban slums in the city, as well as remote areas of Maharashtra, has focused on making education truly accessible for all. Building these desks was another step in that direction.

Speaking to The Better India, she adds, "Sitting for long hours while bent over to write on the floor amounts not just to bad handwriting but also various health hazards like poor eyesight and posture. And yet, so many schools don't have the means to provide this facility, as buying furniture would mean large flow of funds, which is far from the reality." So, one had to find a sustainable solution that would be beneficial for the students without costing the school. The answer was found to be a portable Multi-functional Help Desk made of recycled cardboard, that could double as a raised writing desk and a book bag! Launched in 2017 in various schools in Satara district, the innovative desk was an inexpensive solution, made out of cardboard refrigerator boxes and spare car parts. Based on stencil design, they manually made cardboard cutouts and folded them to form simple school desks, known as help desks. However, they eventually used a laser-cutting machine to make the process more efficient. The creation of a desk from recycled cardboard cost between Rs 10-12, allowing the organisation to make and distribute them for free. As a result, the 50 cm raised top of the desk allowed children to sit comfortably cross-legged, which meant that they could stay longer at school.

"Not only is it an inexpensive alternative but is also light-weight and portable. They can be folded in a compact briefcase or bag and neatly piled up in a corner when the class is over, or when the teacher wants the students to engage in an activity which needs an open space in the classroom," says Shobha. So far, Aarambh has been able to change the lives of 2,000 children with the help of this desk, in Western Maharashtra alone. "We didn't expect it to be such a hit and now, many more schools are asking for it, not just in Maharashtra but beyond as well. And so, we want to scale it up once we manage to get the funds," she adds.

They further hope to improve the material and make it waterproof and more sustainable during the rains. "The help desk has helped many students to look forward to school, and we want this to be possible around the year. We are planning to expand this project into an employment generation means as well, by empowering the rural youth to manufacture them and earn a living. Along with transport costs and the machinery, the project would need an estimated Rs 14 lakh. We have already been able to manage around Rs 6 lakh of funds and hope to kickstart the improved version soon," shares Shobha.

A project as innovative and useful as this that has the potential for mass impact should not be curled up into oblivion due to lack of funds. With our best wishes and support, we hope to see Aarambh begin a revolution across the country!

GATE 2019

Organizing Institute

career

GATE Online Application Processing System (GOAPS) Website Opens		Saturday	1st September 2018
Closing Date for Submission of (Online) Application		Sunday	Extended to 23rd September 2018, 18:00 hrs
Enrollment process closes on		Monday	1st October 2018
Extended Closing Date for Submission of (Online) Application		Wednesday	3rd October 2018
Paper Change Request (closed)		17/10/2018 to 24/10/2018	
Corrections request concerning Gender / Category / PwD Status / Dyslexia and other similar learning disabilities		31/10/2018 to 07/11/2018	
Requesting Change of Examination City (an additional fee will be applicable)		13th November 2018	16th November 2018
Corrections request concerning Name / DOB/ Details of Parents /Guardian /Correspondence address/ Qualifying degree Details.		27/9/2018	26/11/2018
Admit Card will be available in the Online Application Portal (for printing)		Friday	4th January 2019
GATE 2019 Examination	Forenoon 9:30 AM to 12:30 Noon (Tentative)	Saturday Sunday	2nd February 2019 3rd February 2019
	Afternoon 2:30 PM to 5:30 PM (Tentative)	Saturday Sunday	9th February 2019 10th February 2019
Announcement of the Results in the Online Application Portal		Saturday	16th March 2019

FOR MORE DETAILS VISIT: http://gate.iitm.ac.in/

WoW !

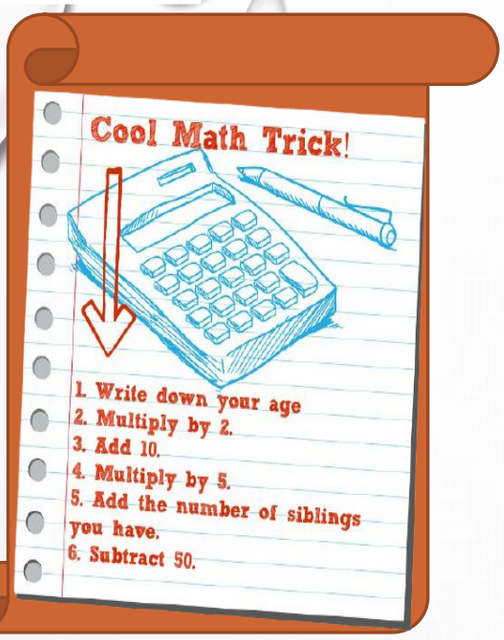
Inventions That Changed the World

Steam Engine: A Spanish mining administrator named Jerónimo de Ayanz is thought to have been the first person to develop a steam engine. He patented a device that used steam power to propel water from mines. However, it is Englishman Thomas Savery, an engineer, and inventor, who is usually credited with developing the first practical steam engine, in 1698. His device was used to draw water from flooded mines using steam pressure. In developing his engine, Savery used principles set forth by Denis Papin, a French-born British physicist who invented the pressure cooker. In 1711, another Englishman, Thomas Newcomen, developed an improvement in the engine, and in 1781, James Watt, a Scottish instrument maker employed by Glasgow University, added a separate condenser to Newcomen's engine, which allowed the steam cylinder to be maintained at a constant temperature — dramatically improving its functionality. He later developed a double rotating steam engine that, by the 1800s, would be powering trains, mills, factories, and numerous other manufacturing operations.

Concrete: Concrete is one of the most widely used artificial materials. It's a composite material made from a mixture of broken stone or gravel, sand, Portland cement, and water, which can be spread or poured into molds and forms a mass resembling stone on hardening. One of the key ingredients of concrete is cement. The foundation of cement was laid in 1300 BC. Middle eastern builders coated the outside of their clay fortresses with a thin, and moist layer of burned limestone, which chemically reacted with gasses in the air to form a hard, protective surface. Around 6500 BC, the first concrete-like structures were built by the Nabataea traders or Bedouins in the southern Syria and northern Jordan regions. By 700 BC, the significance of hydraulic lime was known, which led to the development of mortar supply kilns for the construction of rubble-wall houses, concrete floors, and underground waterproof cisterns. Around 3000 BC, the Egyptians were using early forms of concrete as a mortar in their building. In 1824, Portland cement was invented by Joseph Aspdin of England. George Bartholomew had laid down the first concrete street in the US during 1891, which still exists. By the end of the 19th century, the use of steel-reinforced concrete was developed. In 1902, using steel-reinforced concrete, August Perret designed and built an apartment building in Paris. This building a wide admiration and popularity for concrete and also influenced the development of reinforced concrete. In 1921, Eugène Freyssinet pioneered the use of reinforced- concrete construction by building two colossal parabolic-arched airship hangars at Orly Airport in Paris.

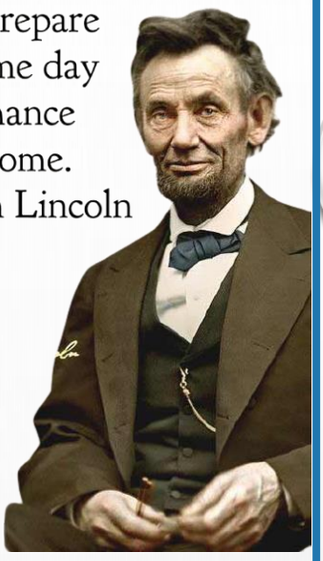
Nails: The sophisticated human life would not have been possible without the invention of the humble nail. They provide one of the best clues in determining the age of historic buildings. Prior to the invention of nails, wood structures were built using rope, they were used to interlock adjacent boards. The invention of nails goes back to several thousand years and was possible only after the development of techniques to caste and shape metal. Bronze nails dating from around 3400 BC, have been found in Egypt. According to the University of Vermont, the use of hand-wrought nails was the norm until the 1790s and early 1800s. By 1913, 90 percent of nails produced in the U.S. were steel wire nails.

Fun Zone



What is your answer? If you did the math correctly, the first 2 digits of the answer show your age, and the last digit is the number of siblings in your family.
Cool, right?

I will prepare and some day my chance will come.
-Abraham Lincoln



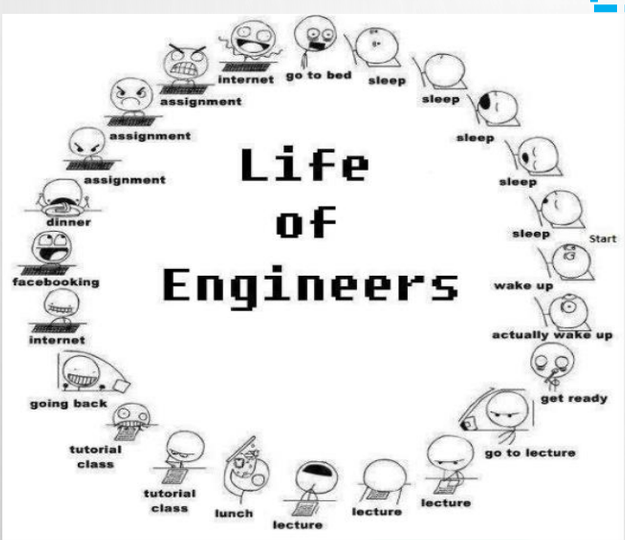
TRICK TO FIND PERCENTAGE

IF WE HAVE TO FIND THE PERCENTAGE OF THE NUMBER 5% OF 475, FOLLOW THE STEPS.

FOR THE GIVEN NUMBER, MOVE THE DECIMAL POINT OVER BY ONE PLACE. 475 BECOMES 47.5

THEN DIVIDE THE NUMBER 47.5 BY 2, WE GET 23.75.

23.75 IS THE SOLUTION TO THE GIVEN PROBLEM.



Mathematicians: pi is a non-repeating infinite decimal that cannot be expressed as a root of a rational polynomial.

Engineers:

SOLVE SUDOKU

		6	8		9	1		
			7		1			
5			2		8			4
4	3						9	5
	6						8	
2			5	3	6			9
		7				4		

There's a bathtub filled with water in front of you. You have a spoon, a cup, and a bucket. What is the fastest way to empty the tub?

ANS: PULL OUT THE PLUG

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