



ROHINI

COLLEGE OF ENGINEERING & TECHNOLOGY

Approved by AICTE and Affiliated to Anna University, (An ISO Certified Institution)

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MECHTRON - 2021

ANNUAL TECHNICAL MAGAZINE

DEPARTMENT OF MECHANICAL ENGINEERING

(2020 - 2021)



MECHTRON 2021

2020 - 21

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Mr. P.G.JEBIN SUNDARARAJ [Assistant Professor]

STUDENT COORDINATORS:

A. ABHIJITH MESSIA [IV YEAR]

A. ABILESH [III YEAR]

N.R. MOHAMED AFSAL [II YEAR]

THE COLLEGE MAGAZINE IS A COMPREHENSIVE MAGAZINE AS IT CONTAINS VALUABLE ARTICLES FROM THE COLLEGE PROFESSORS AND FROM THE EX-STUDENTS, WHO WANT TO CONVEY ABOUT THEIR SUCCESSFUL CAREER AND ABOUT THEIR INTERESTING EXPERIENCES. THUS A COLLEGE MAGAZINE PLAYS AN IMPORTANT ROLE IN THE LIFE OF COLLEGE STUDENTS. FOR OLD STUDENTS, IT REVIVES THEIR MEMORIES.

If you have any queries or feedback, address them to Mechtron2021@gmail.com

ABOUT DEPARTMENT



The Department of Mechanical Engineering started in the year 2012 with an initial intake of 60 students to the B.E Program and increased to an intake of 120 students from 2013 and 180 students from 2014. The Department offers ME - Thermal Engineering programme from 2015 with an intake of 24 students. The Department is a recognized research centre by Anna University Chennai from the year 2019. The department accomplish outcome Based Education which help the students to learn, develop and serve to the society. The Department has experienced and dedicated faculty with a wide range of specialization namely Thermal Engineering, Engineering Design, Manufacturing Engineering, Energy Engineering, CAD/CAM, Industrial Engineering and Mechatronics.

The faculty members have published more than 100 papers in National/International journals/Conference and had written books, filed patterns during the last 3 years and received many awards. The students were motivated by providing lot of opportunities like technical presentation in Symposium, conferences for skill development. The department provide value added knowledge to under graduates and post graduate students. Apart from curriculum students were motivated to participate in sports. The department has well established laboratory facilities to conduct research work on different specialized areas like Material Science, Renewable Energy, Thermal Science. The students of the department have received external research funding from Tamil Nadu State council for Science and technology in recent years. The students of the departments have joined in reputed industries through placements and some of them are turned to be an entrepreneur. The department has a good network of alumni.

VISION



To inculcate competence in the field of mechanical engineering for the students by providing quality education and learning opportunities to become ethically strong engineers for the development of society.

MISSION



- To provide fundamentals and technical skills in Mechanical Engineering through effective teaching-learning methodologies.
- To provide an ambience for research through collaborations with industry and academia.
- To inculcate the students' leadership quality through employability skills with ethical values.

PROGRAMME EDUCATIONAL OBJECTIVES [PEO'S]



PEO 1

Graduates will apply the knowledge of Mechanical Engineering concepts and innovative methods to solve real world Engineering problems.

PEO 2

Graduates will have the required qualities for a successful carrier in Mechanical Engineering and related fields.

PEO 3

Graduates will exhibit the professional skills with ethical values, Communication skills and team spirit.

PROGRAMME SPECIFIC OBJECTIVES [PSO'S]



PSO1:

Graduates of the program will achieve optimized design by utilizing their knowledge in thermal engineering, material science, manufacturing, fluid power and computer integrated manufacturing.

PSO2:

Graduates will be able to analyse and interpret by using modern tools and provide solutions to real time mechanical engineering and related problems.

PSO3:

Graduates will learn managerial skills to work effectively in a team and are aware of the impact of professional engineering solutions in human community, environmental context, ethics and be able to communicate effectively.



CHAIRMAN 'S MESSAGE

“Education is for improving the lives of others and for leaving your community and world better than you found it”

I deem it to be a matter of immense pleasure and honour for me to address you all through the website of ROHINI College of Engineering & Technology. It is indeed very heartening to witness that the college has carved a name for itself in the academic scenario of the region. Education is the most powerful tool to bring desirable changes in our personality and also to bring positive changes in our society. It is the only medium which enables you to move from darkness to brightness.



Dear friends, I strongly believe that, there can be no better way to drive and improve our nation’s prosperity and social economic well-being than through its education system. I also believe that, technocrats are the key to continued economic and technological advancement of our country.

I would take this opportunity to urge you all to focus on all round development. You should always have your education laced with morality and ethics. This task has to be taken over by the academicians to provide value and ethic based education. You should all remember that, “honesty is the first chapter in the book of wisdom” and we should inculcate honesty and integrity in all what we do.

I earnestly hope and trust that, my esteemed academicians and budding technocrats will work with sincerity, honesty and dedication and thereby contribute to make this world a better place to live in.

**Best Wishes,
Shri.K.NEELA MARTHANDAN
Chairman
ROHINI Groups.**

PRINCIPAL'S MESSAGE

‘We make technocrats, who proudly say ‘I am an Engineer; I serve mankind, by making dreams come true.’

The major challenge for today's engineering educational institutions is to accommodate the ever varying aspirations of the younger generation because of increasingly changing demand and development in industries. We constantly put efforts to accommodate these aspirations by fine tuning the academics of college with innovative and practical oriented teaching - learning practices along with other developmental activities.



Our goal is to change the world through education. It may sound idealistic, but this is precisely our long term goal. It is what motivates the work of everyone at the ROHINI College of Engineering and Technology — from faculty and staff, to students and alumni. It inspires our teaching and research. It is this goal which fuels the faculty to excel.

Our approach reflects the educational needs of the 21st century. We focus on our students by providing them with a world-class outcome based education and hands-on experience through research, training, and student forum activities etc. The success of our undergraduate, postgraduate & research programs is supervised by our eminent faculty, who continue to set the standard for excellence. There is continuous check on the implementation of planned academic activities with desired results in grooming our future generation for employment and for higher studies in India and abroad. A research culture has taken shape in the institute through enhanced R & D activities. We believe in continuous development and strive to carry on the best efforts and endeavours towards the benefit of the students.

Our University results and placement speaks about our excellence with many of our students bringing laurel to the college by getting highest ranking in university exams and huge number of students are placed in national & multinational companies, moreover our students' creativity and determination is evident by this continuous success in various fields.

Our institute stands by its core values, mission of churning out well-rounded individuals and thorough professionals.

**Best Wishes,
Dr.R.RAJESH, M.E., Ph.D.
Principal
Rohini College of Engineering & Technology.**

HOD'S MESSAGE

Mechanical engineering is one of the oldest and broadest engineering discipline, and plays a significant role in enhancing safety, economic vitality, enjoyment and overall quality of life throughout the world. A prerequisite for development is growth and that is directly related to production or output of a country.



A warm and Green Greetings from the Department of Mechanical Engineering at RCET. The college has been simply unstoppable in its progress as it has been actively involved in various activities that have brought to light the hidden talents of the college students and staff. Mechanical Engineering is a professional Core engineering discipline that deals with the design, production and maintenance of any produce of any industry.

Our department has a team of highly qualified and experienced faculty, good infra structure and lab facilities. We are striving hard continuously to improve upon the quality of education and to maintain its position of leadership in engineering and technology. We always work with the motto "Nothing can be achieved without genuine effort." The core values of the department help the students to develop their overall personality and make them worthy to compete and work at global level. Our faculty are continuously attending various training programs, publishing research papers, books and filing patents. Many are pursuing research. Our department has been conducting seminar / conferences to keep the faculty and students abreast with the latest developments in the field of technical education. We are happy to share that many students are pursuing higher studies in leading universities in India and abroad. I am certain that our students will prove to be an invaluable asset to an organization. We , Mechanical engineers to build the nation.

**Best Wishes,
Dr. S INDRAN M.E, Ph.D
HOD / Mechanical Engineering / RCET.**

EDITOR'S MESSAGE

It gives us great pleasure to bring you issue of MECHTRON 2021, the Mechanical department technical magazine of Rohini College of Engineering and Technology, Kanyakumari.

The objective of the magazine is to mainly focus on Achievement of the students from the Mechanical Engineering department in the Co-curricular and Extra-Curricular Activities.

The name and fame of an institute depends on the caliber and achievements of the students and teachers. The role of a teacher is to be a facilitator in nurturing the skills and talents of students. This magazine is a platform to exhibit the literary skills and innovative ideas of teachers and students. MECHTRON 2021 presents the skills and innovative thinking of students and contributions of teachers.

We are also thankful to our Management and Principal for their support and encouragement.. Last but not the least we are thankful to all the authors who have sent their articles. We truly hope that the pages that follow will make an interesting read.



Mr. T. JEBASINGH
Editor of Department Magazine
ROHINI College of Engg. And Technology.

ABOUT COLLEGE



ROHINI COLLEGE OF ENGINEERING AND TECHNOLOGY

A temple of learning, is an ISO certified institution was founded by the great Industrialist and Philanthropist, Shri. K.Neela Marthandan. The main objective of our college is to advance the knowledge base of the engineering professions and to influence the future directions of engineering education and practice.

This is the best Engineering College in Nagercoil, Kanyakumari District. We believe not only in educating the students, but also in grooming characters, with moral and ethical values to build the nation. Since the beginning, the college has been providing world-class facilities & infrastructure in education and learning. The emphasis is on transformational leadership rather than directional leadership. We aim to establish new trends, introduce innovative training methodologies, and thus guide students towards the road to success.

RCET VISION: To be an academic institute of continuous excellence towards education, research in rural regime, and provide service to nation in terms of nurturing potentially higher social, ethical and engineering companion graduands.

RCET MISSION: To faster and promote technically competent graduands by imparting the state of art engineering education in rural regime.

To enunciate research assisted scientific learning by dissemination of knowledge towards science, agriculture, industry and national security.

3D-PRINTED ROCKET ENGINES: THE TECHNOLOGY DRIVING THE PRIVATE SECTOR SPACE RACE

The volatile nature of space rocket engines means that many early prototypes end up embedded in dirt banks or decorating the tops of any trees that are unfortunate enough to neighbour testing sites. Unintended explosions are in fact so common that rocket scientists have come up with a euphemism for when it happens: rapid unscheduled disassembly, or RUD for short.

Every time a rocket engine blows up, the source of the failure needs to be found so that it can be fixed. A new and improved engine is then designed, manufactured, shipped to the test site and fired, and the cycle begins again—until the only disassembly taking place is of the slow, scheduled kind. Perfecting rocket engines in this way is one of the main sources of developmental delays in what is a rapidly expanding space industry.

Today, 3D printing technology, using heat-resistant metal alloys, is revolutionizing trial-and-error rocket development. Whole structures that would have previously required hundreds of distinct components can now be printed in a matter of days. This means you can expect to see many more rockets blowing into tiny pieces in the coming years, but the parts they're actually made of are set to become larger and fewer as the private sector space race intensifies.

Rocket engines generate the energy equivalent of detonating a ton of TNT every second, directing that energy into an exhaust that reaches temperatures well over 3,000°C. Those engines that manage this without rapidly disassembling in an unscheduled fashion take at least three years to engineer from scratch, most of which is taken up by the cyclical process of redesign, rebuild, refire and repeat.



Mr. S.T. Arjun

AP/ MECH

INDUSTRIAL APPLICATIONS OF SERVO MOTORS

- **Robotics:** A servo motor at every "joint" of a robot is used to actuate movements, giving the robot arm its precise angle.
- **Conveyor Belts:** Servo motors move, stop, and start conveyor belts carrying product along to various stages, for example, in product packaging/bottling, and labeling.
- **Camera Auto Focus:** A highly precise servo motor built into the camera corrects a camera's lens to sharpen out-of-focus images.
- **Robotic Vehicle:** Commonly used in military applications and bomb detonation, servo motors control the wheels of the robotic vehicle, generating enough torque to move, stop, and start the vehicle smoothly as well as control its speed.
- **Solar Tracking System:** Servo motors adjust the angle of solar panels throughout the day so that each panel continues to face the sun, harnessing maximum energy from sunup to sundown.
- **Metal Cutting & Metal Forming Machines:** Servo motors provide precise motion control for milling machines, lathes, grinding, centering, punching, pressing, and bending in metal fabrication for such items as jar lids to automotive wheels.
- **Antenna Positioning:** Servo motors are used on both the azimuth and elevation drive axis of antennas and telescopes such as those used by the National Radio Astronomy Observatory (NRAO).
- **Woodworking/CNC:** Servo motors control woodturning mechanisms (lathes) that shape table legs and stair spindles, for example, as well as augering and drilling the holes necessary for assembling those products later in the process.
- **Textiles:** Servo motors control industrial spinning and weaving machines, looms, and knitting machines that produce textiles such as carpeting and fabrics as well as wearable items such as socks, caps, gloves, and mittens.
- **Printing Presses/Printers:** Servo motors stop and start the print heads precisely on the page as well as move paper along to print multiple rows of text or graphics in exact lines, whether it's a newspaper, a magazine, or an annual report.
- **Automatic Door Openers:** Supermarkets and hospital entrances are prime examples of automated door openers controlled by servo motors, whether the signal to open is via push plate beside the door for handicapped access or by radio transmitter positioned overhead.

The world would be a much different place without servo motors. Whether they're used in industrial manufacturing or in commercial applications, they make our lives better, easier, and in many cases provide us with more affordable products.



Mr.R. David
AP/ MECH

ADVANCING ROBOTICS AND AUTOMATION

Smart manufacturers are efficient by design. This is where robotics and automation thrive. And, according to the Robotic Industries Association, manufacturers see the potential. The continued trend toward collaborative environments is playing a significant role. Unlike historical deployments where one or two processes often consumed a disproportionate share of the project cost, collaborative robots (or cobots) allow for incremental investment. As a result, manufacturers can automate one process at a time.

"The difference is that in many cases the programming is taking place by the line operator. The business impact in these companies is significant because everyone is struggling to hire, which hits these companies even harder," he says. "We are regularly seeing collaborative robots go in right at or below the annual cost of an average manufacturing worker."

The boost in the availability of plug-and-play, pre-engineered peripherals is also making a significant difference. "Industry focused companies are building products to seamlessly integrate with robots in a matter that strips out the time, cost and risk commonly associated with robots," he says. "This trend is going to continue into deeper application kits, making collaborative robots more attractive."

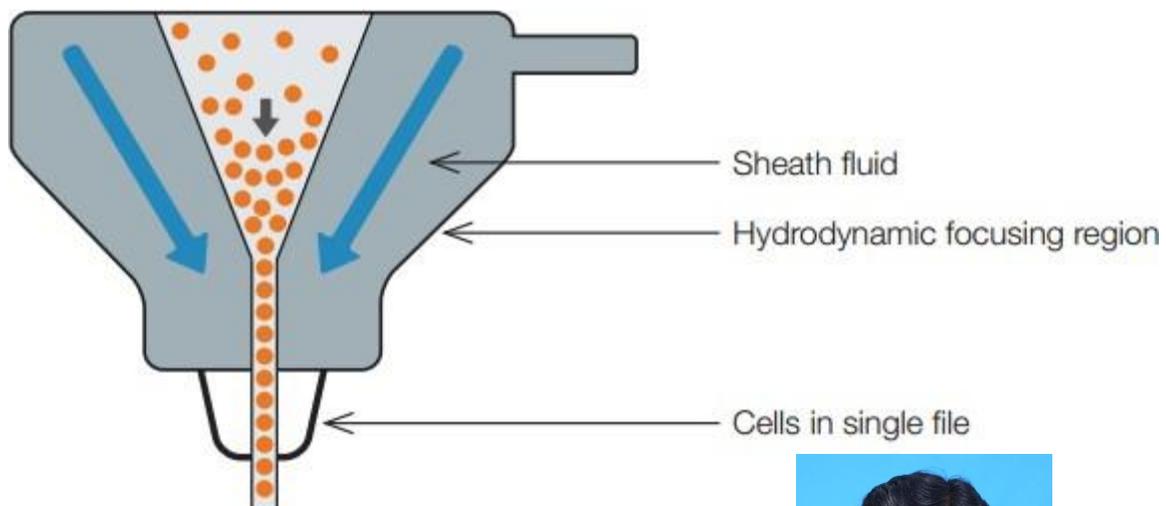


Dr. Kailainathan
ASP/ MECH

CONCEPTS OF FLUIDICS

One of the fundamentals of flow cytometry is the ability to measure the properties of individual particles. When a sample enters a flow cytometer, the particles are randomly distributed in the 3-D space of the sample line, the diameter of which is significantly larger than the diameter of most cells. The sample must therefore be ordered into a stream of single particles that can be interrogated individually by the instrument's detection system. This process is managed by the fluidics system.

The fluidics system consists of a central core through which the sample fluid is injected, enclosed by an outer sheath fluid. Due to narrowing of the sheath (in a nozzle or cuvette) the fluid velocity is increased. The sample is introduced into the center and is focused by the Bernoulli effect. This allows the creation of a stream of particles in single file and is called hydrodynamic focusing. Under optimal conditions (laminar flow) there is no mixing of the central fluid stream and the sheath fluid.



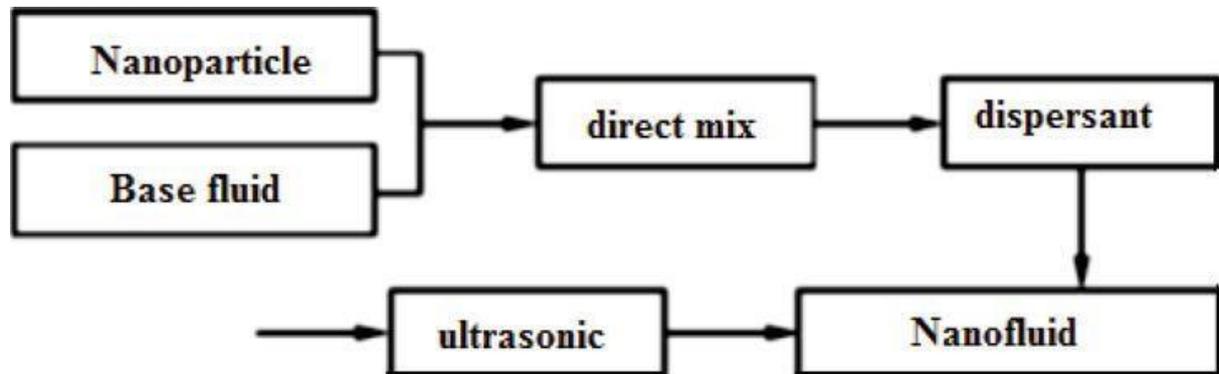
Mr. P.G.Jebin Sundara raj

AP/ MECH

METHODS OF PREPARING NANOFLUIDS

Nano fluids are produced by several techniques: first step, second step, and other techniques. To avoid the sedimentation of nanoparticles during its operation, surfactant may be added to them. Nano fluid preparation is the first step ahead of any implementations. Therefore, it entails more focus from researchers to obtain a good stage of stability. Colloidal theory states that sedimentation in suspensions ceases when the particle size is below a critical radius due to counterbalancing gravity forces by the Brownian forces. Nanoparticles of a smaller size may be a better size in the different applications. However, it has a high surface which leads to the formation of agglomerates among them. Therefore, to obtain a stable Nano fluid with optimum particle diameter and concentration, it is considered a big challenge for researchers. Two common methods are used to produce Nano fluids, the two-step method and the one step method, and others have worked up some innovations.

The two-step method is the common method to produce Nano fluids. Nanoparticles of different materials including nanofibers, nanotubes, or other nanomaterials are first produced as Nano sized from 10 to 100 nm by chemical or physical methods. Then, the Nano sized powder will be dispersed in base fluids with the help of intensive magnetic force agitation, ultrasonic agitation, high-shear mixing, homogenizing, and ball milling. As resulting from high surface area and surface activity, nanoparticles tend to aggregate reflecting adversely on the stability of Nano fluid. To avoid that effect, the surfactant is added to the Nano fluids.



Mr. M. Stanly Selva Kumar

AP/ MECH

STUDENTS PAGE

“A MOM TEACHES LOVE .. BY LOVING IT...”



M.SELVA AJIN

II – MECH

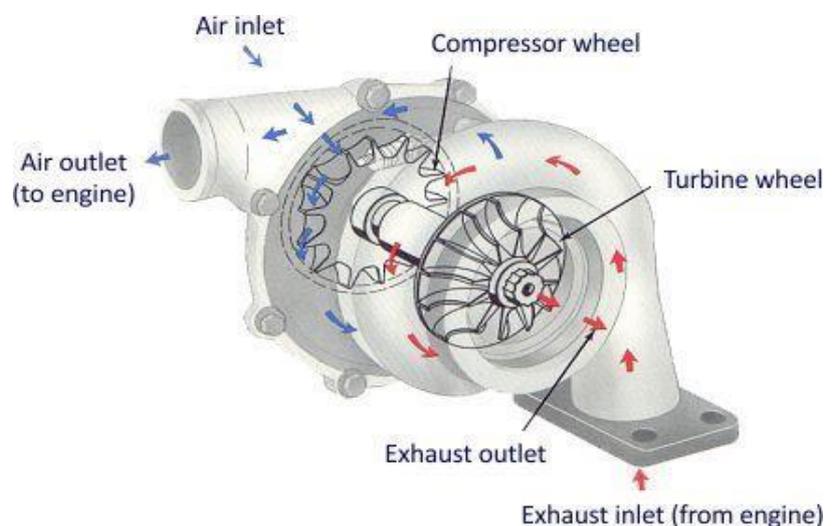
TURBO CHARGER

A significant difference between a turbocharged diesel engine and a traditional naturally aspirated gasoline engine is **the air entering a diesel engine is compressed before the fuel is injected**. This is where the turbocharger is critical to the power output and efficiency of the diesel engine.

It is the job of the turbocharger to compress more air flowing into the engine's cylinder. When air is compressed the oxygen molecules are packed closer together. This increase in air means that more fuel can be added for the same size naturally aspirated engine. This then generates increased mechanical power and overall efficiency improvement of the combustion process. Therefore, the engine size can be reduced for a turbocharged engine leading to better packaging, weight saving benefits and overall improved fuel economy.

A turbocharger is made up of two main sections: the turbine and the compressor. The turbine consists of the **turbine wheel** and the **turbine housing**. It is the job of the turbine housing to guide the **exhaust gas** into the turbine wheel. The energy from the exhaust gas turns the turbine wheel, and the gas then exits the turbine housing through an **exhaust outlet area**.

The compressor also consists of two parts: the **compressor wheel** and the **compressor housing**. The compressor's mode of action is opposite that of the turbine. The compressor wheel is attached to the turbine by a **forged steel shaft**, and as the turbine turns the compressor wheel, the high-velocity spinning draws in air and compresses it. The compressor housing then converts the high-velocity, low-pressure air stream into a high-pressure, low-velocity air stream through a process called diffusion. The **compressed air** is pushed into the engine, allowing the engine to burn more fuel to produce more power.



ABIRAM

III – MECH

TUBELESS TYRE

A tubeless tyre looks like a standard tube-type clincher tyre but requires no inner tube and, once 'seated' (seating is the process of snapping the beads into position), it forms an airtight seal with the rim. A valve just like the one you'd find on an inner tube is fitted directly to the rim. For the system to work, neither the rim nor tyre can leak air, so the tyre needs to fit tightly to the rim.

Sealant poured into the tyre or injected through the valve helps plug any tiny leaks. This sealant stays liquid inside the tyre and will heal small punctures suffered while riding. Tubeless tyres are not to be confused with tubular tyres. Tubulars (also known as 'tubs' or 'sew-ups') are a traditional type of tyre that's glued or taped to a tubular-specific rim. They are still widely used in road racing and cyclocross but have otherwise largely been replaced by high-performance clinchers.

The number one advantage of tubeless tyres compared to standard clinchers with inner tubes is they can be run at lower pressures without the risk of pinch flats. A pinch flat occurs when your tyre hits an obstacle (such as a rock or the edge of a pothole) and deforms to such an extent that it squashes the inner tube against the rim. This leads to a characteristic 'snake bite' style double puncture.

With no inner tube to trap, and sealant in the tyre to heal small punctures, a tubeless setup is much less prone to flattening overall, and so allows you to reap the benefits of lower tyre pressures. These include greater comfort, and potentially more grip and speed too, although the relationship between tyre pressure and performance is complex so it's hard to generalise.

Tubeless tyres may also have lower rolling resistance and therefore be faster than an equivalent tubed setup, but again it's hard to generalise because there are many variables and it depends exactly what you consider to be an apples-to-apples comparison.

A tubeless tyre looks like a standard tube-type clincher tyre but requires no inner tube and, once 'seated' (seating is the process of snapping the beads into position), it forms an airtight seal with the rim. A valve just like the one you'd find on an inner tube is fitted directly to the rim. For the system to work, neither the rim nor tyre can leak air, so the tyre needs to fit tightly to the rim.

SIVAKUMAR.J

IV- MECH

“LOVE IS LIKE COLD WIND IN SUMMER”



SIMAN R
IV – MECH

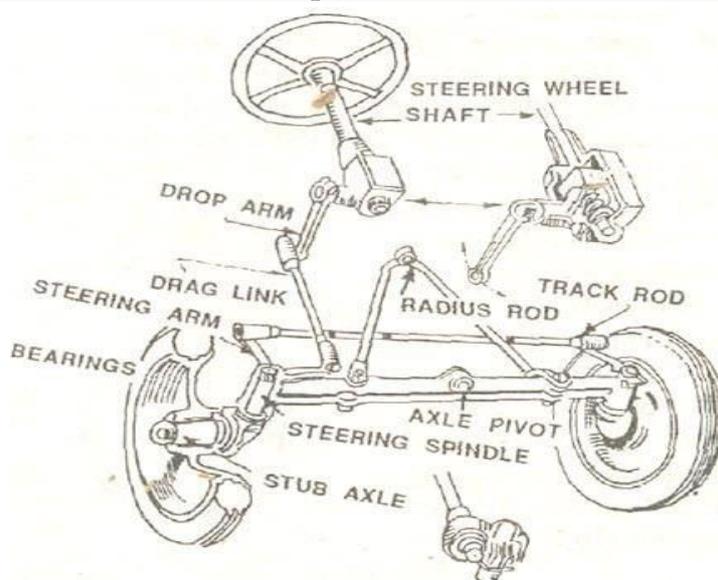
STEERING SYSTEM : NECESSITY. STEERING GEOMETRY

The steering system is required to control the direction of motion of the vehicle (tractor in our case). This is done through a series of links used to convert the rotation of the steering wheel into change of angle of the axis of the steering wheels. Another function of the steering system is to provide directional stability. The motion of the vehicle being steered needs to become straight ahead when the force on the steering wheel is removed. The design of the steering system should be such that it should cause minimum wear of the tyres of the wheels.

The steering system can be classified into front wheel steering, rear wheel steering or all wheel steering. The system, governing the angular movement of front wheels of a tractor is called steering system. This system steering wheel minimizes the efforts of the operator in turning the front wheel with the application of leverages. The different components of the system are:

- steering wheel
- steering shaft
- steering gear
- pitman arm (drop arm)
- drag link
- steering arm
- tie rod and
- king pin.

When the operator turns the steering wheel, the motion is transmitted through the steering shaft to tire angular motion of the pitman arm, through a set of gears. The angular movement of the pitman arm is further transmitted to the steering arm through



Steering system

the drag link and tie rods. Steering arms are keyed to the respective king pins which are integral part of the stub axle on which wheels are mounted. The movement of the steering arm affects the angular movement of the front wheel. In another design, instead of one pitman arm and drag link, two pitman arms and drag links are used and the use of tie rod is avoided to connect both steering arms.

HERE ARE 10 SIGNS OF EMOTIONAL MATURITY

- **Being Flexible**
- **Taking Ownership & Responsibility**
- **Knowing That They Don't Know Everything**
- **They Look for Learning and Growth From Every Opportunity**
- **They Actively Seek Out Multiple Points of View To Help Inform Their Own**
- **They Stay Resilient**
- **They Have a Calm Disposition**
- **They Believe in Themselves**
- **Approachability**
- **A Good Sense of Humor**

BE MATURED

AJAY THARAN P

III – MECH



ROHINI

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THANK YOU...