K.L.N. College of Engineering

Pottapalayam – 630612.(11 km From Madurai City)
Tamil Nadu, India.

MECASO/MECH/VOLUME 1/ISSUE 3

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DEPARTMENT OF MECHANICAL ENGINEERING

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VISION

To become a Centre of excellence for Education and Research in Mechanical Engineering.

MISSION

- Attaining academic excellence through effective teaching learning process and state of the art infrastructure.
- Providing research culture through academic and applied research.
- Inculcating social consciousness and ethical values through co-curricular and extra-curricular activities.

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

PEO I	Graduates will have successful career in Mechanical Engineering and service industries.
PEO II	Graduates will contribute towards technological development through academic research and industrial practices.
PEO III	Graduates will practice their profession with good communication, leadership, ethics and social responsibility.
PEO IV	Graduates will adapt to evolving technologies through lifelong learning.

PROGRAM SPECIFIC OUTCOMES (PSOs)

Mechanical Engineering Graduates will be able to:

PSO 1	Derive technical knowledge and skills in the design, develop, analyze and manufacture of mechanical systems with sustainable energy, by the use of modern tools and techniques and applying research based knowledge.
PSO 2	Acquire technical competency to face continuous technological changes in the field of mechanical engineering and provide creative, innovative and sustainable solutions to complex engineering problems.
PSO 3	Attain academic and professional skills for successful career and to serve the society needs in local and global environment.

MECASO

MECHANICAL ENGINEERING NEWSLETTER

Principal Message

A weak link is better than a strong memory. Nothing exemplifies it better than the nostalgic feeling one gets when leafing through the dusty old pages of his/her college magazine. It can make a reader travel down the lanes of memory, giving rise to a surge of emotions of many hues and colors. KLNCE's MECASO is going to give the same pleasure to all the brilliant minds who traverse through the portals of this temple of learning. I am happy to see the amount of enthusiasm of eminent members of the college to contribute to the magazine. Not to be outdone, our students have devoted time and plunged into creating powerful stories, heart-warming poems, vivid drawings and informative articles. I stand awed by the sheer number of articles that have come pouring in for the magazine. This shows the positive and creative energy of faculty members and students present in the college. We proudly publish this magazine in order to show to the outside world, and also to remind the denizens of KLNCE, the progress we have made so far. We intend to continue presenting the talent and creativity of our staff and students through MECASO every year. I invite you to read and immerse yourself in the unfolding art and be exulted

Principal

Dr.A.V. RAMPRASAD

Message from the Head of the Department

I am delighted to present our department magazine for the month of December. It is a nice platform for the students to exhibit their talents. I strongly believe that it would be a medium through which the others can learn about the potential and achievements of our students. I hope that this would be an ongoing process and the magazine would bring out the latent talent of everyone. I join Principal in appreciating and recognizing the hard work of the editors and the magazine committee in bringing out the magazine and wish them success in their endeavour.

HOD / Mech

Dr. M.R. Thansekhar

News Letter Editorial Board

Crusher

By Barath Narayanan K S (131324) II year A Section

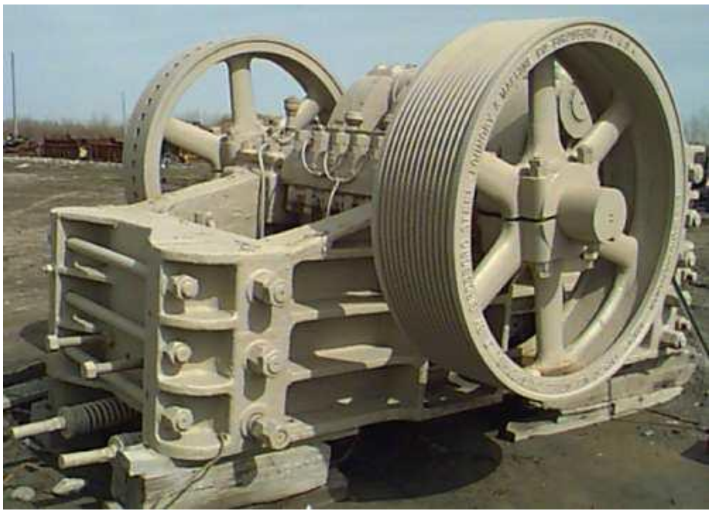
A crusher is a machine designed to reduce large solid material objects into a smaller volume, or smaller pieces. Crushers may be used to reduce the size, or change the form, of waste materials so they can be more easily disposed of or recycled, or to reduce the size of a solid mix of raw materials (as in rock ore), so that pieces of different composition can be differentiated. Crushing is the process of transferring a force amplified by mechanical advantage through a material made of molecules that are bond together strongly, and resist deformation more than those in the material being crushed do. Crushing devices hold material between two parallel or tangent solid surfaces, and apply sufficient force to bring the surfaces together to generate enough energy within the material being crushed so that its molecules are separated from (fracturing), or change alignment in their relation to (deformation), each other. The earliest crushers were hand-held stones, where the weight of the stone provided a boost to muscle power, which is used against a stone anvil. Querns and mortars are types of these crushing devices.

Types of Crusher

The most common types of crusher these days are basically used to help people. The design of these types enable them to crush follow the types of crusher and then crush as look as possible or destroy. These crusher types are jaw crusher, gyratory crusher and impact crusher.

Jaw Crusher

A jaw or toggle crusher consists of a set of vertical jaws, one jaw being fixed and the other being moved back and forth relative to it by a cam or pitman mechanism. The jaws are farther apart at the top than at the bottom, forming a tapered chute so that the material is crushed progressively smaller and smaller as it travels downward until it is small enough to escape from the bottom opening. The movement of the jaw can be quite small, since complete crushing is not performed in one stroke. The inertia required to crush the material is provided by a weighted flywheel that moves a shaft creating an eccentric motion that causes the closing of the gap. Single and double toggle jaw crushers are constructed of heavy duty fabricated plate frames with reinforcing ribs throughout the jaw crusher's. The crusher's components are of high strength design to accept high horsepower draw. Manganese steel is used for both fixed and movable jaw faces. Heavy flywheels allow crushing peaks on tough materials. Double Toggle jaw crushers may feature hydraulic toggle adjusting mechanisms



Jaw crusher

Gyratory Crusher

A gyratory crusher is similar in basic concept to a jaw crusher, consisting of a concave surface and a conical head; both surfaces are typically lined with manganese steel surfaces. The inner cone has a slight circular movement, but it does not rotate; the movement is generated by an eccentric arrangement. As with the jaw crusher, material travels downward between the two surfaces being progressively crushed until it is small enough to fall out through the gap between
the two surfaces. As an example, a Fuller-Traylor gyratory crusher features throughputs to 12,000 TPH with installed powers to 1,300 HP.

Gyratory crusher

Impact Crushers

Impact crushers involve the use of impact rather than pressure to crush material. The material is contained within a cage, with openings on the bottom, end, or side of the desired size to allow pulverized material to escape. This type of crusher is usually used with soft and non-abrasive material such as coal, seeds, limestone, gypsum or soft metallic ores.

Impact crusher

Mems Technology

By Harish Kumar B (121310) III year C Section

Micro-Electro-Mechanical Systems, or MEMS, is a technology that in its most general form can be defined as miniaturised mechanical and electro-mechanical elements that are made using the techniques of micro fabrication. The critical physical dimensions of MEMS devices can vary from well below one micron on the lower end of the dimensional spectrum, all the way to several millimeters. The term used to define MEMS varies in different parts of the world. In the United States they are predominantly called MEMS, while in some other parts of the world they are called “Microsystems Technology” or “Micro Machined Devices”. While the functional elements of MEMS are miniaturized structures, sensors, actuators, and microelectronics, the most notable elements are the micro sensors and micro actuators. Micro sensors and micro actuators are appropriately categorized as “transducers”, which are defined as devices that convert energy from one form to another. In the case of micro sensors, the device typically converts a measured mechanical signal into an electrical signal. The more complex levels of integration are the future trend of MEMS technology. The present state-of-the-art is more modest and usually involves a single discrete micro sensor, a single discrete micro actuator, a single micro sensor integrated with electronics, a multiplicity of essentially identical micro sensors integrated with electronics and a single micro actuator integrated with electronics. MEMS technology is sometimes cited as separate and distinct technology. In reality the distinction is not so clear-cut. The well-known Scanning Tunneling-Tip Microscope (STM) which is used to detect individual atoms and molecules on the nanometer scale is a MEMS device. Similarly the Atomic Force Microscope (AFM) which is used to manipulate the placement and position of individual atoms and molecules on the surface of a substrate is a MEMS device as well. In fact, a variety of MEMS technologies is required in order to interface with the nano-scale domain. Thus the MEMS is a technology of encompassing highly miniaturised things that cannot be seen with the human eye. The common benefits afforded by this technology, include: increased information capabilities, miniaturization of systems, new materials resulting from new science at miniature dimensional scales, and increased functionality and autonomy for systems.

Thermal Barrier Coatings for Diesel Engines

By Ganapathiappan S (121006) III year A Section

The diesel engines play a vital role in the transport sector for various purposes. Average brake thermal efficiency of a single cylinder experimental diesel engine (Kirloskar) is found to be 27% to 29%. Almost all researches reveal the fact that all the heat produced during the combustion process is not being used.

In diesel engines, most of the heat produced during combustion is not utilized for useful work. Hence combustion chamber, cylinder head, piston bowl and valve facings were coated with ceramic material (insulator) to retain this heat.

Ceramic coated engines had also been tested for their performance, combustion, and emission characteristics. hese engines are also known as Low Heat Rejection (LHR) engines, low heat loss engines or Thermal Barrier Coated (TBC) engines. Experiments with LHR engines fuelled with biodiesel resulted in improved efficiency, reduced smoke level with increased NOx emission. In conventional engines, the thermal energy would be lost through the coolant, whereas in LHR engine it is retained in the combustion chamber. Hence additional power and improved efficiency are the expectations in an insulated engine. The essential property to be considered in ceramic coating, is its thermal conductivity. The thermal conductivity varies from 2 W/m degree Celsius for zirconia to 49 W/m degree Celsius for alpha silicon carbide. Among the various ceramics tested, Partially Stabilized Zirconia (PSZ) has been chosen as the best insulation by many researchers because of its low thermal conductivity, adequate strength, and coefficient of linear expansion almost equal to that of cast ironIn general every engine will have its manufacturer’s settings which are suitable for the conventional fuel (petroleum diesel or neat diesel). However during any research work with fuel modification, optimization will be done by varying these parameters. Normally variations will be made in its injection timing, injection pressure and in compression ratio.

Various forms of LHR engines are:

- Ceramic coated engine
- Air gap insulated piston engine
- Air gap insulated piston and air gap insulated liner engine
- Air gap insulated piston and air gap insulated liner engine

Ceramic coated cylinder head engine and ceramic coated engine, Partially Stabilized Zirconia (PSZ) of thickness 500 microns is applied on the inner side of the cylinder head. In air gap insulated piston LHR engine, the piston is made into two parts. A crown made of low thermal conductivity material is threaded to the body of the piston and the gasket made of low thermal conductivity material is provided in between the crown and the body of the piston. Since air is a bad conductor of heat, the combination of two low thermal conductive materials decreases heat flow to the coolant which results in LHR engine.

In air gap insulated piston and air gap insulated liner type of LHR engine, the insulation is provided in the piston with low thermal conductivity material crown and air gap is provided in between body and crown with gasket. Insulation is also provided in the liner with low thermal conductivity material. In the LHR engine which combines the effect of ceramic coating, air gap insulated piston, and air gap insulated liner, it results in best insulation among other three forms of LHR engine and hence more amount of heat is retained in the combustion chamber which leads to higher efficiency than other forms of LHR engine.

Conclusion:

It can be concluded that in LHR engines, the heat retained during the combustion enhances the reaction. The researches with biodiesel as the test fuel prefer LHR engines, as they reduce the viscosity of biodiesel due to the retention of heat. However, the elevated oxides of nitrogen (NOx) is the major drawback of LHR engine. Study is still in progress to reduce the NOx emission. Few techniques which are in process are emulsified fuel, water injection during combustion, etc.

Smart Glass

By Baskaran K(111040) IV year A Section

The development and increasing availability of "smart" glass technology could bring significant changes to the design of structures and transportation. As prices drop and supplies grow, so-called "smart glass" has the potential to redefine how architects and engineers design the exterior of buildings to meet sustainability criteria, according to a report released last week by the London office of Navigant Research, Smart Glass: Electro chromic, Suspended Particle, and Thermo chromic Technologies for Architectural and Transportation Applications: Global Market Analysis and Forecasts. The firm's energy performance projections indicate that smart glass will see significant gains over typical high-efficiency, low-emissivity glass within the next decade, and adoption levels will grow as prices for the new technology drop and supplies increase.

There are three types of smart glass, which can be used in both the construction and transportation fields: electro chromic, suspended particle, and thermo chromic."Usually what people are referring to when they refer to smart glass, is actually electro chromic glass," says Eric Bloom, a senior research analyses for Navigant Research in London and a co-author of the study. "When a charge is applied to the glass there is a change in opacity, so it can go from pretty much totally clear to pretty much totally dark, just by changing the voltage being applied." The charge changes the opacity of the glass by moving lithium ions between two layers of film sandwiched between two layers of glass. Electrochromic glass offers the highest performance of each of the three types of smart glass, at a typical cost of $45 to $70 per square foot, Bloom says. Suspended particle glass typically costs about 20 percent more than electro chromic glass and works as it sounds, according to Bloom. Suspended particles located between two panes of glass are controlled through the application of a very low voltage. When the charge is applied, the particles reorient themselves to either let light through or block it. Thermo chromic glass—which has been around for some time, and is the concept behind the ubiquitous color-changing glasses popularized in the year 1980s and 1990s—typically costs approximately $30 to $45 per square foot, he says. By comparison, low-emissivity glass typically costs between $5 and $15 per square. The volume of smart glass sold globally is expected to grow dramatically, from a very low volume in this year to up to just over 2.7 million m2 by 2022. (Navigant Research). "So comparing it, $5 to $15 a square foot versus $45 to $70 a square foot—it's quite a jump," Bloom says. "But, having said that, the costs are coming down pretty rapidly." As manufacturing processes scale up over the next decade, Bloom predicts that the costs of smart glass will drop by approximately 40 percent. In the last two years alone, he points out, the market has effectively transitioned from "science projects to reality," which is the first step in moving away from research and development toward full-scale production.

In-Plant Training

S. No.	Name of the Industry	Name of the students	Duration
1.	Port Trust Of Chennai, Chennai.	R.Vignesh	26.12.2014 to 31.12.2014
2.	Integral Coach Factory, Chennai38.	Vignesh.R	04.12.2014 to 11.12.2014
3.	TVS Iyengar & Son's Pvt. Ltd., Madurai.	R.M.Kannan	15.12.2014 to 25.12.2014
4.	Sree Mangayarkarasi Mills (P) Ltd, Madurai - 625201.	K.C.Gobi L.M.Akilarajan O.M.Balaji K.Arunkumar R.Diwahar	23.12.2014 to 27.12.2014
5.	Rail Net Software Solutions, Madurai.	S.Ajith Kumar M.Kathresan	15.12.2014 to 20.12.2014
6.	Aavin Milk Products, Madurai - 20.	V.Muthappan M.Kathiresan S.Ajith Kumar	22.12.2014 to 26.12.2014

Workshop – Participants

S. No.	Date	Name of the Participant	Programme and Venue	Event
1.	6 .12.14 to 8.12.14	R.M. Kannan	Dept. ECE, K.L.N. College of Engineering	Arduino Hands on for Young Innovators
2.	26 .12.14 to 27.12.14	K. Goushik	ESCI, The Institution Of Engineers (India)	Inter Disciplinary Workshop on Design And Development of Small Satellites

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PROGRAM OUTCOMES (POs)

Mechanical Engineering Graduates will be able to

1.	Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals and an engineering specialization to solution of complex engineering problems.
2.	Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3.	Design / development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4.	Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5.	Modern tool usage: Create, select and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
6.	The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7.	Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8.	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9.	Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10.	Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11.	Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects in multidisciplinary environments.
12.	Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

K.L.N. COLLEGE OF ENGINEERING

VISION

To become a Premier Institute of National Repute by Providing Quality Education, Successful Graduation, Potential Employability and Advanced Research & Development through Academic Excellence.

MISSION

To Develop and Make Students Competent Professional in the Dynamic Environment in the field of Engineering, Technology and Management by emphasizing Research, Social Concern and Ethical Values through Quality Education System.

Principal President Secretary & Correspondent