K.L.N. College of Engineering

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

MECASO/MECH/VOLUME 3/ISSUE 1

MARCH 2016

2016

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

It is happiness unlimited to see KLNCollege of Engineering breaking barriers and moving forward confidently. The adage “Fortune favours the bold” is very true in the case of KLNCE. There is nothing... absolutely nothing that stops the KLNCE juggernaut from rolling forward, going on boldly from one project to another... leaving the spectators spell-bound. Everything that KLNCE touches turns into gold. All these things have been made possible by the extraordinary vision and the immaculate planning of our Management, which coupled with the skills of the staff have made the college scalenew highs. This magazine brings out the notable achievements of department of Mechanical Engineering. I am sure that through these pages readers will get a bird’s eye view of Mechanical Department and its wonders.

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Principal

Dr.A.V. RAMPRASAD

Message from the Head of the Department

Education is the investment in Human Resource Development. It is art of training and equipping the youth to be builders of future, enabling them to multiply wisely and judiciously the God-given 'Talent'. The future of humanity will be bright only if intellectual, emotional and spiritual evolution is ensured through education. KLN College of Engineering rightly employs the studies in Engineering & Technology as a tool for same. Let the decades-old endeavour of KLN College of Engineering and Technology in the pursuit of knowledge be ever fruitful, contributing to the enhancement of human dignity

HOD/MECH

Dr. P. UDAYAKUMAR

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Anti-Lock Braking System

By L.M. Akilarajan (131326) III Year C Section

An anti-lock braking system (ABS) is an automobile safety system that allows the wheels on a motor vehicle to maintain tractive contact with the road surface according to driver inputs while braking, preventing the wheels from locking up (ceasing rotation) and avoiding uncontrolled skidding. It is an automated system that uses the principles of threshold braking and cadence braking which were practiced by skillful drivers with previous generation braking systems. It does this at much faster rate and with better control than a driver could manage.

ABS generally offers improved vehicle control and decreases stopping distances on dry and slippery surfaces; however, on loose gravel or snow-covered surfaces, ABS can significantly increase braking distance, although still improving vehicle control since initial widespread use in production cars, anti-lock braking systems have been improved considerably. Recent versions not only prevent wheel lock under braking, but also electronically control the front-to-rear brake bias. This function, depending on its specific capabilities and implementation, is known as electronic brakeforce distribution (EBD), traction control system, emergency brake assist, or electronic stability control (ESC).

Operation

The anti-lock brake controller is also known as the CAB (Controller Anti-lock Brake). Typically ABS includes a central electronic control unit (ECU), four wheel speed sensors, and at least two hydraulic valves within brake hydraulics. The ECU constantly monitors the rotational speed of each wheel; if it detects a wheel rotating significantly slower than the others, a condition indicative of impending wheel lock it actuates the valves to reduce hydraulic pressure to the brake at the affected wheel, thus reducing the braking force on that wheel; the wheel then turns faster. Conversely, if the ECU detects a wheel turning significantly faster than the others, brake hydraulic pressure to the wheel is increased. So the braking force is reapplied, slowing down the wheel. This process is repeated continuously and can be detected by the driver via brake pedal pulsation. Some anti-lock systems can apply or release braking pressure 15 times per second. Because the wheel of car equipped with ABS is practically impossible to lock even during panic braking in extreme conditions.

The ECU is programmed to disregard differences in wheel rotative speed below a critical threshold, because when the car is turning, the two wheels towards the center of the

curve turn slower than the outer two. For this same reason, a differential is used in virtually all road side vehicles.

If fault develops in any part of the ABS, a warning light will usually be illuminated on the vehicle instrument panel, and the ABS will be disabled until the fault is rectified.

Modern ABS applies individual brake pressure to all four wheel through a control system of hub-mounted sensors and a dedicated micro-controller. ABS is offered or comes standard on most road side vehicles produced today and is the foundation for electronic stability control systems, which are rapidly increasing in popularity due to the vast reduction in price of vehicle electronics over the years.

Modern electronic stability control systems are an evolution of the ABS concept. Here, a minimum of two additional sensors are added to help the system work: these are a steering wheel angle sensor, and a gyroscopic sensor. The theory of operation is simple: when the gyroscopic sensor detects that the direction taken by the car does not coincide with what the steering wheel sensor reports, the ESC software will brake the necessary individual wheel(s) (up to three with the most sophisticated systems), so that the vehicle goes the way the driver intends. The steering wheel sensor also helps in the operation of Cornering Brake Control (CBC), since this will tell the ABS that wheels on the inside of the curve should brake more than wheels on the outside, and more.

ABS equipment may also be used to implement a traction control system (TCS) on acceleration of the vehicle. If accelerating of the tire loses traction, the ABS controller can detect the situation and take suitable action so that traction is regained. More sophisticated versions of this can also control throttle levels and brakes simultaneously.

The speed sensors of ABS are sometimes used in indirect tire pressure monitoring system (TPMS), which can detect under-inflation of tire(s) by difference in rotational speed of wheels.

Components

There are four main components of ABS: wheel speed sensors, valves, a pump, and a controller.

Speed sensors

A speed sensor is used to determine the acceleration or deceleration of the wheel. These sensors use a magnet and a Hall effect sensor, or a toothed wheel and an electromagnetic coil to generate a signal. The rotation of the wheel or differential induces a magnetic field around the sensor. The fluctuations of this magnetic field generate a voltage in

the sensor. Since the voltage induced in the sensor is a result of the rotating wheel, this sensor can become inaccurate at slow speeds. The slower rotation of the wheel can cause inaccurate fluctuations in the magnetic field and thus cause inaccurate readings to the controller.

Valves

There is a valve in the brake line of each brake controlled by the ABS. On some systems, the valve has three positions:

- In position one, the valve is open; pressure from the master cylinder is passed right through to the brake.
- In position two, the valve blocks the line, isolating that brake from the master cylinder. This prevents the pressure from rising further should the driver push the brake pedal harder.
- In position three, the valve releases some of the pressure from the brake.

The majority of problems with the valve system occur due to clogged valves. When a valve is clogged it is unable to open, close, or change position. An inoperable valve will prevent the system from modulating the valves and controlling pressure supplied to the brakes.

Pump

The pump in the ABS is used to restore the pressure to the hydraulic brakes after the valves have released it. A signal from the controller will release the valve at the detection of wheel slip. After a valve release the pressure supplied from the user, the pump is used to restore a desired amount of pressure to the braking system. The controller will modulate the pumps status in order to provide the desired amount of pressure and reduce slipping.

Controller

The controller is an ECU type unit in the car which receives information from each individual wheel speed sensor, in turn if a wheel loses traction the signal is sent to the controller, then the controller will limit the brake force (EBD) and activate the ABS modulator which actuates the braking valves on and off

Use

There are many different variations and control algorithms for use in ABS. One of the simpler systems works as follows:

1. The controller monitors the speed sensors at all times. It is looking for decelerations in the wheel that are out of the ordinary. Right before a wheel locks up, it will experience a rapid deceleration. If left unchecked, the wheel would stop much more quickly than any car could. It might take a car five seconds to stop from 60 mph (96.6 km/h) under ideal conditions, but a wheel that locks up could stop spinning in less than a second.
2. The ABS controller knows that such a rapid deceleration is impossible, so it reduces the pressure to that brake until it sees an acceleration, then it increases the pressure until it sees the deceleration again. It can do this very quickly, before the tire can actually significantly change speed. The result is that the tire slows down at the same rate as the car, with the brakes keeping the tires very near the point at which they will start to lock up. This gives the system maximum braking power.
3. This replace need to manually pump the brakes while driving on a slippery or a low traction surface, allowing to steer even in most emergency braking conditions.
4. When the ABS is in operation the driver will feel a pulsing in the brake pedal; this comes from the rapid opening and closing of the valves. This pulsing also tells the driver that the ABS has been triggered. Some ABS systems can cycle up to 16 times per second.

Thermochromism

By S.Amarnath (131907) IV Year A Section

Thermochromism is the property of substances to change color due to a change in temperature. A mood ring is an excellent example of this phenomenon, but thermochromism also has more practical uses, e.g. in baby bottles (changes to a different color when cool enough to drink) or kettles (changes when water is at or near boiling point). Thermochromism is one of several types of chromism.

Thermochromatic liquid crystals

The two common approaches are based on liquid crystals and leuco dyes. Liquid crystals are used in precision applications, as their responses can be engineered to accurate temperatures, but their color range is limited by their principle of operation. Leuco dyes allow wider range of colors to be used, but their response temperatures are more difficult to set with accuracy.

Some liquid crystals are capable of displaying different colors at different temperatures. This change is dependent on selective reflection of certain wavelengths by the crystallic structure of the material, as it changes between the low-temperature crystallicphase, through anisotropic chiral or twisted nematic phase, to the high-temperature isotropic liquid phase. Only the nematicmesophase has thermochromic properties; this restricts the effective temperature range of the material.

The twisted nematic phase has the molecules oriented in layers with regularly changing orientation, which gives them periodic spacing. The light passing through the crystal undergoes Bragg diffraction on these layers, and the wavelength with the greatest constructive interference is reflected back, which is perceived as a spectral color. A change in the crystal temperature can result in a change of spacing between the layers and therefore in the reflected wavelength. The color of the thermochromic liquid crystal can therefore continuously range from non-reflective (black) through the spectral colors to black again, depending on the temperature. Typically, the high temperature state will reflect blue-violet, while the low-temperature state will reflect red-orange. Since blue is a shorter wavelength than red, this indicates that the distance of layer spacing is reduced by heating through the liquid-crystal state.

Some such materials are cholesterylnonanoate or cyanobiphenyls.

Liquid crystals used in dyes and inks often come microencapsulated, in the form of suspension.

Liquid crystals are used in applications where the color change has to be accurately defined. They find applications in thermometers for room, refrigerator, aquarium, and medical use, and in indicators of level of propane in tanks. A popular application for thermochromid liquid crystals are the mood rings.

Liquid crystals are difficult to work with and require specialized printing equipment. The material itself is also typically more expensive than alternative technologies. High temperatures, ultraviolet radiation, some chemicals and/or solvents have negative impact on their lifespan.

What is NDT?

By K.Nagarjun (121046) IV Year A Section

Nondestructive Testing (NDT) plays an important role in assuring that structural and mechanical components perform their function in safe, reliable, and cost-effective manner. NDT technicians perform the necessary tests to locate the indicators and discontinuities that may cause failures or shut downs in such systems. These tests are performed in a manner that does not affect the future usefulness of the object or material – hence, the name "nondestructive." NDT allows for careful and thorough materials evaluation without the need for deconstruction or damage. NDT is typically used at various points in a part's life cycle. NDT can be used prior to the use of a component for the sake of quality control. NDT is also employed while components are in use to detect service related conditions caused by wear, fatigue, corrosion, stress, or other factors which affect reliability.

NDT Technologies Include:

Visual and Optical Testing (VT)

Visual Examination can be an effective way to recognize surface imperfections that could adversely affect a part or component. Visual Examiners use knowledge of how a part is manufactured, the function of the human eye, lighting requirements, and precise measuring tools to evaluate materials. Computer controlled camera systems and optical aids such as borescopes may also be used to recognize and measure features of a component.

Radiography (RT)

Radiographic Examination involves using radioactive isotopes (gamma rays) or X-rays on materials to peer qualitatively for indications the same way a doctor looks for fractures or other conditions within the body. Radiation is directed through a part and projected onto film or a digital detection device leaving an image which can be examined by the qualified Radiographer.

Ultrasonic Testing(UT)

Ultrasonic Examination uses high-frequency sound waves which are transmitted into a material to detect discontinuities or locate changes in material characteristics. Sound is introduced into the object being examined and reflections from internal imperfections, areas of acoustic impedance, or varying geometrical surfaces are returned to receiver.

Magnetic Particle Testing (MT)

Magnetic Particle Examination is accomplished by inducing magnetic field into a ferromagnetic material and applying iron particles to the surface of the item being examined. Surface and near-surface discontinuities affect the flow of the magnetic field within the part causing the applied particles to gather at locations of flux leakage, thus producing visible indication of the irregularity on the surface of the material.

Penetrant Testing (PT)

Penetrant Examination is performed with dye solution. Once applied to the surface, the dye will effectively penetrate any surface-breaking cavity. Excess solution is removed from the object. A developer is then applied to draw out any penetrant that remains unseen. With fluorescent dyes, ultraviolet light is used to make the “bleed-out” fluoresce brightly, allowing imperfections to be readily seen. With visible dyes, a color contrast between the penetrant and developer makes the "bleed-out" easy to see.

Numbers in Bike Names & What They Mean

By N.I. Kishore Kumar (141114) II Year A Section

Most motorcycles have numbers in their names. The numbers can range from 49 up to 1800 (and maybe beyond!). This numbering system names the size of the engine. When the engine gulps in air and gas, the number defines the volume of the total breath. Each piston goes up and down inside a cylinder. When the piston is as far down the cylinder as possible, the interior volume of the cylinder is measured. If there are multiple cylinders in an engine, their total volume is added together.

Larger volume usually means more power (and greater engine weight). Some engine designs make more or less power out of their volume (depending on design), so this is rating of size only, not power, although they're closely related. It gives a person to general sense of "how big" a bike's engine is as a frame of reference to other motorcycles.

Size may be in "cubic inches" (Harley Davidson & US bikes) or cubic centimeters or "cc" as found on "Metric Bikes" that are from companies based outside of the USA.

Since motorcycles are considerably lighter than cars, smaller engines are strength, since smaller usually means lighter – a lighter bike is more nimble, easier to maneuver, gets better gas mileage, and easier to park. A 250cc engine is frequently suggested as the minimum for use on all US roads, highways, and freeways. Engines smaller than 250cc's may have trouble keeping up in freeway traffic. Engines larger than 250cc's will produce more power, or may produce power differently, depending on design.

First Bike Strategy/Advice

Motorcycle University encourages people to consider bikes under 600cc's. Get one, master it under all conditions, and just enjoy riding without worrying about the technology – you should be focused on your skills FIRST. Since anything 250-550 will do everything most cars will do, they're enough.

There are a number of bikes in the market which will spend their entire lives as "starter bikes", being passed from one person to another as they learn. Once you've mastered your starter bike, it's OK to sell it along to another beginner, and people frequently wind up getting most or all of their money back if they buy dependable, used, starter bike rather than purchasing a brand new bike. Starter bikes don't take themselves too seriously, and are usually more tolerant of mistakes or even getting dropped. The same can't be said of a fancy sport-bike with expensive, fragile plastic bits on it. Choose your first bike wisely – you're looking to learn, not show off…

Bikes with engines 600cc's and larger vary in function and personality much more than you'll find in the world of cars, and will require experience and skill to ride safely. People frequently discover that what they think about motorcycles going in is not what they like about them once you've got 3000 miles under their belt. For example: cruisers have handling limitations, sport bikes can be less than comfortable for long rides, or all sorts of other things that you might not expect without actually trying them out. For example: a 1000cc motorcycle will exceed the most expensive exotic sports cars for acceleration and stopping. When things go wrong on such a bike, they go wrong so quickly that mistakes become hard to avoid, and there is no reset button during a crash. Start out small and light is our advice. Get a basic (used?) bike and mature into a more expensive or refined purchase later.

Moto U Engine Types: In Depth

We should begin this discussion by saying that no single engine type is superior to any other, however, different engines do perform differently, and some engines are better choices for different riding styles. A person riding a bike in the dirt may favor sharp bursts of acceleration while a person riding interstates with a passenger and luggage may desire smoothness and passing power at speed.

We will explain engines from broad to more specific.

All engines use "The Otto Cycle" or "Four Stroke" which describes the process of burning fuel to create rotary power within an internal combustion engine (as opposed to an external combustion engine, i.e. a steam locomotive). The four parts of the Four Stroke / Otto Cycle are: Intake, Compression, Ignition, Exhaust

Also known in fun as: "Suck-Squeeze-Bang-Blow"

There are two major types of gasoline engines: Two-Stroke and Four-Stroke motors. The number of strokes defines how many times the piston changes direction in order to complete a power cycle.

Four Stroke Engines

On a Four-Stroke, the intake and exhaust cycles are controlled and kept mostly separate by valves. Four-stroke motors are more complex and heavier, but have better fuel economy and lower emissions. Four-stroke motors are almost universal in road-going motorcycles. For a given displacement, they are less powerful than Two-Stroke engines of equal displacement because they ignite the fuel-air mixture every other time the piston comes upward.

Two-Stroke Engines

Two-Stroke engines have been almost completely banned from public life. Most Two-Stroke motorcycles available today are either collectors items, or off-road racing bikes. They are still popular for racing because they are powerful, light-weight, mechanically simple, and cheap to maintain. They are more powerful for a given displacement because they ignite the fuel-air mixture (i.e. create power) each time the piston moves upward.On a Two-Stroke, the intake and exhaust cycles are not mechanically separate, which causes some unburned fuel to escape into the atmosphere, creating pollution (you can see a blue-gray tint in the exhaust of Two-Strokes). These engines are no longer allowed on most western roads, and are increasingly rare for dirt riding (but still in action). A Two- Stroke engine makes a distinctive "ring-ding-ding-ding" sound when it is revved up.

Two-Stroke engines also require lubricating oil in the fuel, creating additional pollution. Unfortunately, these chemicals create smog.

Displacement

Displacement is the volume of the cylinder measured when the piston is at the bottom of its stroke, and is usually expressed in Cubic Centimeters. Some American manufacturers describe the displacement of their engines in Cubic Inches. Displacement is a good predictor of performance. Large- displacement engines generally have more power than smaller-displacement engines. Therefore, most beginner bikes have smaller displacement engines.

Number of Cylinders

Generally, an engine with more pistons for given displacement will have more power than an engine with fewer cylinders. Why? Surface area: the relationship between the volume of cylinder and the diameter of the cylinder is such that if you divide one cylinder into two cylinders of equal volume and similar proportions, you actually increase the surface area of the pistons. This means that the burning fuel-air mixture has more surface area to push on during the ignition cycle, therefore, more power can be extracted. Why don't engines have eleven-teen cylinders? Because additional weight and mechanical friction eventually cancel out improvements in power output.

Most street motorcycles in the US market have engines of two or four cylinders. Production motorcycles have been made with one, two, three, four, and six cylinders. Worldwide, however, the most popular engine type is the small-displacement, single-cylinder because they are cheap to produce, easy to maintain, and thrifty on fuel.

In-Line, Vee, and Boxer.

In-Line arrangements have the cylinders parallel to each other, while Vee and Boxer engines have cylinders in two banks at an angle to each other.

An **in-line** engine has all of its cylinders mounted on common plane. In-line engines can have any number of cylinders, with two, three and four being most common. There are six cylinder engines in large touring bikes.

A Vee engine has its cylinder banks mounted at an angle to one another yet acting on a common crankshaft. The V-Angle of the cylinder banks has a lot to do with the "character" of an engine, specifically regarding vibration.

Boxer engines are essentially a Vee engine, but the cylinder banks are 180 degrees opposite one another. A Vee or Boxer engine can have two, four, or six cylinders.

Engines can be designed for either transverse mounting or longitudinal mounting. Transverse mounted means that the crankshaft is perpendicular to the direction of travel. Longitudinal means the crankshaft is parallel to the direction of travel. Most motorcycles use the transverse-mounting arrangement for several reasons, but most importantly the rotational axis of the crankshaft, transmission, and rear wheel are all aligned in the same direction making it mechanically easier to move power through the drive train.

Final Drives

The final drive is the mechanical means by which the rotation of the engine is transmitted to the rear wheel where it drives the motorcycle forward, or how the engine is connected to the rear wheel.

Chains

The most common method is chain and sprockets. They are relatively inexpensive and quite reliable. By replacing components, they can also be used to alter the final drive ratio, i.e. how many RPM the engine spins for a given road speed. The downsides are that they require frequent maintenance, are consumable, and that the components are exposed to the world: rain, sand, road debris and road salt (if you live where it snows). These elements can cause a chain and sprockets to degrade and need replacement over time. Chain and sprockets are also sensitive to alignment, and can be noisy, but modern designs have reduced this problem, and chains are still the most common type.

Belts

Not as common, but mechanically similar to a chain and sprockets are belt drive. The belts are made of rubber and reinforced with space-age fiber such as kevlar. Belt drive has all the advantages of chain, yet is completely maintenance free (i.e. no adjustment or lubrication ever) and nearly silent.

Shaft Drive

Drive shaft setups generally never need adjusting, they are very quiet, and are generally good for the life of the bike. The downsides are that if they do break, they are expensive to fix, and they are slightly less efficient than a chain.

Fuel Delivery: Carbs vs. EFI

In an engine, the fuel and air are combined to create a combustible mixture for the engine to burn. There are only two kinds of devices that do this: Carburetors, and Electronic Fuel Injection, commonly abbreviated as "EFI".

Carburetors are mechanical devices which meter fuel and air and mix them together into a mist as the air is sucked into the engine. They utilize the Bernouli effect to draw fuel through a series of tubes and metering orifices called Jets. This is the same way a perfume mister or an airbrush works. Carburetors are "old school" and many people understand how to work on them. They do have drawbacks: because they use air flow to perform their task, they are sensitive to air density changes due to altitude, losing power at higher altitudes. They also are sensitive to dirt, long periods of storage, and orientation, i.e. if your bike tips over, fuel will spill out on the ground.

Electronic Fuel Injection is the modern solution to the task of mixing fuel and air. It utilizes a small computer and sensors to determine the instantaneous requirements of the engine, which enables better fuel economy and power. The fuel is pressurized by an electric fuel pump and fed to a fuel injector, which is a tiny little valve with a spray nozzle that injects a mist of fuel into the intake tract of the engine. Varying levels of power are achieved by how long the injector is held open. Because air and atmospheric pressure are not used to deliver fuel, and because their sensors can instruct the computer to adapt to differences in air density, EFI systems are not affected by altitude. The downsides of EFI are that they are complex electronic systems which are not easily diagnosed and repaired if they quit working correctly. They are also more expensive to repair, but are extremely reliable.

Cooling Systems

Air cooled engines use fins on the cylinder to increase the surface area so the excess heat can be carried away by the wind rushing over them while the bike is moving. Air cooling is simplicity itself. There are no moving parts and no maintenance. However, it cannot shed much heat when the bike is sitting still, leading to overheating. Air cooling limits the amount of heat which can be removed from the engine, which creates an upper limit of how much power the engine can create. Air cooling efficiency is also linked to ambient air temperature – it works best in cool air – not as well in hotter air. Burning fuel inside the engine creates power. This creates extreme heat inside the motor. Most of this energy is used to generate power, but some of it generates heat. The excess energy which cannot be turned into power becomes heat, and must be removed from the engine, or the internal parts will be melted or damaged. Removing excess heat is called Cooling.

Liquid cooling is the modern solution to this task. Most bikes sold today are liquid cooled. The system requires a pump, water passages around hot areas of the engine, a liquid coolant, a radiator, a thermostat, and a fan. Heat is carried by the liquid coolant to the radiator, where it is dispersed into the ambient air (just like on air-cooled bikes, only much better!).

If the bike is stationary and the coolant temperature rises, the thermostat senses this and turns on the fan, which forces air over the radiator, shedding excess heat. While the system is more complicated, it is completely proven, reliable technology. With the additional components and liquid, the system weighs more. Developments in manufacturing technology have produced significant weight savings in other areas, so liquid cooled engines are much lighter than they used to be, and this makes them the superior choice from a technological standpoint. The only maintenance requirement is to keep the coolant full, and flush the system every several years.

Transmission

Transmissions are usually incorporated into the engine cases (called a unit trans) but some bikes have separate transmissions, driven by a belt or chain. Transmissions are necessary because they multiply the RPM of the engine using different gear ratios to suit a wide range of road speeds. Gear ratio changes are done by moving the Shift Lever. Older bikes usually have fewer “speeds” i.e. gear ratio combinations. Newer bikes have more speeds to allow for better acceleration. Transmissions usually have 4, 5 or 6 speeds.

Some manufacturers have produced automatic transmissions which electronically select gear ratios, but these are unusual in general.

Most scooters use a “Continuously Variable Transmission”, or “CVT” which keeps the motor near its peak power output during acceleration, getting the most performance out of modest power. CVT trans have not been offered on full-size motorcycles despite offering potentially superior performance. Generally, transmissions do not require maintenance unless they are separate from the engine cases, in which case oil changes are required.

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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**