

AUTOMOTIVE ENGINE MANAGEMENT SYSTEM

Cover Page – Slide 1

I welcome you all to this exciting session on Automotive Engine Management System.

Learning Outcomes – Slide 2

At the end of this session, it is my belief that we would have achieved the following Learning Outcomes:

- Discuss the workings of the Engine Management System.
- Explain the functions of sensors, actuators, and their differences, and,
- State the benefits of Engine Management System.

Engine Management System – Slide 3

It is an electronic control system whereby the engine ignition, fueling and idle speed functions are controlled by an Electronic Control Module (ECM). This is to achieve the following:

- High specific power output
- Moderate fuel consumption and
- Low exhaust emission

A computer controls injection and ignition systems with reference to shared optimization criteria.

Digital data processing and micro-processors make it possible to translate extensive operating information into program-map controlled injection and ignition data.

Therefore when “ignition” and “fuel Injection” are integrated within a single system, the idea is that the individual elements acquire flexibility and operational scope well beyond that available from each system working separately.

Features of an Engine Management System – Slide 4

A modern **Engine Management System** must contain self-diagnosis features.

It is expected to fulfill a variety of requirements as follows:

1. Comprehensive system and component monitoring.
2. Protection for components exposed to special risks when malfunction occur.
3. Substitution of default values for emergency operation, and,
4. Operator display.

Why an Engine Management System? – Slide 5

The Engine Management System is responsible for controlling the amount of fuel being injected and for adjusting the ignition timing. Optimum functioning of the Engine Management System assures maximum engine power, with the lowest amount of exhaust emission and the lowest fuel consumption.

What is an Engine Control Module? – Slide 6

The Engine Control Module (ECM), also called the Engine Control Unit (ECU), ensures that your vehicle operates at optimal performance. The ECM monitors most of the sensors in the engine bay to manage your vehicle's air-fuel mixture and regulate the emission control systems.

The ECM regulates four main parts of your vehicle's operating systems:

1. Air-Fuel Ratio.
2. Idle Speed.
3. Variable Valve Timing, and,
4. Ignition Timing.

In terms of the air-fuel ratio, the ECM uses sensors to regulate the oxygen to fuel ratio detected in your car's exhaust to detect an engine rich/lean reading. Some of these sensors include the mass airflow sensor(s), the oxygen sensor(s), air-fuel sensor(s).

For the idle speed, the ECM relies on sensors located by the crankshaft and camshaft(s) that track your vehicle's Revolutions Per Minute and engine load by monitoring the speed of rotation of the engine. The variable valve timing system controls when the valves are opened in the engine to either increase power or fuel economy.

Lastly, the ECM controls the ignition timing, this is the position at which the spark plug is fired within the combustion cycle. Precise control of this timing allows for more power and/or better fuel economy. The ECM also controls multiple other systems on top of these main tasks. It is often called the brain of the car and rightfully so, because most everything required to operate newer cars go through the ECM, if not directly controlled by it.

Causes of Accidents – Slide 8

The following are the major causes of accidents:

- Lack of safety devices.
- Failure to use safety devices provided.
- Failure to follow laid-down rules, method and procedures for handling tools, equipment and machines.

How to Prevent Accident in a Workshop – Slide 9

Simple techniques have been evolved for accident prevention through experience. These may include:

1. Identify the hazard.
2. Estimate the hazard.
3. Engineering Control.
4. Use of Personal Protective Equipment, and,
5. Education.

Workspace Housekeeping – Slide 10

Housekeeping are activities undertaken to create or maintain an orderly, clean, tidy and safe working environment. Effective housekeeping can eliminate many workplace hazards and help get work done safely and properly.

Effective house keeping can eliminate some workplace hazards and help get a job done easily and properly.

A good housekeeping program plans and manages the orderly storage and movement of materials from point of entry to exit. It includes a material flow plan to ensure minimal handling.

Worker training is an essential part of any good housekeeping program. They should be reporting any unusual conditions or hazards as well as obeying posted warning signs.

The final addition to any housekeeping program is inspection. It is the only way to check for deficiencies in the program so that changes can be made.

Let's look at how housekeeping should be carried out at the following spaces:

1. Floors.
2. Light fixtures.
3. Stairways.
4. Spill Control.
5. Tools and Equipment.
6. Maintenance.
7. Waste Disposal, and,
8. Storage. Fire prevention.

Housekeeping: Floors – Slide 11

Clean up spills such as oil on floors immediately. Floors should be free of debris and accumulations of dust. Areas that cannot be cleaned continuously, such as entranceways, should have anti-slip flooring.

Replace any worn, ripped, or damaged flooring that poses a tripping hazard. Repair all trap doors and railings. Any equipment or tools not in use should be removed from the work area.

Guard floor openings. Trap doors, cages or railings around hay chutes will prevent anyone from accidentally falling into them.

Cut down and remove weeds and brush from around buildings. They can hide tripping hazards.

Housekeeping: Light Fixtures – Slide 12

All buildings and yards should be adequately lighted. Dirty light fixtures reduce essential light levels. Light fixtures in storage areas containing combustible materials should be protected against breaking (i.e., explosion proof fixtures).

Maintain lighting evenly, since shadows mixed with light spots inside animal handling facilities will increase the animal's fear and tension.

Housekeeping: Stairways – Slide 13

Stairways should be clearly marked and kept clear of objects that can cause trips and falls.

Aisles should be wide enough to accommodate people and vehicles comfortably and safely. Warning signs and mirrors can improve sight lines at blind corners. Properly arranged aisles encourage people to use them so that they do not take "shortcuts" or "bottleneck" storage. Stairways and aisles also require adequate lighting.

Housekeeping: Spill Control – Slide 14

The best way to control spills is to stop them before they happen. Regularly cleaning and maintaining machines and equipment is one way to do this. Another is to use drip pans and guards where possible spills might occur. When spills do occur, it is important to follow cleanup procedures as indicated on the Material Safety Data Sheet.

Spills must be cleaned up immediately. Absorbent material is useful for wiping up greasy, oily or other liquid spills. Used absorbents must be disposed of properly and safely.

Housekeeping: Tools and Equipment – Slide 15

Keeping tools neat and orderly can be very important to everyone's safety, whether in the tool room, on the rack, in the yard, or on the bench.

Returning tools promptly after use reduces the chance of them being misplaced or lost. Workers should regularly inspect, clean and repair all tools and take any damaged or worn tools out of service.

Housekeeping and Maintenance – Slide 16

A good maintenance program provides for the inspection, maintenance, upkeep and repair of tools, equipment, machines and processes.

Maintenance involves keeping buildings, equipment and machinery in safe efficient working order and in good repair. This includes maintaining sanitary facilities and regularly painting and cleaning walls, maintaining windows, damaged doors, defective plumbing, and broken floor surfaces.

Housekeeping and Waste Disposal – Slide 17

The regular collection, grading and sorting of scrap contributes to good housekeeping practices. Allowing materials to build up on the floor wastes time and energy since additional time is required for cleaning it up.

Placing scrap containers near where the waste is produced encourages orderly waste disposal and makes collection easier. All waste receptacles should be clearly labelled (e.g., recyclable glass, plastic, metal, toxic and flammable etc.) All waste containers should be emptied regularly.

Housekeeping and Storage – Slide 18

Stored materials should allow at least one meter (or about 3 feet) of clear space under sprinkler heads. Stacking cartons and drums on a firm foundation and cross tying them, where necessary reduces the chance of their movement. Stored materials should not obstruct aisles, stairs, exits, fire equipment, emergency eyewash fountains, emergency showers, or first aid stations.

All storage areas should be clearly marked.

Housekeeping and Fire Prevention – Slide 19

Flammable, combustible, toxic and other hazardous materials should be stored in approved containers in designated areas that are appropriate for the different hazards that they pose.

All combustible and flammable material must be present only in the quantities needed for the job and kept in safety cans during use. Oily or greasy rags should be placed in a metal container and disposed of regularly.

Conclusion – Slide 20

Hey, so in the past few minutes, we have been able to look at:

1. Workshop Safety.
2. Safety Precautions in the Workshop.
3. Workplace Accident.
4. How to Prevent Accident in a Workshop, and,
5. Workspace Housekeeping.

Safety is Important and mandatory. When working in the workshop, being safe is always protecting oneself from danger. It is also looking out for the people around you. When all guidelines for safety in a workshop are followed and well attended to, accidents can be prevented.

So, in conclusion if ***you're not safety conscious, you could end up unconscious.SO THINK ABOUT IT!***

Thank you and Stay Safe. Bye.

