MODULE CONTENT

| Unit of Competency | **DIAGNOSE AND REPAIR ENGINE COOLING AND LUBRICATION SYSTEM** |
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| Module Title | **DIAGNOSING AND REPAIRING ENGINE COOLING AND LUBRICATION SYSTEM** |
| Module Descriptor | This unit describes the performance outcomes required to diagnose and repair faults in the cooling systems of  vehicles such as radiator, water pump, and thermostat  and lubrication systems such as oil pump, oil cooler,  hoses and oil pressure switch. It covers the knowledge,  skills, and attitudes required to prepare to diagnose and  repair engine cooling and lubrication systems, diagnose  and repair engine cooling and lubrication system and  complete work processes. |
| Nominal Duration | **hours** |
| Summary of the Learning Outcomes: | |
| Upon completion of this module the student must be able to: | |
| LO1. Prepare to diagnose and repair drive lines | |
| LO2. Diagnose drive lines | |
| LO3. Repair drive lines | |
| LO4. Complete work processes | |

**LEARNING EXPERIENCES**

**LEARNING OUTCOMES NO. 1**

**PREPARE TO DIAGNOSE AND REPAIR DRIVE LINES**

| **Learning Activities** | **Special Instructions** |
| --- | --- |
| Read Information Sheet 3.1-1 Prepare to diagnose and repair drive lines | If you have some problem on the content of the information sheet don’t hesitate to approach your Trainer.  If you feel that you are now knowledgeable on the content of the information sheet, you can now answer self-check provided in the module. |
| Answer Self-Check 3.1-1 on Prepare to diagnose and repair drive lines | Try to answer the Self-check without looking at the Answer Key  Compare your answer to Answer Key 3.1-1 |
| Observe Trainer’s demonstration on Task Sheet 3.1-1 on Prepare to diagnose and repair drive lines | Listen carefully and attentively so that you may be able to perform a task correctly  Ask questions if are in doubt for clarification |
| Perform the Task Sheet 3.1-1 on Prepare to diagnose and repair drive lines | Remember the step-by-step procedure thePrepare to diagnose and repair drive lines |
| Evaluate the performance using the Performance Criteria Checklist 3.1-1 | Repeat the task in case fail to meet the criteria |

**INFORMATION SHEET 1.1-1**

**PREPARE TO DIAGNOSE AND REPAIR DRIVE LINES**

**Learning Objectives:**

After reading this **Information Sheet**, you must be able to:

1. Determined job requirements
2. Sourced and interpreted diagnostic information.
3. Verified symptoms.
4. Identified hazards associated with the work and managed risks.
5. Selected and checked tools, equipment, and materials.
6. Reported defective and damaged tools and equipment.
7. Checked and reported availability of materials.
8. Applied safety practices.

**DRIVE LINES**

**What driveline means?**

**noun. the components of the power train of an automotive vehicle that are between the transmission and the differential, and generally consisting of the drive shaft and universal joint.**

The driveline of your **vehicle transfers power from the engine and transmission to the wheels**. It is the axels, driveshaft, wheels, joints and differentials. The parts and services needed vary whether you have a front wheel drive, rear wheel drive, all wheel drive or 4-wheel drive vehicle.

**Purpose:**

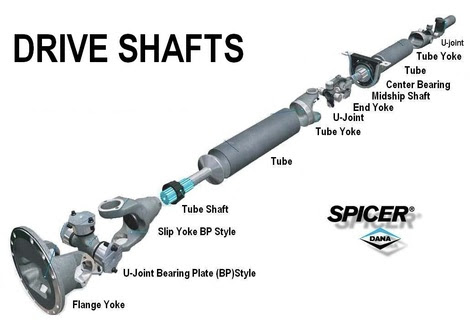
* The driveline system of a vehicle performs the dual functions of **providing a smooth coupling between the engine and the driving wheels and of making a selection of gear ratios available**.

**What are the parts involved in the driveline of the vehicle?**

## **Key Driveline Parts and Components**

The driveline is the vehicle system that distributes power from the engine and transmission to the wheels, essentially enabling the vehicle to move. It is made up of many individual components that work together. While the exact components in a driveline may vary depending on the design and configuration of the vehicle (e.g., front-wheel drive, rear-wheel drive, all-wheel drive, or four-wheel drive), they include:

* **Driveshaft/PTO shaft.** The driveshaft—also referred to as the drive shaft, propeller shaft, or prop shaft—is the first driveline component. It transmits torque from the transmission to the differential for distribution to other driveline components. **Power take-off** (PTO) shafts are similar to driveshafts in that they allow for the transference of power from the engine to a connected component. However, they are used to power another piece of equipment connected to the vehicle rather than the vehicle itself.

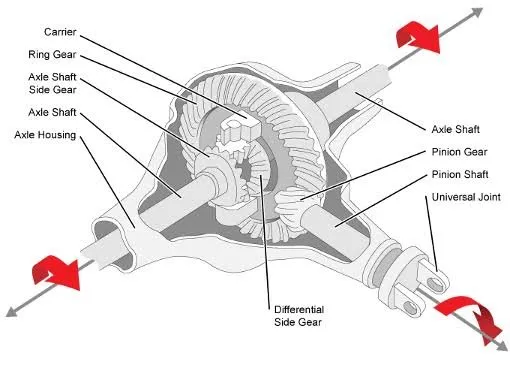


**PTO shaft**

** heavy duty tractor**

** mini PTO shaft**

* **Differential(s)**. The differential is the driveline component that transmits torque to the wheels. Front-wheel drive vehicles have front differentials, rear-wheel drive vehicles have rear differentials, all-wheel drive vehicles have front and rear differentials, and four-wheel drive vehicles have differentials that control all four wheels independently.
* Axle shafts. Axle shafts connect to either side of the differential and extend outward toward each wheel. They rotate independently, depending on the input provided by the differential(s).



* **U-joints**. U-joints—also known as universal joints—are flexible pivot points that transit power at varying angles.



* **CV joints.** CV joints—also known as constant-velocity (CV) joints—are bendable joints that keep the drive wheels rotating at a constant velocity.



All of these components are essential to the operation of the driveline, especially the driveshaft/PTO shaft. The driveshaft provides the initial connection between the transmission and other driveline components, which makes movement and acceleration possible. It consists of numerous components (e.g., the slip yoke, boot, pinion yoke, and bolt), which, if damaged, can cause issues in the performance of the vehicle. Similar to the driveshaft, the PTO shaft transfers power to other connected pieces of equipment. However, the mechanical power is converted into hydraulic power, which can then be used as a power source for various applications. For example, PTO shafts are used in off-road vehicles and heavy trucks for specialized functions (e.g., raising and lowering the truck bed) and powering separate equipment (e.g., harvesters and pumps).