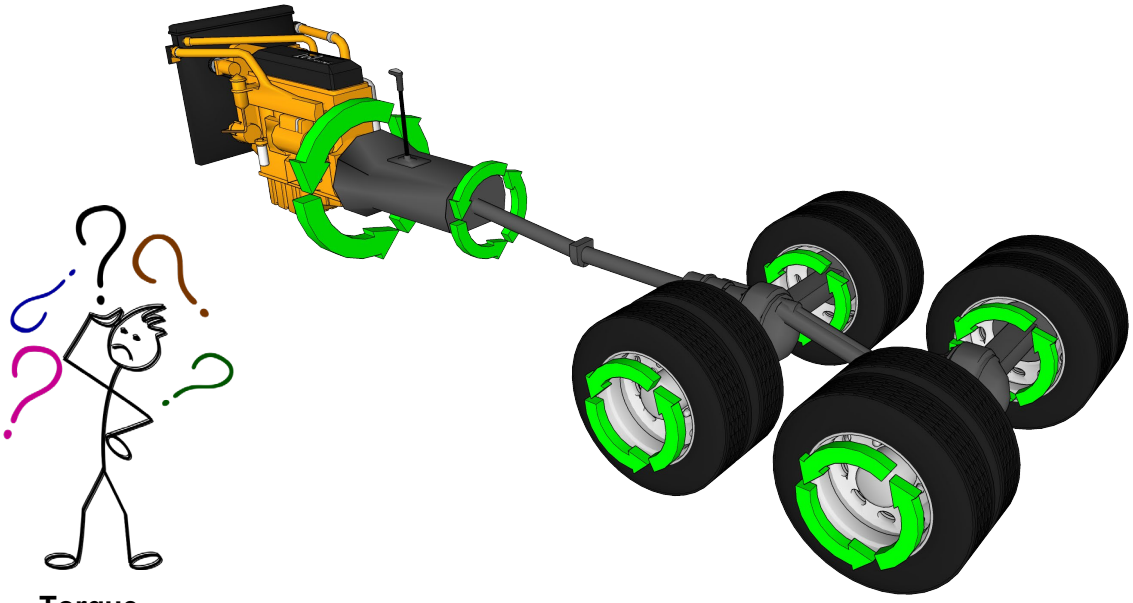
Competency 2

Use Of Engines 1

Lesson Objective:
- Associate the use of the engine according to its capabilities.
- Learn the means to optimize its lifespan and efficiency.

Transmission Power:

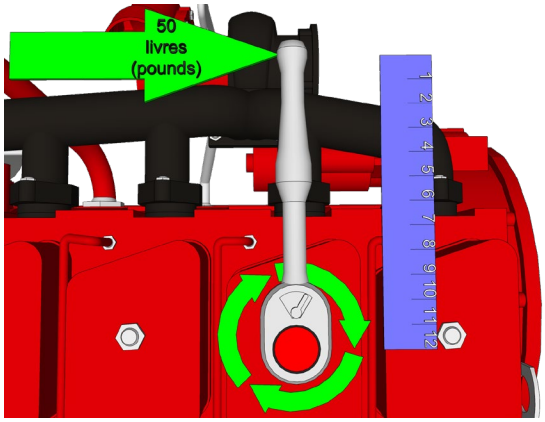
The engine produces power needed to move the truck. This power is transferred to the transmission which has the role of multiplying it. From the transmission, it will continue its course passing through the differentials which will change the direction of the rotation of the movement to finally reach the wheels.

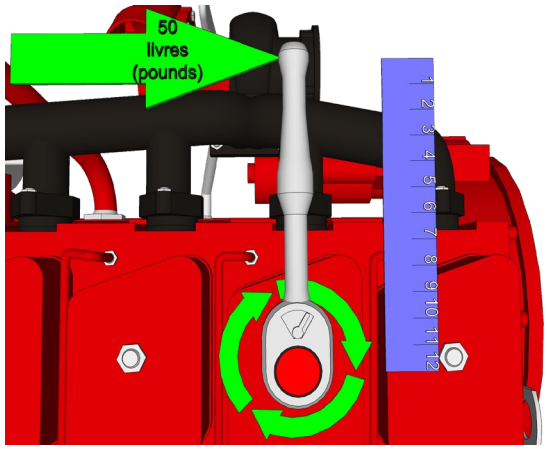


Torque **or HP?**

In order to get the most efficiency from his engine, the driver must understand how it works.

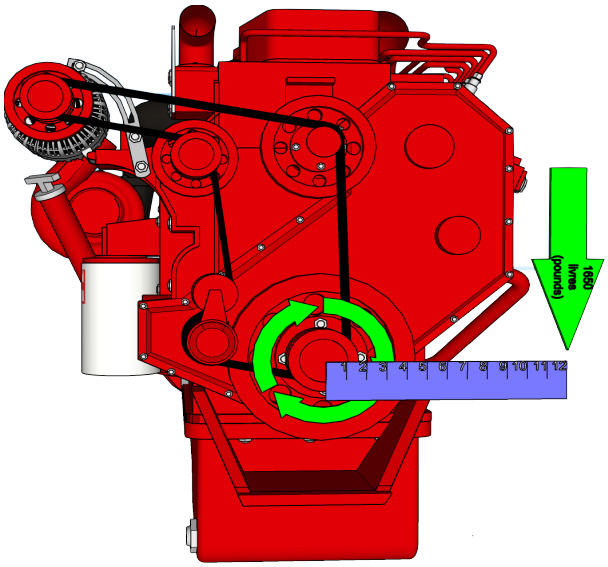
IIt is better to use **torque** rather than **HP** (Horse Power) when operating the vehicle. Today's vehicles are designed for this purpose and their focal point is on fuel efficiency. There are certain circumstances where working with the HP may be necessary.





What is torque?

Torque is a rotational force applied to an axis, It is measured in **pounds/foot** (imperial system) or newton/meters (metric system). In the example on the right, the bolt will be tightened with a torque of **50 lb/ft.**

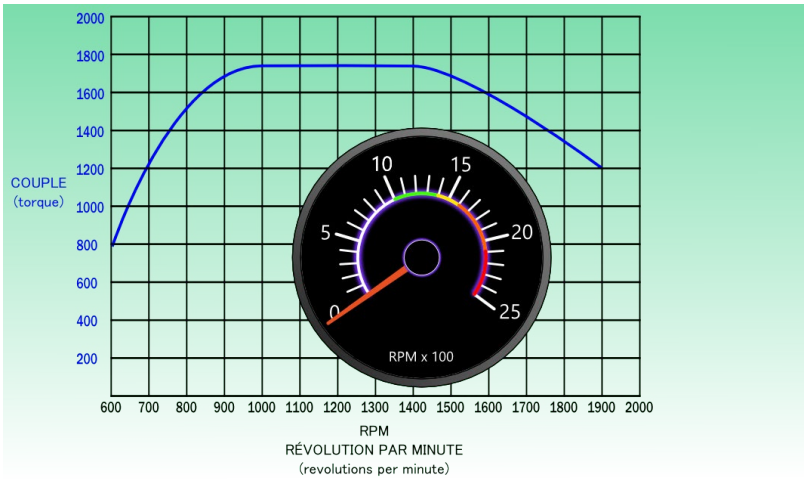


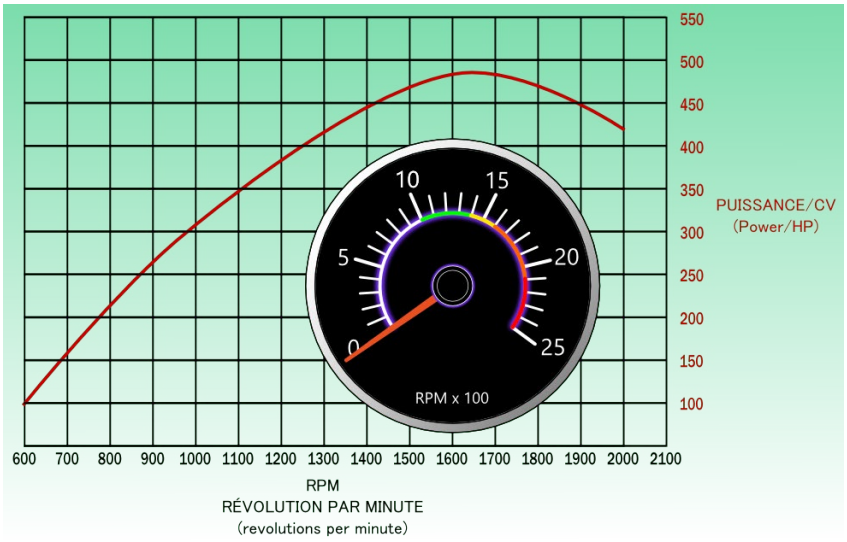
The power of an engine is calculated in the same way. In the second example, the engine develops a rotational force of **1650 lb/ft**. Typically, truck engines develop between 1250 and 1850 lb/ft of torque.

Contrary to an electric motor, the torque of a diesel engine is variable depending on the rotational speed of the engine (RPM)

In the example on the right, the engine torque varies between 800 and 1750 lb/ft of torque Its **maximum torque** reaches a plateau that extends over a **<u>range</u>** of **<u>400 RPM</u>** which is between 1000 and 1400 RPM.

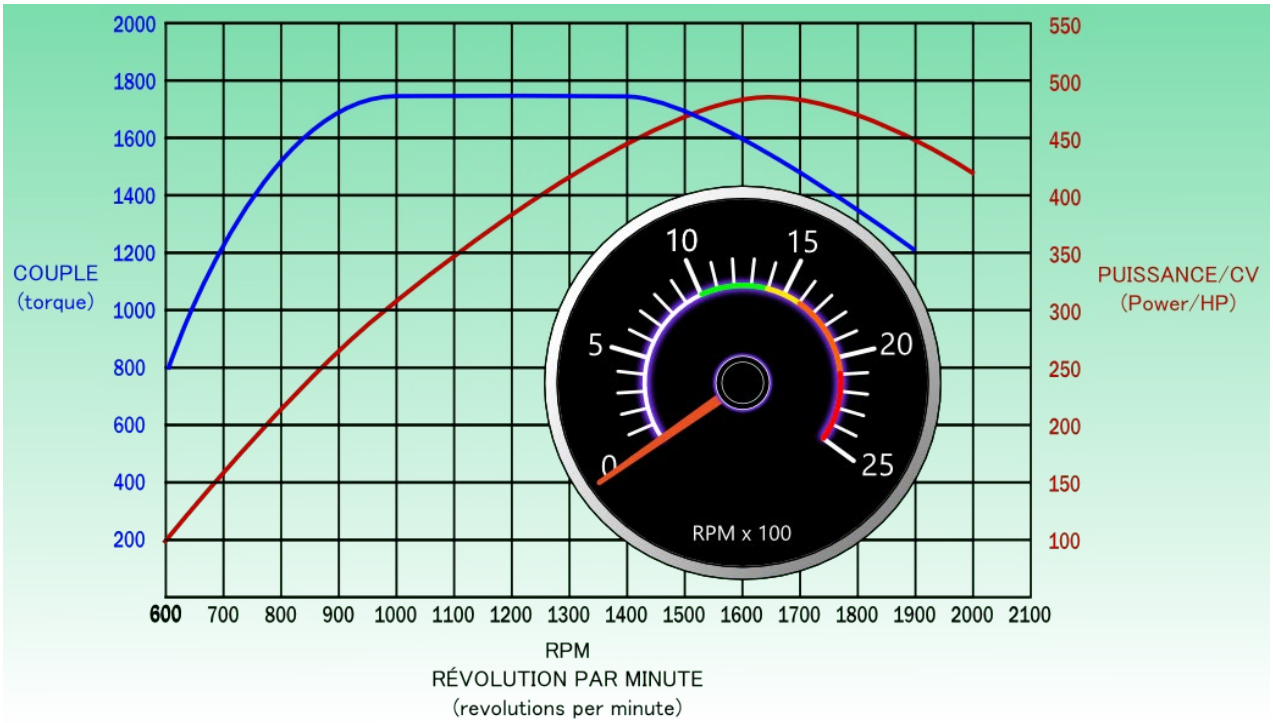
The number **1000** Therefore represents the **minimum speed** to be observed when the engine is under load..





In the example on the left, the engine is developing **485 HP @ 1650 RPM**.
The number 1650 represents the **maximum speed** to be reached in order to obtain the maximum power from this engine.

Below you will find the two previous examples combined:



TERMINOLOGIE

1. Progressive shifting

Shifting technique that combines efficiency and fuel economy: It is about getting the engine speed as low as possible to do your gear changes.

2. Peak Torque

Specified or advertised by the manufacturer.

Maximum engine torque is established according to the work that needs to be done. Thus reflects the ability to climb hills. Found in the example above, over a **range** between **1000** and **1425 RPM.**

3. Ideal Range (Sweet Spot)

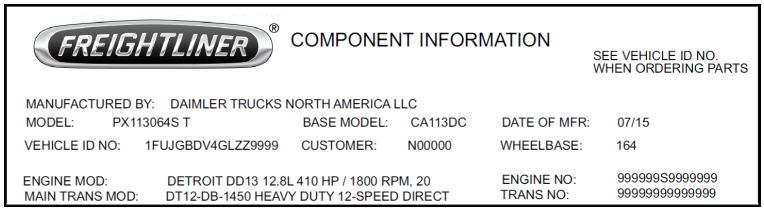
Ideal operating range represents the torque range. This range is also the economical range of revolution for using an engine under load. **During upshifts on High range, the recovery of the next gear (RPM) must be within this range.**

4. HP (Horsepower)

The power an engine can produce in a given time.

5. Maximum Horsepower

Highest degree of power developed by an engine. Usually reached around 1800 RPM (Example Detroit, DD13). Engine speed at which work is performed the fastest.



FREIGHTLINER® COMPONENT INFORMATION

SEE VEHICLE ID NO. WHEN ORDERING PARTS

MANUFACTURED BY:	DAIMLER TRUCKS NORTH AMERICA LLC				
MODEL:	PX113064S T	BASE MODEL:	CA113DC	DATE OF MFR:	07/15
VEHICLE ID NO:	1FUJGBDV4GLZZ9999	CUSTOMER:	N00000	WHEELBASE:	164
ENGINE MOD:	DETROIT DD13 12.8L 410 HP / 1800 RPM, 20			ENGINE NO:	999999S9999999
MAIN TRANS MOD:	DT12-DB-1450 HEAVY DUTY 12-SPEED DIRECT			TRANS NO:	99999999999999

6. Engine Speed (RPM)

Engine speed is expressed in revolutions per minute. (RPM).

7. Tachometer (RPM Gauge)

Gauge which measures the speed of rotation of the engine.

8. idle

Minimum engine speed. Usually around 650 RPM.

9. Fast Idle

Increased engine speed. When prolonged idling is required. Around 1000 RPM.

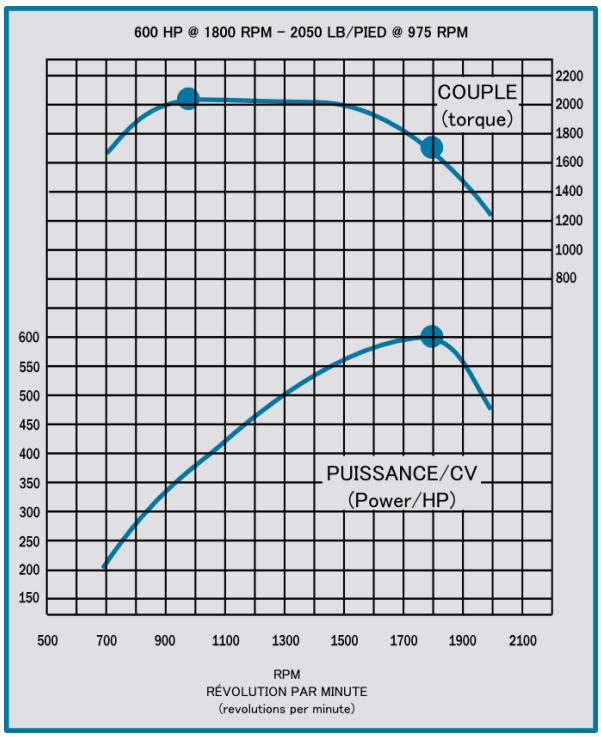
10. Maximum Engine Speed

Maximum rotational speed determined by the manufacturer of an engine. **This engine speed should never be exceeded during operation.**

The truck owner/carrier can lower this limit by having it programmed.

11. Engine under load

Expression meaning that the engine is exerting significant effort.



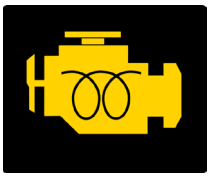
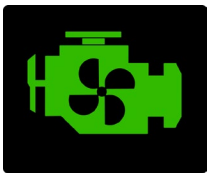
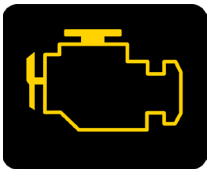
In this second example, the 16L engine develops **2050 lb/ft of torque @ 975 RPM.**
Over this torque range which extends over approximately 400 RPM, the number 975 therefore represents the _____ range to be observed under load.

In addition, this engine develops **600 HP @ 1800 RPM.**
The number 1800 therefore represents the _____ to be reached in order to obtain the **maximum power** from the engine.

Explanatory videos:

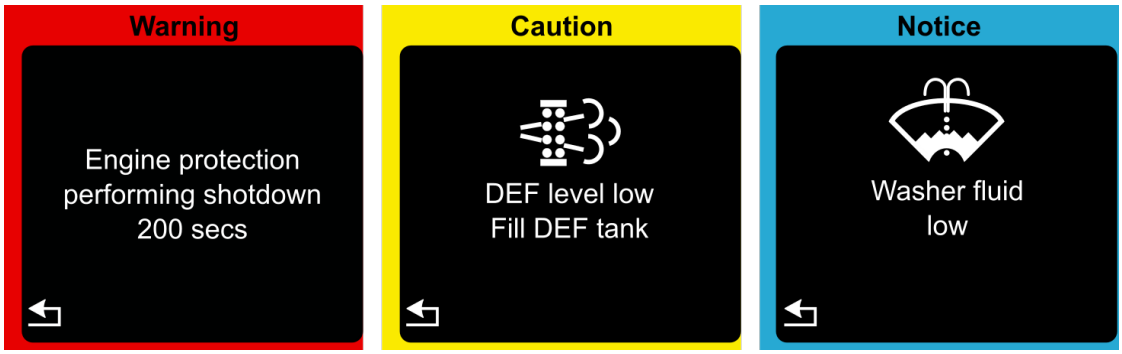
DAF ECO TRAINING EPISODE 1,2 and 3
https://www.youtube.com/watch?v=dI5aAn-fPds
https://www.youtube.com/watch?v=a4I3SV3nBII
https://www.youtube.com/watch?v=V05SnGuDu3Q

Indicator lights and warning lights:


Electronic **Display:**

The electronic display provides a wealth of information for the driver. Especially when an indicator light appears, related information can be communicated via this screen. Messages can be presented as a warning, caution, or notice.



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