**Level 3 Diploma in Work-based Land-based Engineering Operations**

Unit 600 Task A: Use Calculations

(This task uses units of measurement, scaling, measuring & calculation)

**ACTIVITY 1 TITLE: TRACTOR POWER MEASUREMENT**

**Introduction**

The diesel engine is the power unit which allows the machine to perform all the tasks it’s asked to do. The size and power output of the engine will determine the energy and speed at which each operation can be carried out.

When an engine is produced by a manufacturer, they publish the power output in the specifications. These figures are measured with a piece of equipment called a dynamometer. When an engine is installed in a machine however, there is a slight loss of power due to driving a mechanical transmission, oil drag and other factors.

In an agricultural tractor, power is typically measured at the PTO as this is the most convenient point and relevant with so many attached machines using it.

Power is defined as the ***rate of doing work***, quoted in Kilowatts (ref. workbook page 53).

With a set of measured power readings, we can calculate torque. Torque can be worked out using the following formula:

$$Torque NM=\frac{Power KW}{Speed rpm} x constant 9549$$

..you may remember this being explained on page 5 of your workbook.

**Task**

A. Complete the L3 Task Sheet 306/03: “Measuring Engine Power” (if not previously undertaken).

B. On the proforma P1 calculate the torque at each step using the formula above.

C. On a sheet of graph paper, construct an appropriate line graph showing clearly both the ‘power’ and ‘torque’ curves.

D. Ensure your axes are consistent and don’t overlap. Mark the points on your ‘x’ axis (r.p.m.) the points of peak torque and max. power.

**(Note: The graph can be produced in a spreadsheet table if preferred.)**

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**QUESTIONS**

1. What was the peak torque of the engine tested? What should it have been?

2. What was the rpm of the engine at this reading? What should it have been?

3. How is using a “*constant*” helpful in undertaking multiple calculations using a common formula?

**NOW HAND IN WITH YOUR TASK SHEET AND PROFORMA**