How many horse power?

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Solution: The energy extracted for each cylinder is $w = -P\Delta V$ and there are 6 cylinders so the work extracted revolution is $w = -6P\Delta V$ times the efficiency:

$$w = -6(100 \text{ atm})(0.5 \text{ L})(0.25) = -75 \text{ L-atm}$$

Using the conversion 101.325 J/L-atm we have:

$$w = -75 \text{ L-atm} = 7600 \text{ Joules per rev}$$

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Since the engine is running 1800 rpm that corresponds to 30 revolutions per second. Therefore the power is:

P = |w|(frequency per second)

P = 7600(30) Watts = 228 kilowatts

One horse power corresponds to 746 Watts so this is a 300 horsepower engine.