

WORK-ENERGY-POWER

Unit 10 & 11 Dr. John P. Cise

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& New York Times , February 26, 2016 by Tom Voelk

Restoring Diesel's Good Name With a New Range Rover Sport Td6



FROM WIKIPEDIA SITE:

Modern turbo-diesel engines are using electronically controlled, common-rail fuel injection, that **increases the efficiency up to 50% with the help of geometrically variable turbo-charging system**; this also increases the engines' torque at low engine speeds (1200-1800RPM).

INTRODUCTION: Efficiency = $W_{OUT} / W_{IN} = P_{OUT} / P_{IN} = X$

W_{OUTPUT} of Td6 engine goes into kinetic energy (K) of Car . Thus, $P_{OUTPUT} = W_{OUT} / t = [\frac{1}{2} m V^2] / t$

Thus $X P_{INPUT} = [\frac{1}{2} m V^2] / t$

QUESTIONS: (a) Land Rover site says the weight of the Td6 is 4727 lb. Find mass of Td6?
(b) Convert HP (P_{INPUT}) of this car to ft. lb./s.?
(c) Find efficiency X of this Turbo Diesel Td6?

HINTS weight = $m g$, $g = 32 \text{ ft./s.}^2$,
HP = 550 ft. lb./s ,

ANSWERS: (a) 147.72 slugs , (b) 139,700 ft. lb./s.
(c) ~ 58 %. This is 10 – 20 % more efficient than Gasoline turbo engine which are about 40 %.

AUTHOR COMMENT: Turbo Diesel cars , as stated at Wikipedia left, can be as efficient as 50% as got here.

The engine technology offers the kind of performance that's quite appealing, namely serious muscle off the line and significantly improved fuel economy over gasoline-powered engines. **[Wikipedia says turbo diesel are 50% or more efficient]** Into this hostile environment, Land Rover brings its first diesel for the American market. Do not judge by the misdeeds of others; the Td6 3-liter turbodiesel motor may be the best way to motivate a Range Rover. Diesel's stump-pulling power encourages off-roading, perfect when tossing this \$103,925 (as tested) luxury vehicle on the [Rubicon Trail](#). The **(((Td6 packs 254 horsepower)))** and enough soul-satisfying torque to drag Lucifer back to Hades, 440 pound-feet to be precise. Only those outside the car might, and I emphasize might, know this is a diesel. The telltale grumble is replaced with a sonic quality closer to gasoline direct-injection. Inside, the Range Rover is whisper quiet even as it **(((cranks from rest to 60 miles an hour in about seven seconds.)))** Fuel economy is officially rated by the government at 22 miles per gallon in the city, 29 on the highway