

WORK-ENERGY-POWER

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Video Review: Volvo V90 Cross Country Rolls Into S.U.V. Territory



INTRODUCTION: This Volvo V90 output power(P_{OUT}) goes into doing (output work/unit time) where $W_{OUT} = \text{Useful kinetic energy} = \frac{1}{2} m v^2$. Thus $P_{OUT} = \frac{1}{2} m v^2/t$ and since

$$X = \text{efficiency} = P_{OUT}/P_{input} ,$$

$$X = [\frac{1}{2} m v^2]/t(P_{INPUT})$$

QUESTIONS: (a) Find mass of the V90 ? (b) Convert V90 HP to ft. lb./s.? (c) Find efficiency X of Volvo V90 ? .

HINTS: $W = mg$, $g = 32 \text{ ft./s.}^2$, $60 \text{ mph} = 88 \text{ ft./s.}$, $550 \text{ ft. lb./s.} = 1 \text{ HP}$

ANSWERS: (a) $m = 131.9 \text{ slugs}$, (b) $P_{INPUT} = 173,800 \text{ ft. lb./s.}$, (c) $X = \text{efficiency} = \sim 49 \%$, typical of turbo & supercharged engines.

Welcome, friend. Surely you've glanced at the photo of the [Volvo V90](#) Cross Country and understood that it's a station wagon. And yet you read on. Possibly you're an original thinker and open-minded about wagons. Or perhaps you're just odd. Lately, it seems, you have to be to own a wagon. In 2016, 40 percent of the vehicles sold in the United States were crossovers and sport utility vehicles, according to IHS Automotive. Wagons? [About 1percent](#). Based on the same architecture as the XC90 S.U.V., the 2017 Cross Country has one powertrain, designated T6. **(((Its two-liter four-cylinder engine is turbocharged and supercharged, turning out a healthy 316 horsepower** and 295 pound-feet of torque. The gearbox has eight speeds. All-wheel drive is standard. Drive modes noticeably change the vehicle's dynamics, and the Cross Country's suspension gets extra range of motion for smoothing out forest service roads. **This 4,220-pound machine moves from a standstill to 60 miles an hour in a robust six seconds.)))** For hikers in less of a hurry, the 2018 models will be available with a less expensive T5 engine (basically the T6 without the supercharger). For highway trekking, the quiet, comfortable and composed Cross Country lives up to its name.