

WORK-ENERGY-POWER

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With the LaCrosse, Buick Continues to Pamper



INTRODUCTION: This direct-injected engine output power (P_{OUT}) goes into doing (output work/unit time) where W_{OUT} = Useful kinetic energy = $\frac{1}{2} m v^2$.

$$\text{Thus } P_{OUT} = \frac{1}{2} m v^2/t$$

$$X = \text{efficiency} = P_{OUT}/P_{input}, \quad X P_{INPUT} = \frac{1}{2} m v^2/t$$

At Buick web site the curb weight + driver = 3775 lb..

QUESTIONS: (a) Convert power input of 310 HP to ft. lb./s., (b) Find mass of car in slugs?, (c) Find this LaCrosse 2017 efficiency X?

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

Driven | 2017 Buick LaCrosse

The latest generation of this luxurious sedan, wearing the new face of Buick, is very comfortable in its role of being, well, very comfortable. The newest generation of the [Buick LaCrosse](#). Comfortable? Its coddling suspension mercifully shrugs off frost heaves. **(((Powered by a 3.6-liter direct-injected V6**

quietly turning out 310 horsepower))) and 282 pound feet of torque, **(((the LaCrosse hustles from rest to 60 miles an hour in 6.8 seconds)))**.

The 8-speed transmission's shifts are creamy, although its electronic controller can be vague. I wish Buick had stayed old school there. The paddle shifters are most welcome, though. The LaCrosse has managed to lose some 300 pounds while increasing the structural rigidity of the chassis. And the LaCrosse, which starts at \$32,990, isn't cheap. My Premium model costs \$48,970. Some competitors are priced low enough to fund a relaxing family vacation with the savings (though I suspect G.M.'s pricing structure leaves room for shoppers to haggle aggressively).

ANSWERS: (a) 170,500 ft. lb./s., (b) 118 slugs, (c) 39.41 %

COMMENT: This direct-injected engine has a similar efficiency as turbos. Turbos usually are about 40 % efficient.