

# KINETIC ENERGY

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## The F-150's Aluminum Diet



A 2015 Ford F-150 camouflaged to conceal the new design ahead of its introduction at the Detroit auto show.

**INTRODUCTION:** The 2013 6450 gross weight (from Ford spec. site) F-150 is being reduced in weight by 1000 lb. (see article below) in 2014 by using aluminum.

**QUESTIONS:** (a) The aluminum 2014 F-150 will be 1000 lb lighter than the 2013 version. Verify what is stated below.....-1000 lb. is a 15% decrease in weight? (b) Find the mass (in slugs) of the 2013 F-150? (c) Find kinetic energy of the 2013 F-150 traveling at 60 mph? (d) Find mass (in slugs) of 2014 F-150? (e) Find kinetic energy of the 2014 F-150 traveling at 60 mph ?

**HINTS:** Kinetic energy =  $K = \frac{1}{2} mv^2$ , 60 mph = 88 ft./s

**ANSWERS:** (a) – 15.5 % , (b) 201 56 slugs, (c) ~ 780,440 ft. lb. , (d) 170.3 slugs, (e) ~ 659,450 ft. lb

DETROIT — When Ford rolls out its redesigned F-150 pickup truck here on Monday morning to kick off two days of press previews for the 2014 [North American International Auto Show](#), the automaker will be making one of the boldest product gambles in its 111-year history. The calculated risk Ford is taking — **((( casting aside the traditional and long proven welded steel construction of the truck's cab and cargo bed and switching to a body that is largely lightweight aluminum — )))** is sure to rank among the most important news items coming from the automakers' displays at the show. The much-anticipated switch in materials — **an investment of billions of dollars by Ford in factory updates, production tooling and engineering expertise** — is a breakthrough in scale and a first for pickups. It is aimed **at (((drastically reducing the F-150's weight to improve fuel economy)))**. According to engineers involved in its development, the new truck is expected to be some **15 percent lighter over all** than the steel 2014 version, with the aluminum body and bed alone *shaving more than 450 pounds. Including engine and suspension components, (((aluminum is expected to account for as much 1,000 pounds of the truck's weight(reduction)))*. Cutting weight is widely regarded as the most cost-effective way to reduce fuel consumption and greenhouse gases. Industry experts say **that trimming weight by 10 percent results, on average, in a fuel-economy improvement of 6 to 7 percent.** By Ford's calculations, the 2015 truck, equipped with a new 2.7-liter EcoBoost V6 and a 6-speed automatic transmission, will be capable **of achieving "close to" 30 miles a gallon** in the Environmental Protection Agency's 30 m.p.g. rating would catapult the F-150 well beyond its competitors, led by the 2014 Ram 1500 HFE at 25 m.p.g. highway, and would handily top the thriftiest (23 m.p.g. highway) 2014 F-150. And — this is the payoff — it would bring Ford's most profitable vehicle line closer to meeting the **government's future fleet mileage standards, which call for vehicles with a footprint as large as a full-size pickup to average (((30.2 m.p.g. by 2025 )))**.