

Gearing up

When it comes to fuel economy, automatic transmissions have caught up to their manual counterparts.



THE MANUAL (ALSO CALLED STANDARD OR STICK SHIFT) TRANSMISSION remains common in much of the world, but according to a 2012 report, in the U.S. more than 93 percent of new cars feature automatic transmissions. Though small in number, adherents of the manual transmission usually cite several reasons for their preference:

- A car with a manual transmission costs less than a comparable vehicle with an automatic transmission.
- A manual transmission is more fun to drive and gives the driver a greater sense of control over the vehicle.
- Manual transmissions are mechanically less complicated than automatics, making them easier to maintain and less expensive to repair.

If you drive a manual, you may have noticed a particular omission from this

list. For many years, the manual transmission could also boast of a fuel economy advantage over the automatic. However, as the accompanying chart reveals, that advantage is now history.

The chart specifically compares the fuel economy of automatic and manual transmission options, where both were available in one model with the same engine. Two contributing factors to this trend are that automatic transmission design has become more efficient (using earlier lockup and other strategies), and the number of gears used in automatic transmissions has increased much quicker than in manual transmissions.

The advance in the number of gears is particularly noteworthy. Three forward speeds were the most common up until about 1995. By 2012, six forward speeds became the most common configuration, and at least two companies

are offering transmissions with nine forward speeds!

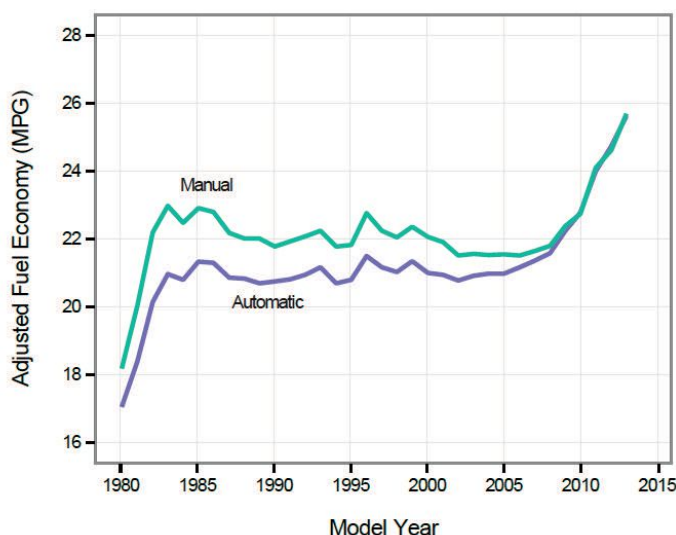
The reason for the increase is that the more gears offered, the more often the engine can operate near its peak efficiency. The main tradeoffs are increased transmission weight and complexity. This is where the tribologist can make all the difference. By specifying higher-strength materials and better automatic transmission fluids (ATFs), the transmission weight can be minimized while reliability is maximized.

ATF is a highly engineered transmission component that provides numerous functions. In addition to lubricating the contact regions, ATF also acts as a coolant (to remove heat generated by friction), provides torque transfer (via clutches and the torque converter), transfers hydraulic power (to operate valves and clutches) and protects components from wear and oxidation (including ferrous and non-ferrous metals as well as non-metallic components such as the clutches and seals).

So by all means enjoy driving a stick, if that is your preference. Do note, however, that thanks to the automotive tribologist, you can no longer claim that you are doing it for the fuel economy!



Ed Becker is an STLE Fellow and past president. He is president of Friction & Wear Solutions, LLC in Brighton, Mich., and can be reached through his website at www.frictionandwearsolutions.com.



Comparison of Manual and Automatic Transmission Adjusted Fuel Economy. (U.S. EPA Report EPA-420-R-13-011, Light Duty Automotive Technology, Carbon Dioxide Emissions, and Fuel Economy Trends: 1975-2013, December 2013.)