

Under the Hood, January 2018

The C7 Corvette engine is rather archaic. Not just because it uses pushrods to actuate the valves rather than overhead cams (although some of that criticism is well deserved), but because it still uses pistons moving up and down to provide a rotational force to the wheels. At 6,000 rpms, each piston is changing direction 12,000 times per minute or 200 times per second. Each piston is also traveling over 60 feet per second in the cylinder bore. Every rotation of the engine has the piston rapidly accelerating to its maximum speed, stopping, changing direction, and then rapidly accelerating again; one hundred times per second. Multiply that effort by eight, as we have eight-cylinder engines. What if I was to tell you that there is a new engine that uses an eccentric device to convert pressure into direct rotation force without all that reciprocating action. This engine is more compact, smoother, far less complicated, and more powerful for its weight than the old-fashioned engine. Most of the major manufacturers are conducting testing of this new engine and many have paid big bucks for license rights. Wait a minute, this sounds a lot like the Wankel rotary engine, and all the buzz from 50 years ago. In the 1960's many thought the rotary engine would replace the reciprocating engine. NSU in Germany and Mazda in Japan were probably the two manufacturers that did the most with the rotary. Mazda produced the Cosmos Sport in 1967 with their first commercial rotary engine. Poor fuel economy, even by 1960's standards, relatively low torque and premature oil seal wear doomed the rotary. Even Mazda has stopped production of their RX 8 rotary powered sports car. Fifty years ago, the Wankel rotary was predicted to revolutionize the auto industry. It seems every month or so, I read about another major proposed break through in engine design. Then months or years later, I realize that this latest and greatest invention is no longer in the news. What is the lesson here? I suspect we should all be somewhat hesitant to believe that major changes are always right around the corner. I think everyone would agree that the modern Corvette reciprocating engine is far superior to the original 1955 Chevy V8. The newer engine is more fuel efficient, develops more horsepower per cubic inch, and has much better longevity, while having much better environmental impacts. However, the basic design of the two engines is very similar. When will the basic engine design change? Who knows, but it didn't happen as predicted over 50 years ago. Nor many of the many other predictions in the following 50 years.

There used to be a natural hierarchy of performance vehicles, and Corvette was always at, or near, the top. That natural order has been changing over the years. One current example has Jeep putting the Dodge 707 horsepower engine in the Grand Cherokee. The Grand Cherokee is a heavy vehicle at about 5100 lbs. One measure of a vehicle's performance is the weight each horsepower needs to move. The Jeep has a lbs/hp ratio of about 7.21. The standard C7 Corvette at about 3300 lbs has a ratio of 7.17. Close enough that you might well find one of these Grand Cherokees beating our Vette in the stoplight drags. As the speed increases, the Vette should still come out the winner. The Vette has a lower coefficient of drag than the Jeep. As the speed increases, aerodynamic drag increases with the square of velocity, so as the speed doubles, the drag increases by a factor of 4. With a lower drag coefficient, the Vette becomes more responsive to the available horsepower than the Jeep. You probably remember this from your bicycle days. When you doubled your speed from 10 mph to 20 mph, your pedaling effort increased about 4 times. Our Vette fraternity still has the Z06 as our top gun. The Z06 is down 57 horsepower from this Jeep but with a weight of about 3500 lbs, the Z06 shows up for the challenge with a lbs:hp ratio of 5.40. That is more than adequate to put down most challengers. We don't even need to talk about the new coming ZR1 as I don't think there is a domestic vehicle that could touch it. However, Chevy has thrown down the gauntlet, with the ZR1, so we will see what the competition does in response. By the end of the 2017 production run, the total number of Corvettes produced in history now is close to 1.6 million. Further it is estimated that there are still 750,000 Corvettes still on the road. I suspect that there are a lot of garage queens in that number. The Corvette has been a halo car for Chevrolet and GM, and at those production numbers you would anticipate that

the Corvette has also contributed to the corporate profits as well. Another halo car has hit a major milestone. Porsche introduced the 911 in 1963, 10 years after the debut of the Corvette. Although Porsche had planned to drop the rear engine 911, the faithful were not happy, and the 911 survived. Porsche has now produced over 1 million 911 variants, and currently offers 22 varieties of the 911. Considering that Porsche has always been more expensive than the standard Corvette, the 1 million milestone is an awesome accomplishment.