

## Automotive Technology

### Everything Old is New Again!



By JEFF KINZLER

I was perusing a recent issue of *Car and Driver* magazine, (October 2007) featuring the new crop of 2008 cars when I saw a most interesting article. It seems that Nissan's Infiniti, has joined BMW in bringing out an innovative new feature, a variable intake valve lift system. In the Infiniti system, the variable lift of the intake valves serves to throttle the engine most of the time. In the BMW system the variable intake valve lift is used to throttle the engine at all times. The article points out that this reduces pumping losses, having the effect of increasing both engine output and efficiency.



BMW VALVETRONIC CYLINDER HEAD

Here's what BMW says about its valvetronic system:

"This highly advanced technology replaces the conventional throttle butterfly with a electrical mechanism that controls the amount of lift of the individual intake valves on each cylinder. Your engine is able to breathe freely, delivering better performance while using less fuel. The performance of the engine is more efficient and immediate, thanks to the elimination of the pumping losses and air-flow

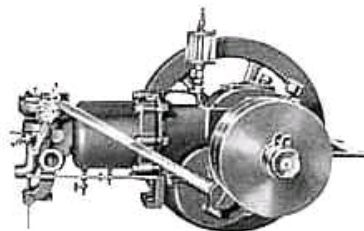
disturbance caused by a conventional throttle butterfly. Instead, air can flow through the intake manifold freely, and Valvetronic precisely regulates the quantity of air entering the cylinders. Valvetronic uses a uses a stepper motor to control a secondary eccentric shaft fitted with a series of intermediate rocker arms, which in turn control the degree of valve lift. The throttle butterfly is no longer needed as a means of controlling the air supply - though for safety reasons it is still fitted as an emergency back-up. By optimising the fuel/air mix process, Valvetronic produces fuel savings of up to 10 percent (based on the ECE driving cycle). In addition, Valvetronic improves cold start behaviour, lowers exhaust emissions and provides smoother, more immediate power."

([www.bmw.com/en/newvehicles/3series/sedan/2005/allfacts/engine\\_4c\\_petrol.html](http://www.bmw.com/en/newvehicles/3series/sedan/2005/allfacts/engine_4c_petrol.html)).



HENRY M. LELAND

In *Cadillac, the Complete 70 Year History* by Maurice Hendry (*Automobile Quarterly*, 1973) there is description of the single cylinder engine in the first Cadillac. At page 35, Hendry describes the intake system: "speed was controlled by varying the lift of the intake valve, an unusual but effective arrangement that permitted a very simple, trouble free carburetor design, having neither jets, air valve, throttle or float.



CADILLAC'S "MIGHTY HERCULES" ONE CYLINDER ENGINE

The cam for the intake was adjustable from a lever on the steering column, providing the throttle function. Hendry further explained: "With the engine running at its normal full load and speed, the quantity of the mixture and the suction inducing its flow to the cylinder were at a maximum. "When the driver reduced the engine power, the period but not the fierceness of suction was altered, giving a series of sucks at the carburetor of about the same intensity, but getting shorter and shorter in duration with reduction in the load on the engine.

Hendry points out that the Cadillac's variable intake valve lift control system gave its engine greater flexibility and more reliable operation in an era when most contemporary engines had primitive fuel systems and could not run well at varying speeds. The single cylinder Cadillac engine also had a very high specific output of 6.3 horsepower per liter, a level of efficiency not reached by other cars until four years after the single Cadillac made its debut in 1902. As far as fuel efficiency goes, the Cadillac was able to run continuously around the Brooklands race track flat out at its maximum speed of 34 mph and deliver nearly 30 miles per gallon!

So here we are, some 105 years after the introduction of Cadillac's variable intake valve lift throttle control, and BMW and Infiniti, seeking more powerful and efficient engines, have adopted exactly the same principle.

How cool is *that*?

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