

Four's company with engine valves

Dear Tom and Ray: I grew up in the service department of a large automobile dealership and was in the auto-parts business for 30 years. However, the advantage of having four valves per cylinder instead of two is difficult for me to grasp. It seems to me more parts mean more friction loss. Also, more parts to wear out and more repairs for you guys to do. But what about the car owners? What do four valves per cylinder do that two bigger valves per cylinder couldn't do? — Charlie

Tom: Good question, Charlie. The answer is that the four valves allow the engine to breathe better. For each explosion inside the engine, a cylinder needs to take in fuel and air through its intake valve and then expel exhaust through its exhaust valve. That process of bringing stuff in and out of the cylinder is called "breathing."

Ray: And the more easily an engine breathes, the more power it produces and the more efficiently it runs. So why not just make the intake and exhaust valves bigger?

Tom: The answer is geometry, Charlie. Draw a circle on a piece of paper to represent the top of the cylinder. Now draw two equal-sized circles (valves) inside that circle ... make them as big as you can. You

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see how much space is left over in that original circle?

Ray: Now, in the same-size circle, draw four equal circles to represent the area that would be covered by four valves. You see how much more surface area you can cover with four valves?

Tom: I suppose you could get carried away and start using six, eight or 10 valves per cylinder to really maximize breathing. But then you'd be running into the problems you describe in your letter, Charlie: too many parts and not enough benefit.

Ray: So that's why many modern engines have settled on four valves per cylinder, two intake and two exhaust valves. I guess this is one of those cases where four's company and six is a crowd.

Dear Tom and Ray: My husband and I have an ongoing argument about the clutch in his truck. He says that it is bad to have your foot on the clutch when the truck is at a total standstill and that it will wear out sooner than if you leave your foot off the clutch. He

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