

# Gas dynamics of exhaust valves

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Funding: CCGEx

Due to tougher legislations on exhaust emissions from internal combustion engines, the development of more efficient engines with lower emissions is a hot topic within the vehicle industry. In a Diesel engine approximately 30-40 % of the combustion energy is lost through the exhaust gases. Some of this energy can be recovered using a turbo-charger. To maximize the energy recovery the energy losses related to the exhaust valve and port need to be better understood.

This project focuses on the physics of the flow past the exhaust valve and aims to determine in what ways different parameters influence the flow over an exhaust valve. What distinguishes this project from most previous studies is that the experiments will be performed under more realistic conditions than earlier, e.g. higher pressure ratios leading to choked conditions, and dynamic (i.e. moving) valves. The results of the experimental campaign can then be used to improve the one-dimensional models that are currently used in industry to estimate the losses over the exhaust valves and ports. By understanding the physics of the flow and the influence of the geometry and other parameters, the pressure loss past the exhaust valve and port can be decreased through geometric changes or by controlling the valve openings that will lead to improved performance.



Quiz: One of the valves in the figure is an intake valve and the other an exhaust valve. Which one is the exhaust valve?