

## **MEDUSA – a New Way to Control Turbochargers**

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### Summary:

Turbochargers are usually controlled by using a Waste Gate or a Variable Nozzle system (VN). A Waste Gate controlled turbocharger is built with a smaller turbine to achieve under low mass flow rates higher rotational speeds. By exceeding a specific pressure the Waste Gate opens to bypass exhaust gas around the turbine. The energy of the bypassed exhaust gas is lost.

A VN-system uses variable turbine inlet nozzles to control the cross-section area at the turbine inlet. This gives the possibility to control the turbocharger over the whole operation range without wasting energy. The problem for VN controlled TCs are the moving parts of the VN placed in the hot exhaust gas at turbine inlet. The reliability of these parts is low compared to the Waste Gate system because of the high component load of the variable parts.

The proposed paper presents a new control unit based on a partial admission system, which is as well showed in the origin of the name of the system: Multiple Exhaust Duct with Source Adjustment (MEDUSA). The system uses separate controllable flow channels connected to the inlet of the turbocharger turbine. This provides mainly two benefits on the one hand the operation point of the TC can be controlled by closing and opening the flow channels. On the other hand the impulse of the exhaust gas produced by the internal combustion engine is conserved in the flow channels.

This work will presents the MEDUSA system, its function and as well some first measurements.