# Adaptations

The fuel-air mixture formed in the intake tract requires a certain period of time until is reaches the oxygen sensor in the form of exhaust gas. This time decreases as load and engine speed increase. For this reason, the response time of the emission (lambda) control system is also dependent on load and engine speed. Fuel-air mixture deviations detected by the oxygen sensor result in adaptation values (learned correction values) being stored. By way of the adaptations, the injection can be brought close to the nominal value in advance. A reduction in the response time is achieved in this way.

For instance, if the basic injection values of the DME characteristic map are too low during idling or in order to maintain the ideal fuel-air mixture, the emission (lambda) control system would have to constantly increase the injection timing. In this case, an adaptation value is learnt which corrects the basic injection value. The emission (lambda) control then only needs to undertake the fine adjustment.

Following adaptations are performed during engine operation:

## Tank ventilation adaptation

When the tank ventilation valve is open, an additional combustible mixture is supplied from the carbon canister to the engine. The shift in mixture detected by the oxygen sensor is completely corrected out by means of the tank ventilation adaptation value.

## Idle air adaptation

The task of idle air adaptation is carried out by the idle actuator. On the basis of the air volume it ensures a constant idle speed.

## Idle mixture adaptation

If idling is detected on the basis of the throttle position during the rest phase of the tank ventilation system, idle mixture adaptation takes place at certain intervals.

## Partial load mixture adaptation

Also in the partial load range, mixture adaptation takes place at certain intervals. The determined adaptation value is taken into consideration in all partial load ranges.

## Sensor-Wheel Adaptation

Misfiring causes irregularities in the rotational speed of the crankshaft. These irregularities can be detected by way of changes in the segment time.

Segment times (time, in which a certain number of teeth on the increment wheel move past the sensor) are constantly determined via the reference mark sensor (= crankshaft sensor). These segment times are constantly checked during engine operation. In the event of a fault, a defect code is stored and injection of the corresponding cylinder is deactivated. Refer to misfiring detection.

In order to avoid incorrect evaluation, sensor-wheel adaptation must be carried out after replacing a DME control unit or increment wheel. If only the increment wheel is replaced, the sensor-wheel adaptation must first be deleted (disconnect control unit from power supply for 5 minutes).

The sensor wheel adaptation determines the irregularity of the increment wheel and takes it into consideration when evaluating the segment times. Sensor wheel adaptation is implemented automatically as soon as the engine is operated in overrun condition for at least 10 seconds.