



Cheap but not cheerful

When a poorly performing Audi A4 was brought to MKW Motors recently, all of the diagnostic tests showed good values. On closer examination, it could be seen that although signal voltages were within spec, they were too slow to react. The cause of this problem was that inferior parts had been fitted on the A4 explains MKW Motor's Keith Walsh.

The Audi A4 was down on power, heavy black smoke billowed from the exhaust and a violent diesel knock was heard on acceleration. There were no fault codes logged. Live data showed that the EGR valve was operating out of the normal range. When revved, the EGR valve should close immediately to allow full engine power. The EGR was only gradually closing. Should the EGR valve simply be replaced at a high cost? The EGR valve was opening on instruction from the engine ECU, and the ECU was opening the valve because of information it was receiving.

With the observed erratic operation of the EGR valve and our understanding of common rail systems, we decided to inspect the operation of the airflow sensor. The ECU will control the position of the EGR valve as a result of the airflow signal.

Still Air Test

This test is carried out with the sensor powered on, removed from the air stream but still plugged in. Cap off both ends of the sensor to ensure that there isn't any airflow. The reading for this sensor should be 0.98-1.02 volts and it was correct.

Idle Voltage Test

With an idling diesel engine, you should see 2 volts at the sensor. This voltage was correct.

Max Load Voltage

This is an analogue sensor and with the airflow signal on the oscilloscope, you should see a responsive increase in voltage up to about 4- 4.5 volts. This voltage was also good.

So what's the problem?

There weren't any problems with the air flow meter voltages, so we decided to look closer at the sensor operation and reaction times. While the steady state voltages were OK, the sensor response

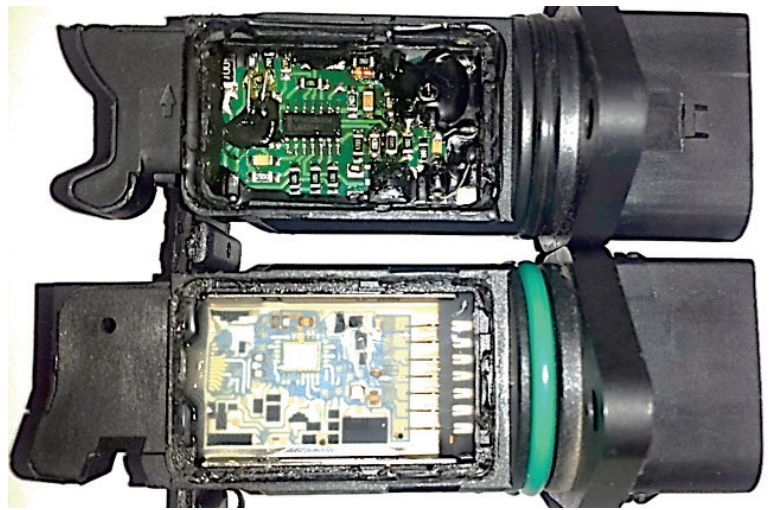
was slow. This resulted in outdated, and incorrect information being supplied to the ECU during acceleration. As a result of this delayed sensor signal change, in relation to actual engine change, the ECU was holding the EGR valve open for too long, causing poor combustion, low power, heavy smoke and diesel knock.

True Cost of Cheap Parts

To realise why using inferior parts is bad for business, and to put it into context, you need to realise how technically advanced and sophisticated the systems fitted to cars are. These systems include Engine Management, Electronic Stability Programme, Supplementary Restraint, Adaptable Cruise Control and more. Using inferior quality electronic components is like getting incorrect directions to a place you need to be urgently.

To meet strict emission levels, the engine management systems need to react quickly. When a fault has been diagnosed and a cheap electronic part has been fitted in, it can cause a chain reaction effect in the operation. The sensor may look perfect on the outside, very much like the original, but this may not be the case. The pictures shown here of the inside of the inferior, slow reacting sensor from the A4 was clearly different than a quality sensor.

An inferior sensor can give incorrect or delayed information, and then the



The inferior sensor, at top, gave delayed information, that caused the A4 to be unable to operate within its mapped memory

engine management cannot operate to the required conditions needed within its mapped memory. The management system will now see problems within the system by comparing sensor values against one another. In most cases, the engine management system cannot determine the true location of the fault as it expects that good quality sensors or actuators are fitted. As a result, it will trigger random fault codes after your customer has taken their vehicle back.

The customer comes back to you with a new fault code the is not an actual fault, it is a chain reaction fault caused when the engine ECU has received incorrect information. You will now go fault-finding a fault which is not really there and you might not think that the new sensor is at fault, leading you into hours of wasted time, money and parts, along with the possibility of losing a customer. It will also lead to destroying your confidence as a technician. In the end, you will end up buying a quality part and this will be at your expense.

