Oxygen sensors are one of the most commonly replaced engine sensors. A sluggish or defective O2 sensor can make an engine run rich and waste fuel. A bad O2 sensor can also increase emissions, which can cause a vehicle to fail an emissions test.
Oxygen sensors are part of the engine management system. They have been used since the 1980s for feedback fuel control. The sensor monitors oxygen levels in the exhaust. This provides a feedback signal for the powertrain control module (PCM) so it can readjust the fuel mixture as engine speed and load change.
Most inline four and six-cylinder engines have a single O2 sensor (though BMW and some others use two). On V6, V8, V10 and opposed four and six cylinder engines, each cylinder bank has its own oxygen sensor located in the exhaust manifold. On 1996 and newer cars and light trucks with OBD II, there is also a “downstream” O2 sensor located in or behind the catalytic converter to monitor catalyst efficiency.
Given all of these applications, there are ample opportunities to sell replacement O2 sensors. Most vehicle manufacturers have no specified service interval for replacing O2 sensors (though on some older pre-OBD II import applications a “service reminder” light did come on every 30,000 to 50,000 miles to remind the driver to have the O2 sensor checked). Under normal operating conditions, the O2 sensors on most late model vehicles should last well beyond 100,000 miles. But that doesn’t mean forever. Oxygen sensors can be contaminated by silicates in engine coolant if an engine develops a head gasket leak, by phosphorous if an engine is burning oil, or by silicone in some types of RTV sealer.

Some parts manufacturers recommend replacing high-mileage O2 sensors at 100,000 miles for preventive maintenance and to restore like-new performance.
If the engine management system detects a problem with an O2 sensor, it may set a diagnostic trouble code and turn on the Check Engine light. Reading the code with a scan tool will tell you the nature of the problem, and which sensor is involved.
The code will indicate the nature of the fault and identify the sensor by its location, such as sensor 1 or 2, bank 1 or 2. Sensor 1 is always an upstream sensor in the exhaust manifold. Sensor 2 is usually a downstream sensor behind the converter, unless the engine is an inline four or six with two upstream sensors. Sensor 3 or 4 would always be a downstream sensor.
Bank 1 is the side that includes cylinder number one in the engine’s firing order. Bank two is the other side. Being able to correctly identify which sensor is experiencing a problem is essential so your customer does not replace the wrong sensor.
Replacement oxygen sensors come in a variety of types and configurations. Oxygen sensors may have one to four wires. Most are the zirconia type with either a ceramic thimble or flat planar ceramic strip inside. Some older Toyota models use a special type of “titania” O2 sensor that works a little differently than a conventional O2 sensor. Instead of changing voltage when the fuel mixture changes from rich to lean, a titania O2 sensor changes resistance. The two different types are not interchangeable.
On many newer vehicles, a more advanced type of “wideband” oxygen sensor called an Air/Fuel (A/F) sensor is used. A/F sensors work differently than the older style O2 sensors. Instead of generating a simple rich or lean voltage signal when the fuel mixture changes, an A/F sensor provides a variable current signal that allows the PCM to determine the exact air/fuel ratio of the engine. An A/F sensor can also read much leaner air/fuel mixtures than an ordinary O2 sensor. A/F sensors also operate at a much higher temperature (1200 degrees F versus 600 degrees F for an O2 sensor), which means their internal heater circuit requires a much higher current.

The added sophistication that goes into an A/F sensor makes it more costly to manufacture. The ceramic strip inside the sensor has multiple layers, which include a “Nerst” cell and ion pump that moves oxygen into and out of a diffusion gap