



1



2



3



4

### 3 Piston crown

#### 3.6 Wear on crown edge and damaged top land

- Symptoms** On the Otto engine piston in Figure 1 as well as on the Diesel engine piston in Figure 2, the edge of the top land looks as if it has been "eaten away". Figure 4, taken with a scanning electron microscope, shows that this is not a case of melting but of abrasive wear.
- In Figure 3, a Diesel engine piston, piston material is displaced at the edge of the combustion cavity.
- Cause and Effect** On both engines affected, a build-up of oil carbon ("coke") in the cylinder bore chamfer has caused wear at the edge of the piston crown. Oil carbon can also build up on the edge of the gasket in the quench area of the cylinder head. Hard contact there leads to displacement of material and to abrasive wear, and the layer of oil carbon increases in step with piston wear. Preignitions may cause the piston edge to melt, thus accelerating wear.
- In the case of swirl-chamber Diesel engines, deposits, particularly of oil carbon and combustion residues, occur on the hot underside of the swirl-chamber insert; the piston then strikes against these deposits. In many cases, wear is precisely localized to the outer and orifice diameters of the insert (Figure 3). In most cases, the displacement of material is caused by hard cylinder contact of the top land. In a laboratory investigation, the piston material exhibits no signs of melting.
- Remedy** Do not chamfer the top edge of the cylinder bore too strongly. Check that the cylinder head gasket is of the correct type.