Note 29

The 'Nikasil' process

The 'Nikasil' surface treatment process was developed in the late '60s by Mahle, the German piston manufacturer, in conjunction with NSU and Daimler-Benz (468) originally to provide a wear resistant coating for Al-alloy rotor casings fitted to Wankel rotary engines. It was the result of a long programme of material combinations tried by many Wankel licencees to overcome a 'ripple' wear pattern characteristic of this engine type.

The process used electrolytic deposition to plate the Al-alloy casings with nickel in which particles of silicon-carbide smaller than 1 micron (0.001mm) were dispersed. After finishing treatment the plating was only 200 microns (0.2mm) thick in the Wankel application (870).

Porsche first used 'Nikasil' coating in a normal piston engine for (air-cooled) Al-alloy cylinders in the 1971 5L development of the F12 Type 912 unit and, compared with the previous Cr-plated Al-alloy cylinders ('Chromal') found it increased power (302). The layer may have been thinner than that used in the Wankel engine (a 'few hundredths of a millimetre' was quoted in (241) when applied in 1973 to the Porsche Type 911/83 competition engine (also air-cooled).

The reported improvement in oil consumption of the DFV with 'Nikasil'-treated Al-alloy cylinders may have been a consequence of more rapid and complete bedding-in of the piston rings, which is what is thought to have occurred in the Porsche 912 engine. If this then reduced combustion gas blow-by a power gain would have been observed