

through an angle of 180°C and then straightened four times successively. The platinum remains firmly adhered to the substrate.

While all plating systems have to be handled and used with due regard to the health and safety of operators and the environment, the new platinum and platinum alloy system has clear advantages over most conventional commercial systems, being non-toxic and non-explosive in either the wet or the dry state. In addition, as it is only mildly alkaline, it is less hazardous than the strongly alkaline or acidic materials of some existing baths.

Following the granting of provisional patent

coverage worldwide, the new platinum and platinum alloy plating process was launched by Johnson Matthey in the Pacific Basin region during the latter part of 1988, and has been well received. It is confidently expected that continuing development work will further extend the range of industrial applications that can be achieved with the new system.

### References

- 1 M. E. Baumgärtner and Ch. J. Raub, *Platinum Metals Rev.*, 1988, 32, (4), 188
- 2 P. E. Skinner, Proc. Conf. Inst. Met. Finish., Annual Technical Conference, Brighton, April 1989, p. 187

## Ignition and Engine Performance Conference

Twenty-two motor companies and seven spark plug manufacturers were represented at the 26th Champion Ignition and Engine Performance Conference, held in Munich, West Germany on 25th and 26th April, 1989. The various areas of technology addressed included spark plug and ignition system developments, engine design and the effects of fuel, fuel lubricants and fuel additives on engine performance.

Discussions on the current and future requirements for electrode materials in spark plugs, and new operational design concepts were confined mainly to Champion, Robert Bosch and Nippondenso. Each of these spark plug manufacturers use platinum or noble metal alloys for electrode tips, or as fine wires for complete electrodes. The reasons for their use include the need to provide high performance and reliable ignition, and to ensure that the ignition system is capable of surviving for the lifetime of the engine. The engine manufacturers gave a clear indication that, because of a desire to completely seal the engine compartment, future designs would necessitate the use of totally reliable plug systems. Indeed, the plug systems on some existing engines are not readily accessible, and must therefore provide guaranteed performance and lifetime.

Informative discussions took place on engine cold start, the advantages and disadvantages of projected nose plugs and operating heat range. AC-type, dual plug and coil-on-plug ignition systems were also considered, and some thoughts on "knock" detectors were given.

This well organised conference enabled the 130 delegates to increase their awareness of the

opportunities for innovation in materials technology which will accompany new concepts in engine design.

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### Combustion Research in Japan

Prepared by the Global Competitiveness Council and published by the Society of Automotive Engineers, the latest volume in a most useful series devoted to increasing the awareness worldwide of Japanese research on spark ignition engines contains extended abstracts of some two hundred papers. The wide range of topics covered includes some applications where the platinum metals are currently in use, namely: emission control catalysts, sensors and spark plug materials. It also embraces subjects such as alternative fuels, improved engine design and the reduction of unregulated secondary pollutants, which may affect future demand for the platinum metals.

The investigations summarised have been carried out by researchers affiliated with Japanese corporations, research institutes and universities, and this volume will enable English speaking readers to gain a valuable introduction to Japanese technical literature on the subject. Furthermore seventeen key sources of information are listed, as are the organisations which originated most of the work.

**Combustion Research in Japan**, Volume 5, Spark Ignition Engine Research, ISBN 0-89883-676-X, may be obtained from: SAE Customer Service, 400 Commonwealth Drive, Warrendale, PA 15096-0001, U.S.A., price \$102.00, or from the SAE European Office, 68a Wilbury Way, Hitchin, Herts SG4 0TP, England, price £79.00.