

sically high rate of work-hardening and that this is due to a different mechanism of slip processes than occur in other face-centred cubic metals. Further experimental work

based on a study of slip line formation combined with a suitable X-ray diffraction technique would be necessary to define the operative slip system.

### References

- 1 F. M. Jaeger and J. E. Zanstra .. *Proc. K. Akad. Wet. Amsterdam*, 1931, **34**, 15
- 2 A. A. Rudnitsky, R. S. Polyakova and I. L. Tyurin .. *Izvest. Sekt. Platiny (Akad. Nauk SSSR)*, 1955, **29**, 185-189; 190-196

## Vacuum Casting Uranium Reactor Fuel Elements

### TEMPERATURE CONTROL WITH PLATINUM THERMOCOUPLES

Among the final operations at the Springfields Works of the United Kingdom Atomic Energy Authority is the vacuum casting of high-purity uranium into rods for use as reactor fuel elements.

The Springfields Works undertakes the preparation of almost all the uranium refined in Britain, starting from the ore. After a series of chemical treatments, uranium tetrafluoride is reduced with metallic calcium by firing in a reduction mould.

To produce the reactor fuel elements in the required shape and size, and also to remove metallic and non-metallic impurities, the uranium is then melted and cast in a

group of high-frequency vacuum furnaces. These are of the stationary-crucible, bottom-pouring type, the base of the crucible being pierced by a pouring hole, closed during melting by a graphite or alumina bung.

For successful casting the pouring temperature is critical, and is controlled by means of platinum : rhodium-platinum thermocouples led in through the top of each furnace. When correct pouring temperature has been attained, the bung is removed by means of a graphite rod and a system of bell cranks, push rods and levers, and the molten uranium runs through a launder into the moulds stationed in the lower part of the furnace.

*A battery of three high-frequency vacuum casting furnaces for the production of uranium reactor fuel elements at the Springfields Works of the Atomic Energy Authority. Temperature control during melting and casting the uranium is effected by means of platinum: rhodium-platinum thermocouples*

