Advanced Gas-Cooled Reactor Fuel

Fuel Engineering

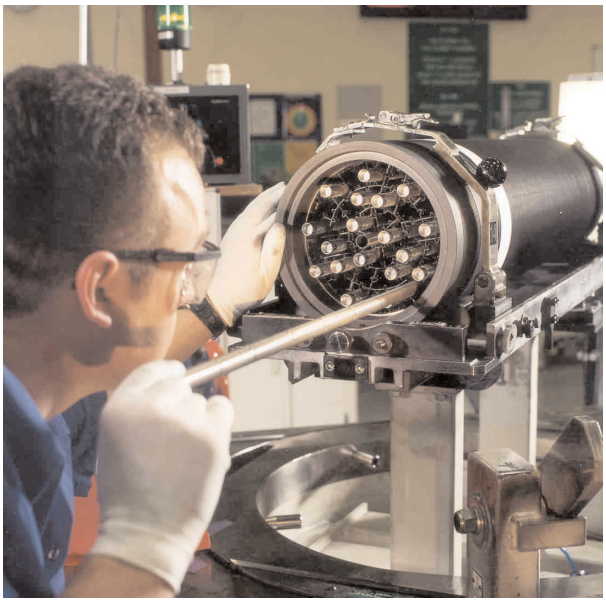
Background

Advanced gas-cooled reactor (AGR) fuel is unique to Britain and is used to power the second generation of U.K. nuclear power stations. There are currently 14 AGR reactors operating on 6 sites. They have a total capacity of 7875 megawatts (million watts), provide about 15% of the base-load electricity in this country, and are fueled entirely by Westinghouse Springfields.

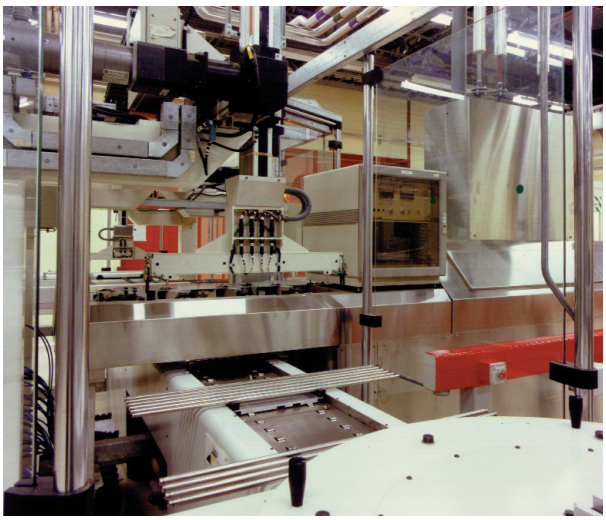
Manufacturing AGR Fuel

State-of-the-Art Plant

Westinghouse operates a highly sophisticated state-of-the-art production plant for the manufacture of AGR fuel. Further developments have been the introduction of Stage II and Stage III fuel designs, which have resulted in more efficient fuel.



Manufacturing excellence is achieved through automation, exacting process control, and the work of highly skilled employees.



Westinghouse uses a fully automated production line.

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For more information, call your local Westinghouse Electric Company sales representative.

Westinghouse

Oxide Fuel

AGR fuel elements consist of uranium dioxide (UO_2) pellets stacked inside fuel pins. These pins are then grouped within a graphite sleeve to form a fuel assembly. An AGR assembly comprises 36 stainless steel pins, each containing 64 pellets. One AGR pellet is equivalent to 1.5 tonnes of coal.

Westinghouse supplies the fuel for all of Britain's AGR nuclear power stations.

How AGR Fuel Is Produced

- Chemically process uranium ore to produce uranium tetrafluoride (UF_4)
- Reaction with fluorine gas to uranium hexafluoride (UF_6)
- Enrichment
- Conversion to UO_2
- Pelleting
- Canning pellets to form pins
- Assembling pins to form fuel elements
- Delivery to AGR reactor

An AGR assembly produces the same amount of electricity as 25.5 million cubic metres of gas.

UF_4 must be converted to UF_6, and then enriched before oxide fuel can be manufactured.

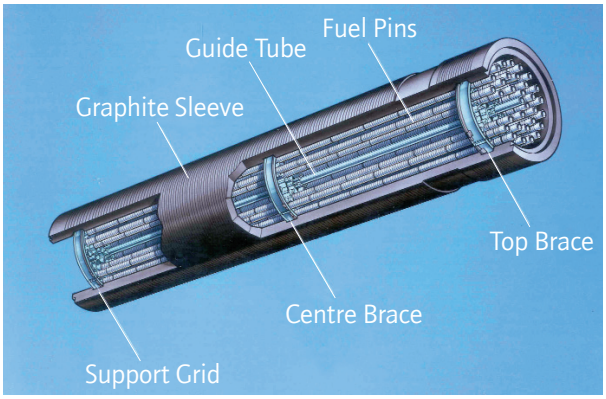
Enriched UF_6 is converted to UO_2 powder via the integrated dry route (IDR) process. Further processing includes granulating the UO_2 powder, pellet pressing, sintering, and grinding. This produces fuel pellets ready for stacking inside a stainless steel pin. Once end caps are fitted, the pins are scaled and pressurized before being assembled in a graphite sleeve to form an AGR fuel assembly.

Oxide Fuels Complex, Springfields Site is one of the most advanced nuclear fuel manufacturing plants in the world.

Assembly and Inspection

After final assembly and inspection, the finished fuel is packed in transit containers for dispatch to an AGR nuclear power station.

Over 5,000,000 AGR fuel pins.



AGR Fuel Assembly produced at Springfields.

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