Successful tests may lead to faster creation of new nuclear fuels

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R&D Technician Steve Steffler removes a glowing billet of depleted uranium from a high-temperature salt bath to place it into the extrusion press.

Idaho National Laboratory recently completed the first successful test of fabrication equipment in the Experimental Fuels Facility (EFF) at INL's Materials and Fuels Complex. Specifically, they finished the first extrusions of depleted uranium—a process of shaping material by forcing it through a die.

The test—conducted with Washington-based TerraPower—serves to restore a metallic fuel fabrication capability that has not been used in the United States since the 1980s. INL is working cooperatively with TerraPower to demonstrate the ability to use extrusion as a way to produce fuel slugs. TerraPower is developing a Traveling Wave Reactor (TWR) concept, a new type of fast reactor.

"INL has a unique set of facilities, capabilities and resources for demonstrating the feasibility of some of these key processes," said Doug Adkisson, TerraPower's senior vice president of Operations. "The collaboration between INL and TerraPower has been outstanding and really underscores what can be achieved in a pretty short time frame."

The lab's employees were equally excited about the new capabilities.

Using an extrusion process has the potential to reduce both cost and waste compared with the casting process employed for producing Experimental Breeder Reactor-II fuel pins in the past. The extrusion process also requires less follow-up work to ensure quality and consistency of the final fuel product before it is encased in cladding.

For the extrusion test, a cylindrical billet of depleted uranium metal was subjected to high temperature and pressure to force it through a shaped die. The process produces a thinner, longer form suitable to use as fuel pins for continued experiments and testing of fuels for a Traveling Wave Reactor.

Provided by Oak Ridge National Laboratory