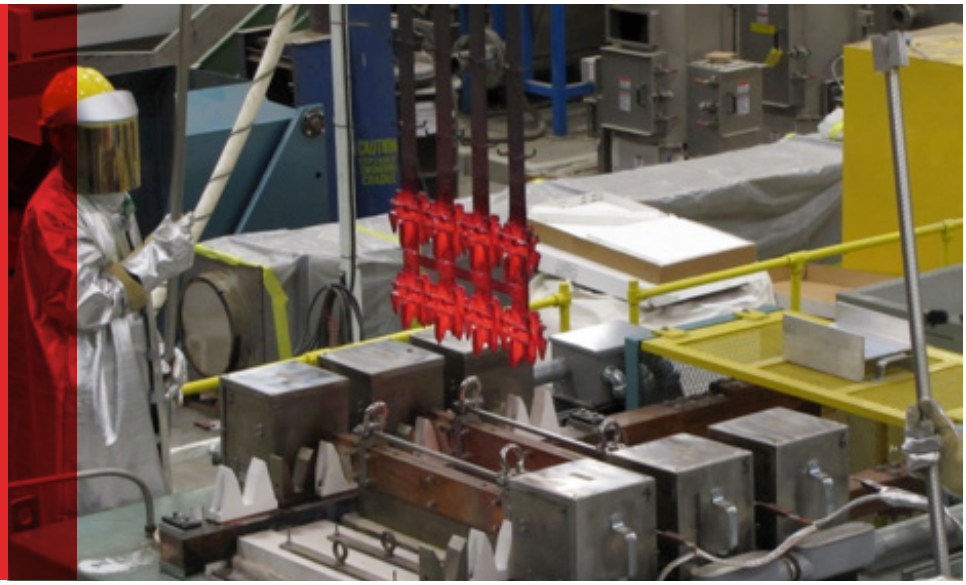
Argonne NATIONAL LABORATORY

ADVANCING TECHNOLOGY DEVELOPMENT FOR TRIBOLOGY

Coatings and lubricants critical to friction reduction



Argonne researcher Osman Eryilmaz recovers industrial parts from the large-scale ultra-fast boriding furnace after a successful boriding treatment. The furnace uses an electrochemical process similar to that of batteries to deposit boron on metal workpieces. (Photo credit: Osman Eryilmaz)

Argonne tribologists work to increase efficiency across a range of technologies by reducing friction inherent in the interactions of moving parts.

However, this mission has become increasingly difficult in the last few decades as performance demands have increased while the size of moving components has greatly decreased in nearly every major industry, from energy production to manufacturing to medical devices.

In order to achieve the desired efficiency gains, Argonne tribology researchers have formed the Surfaces and Lubrication Interaction Discovery and Engineering (SLIDE) program. Among the program's many objectives is the design of novel lubricants and coatings that—when paired with the right materials—not only increase efficiency but also extend component life.

Through advanced testing and materials characterization techniques, SLIDE researchers:

- Optimize and validate next-generation lubricants and additive combinations to increase efficiency
- Engineer coatings for a wide range of applications
- Integrate ideal lubricants and coatings with materials to increase efficiency and component life

LUBRICANTS

Lubricants typically contain performance-enhancing additives with by-products that often compete with one another and react negatively with other materials and coatings. SLIDE testing capabilities reveal new approaches to achieving the desired properties of conventional additives with more environmentally friendly alternatives. SLIDE researchers also apply Argonne's advanced testing and characterization capabilities to develop advanced lubricants that exceed the performance of today's lubricants without their negative side effects.

COATINGS

The discovery of new coatings for friction management lies at the core of the SLIDE mission— because many traditional coatings designed for manufacturing applications are not compatible with some of today's most common performance-enhancing additives, SLIDE researchers must design novel coatings that complement newer additives under a wide range of conditions.

PAIRING LUBRICANTS AND COATINGS

The proper pairing of lubricants and coatings can unlock hidden efficiency gains across a range of technologies. By developing coatings for use with advanced lubricants, SLIDE researchers help industry partners to both increase efficiency and extend the life of valuable machinery.

PARTNER WITH SLIDE

Since its inception in 1983, Argonne's tribology program has authored more than 300 peer-reviewed journal articles and won six *R&D 100 Awards*.

This rich history, combined with the group's unique range of expertise and cutting-edge suite of customizable equipment, allows SLIDE researchers to provide complete solutions for today's most complex tribological research questions.

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