

# ARGONNE-DEVELOPED DIAMOND TECHNOLOGY CONTINUES TO BE AN INDUSTRIAL GEM

## THE CHALLENGE

A mechanical seal is a device that helps join systems or mechanisms together by preventing leakage (e.g., in a pumping system), containing pressure, or excluding contamination. In modern industrial society, mechanical seals are all around us — at our workplaces, in schools, in hospitals, etc.

Diamond, one of Earth's hardest materials, has the potential to improve mechanical seal reliability and performance. However, diamond is generally difficult to synthesize in thin films and even tougher to integrate with other materials. The controlled synthesis of materials as thin films is a fundamental step in the production of many technologies and products.

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## THE PIVOTAL DISCOVERY

Research at the U.S. Department of Energy's Argonne National Laboratory that began in the 1990s led to the invention of ultrananocrystalline diamond (UNCD®) technology.

UNCD® allows a material with the properties of diamond to be grown through a patented chemical vapor deposition process and rendered in the form of incredibly thin films for coating and sealing.

For nearly two decades, the technology has had a broad range of applications across many sectors, from industrial and electronic to mechanical and medical.

## THE IMPACT

- Three former Argonne researchers founded Advanced Diamond Technologies (Romeoville, Ill.), or ADT, in 2003 after licensing Argonne's UNCD® technology.
- ADT has become an industry leader in the development and application of diamond films.
- ADT co-founder John Carlisle returned to Argonne in 2016 and is now director of Chain Reaction Innovations (CRI), an entrepreneurship program in which hard tech innovators from across the U.S. embed for two years at Argonne to develop their technologies for market readiness.
- In 2019, John Crane, a global provider of engineered products and services headquartered in Chicago, purchased ADT's Industrial Division.

