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TechBriefs

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Benefits

- Method for graphite mold or lubricant removal from cast specialty-alloy metal parts
- Technology particularly suited for parts with complex geometry
- Replaces the use of molten salt baths and mechanical extraction methods

Applications

- Specialty metal alloy casting industry
- Specialty metal alloy foundry operations
- Nuclear fuel recovery

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Graphite Removal from Complex Metal Surfaces

Technology Overview

Savannah River National Laboratory has developed a method for digestion and gasification of graphite for removal from complex shapes and difficult-to-reach surfaces. The method can be used to remove graphite remnants from specialty-alloy castings. The method can be particularly beneficial in cleaning castings made using graphite mold materials or lubricants. The method employs a vapor-phase reactant that can avoid damage to the specialty alloy.

Description

Graphite mold materials and lubricants must be removed prior to delivery of the part to the customer. Traditionally, removal of the graphite has been carried out by immersion of the cast piece into a bath of molten salt at elevated temperatures (900 °F) for several hours. Even after treatment, small amounts of graphite can remain adhered, which then must be removed by physical means such as sand blasting, chipping, or drilling the debris away by hand. Such removal methods are frequently inefficient, particularly in those cases in which the piece has a complicated geometry. Molten bath cleaning also proves problematic as complete immersion of the piece is necessary, and this can prove particularly difficult when considering cleaning large, irregularly-shaped pieces. Furthermore, salt baths are inefficient in the use of salt to react with the graphite and result in large volumes of secondary waste.

Intellectual Property

Engineering-scale demonstrations have been performed for the digestion of graphite from nuclear fuel elements. The technology has been granted US Patent No. 9,623,371 (April 18, 2017), “Low Temperature Vapor Phase Digestion of Graphite.”