

Inventions & Innovation Project Abstract

Development of New Stainless Steel

Advanced Steel Technology, LLC is working together with a team from General Electric Power Systems (GEPS) and Universal Stainless & Alloy Products, Inc. (USAP) to develop an innovative martensitic stainless steel, A-521, as a high-strength fastener (bolt) material for use at moderate temperatures in turbine engines, including steam turbines, gas turbines, and aircraft engines. Their primary objective is to create a martensitic stainless (12Cr) steel with very high strength at moderate temperatures, which could replace the expensive, nickel-based, superalloy IN 718 in many fasteners applications. A secondary objective is to replace conventional 12Cr blades, buckets and shafts that operate at intermediate temperatures in turbine engines with stronger steel.

The composition of A-521 is specifically designed to produce excellent mechanical properties while integrating heat treatment steps into production. As a result, energy consumption is reduced by 31-54% during production compared to conventional materials, and costs are lowered. Successful development of A-521 would permit the installed cost of certain turbine engines to be reduced without sacrificing high availability or operational flexibility, thereby enhancing the global competitiveness of U.S. turbine engine manufacturers. Moreover, the domestic specialty steel industry would also benefit through increased productivity and reduced operating costs, while increasing their share of the international market for turbine engine fasteners, blades, buckets and shafts.



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