

Research on the development of non-destructive testing reliability evaluation technology for the localization of aircraft gas turbine engine materials

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Recently, many efforts are being made with government support to localize aircraft engine materials and parts. Super heat-resistant alloy materials and parts used in domestic aircraft engines are mostly imported from overseas due to the lack of aircraft engine quality certification and manufacturing facilities/technology and the lack of a material database for equivalence verification, resulting in a very high level of external dependence. Aircraft engine material parts operate in harsh environments of high temperature, high pressure, and high-speed rotation, and when damaged, they can result in loss of the aircraft and the lives of passengers. For this reason, strict management must be carried out from ingot manufacturing to finished product processing. Accordingly, securing reliability for the local production of aircraft engine materials and parts is of utmost importance. In this study, we aim to develop non-destructive testing reliability evaluation technology for local production of aircraft engine material parts. Non-destructive testing for superheat-resistant alloy ingots/billets/casting and forgings currently under development is mainly performed using ultrasonic testing using the water immersion method. Inspection of the state of the die forging product, which is the stage before final processing, must be conducted. We plan to manufacture step wedges for ultrasonic inspection and secure a sufficient database for non-destructive testing using simulation, and respond to OEM's strict requirements for first product quality qualification procedures. The study was supported by the Hanwha Aerospace and the Korea Planning & Evaluation Institute of Industrial Technology (RS-2023-00256058).