

# 초내열합금 INCONEL 783합금의 링압연 공정설계

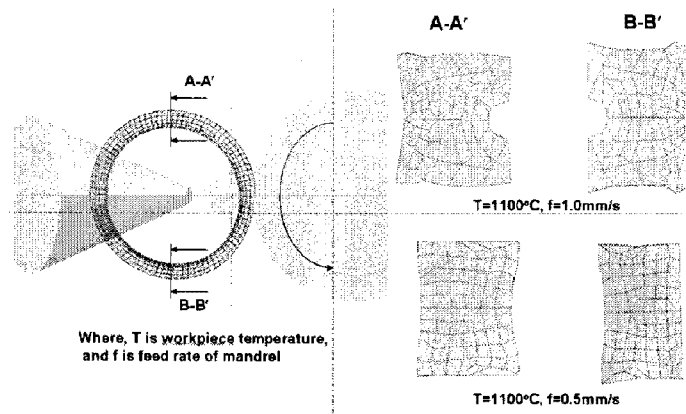
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## Process Design for Ring Rolling of INCONEL 783

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### Abstract

INCONEL alloy 783 was developed for gas turbine applications due to its low coefficient of thermal expansion and good high temperature properties. However, this alloy is rather difficult to form into a complex shape and uniform microstructure during hot forming processes because of its poor workability and large variation of microstructure with temperature, strain, strain rate etc. In this research, the ring-rolling designs for a large-scale ring product of INCONEL 783 were investigated by a calculation method and FEM analysis. The ring-rolling design includes geometry design (rolled ring dimensions, blank and billet size, etc) and optimization of process variables. An optimum process for the ring rolling was designed by FEM simulation and processing map approach, unifying the relationships between constitutive deformation behavior, hot workability and microstructures evolution. Through the processing map of INCONEL 783, the initial heating temperature of the blank was selected as 1100°C. FEM simulation parameters were selected at temperature lower than 1200°C and feed rate of mandrel less than 1.0mm/s by considering the ring-mill capacity. Finally, through the comparison of the simulation and experimental results, an optimum process condition for ring-rolling to manufacture sound and defects-free INCONEL 783 rings was suggested to be the heating temperature of 1100°C and the average feed rate of mandrel less than 0.5mm/s.



**Key Words** : INCONEL 783, Ring Rolling, FEM Analysis, Processing Map, Flow Instability

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