

SOLIDIFICATION OF AN ARTICLE EXTENSION
FROM A MELT USING AN INTEGRAL MANDREL
AND CERAMIC MOLD

Abstract of the Disclosure

A method for forming integral extensions on the end of directionally oriented, superalloy articles, such as airfoil blading members or other components used in gas turbine or other turbine engines. An extension is formed directly on an article by dipping a portion or end of the article having an attached integral mandrel into a molten bath of a compatible alloy, followed by withdrawal of the end under controlled conditions sufficient to cause an integral extension to solidify on the article. A ceramic mold is utilized over the dipped end of the article and the integral mandrel with a mold cavity that generally defines the shape of the extension to be formed. The mold may be formed *in situ* on the mandrel, or preformed and attached to the subject article over the mandrel. The integral mandrel is melted within the mold by dipping the mandrel into the molten alloy. The mandrel acts as a buffer between the molten material and the article while permitting melting of the article end and solidification of the integral extension. Extensions formed by the method of this invention have a microstructure that is continuous and compatible with that of the article. Such microstructures may include epitaxial growth of the extension from the microstructure of the article. The method establishes a temperature gradient within the article during solidification that may be further controlled by auxiliary heating and/or cooling of the article and/or extension during the practice of the method.

Figure 3A