

**STUDIES ON PRODUCTION AND CHARACTERIZATION OF  
CAST NIOBIUM ALLOYED AND NITROGEN ALLOYED  
AUSTENITIC STAINLESS STEELS**

**Ph.D. Thesis Submitted  
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**In partial fulfillment of the requirements  
of the**



**BHARATHIAR UNIVERSITY  
COIMBATORE-641 046  
for award of the degree of**

**DOCTOR OF PHILOSOPHY  
in the Faculty of Engineering**

**JUNE- 2014**

## ABSTRACT

Austenitic stainless steels are the most popular metallic materials due to their moderate cost, better performance, ease of fabrication and remarkable corrosion resistance. The excellent resistance to corrosion in various environments is due to the formation of highly protective surface film. In general elements such as Niobium, Titanium, Molybdenum, Vanadium, and Nitrogen are needed in various ratios along with Chromium, Nickel to provide improved corrosion resistance, better high temperature performance. In particular, Niobium is added to enhance the mechanical properties, reduce sensitization and consequent inter-granular corrosion whereas Nitrogen is added to enhance mechanical properties, to improve localized corrosion resistance in severe environments. These stainless steels with Nb and N contents can be produced wrought as well as casting routes. But, production costs of wrought stainless steels are high for small quantity requirement and unsuitable for readily usable parts of complex geometry.

Wrought materials has minor metallurgical defects like porosity and the same is welded during forming of wrought products and this results in different metallurgical properties for cast and wrought products. Hence, the present work focuses on the production and characterization of both Nb alloyed and N alloyed austenitic stainless steel by casting route using low cost air induction furnace.

Chapter one introduces us to the need for production and characterization of the Niobium alloyed and Nitrogen alloyed cast Austenitic Stainless Steels.

Chapter two deals with the literature survey. In this chapter, an overview of stainless steel is outlined encompassing types of corrosion behavior, wear behavior, role of alloying elements, production and heat treatment. Even though, enormous amount of literature are available on wrought alloys, limited literature