

## EFFECTIVE DESIGN USING TITANIUM

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### Summary

The effective and successful use of titanium requires the recognition, understanding and correct application of the unique combination of useful physical, mechanical and corrosion resistant properties which titanium possesses. These properties are considered in turn, and guidance is given to design for end use and fabrication, using available products and cost effective methods.

### Introduction

This paper identifies and details the principal factors to be considered in successful and effective design using titanium. These are, mechanical and thermal performance, corrosion resistance, practical aspects of fabrication and installation, product availability and price.

Titanium is light and strong and has a family of alloys offering forms and properties appropriate to a wide variety of applications and working environments. Choice of the correct alloy, product form and manufacturing route provide the means of achieving the lowest cost design. Successful use of the metal in heat exchangers and condensers has confirmed the parameters for effective heat transfer.

Titanium and its alloys are resistant to corrosion in a wide range of aggressive conditions. Outstanding resistance to seawater, brines, brackish waters and chlorides is of particular importance. Product availability is good in all of the industrially familiar semi-finished products and components. Fabrication techniques for machining, forming, welding and other processes are well understood, and whilst different in some respects to those used for other metals, are not to any significant extent more costly, nor more difficult to apply successfully.

The final section of this paper gives some background information on availability and price, and the correct approach to costing titanium in its role as an industrial metal of ever increasing importance.

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