The Development and Use of British Steel Bi - Steel

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ABSTRACT

Steel concrete steel composite construction can accommodate very high loadings, has two water tight faces, and can tolerate movement due to its ductility. In the past, application of this form of construction has been limited due to buildability problems associated with it, a lack of design guidance, and the absence of sufficient commercial impetus.

Over the past five years British Steel has invested several millions of pounds in manufacturing technology and the provision of design guidance for a unique steel concrete steel composite product, Bi - Steel. This comprises two steel plates held apart by, and welded to, a regular array of transverse bars. The resulting panels are factory produced to tight tolerances in flat or curved form, and provide a modular system which addresses the buildability issues.

KEYWORDS

Composite, steel, concrete, high strength, offshore construction, construction speed, pre-fabrication.

INTRODUCTION

World-wide, the pressure to design and construct structures that are environmentally acceptable whilst still being economically viable continues to grow. In addition the offshore industry has to cope with locations that are becoming increasingly remote, and environments that present greater physical challenges. As a result there must be continuous improvements in the methods of design, the manufacture, the form of construction products and the way in which they are fabricated into finished structures. Such improvements are usually incremental, and although they are important they are seldom significant.

Occasionally change is more dramatic and may result from the conventional approach having been pushed as far as it can go. If further progress is to be made then whole new methods or materials must be adopted. It is rare however for a material rather than a structural form to be the catalyst for significant steps forward. As it is an unusual occurrence, the assessment and exploitation of the benefits of a new material is often a long and slow process. Whilst steel and concrete have been used together in many ways over the years, the techniques employed have seldom taken full advantage of the respective strengths of both materials. Where they have then the construction costs have usually been too high to encourage wider use.

The purpose of this paper is to introduce to the offshore and polar engineering community a new way of combining these two well known and understood materials to produce what is effectively a new material, Bi - Steel. This offers, probably for the first time, an economically viable and constructable form of the steel concrete steel composite sandwich.

The structural benefits of such composites have been known for some time, but the problem of holding the two face plates in position during construction has been a major obstacle to use in projects. Having solved this problem, with the introduction of Bi - Steel, it is now possible for the offshore industry to seriously consider the use of steel concrete steel composite construction to overcome some of the challenges that it faces. The inherent strength of the composite form, the flexibility of a bespoke modular system and the opportunity to adopt new construction techniques that become available with Bi - Steel can offer significant advantages to this demanding engineering sector.

The aim of this paper is to stimulate engineers and designers to consider how the assets of this new material can be positively applied to improve structural efficiency and reduce both construction and whole life costs as we move forward into the next millennium.