



# Parameter Analysis on Double-side Welded Connection of Orthotropic Steel Decks Based on Structural Stress

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## Abstract

Rib-to-deck welded connections of orthotropic steel decks(OSD's) are prone to fatigue problems and the new type of double-side welded connection is applied for optimization. To further reveal transformation mechanism of fatigue mode, the geometrical parameters of double-side welded connection are analysed based on structural stress method. The results show that, compared with other parameters, the thickness of deck brings the greatest impact on the structural stress at the concerned position, but does not change the fatigue failure mode. The fatigue mode of double-side welded connection is related to both internal and external weld size, and the external weld size should be controlled within a certain range relatively. For the basic structure analyzed, when the external weld size is 4mm, 6mm, 8mm and 10mm, the internal weld size shall not be less than 1.5mm, 1.5mm, 3mm and 4.5mm respectively.

**Keywords:** OSD's; structural stress; double-side welded connection; parameter analysis.

## 1 Introduction

OSD's are mainly composed of deck, longitudinal ribs and transverse ribs (transverse partition), and the longitudinal and transverse stiffening ribs are welded on the lower surface of the deck cover to form a structure to bear the wheel load together<sup>[1,2]</sup>. Compared with traditional bridge deck, OSD's could make better use of the mechanical properties of the

material, has the advantages of light weight and high strength, wide range of application, easy construction, etc. and is widely used in large span bridges. The structural system and the forming method contribute a lot to outstandingly advantageous of OSD's, but at the same time the construction is complex, with many welds and fatigue cracking problems<sup>[3-4]</sup>. According to research based on 7000 OSD's with closed longitudinal rib in