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A Study for Root Shape and Welding Procedure of Welded Joint with Backing Strip

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Abstract

Misalignment to misfitting have been investigated as initial imperfections of welded joint in steel deck plate of bridge or offshore structure. It is known that stress and strain concentration occur at root of welded joint with misalignment as a moment occurs at the welded joint with misalignment by applied force. However, it is hard to avoid misalignment in field welded joint of steel bridge or offshore structure. The welded joint with backing strip is often used for field-welding of closed U-shape trough rib which is fabricated with overhead or vertical welding. Stress flows are disturbed at the welded joint with backing strip. According to bending fatigue test and tensile fatigue test cracks are initiated from the root of welded joint. It has been known that stress concentration becomes smaller when the root of welded joint becomes smoothly.

This paper deals with welding procedure in order to smooth root shape of welded joint with backing strip. Preliminary experiment is performed by TIG welding which investigate to influence of deposited metal and heat input. Semi-automatic Arc Welding and MAG pulse welding is carry out to investigate application for welded joint.

The major findings can be summarized as follows;

1. Both TIG welding and Semi-automatic Arc Welding are improved root shape when width of fusion becomes narrower in backing strip or width of fusion becomes wider in base metal.
2. The root shape becomes well in TIG welding of overhead position when deposited metal is increased at weld metal or depth is shallow fusion at backing strip.
3. The root shape is improved as groove angle is widely and torch has forward angle from ovehead position of the Semi-automatic Arc Welding.
4. The root shape is smooth when the groove angle becomes widely and torch is weaved on vertical up welding of the Semi-automatic Arc Welding, but vertical down welding is bad root shape. However, the root shape is fairly well in the vertical up of MAG pulse welding.
5. Root radius 1.5mm and root angle 132 degrees are obtained at 70 degrees groove angle and forward angle of overhead position, and root radius 0.8mm and root angle 128 degrees are made from 70 degrees groove angle and vertical up welding when misalignment is 2mm at the welded joint with backing strip respectively.