PRINT ISSN : 0289-8063

STRUCTURAL ENGINEERING / EARTHQUAKE ENGINEERING

Vol. 20 (2003) , No. 1 pp.55s-67s

FATIGUE BEHAVIOR OF ALUMINUM DECK FABRICATED BY FRICTION STIR WELDING

Ichiro OKURA[1)], Nobuyasu HAGISAWA[2)], Makoto NARUO[3)] and Hitoshi TODA[4)]

1) Department of Civil Engineering, Osaka University
2) Research & Development Center, Nippon Light Metal Co., Ltd.
3) Dept. of Bridge Design, Aichi Works, Ishikawajima-Harima Heavy Industries Co., Ltd.
4) Bridge & Road Construction Division, Ishikawajima-Harima Heavy Industries Co., Ltd.

(Received: May 16, 2002)

An aluminum deck was fabricated by joining hollow extrusions with the friction stir welding (FSW). The purpose of this study is to make clear the fatigue behavior of the deck. First the material properties of the aluminum alloy used and the FSW region were investigated. Next a fatigue test was carried out for the deck, showing that a fatigue crack was initiated along the FSW-joining line of the top plate just under the load due to the plate-bending stress. Further fatigue tests were conducted for the beam-type specimens, revealing that where the supporting interval of the deck became large, a fatigue crack was caused perpendicularly to the FSW-joining line of the bottom plate by the membrane stress due to the global bending moment.

Key Words: aluminum alloy, deck, friction stir welding, extrusion, fatigue

doi:10.2208/jsceseee.20.55s
JOI JST.JSTAGE/jsceseee/20.55s