

Mechanical testing of flow-drill bolt joints for abrasion resistant steel applications

M. Hietala^{1, a)}, M. Keskitalo^{1, b)}, A. Järvenpää^{1, c)} and K. Mäntyjärvi^{1, d)}

¹University of Oulu, Kerttu Saalasti Institute, Future Manufacturing Technologies (FMT), Pajatie 5, FI-85500 Nivala, Finland

^{a)}mikko.hietala@oulu.fi

^{b)}markku.keskitalo@oulu.fi

^{c)}antti.jarvenpaa@oulu.fi

^{d)}kari.mantjarvi@oulu.fi

Abstract. The paper present an experimental study of usability of a flow-drill bolt joints in ultra-high-strength abrasion resistant steel structures. Test material was 2 mm thick ultra-high-strength abrasion resistant steel. The bolt joint size in this study was M8 x 1.25 mm and flow-drilling and threading were made using a CNC machine. The shear strength and fatigue resistance of a single flow-drill bolt lap-joints were investigated. The maximum tightening torque of the joints was tested. The shear strength and fatigue resistance of the joints were tested with an instrumented hydraulic loading machine. The shear strength tests showed promising results of the properties of the flow-drilled joints compared to traditional threaded bolt joints. The fatigue resistance of the joints showed that flow-drill bolt joints are usable in dynamic loading conditions. The failure mechanism of the bolt joint is presented in this paper.