Development of a DC-LSND Welding Process for GMAW on DH-36 Steel

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The reduction of weld induced distortion has become an important focus of research for the shipbuilding industry with the continuing trend of using thinner plates in the ship's hull and super structure. This paper investigates the use of an active cooling process known as Dynamically Controlled – Low Stress No Distortion (DC-LSND) Welding on medium thickness (5 to 6 mm) DH-36 steel. Thermal profiles are obtained. Hardness, distortion and residual stress measurements are also achieved. Results show that the application of a localized cryogenic cooling source trailing the welding arc can significantly reduce weld induced distortion and residual stress using the GMAW process. And welds done by DC-LSND process show a hardening and brittle tendency. The effect of forced cooling on the weld microstructure is also observed.

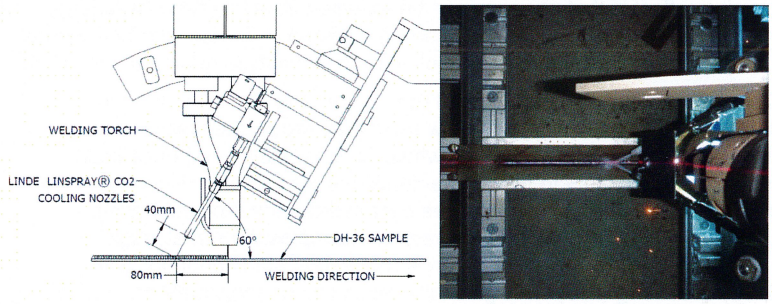

Figure: Setup of trailing heat sink: (a) Sketch of experimental setup; (b) Plan view of experimental setup with CO_2 cooling turned on and shielding device