TEMPER BEAD WELDING (TBW) APPLICATIONS TO AVOID POST WELD HEAT-TREATMENT (PWHT) PROCESS AT WELDING JOINT TUBE STUB TO PIPE HEADER - PRESSURE PART BOILER IN PT. DINAMIKA ENERGITAMA NUSANTARA – SURABAYA

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ABSTRACT
PT. Dinamika Energitama Nusantara (DEN) is a local company with global access that moves on the field of Steam Generator. Currently, PT. DEN is Stoker Boiler manufacturing. In accordance with the Inspection and Test Plan (ITP) in PLTU Maluku Utara 2x7 MW Project, the Wall Header got special treatment, namely the process of PWHT. According to the Welding Technology Institute of Australia (WTIA), one way to avoid PWHT process is a Temper Bead Welding (TBW) technique. TBW technique was developed to simulate the effect of tempering at the PWHT.

The material used is plate SA 36 as a test coupon for the manufacture of WPS and PQR, and 3 sets of tube SA 192 connection with a pipe SA 106 gr.B. Welding process is carried out GTAW and SMAW. The variable used is a non-PWHT, PWHT and TBW. From the existing literature, conducted testing of macro, micro testing, hardness testing and simulation of residual stress using the finite element method (FEM) to each set of the workpiece to see the difference between the three.

The results obtained from the welding data plate workpiece is a document WPS and PQR for TBW techniques. Judging from the results of the macro test, the three objects with a variable non-PWHT, PWHT and TBW there is incomplete fusion defects and slag inclusions, but does not indicate cracks. Judging from the results of the test micro, micro structure of the HAZ on the non-PWHT object is greatest among other objects. For the PWHT object, visible structures in the HAZ region more evenly from fusion line to the base metal. While on TBW object visible granules HAZ region structure is still so great with getting closer to fusion line. Judging from the results of hardness test, the Non-PWHT object to be impaired due to the treatment process PWHT. Percentage decrease in violence on average 10.14% in the weld crown area. While the TBW technique, the percentage decrease in the average hardness 5.01% in the crown area. Judging from the results of FEM simulations, the value of residual stress in a non-PWHT object is immense. With the enactment of TBW techniques, it can reduce the value of residual stress from the large 8.65 MPa end of a 3.02 MPa.

Key words: PWHT, TBW, Macro test, Micro test, Hardness test, Finite Element Method (FEM).