

MODELING AND SIMULATION OF MECANO-WELDING PROCESS FOR TUBULAR SECTIONS

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ABSTRACT

Mecano-welding process for tubular sections is proposed for an alternative process of moulding a large crown of Francis turbine to reduce manufacturing cost and time. It would be achieved by welding several conical segments produced through conical roll bending. The first stage is the conical roll bending from a plate with cylindrical or conical rolls. For the purpose of using cylindrical rolls or reusing the existing conical rolls of the kinematical conical roll bending process for non-kinematical conical roll bending process, attachments were proposed in order to reduce the velocity at the top edge of the plate. During the second stage the gas metal arc-welding is used to join the gap of the bent cone. The process is modelled and simulated under the well-known ANSYS and ANSYS/LS-DYNA environment. Explicit time integration scheme is used in ANSYS/LS-DYNA for simulating the roll bending and implicit time integration scheme is used in ANSYS for simulating the welding. Stress analyses, particularly in the welded zone, are performed.

KEYWORDS

Simulation, Mecano-welding, Roll bending, Large deformation