

Active Exploration of Weld Distortion Scenarios on Digital Twin.

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The familiar CSA W59 (or equivalent AWS D1.1) reference standard for welded structures commits contractors for submitting an effective distortion control plan where welds shall be made in sequence such as to minimize distortion and welding heat shall be balanced. These are all requirements, but standard presents no solutions on how to achieve them. Typically, plans to control weld distortion are therefore mostly intuitive with welding engineers relying on their experience combined with the results of a limited number of practical tests. An alternative with modern computing is a digital twin of welding process on a structure allowing engineers to efficiently optimize welding scenarios without the need for multiple physical samples. Digital twins that are entirely constructed on simulation tools are yet limited by computational time and therefore not mature for practical designs. To this end, we built and integrated machine learning (ML) algorithms with the simulation capability for active exploration of various welding scenarios in real time. We present an example of our algorithm implemented in a real welded structure project.

Target audiences: Engineering Managers, Production Engineers, Weld Designers, Standards Committees, Welding Engineer Consultant, R&D personals, Technical Government Officials, Project Managers.

Key Learning: The audiences will be learning about the trend in welding distortion engineering using advanced techniques that enable engineers for weld sequence design and finding the best sequence out of many possibilities as fast as real-time.