

Submission Title (200 characters limit)

Rapid Adaption of Modern Technologies for Automated Welding of Pressure Equipment

Content Submission Summary (1500 characters limit)

The safe reliable operation of facilities and pressure equipment is central to modern integrity management programs. Across various energy industries (e.g., mining, power generation, oil sands, oil, and gas, etc.), pipe/vessel welding and fabrication are essential to constructing and repairing equipment assets. Historically, manual welding has been used extensively; however, with consideration of chronic skilled labour shortages and lack of uptake of the welder trade, there are current and projected future gaps in welder trade supply. As a result, welding automation technologies are necessary to help fill the void in labour supply in a safe, reliable fashion. This presentation will identify modern best practices for pressure equipment welding and explore the evolution of automation technologies, including mechanization, collaborative robots (cobots), artificial intelligence (AI), and the smartisation of pipe/vessel welding. A case study of all these modern technologies in-use by industry will be presented and demonstrate how automated welding of pressure equipment has evolved.

Content Submission (3000 characters limit)

Energy assets and facilities require reliable fabrication and construction of pressure equipment to ensure safe operations (e.g., mining, power generation, oil sands, oil and gas, etc). Using modern welding processes and automation technologies significantly improves productivity and enhances weld quality, especially with artificial intelligence tools. This talk presents how welding automation of pressure equipment has evolved in recent decades, including a holistic review of modern welding automation for pressure equipment with built-in intelligence. The presentation covers:

- 1) Trend of 'Automation' for Welding:** an overview of the spectrum of welding evolution toward modern welding under welding 4.0.
- 2) The Role of the Workforce:** successful implementation requires a skilled workforce; to that end, the presentation will review the roles of welders, welding operators, shop supervision.
- 3) How a Welding Cobot is Different:** how cobots (collaborative robots) allow the worker to safely work with the robot, side-by-side, to enhance reliability and quality of both human and machine will be reviewed.
- 4) The Smartisation of pipe/vessel welding:** a review of Artificial Intelligence (AI) and Machining Learning will explore these "game-changer" technologies for welding automation – in particular, the rapid response to and correction of welding inconsistencies real-time like a welder.
- 5) Case study – pipe welding:** a detailed case study will explore the application of a cobot for pressure pipe welding applications, and how AI and other modern technologies have enhanced welding quality, lowered repair rates and enhanced weld mechanical properties.

The presentation and case study will highlight these important factors and identify potential pitfalls if best practices are not implemented. The focus will be on emerging trends and technologies for modern automation solutions for pressure equipment fabrication and construction in the energy sector.

Presenter's Biography (1200 characters limit)

Matthew Yarmuch MSc, PEng, IWE is a professional materials and welding engineer, involved in engineering consulting, training, and product development. Matthew is a University of Alberta graduate BSc (Materials Engineering) and MSc (Welding Engineering), and remains involved as an Adjunct Professor at the U of A.

Matthew is the Founder/President of MattCo Engineering Solutions Inc. and their consulting practice includes areas of materials/welding engineering, quality systems, and product development. Matthew has also trained and mentored many past students towards various certifications and professional development.

Matthew is the Chair of the Alberta Welder Optimization Committee (AWOC) and Scholarship Chair of the AWS Alberta Section. He is also active in multiple code committees and local technical societies.

Co-Author(s)

Mahyar Asadi, VP Innovations – Novarc Technologies

Ringo Gonzalez, Director of Welding Innovations – Novarc Technologies

Todd, Welding Technician – Novarc Technologies

Special Considerations

n/a

Additional Information/Presenter Requirements

n/a

Content Submission Title *(required)*

200 characters maximum. You have 200 characters left.

Content Submission Summary *(required)*

1500 characters maximum. You have 1500 characters left.

Content Submission *(required)*

3000 characters maximum. You have 3000 characters left.

Content Presenter's Biography *(required)*

1200 characters maximum. You have 1200 characters left.

Co-Author (if applicable)

Special Considerations

1000 characters maximum. You have 1000 characters left.

Additional Information/Presenter Requirements

1500 characters maximum. You have 1500 characters left.

Format/Style of Session *(required)*

- Virtual In-Person Hybrid (both in-person and virtual)