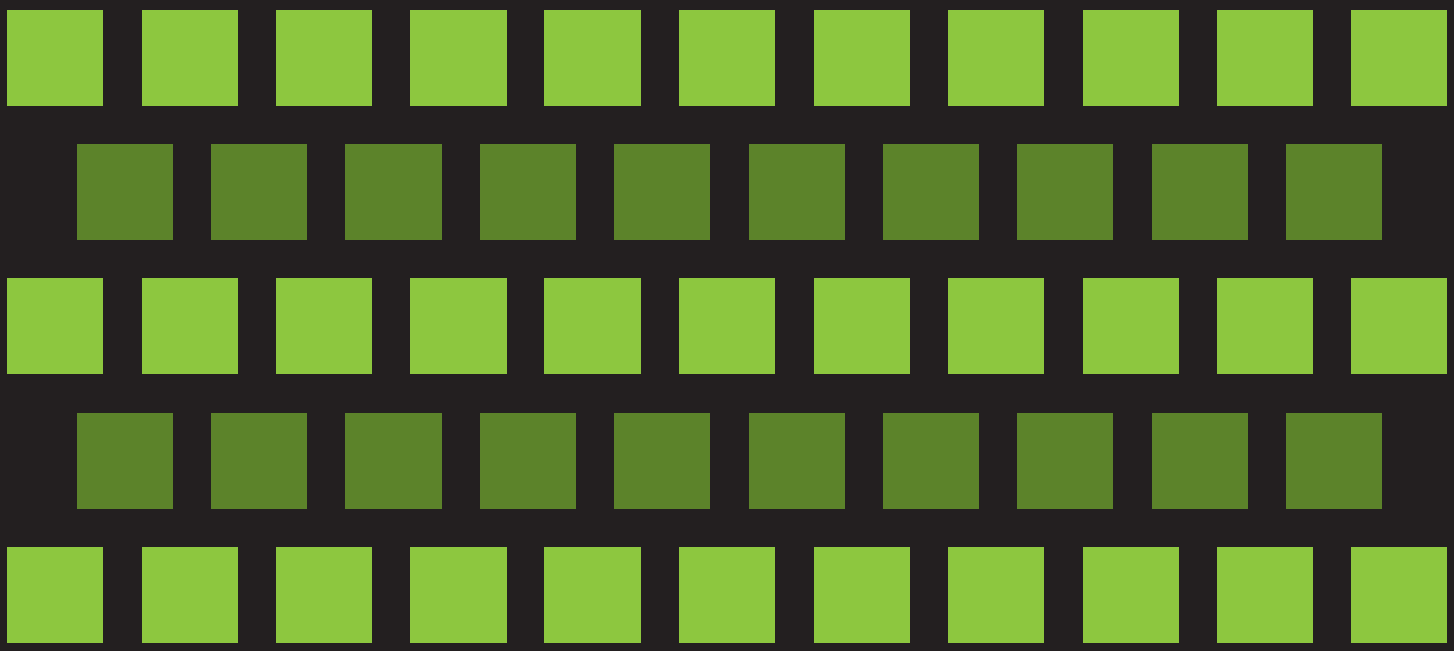
STP-PT-058

TEMPER BEAD QUALIFICATION HARDNESS ACCEPTANCE CRITERIA



ASME STANDARDS TECHNOLOGY, LLC

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TEMPER BEAD QUALIFICATION HARDNESS ACCEPTANCE CRITERIA

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FOREWORD

Part I – Review of Controlled Deposition Repair Literature

Where repairs to steel fabrications are required, but where a subsequent Post-Weld Heat Treatment (PWHT), although desirable, is impractical, as a result of constraints of cost, time or feasibility, it may be appropriate to carry out a controlled deposition repair, which generates a fine-grained Heat-Affected Zone (HAZ), by judicious choice of welding parameters and welding procedure. For some applications, the resulting maximum HAZ hardness is of interest and potential concern. Published literature on controlled deposition repair welding in C-Mn and low alloy steels by different welding processes has been reviewed, and the resulting maximum HAZ hardness values have been tabulated.

Part II – Experimental Program

Repair welding without a subsequent PWHT is allowed in various ASME fabrication codes, but is not currently allowed for P4 and P5A steels. The present project was undertaken to determine reasonable upper limits for the HAZ hardness produced during controlled deposition Shielded Metal Arc Welding (SMAW) repairs in these two steels, and also to investigate whether there is any correlation between HAZ hardness and HAZ impact toughness. The project was supported by ASME Pressure Technology Codes and Standards (PTCS) and was carried out by TWI Ltd, in collaboration with Rolls-Royce plc, who supplied the parent steels and welding consumables, and performed all of the welding on the project.

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