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Spotlight on *Structures*

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The Featured Article, chosen by Editor-in-Chief Leroy Gardner, is about the effects of geometric and metallurgical constraints on ultra-high strength steel weldments.

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Editor's Featured Article

The effects of geometric and metallurgical constraints on ultra-high strength steel weldments

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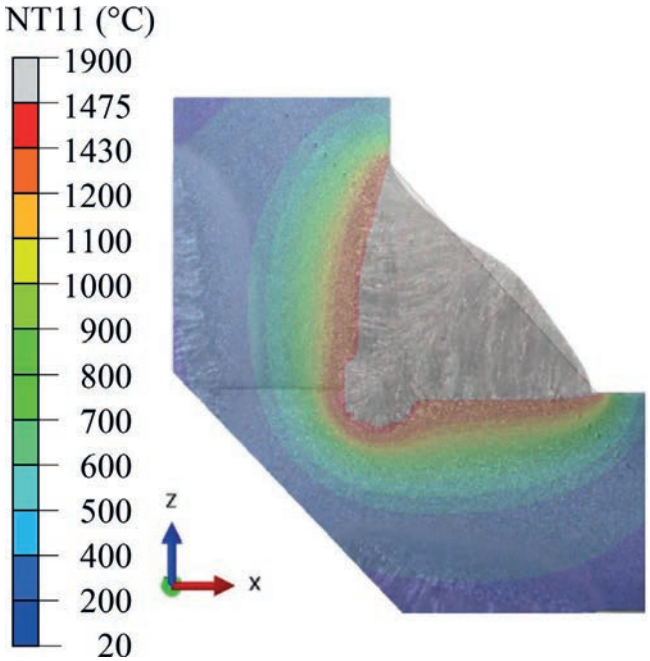
The effect of geometric and metallurgical constraints on the ultimate capacity of weldments manufactured from direct-quenched (DQ) ultra-high strength steel (UHSS) is studied using numerical calculations. In addition, experimental tests are conducted to prove the phenomena in practice. DQ steels behave differently under static loading, especially their weldments, compared to the same-strength class steels, which are manufactured using different alloying and fabrication techniques. In these steels welding generates a distinct softened region at the heat-affected zone (HAZ), which, in certain conditions, can influence the ultimate load-carrying and elongation capacity of the weldment. Metallurgical constraints can form in welds where the soft zone is adjacent to zones with higher strength. Moreover, the current study shows that not only metallurgical constraints, but also geometric ones, can strengthen weldments depending on the joint type. Removing the geometrical constraints from weldments slightly reduces the ultimate load-carrying capacity, while a remarkable reduction is seen in the elongation capacity of the joint. Numerical analysis conducted for non-load carrying X-joints indicates that as the width of the soft zone increases, the effect of the geometric constraint diminishes. Thus, it appears that geometric constraints can, in certain cases, prevent the detrimental effect of strain localization from occurring in the soft regions in at the HAZ. This mechanism seems to increase both the ultimate load-carrying capacity and ultimate elongation of weldments.

→| Read the full paper at **https://doi.org/10.1016/j.istruc.2023.104900**



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