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OPTIMIZATION ANALYSIS OF CONTROLLED COOLINGPORCESS FOR H-SHAPE STEAM BEAMS

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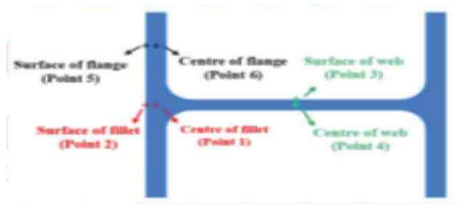
研究重點

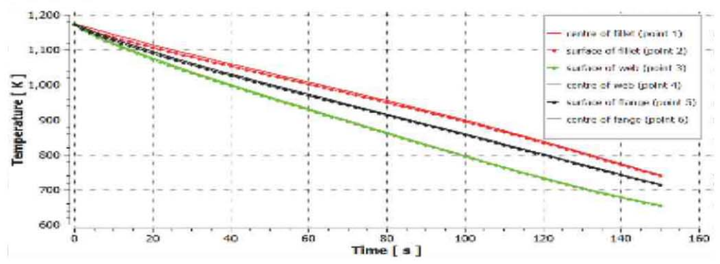
In order to improve the comprehensive mechanical properties of the steel, the cooling rate and the temperature distribution must be controlled in the cooling process. A three-dimensional numerical model for the prediction of the heat transfer coefficient distribution of H-beam in the controlled cooling process was performed in order to obtain the uniform temperature distribution and minimize the maximum stress and the maximum deformation after the controlled cooling. An algorithm developed with a simplified conjugated-gradient method, was used as an optimizer to optimize the heat transfer coefficient distribution. The numerical results showed that, for the case of air cooling 5 seconds followed by water cooling 6 seconds with uniform the heat transfer coefficient , the cooling rate is 15.5 (℃ /s) , the maximum temperature difference is 85℃, the maximum the stress is 125 MPa, and the maximum deformation is 1.280 mm. After optimize the heat transfer coefficient distribution in the control cooling process with the same cooling time, the cooling rate is increased to 20.5 (℃/s), the maximum temperature difference is decreased to 52 ℃ , the maximum stress is decreased to 82MPa and the maximum deformation is decreased to 1.167mm.

研究成果

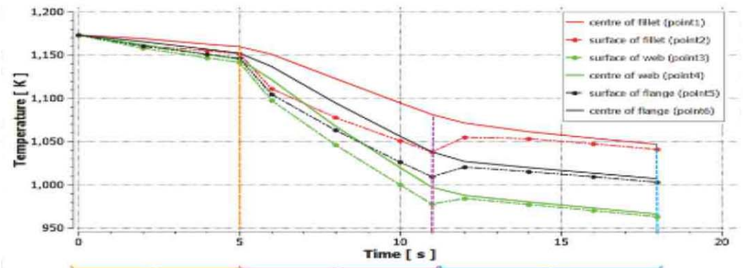
(a) the temperature curve of the points with time by three cooling method



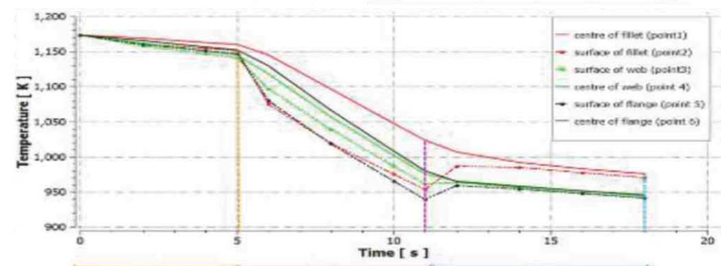
case 1



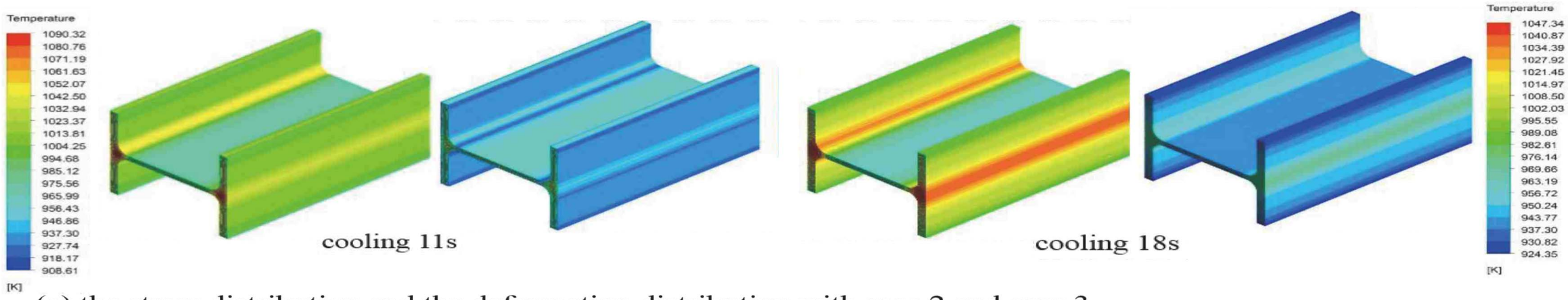
case 2



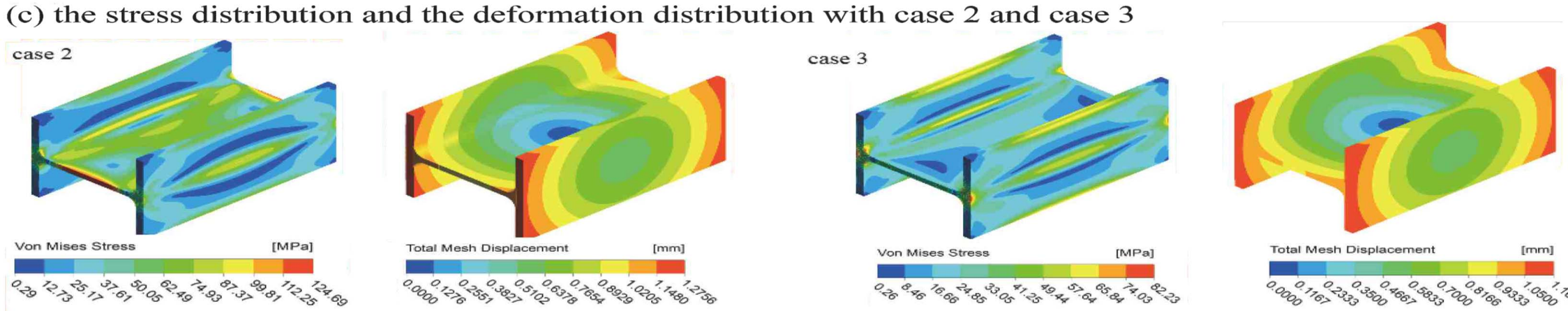
case 3



(b) the temperature distribution of case two compare with case 3



(c) the stress distribution and the deformation distribution with case 2 and case 3



研究生活及心得

儘管在研究過程中會遇到各種困難，但做研究的過程是充實的，很享受徜徉在知識海洋裡的感覺，也很喜歡和老師、學長、學弟學妹一起討論的氛圍，所有的酸甜苦辣對我來說，就像是一種不同的人生經歷，亦是恩賜。因此，要感謝我指導教授的細心教導，感謝學長學弟學妹們在我生活和學習中的幫助和支持以及中技社對我的認可，我會繼續努力，保持學習的積極性，以取得更好的成果。

財團法人 中技社 CTCI FOUNDATION