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Fixture layout optimization for multi point respot welding of sheet metals
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Abstract
The high quality of welding in the automotive industry is achieved by proper positioning of the fixture elements. A new method, N-3-2-1 (N ≥ 1), is proposed for fixture layout optimization of sheet metals. The flexible nature of the sheet metals requires N+3 fixture elements to constrain it normal to the surface (primary plane), but 2-1 fixture elements for other two directions (secondary and tertiary). The objective function is to achieve high stiffness of the workpiece and is calculated in terms of strain energy. Finite element analysis (FEA) was combined with genetic algorithm. A method was also proposed to find the optimum fixturing position of the workpiece in multipoint respot welding operation. Two different kinds of case studies were solved and the performance of the proposed method was also tested in the industrial scenario by fixturing the workpiece and completing the respot welding operation with satisfactory results. © 2018, The Korean Society of Mechanical Engineers and Springer-Verlag GmbH Germany, part of Springer Nature.

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