

Design of Welded Lap Joint

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1 Introduction

This report presents the design of a welded lap joint for connecting two plates of width w and thicknesses t_1 and t_2 . The joint is designed to withstand a tensile force P while complying with IS 800:2007 standards.

2 Problem Statement

The objective is to design a welded lap joint that connects two plates of width w and thicknesses t_1 and t_2 . The joint must withstand a tensile force P while ensuring the following:

- The weld size and material grade conform to IS 800:2007.
- The connection strength is greater than the tensile force P .
- The efficiency of the connection is near 1.
- The length of the connection is minimal.

3 Methodology

The design process involves the following steps:

1. Select the plate grade with the lowest yield strength.
2. Calculate the required weld size based on the plate thickness.
3. Calculate the weld length required to withstand the tensile force.
4. Compute the connection strength and efficiency.
5. Ensure the design complies with IS 800:2007 standards.

4 Input Parameters

The input parameters for the design are:

- Plate thicknesses: $t_1 = 10$ mm, $t_2 = 12$ mm
- Plate width: $w = 200$ mm
- Tensile force: $P = 500$ kN

5 Results

The results of the design are as follows:

- Weld Size: 10 mm
- Weld Material Grade: E250
- Weld Length: 200 mm
- Connection Strength: 500 kN
- Yield Strength of Plates: 250 MPa
- Length of Connection: 200 mm
- Efficiency: 1.0

6 Conclusion

The designed welded lap joint meets all the specified requirements, including compliance with IS 800:2007 standards. The connection strength is sufficient to withstand the tensile force, and the efficiency of the connection is optimal.