# Osdag
## Open steel design and graphics

# Design Problems

- Take help from the video tutorials stored on your desktop.

- Consider $f_y = 250$ MPa, $f_u = 410$ MPa, and $E = 200$ GPa, if not specified

- For any additional assumption you need to make, please add it on the **LiveFeed** form available on the browser.

- Please insert as many comments as you want in the **LiveFeed** form. Use the **Add comment** button to put more than one comment.

- Please **tag** every comment based on the category/topic it belongs to. You can use multiple tags for one comment, if necessary.

- You can also put comments based on the results of the design process.

- All submissions, as asked in the problem, will be through this **LiveFeed** form.

## Set 1 (June 04)

1. Design a **fin-plate** shear connection between a beam of ISMB 400 and the *flange* of a column of ISSC 200. The beam carries a *factored* shear force of 160.0 kN. Use M20 HSFG bolts of grade 8.8. Submit a **design report** for this connection using **Osdag**. The design report should carry your and your company's/institution's name. Submit the **message log** of the whole design process (all iterations). Do you think that the connection design is economic? If not, where do you find scope for further improvement (economisation)?

2. Design a partial depth **end-plate** shear connection between a beam of ISMB 400 and the *web* of a column of ISSC 250. This connection should transfer a shear force of 160.0 kN. Use HSFG bolts of grade 8.8. Submit a **design report** for this connection using **Osdag**. Create an **AutoCAD drawing (.dwg)** of this connection showing at least two views with all the necessary dimensions. Label the drawing properly and submit the **.dwg** file.

# Set 2 (June 05)

3. Design a **cleat-angle** shear connection between a primary beam of ISMB 450 and a secondary beam of ISMB 300. The secondary beam carries a factored shear force of 100.0 kN. Use Black Bolts of grade 4.8. Submit the **design report**. What are the utilisation ratios (demand to capacity ratios) for the bolt group in the secondary beam and in the primary beam? For the bolt group connected to the secondary member, which failure governs their strength? Submit an **editable image (.svg)** for the front view (XY/Section C-C), after changing the cleat angle's label colour to green.

4. Check the safety of the connection shown in the following figure. This connection is supposed to carry a factored shear force of 200.0 kN. If the connection is inadequate, report all the problems in the design and detailing shown here, and redesign it to a safe connection using **Osdag**. Submit the **design report**.
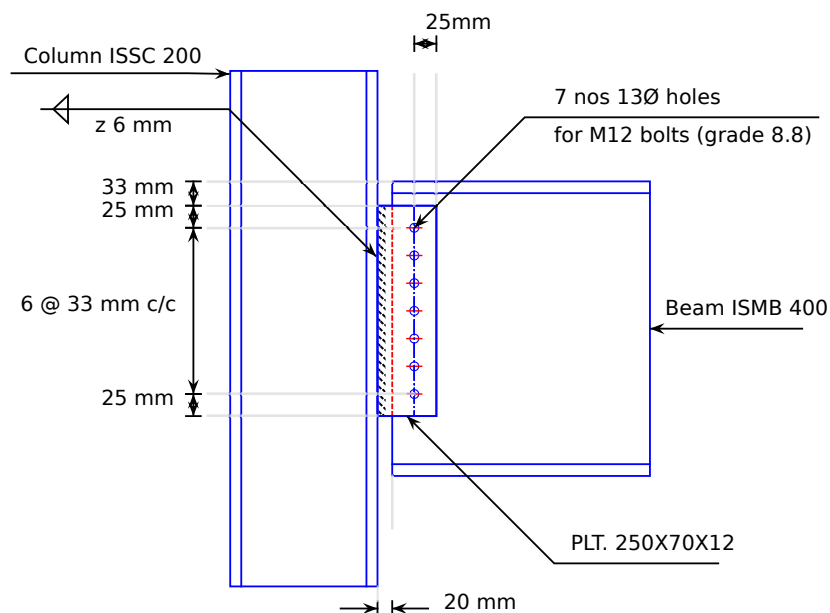


Figure 1: Front view of the connection (for Question 4)