Introduction

Osdag is a cross-platform free and open-source software (GNU (LGPL) Version 3) for the design (and detailing) of steel structures, following the Indian Standard IS 800:2007. It allows the user to design steel connections, members and systems using a graphical user interface. The interactive GUI provides a 3D visualisation of the designed component and an option to export the CAD model to any drafting software for the creation of construction/fabrication drawings. The design is typically optimised

This software is expected to

◆ Provide hands-on design experience for college students, and thus creating tomorrow’s designers familiar and confident with steel design
◆ Provide practical design experience for (new) practising engineers
◆ Work as a teaching tool helping technical/engineering college teachers teaching undergraduate and postgraduate courses on steel design
◆ Integrate easily with modern ICT-based teaching techniques and distant learning methods

Osdag Modules *

◆ Connection
◆ Tension Member
◆ Compression Member
◆ Flexural Member
◆ Beam-Column
◆ Plate Girder
◆ Truss
◆ 2D & 3D Frame
◆ Group Design

*All modules are not available in the current version of Osdag

Osdag is supported by: Ministry of Education Govt. of India
Features

Osdag GUI

Osdag has an interactive graphical user interface with text-validated fields grouped according to the design flow. The design window GUI consists of ‘Input dock’, ‘Output dock’, ‘CAD window’ and ‘Message window’ along with a menu bar at the top.

CAD Model

The interactive ‘CAD window’ displays a 3D CAD model, which provides a clear visualisation of the designed component. You can pan, zoom and rotate the model or view each of the sub-components separately. The created CAD model can be saved into various formats such as IGS, STL, STEP, and BREP.

Optimized Design

Users can obtain the optimum design for a given scenario, from a suite of available options in terms of steel sections (e.g., different channel sizes and plate thicknesses) and connectors (e.g., bolts of different grades and diameters). The optimum design is selected based on the total volume of material and this design solution is detailed in the output dock and design report. Alternatively, one can perform a design check with a specific set of single inputs/selections in the 'Customized' option. In this case, Osdag will inform if the design checks are satisfied and suggest changes otherwise.
A text window for message display provides the status of the design, but more importantly it also suggests necessary changes if a trial design is found unsafe. This part of the GUI displays colour-coded error/warning messages and also suggests possible rectifications, all of which can be saved for a design session.

### Design Report

<table>
<thead>
<tr>
<th>Company Name</th>
<th>IIT Bombay</th>
<th>Project Title</th>
<th>Sample Connection Design</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group/Team Name</td>
<td>Osdag</td>
<td>Subtitle</td>
<td>Beam-Column End Plate</td>
</tr>
<tr>
<td>Designer</td>
<td>Engineer #1</td>
<td>Job Number</td>
<td>1.2.2.1.1.1</td>
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<tr>
<td>Date</td>
<td>18/12/2020</td>
<td>Client</td>
<td>Sonmath Mulkerjee, MN Daustar, Kolkata</td>
</tr>
</tbody>
</table>

#### 2.6 Detailing

<table>
<thead>
<tr>
<th>Check</th>
<th>Required</th>
<th>Provided</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Min. Pitch Distance (mm)</td>
<td>$p_{\text{min}} = 2.5d$</td>
<td>60</td>
<td>Pass</td>
</tr>
<tr>
<td></td>
<td>$= 2.5 \times 24.0$</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>$= 60.0$</td>
<td></td>
<td></td>
</tr>
<tr>
<td>[Ref IS 800 : 2007, Cl. 10.2.2]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max. Pitch Distance (mm)</td>
<td>$p_{\text{max}} = \min(32.0, 300 \text{ mm})$</td>
<td>300</td>
<td>Pass</td>
</tr>
<tr>
<td></td>
<td>$= \min(32.0, 300 \text{ mm})$</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>$= 300$</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Where, $l = \min(25.0, 25.0)$</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>[Ref IS 800 : 2007, Cl. 10.2.3]</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Min. End Distance (mm)</td>
<td>$e_{\text{min}} = 1.5d$</td>
<td>30.0</td>
<td>Pass</td>
</tr>
<tr>
<td></td>
<td>$= 1.5 \times 24.0$</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>$= 30.0$</td>
<td></td>
<td></td>
</tr>
<tr>
<td>[Ref IS 800 : 2007, Cl. 10.2.4.2]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max. End Distance (mm)</td>
<td>$e_{\text{max}} = 12.1 \times (e = \frac{250}{L})$</td>
<td>40</td>
<td>Pass</td>
</tr>
<tr>
<td></td>
<td>$c_1 = 12 \times 25.0 \times \frac{250}{250} = 278.54$</td>
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<tr>
<td></td>
<td>$c_2 = 12 \times 25.0 \times \frac{250}{250} = 278.54$</td>
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</tr>
<tr>
<td></td>
<td>$e_{\text{max}} = \min(c_1,c_2) = 278.54$</td>
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<td></td>
</tr>
<tr>
<td>[Ref IS 800 : 2007, Cl. 10.2.4.2]</td>
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</tr>
</tbody>
</table>

Osdag creates a professional design report with:

- Design and detailing checks as per IS 800:2007
- Overall design summary
- Standard views
- Customisable header
- Designer’s remarks
- Details of the section pertaining to its geometric and mechanical properties
- Selected design preference(s)
- Log messages
The Osdag website contains helpful resources for the user:

- Installers
- Video Tutorials
- Sample Design Problems
- User Tools
- Developer Tools

Osdag’s YouTube channel provides video tutorials, for multimedia-based self-learning.
Osdag is primarily built upon Python and other Python-based FOSS tools

- PyQt
- OpenCascade
- PythonOCC
- Svgwrite
- SQLite

**Expert Reviewers**

A team of expert reviewers review the design and detailing process implemented into each and every Osdag module. The review process relies heavily on the expertise of our review panel, both in the theoretical and practical aspects of steel design, detailing and construction best practices.
Outreach and Dissemination

The Osdag team reaches out to prospective users by

- Conducting training workshops
- Presenting at conferences and workshops
- Presenting to professional societies, industry professionals, students and teachers
- Postal campaign
- Conducting FOSSEE Connect sessions
- FOSSEE Summer Fellowship

Launch of Osdag beta version by
Mr. Sushim Banerjee,
Director General, INSDAG.
June 2017

Some past events

- The Institution of Engineers • Mumbai • July 2016
- Steel Construction Summit • Mumbai • September 2016
- Tribhuvan University • Nepal • October 2016
- Osdag Beta-Launch • Mumbai • June 2017
- SAstra Deemed University Workshop • Thanjavur • February 2018
- IIT Madras • Chennai • April 2018
- O. P. Jindal University • Chhattisgarh • October 2018
- CoAST Conference • NIT Silchar • February 2019
- Osdag Expert Committee Planning Meeting • Mumbai • June 2019
- Osdag Training Program on Steel Connection Design • Mumbai • June 2019
Contact us

Prof. Siddhartha Ghosh
Dept. of Civil Engineering
Structural Safety, Risk and Reliability Lab
5th Floor, Victor Menezes Convention Centre
Indian Institute of Technology Bombay
Mumbai 400076, India

osdag.fossee.in
+91 22 2576 7309/4329
contact-osdag@fossee.in
http://tinyurl.com/OsdagVideos
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