**MODEC Beam Sensei - User Manual 1.0**

Welcome to MODEC Beam Sensei. This web application allows you to:

1) Retrieve both predefined and custom beam properties.

2) Analyze and visualize key aspects of beam behavior such as shear forces and bending moments.

This guide will walk you through each section of the application and how to use it effectively.

Click here to access --------------🡪 [**MODEC Beam Sensei**](http://10.6.191.26:8501)

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5. **Beam Section Library**

This section allows you to explore predefined beam types and properties. You can choose a specific beam type and see the material properties, dimensions, and other relevant information. The section library database is created using 3 beam standards:

1) Products Handbook Structural Steel 2006 from consteel (W)

2) National Standards of the People's Republic of China GB/T 11263-2005 (HW, HM, HN)

3) Excel file 221220\_NSHYPER BEAM\_all. (HY)

**Steps:**

1. **Select Beam Type:**
   * From the drop-down menu, choose the desired **beam type**.

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Fig. 1.1: Select Beam Type

1. **Select Similarity Type and Yield Strength (MPa):**
   * From the drop-down menu, choose the desired **similarity type**. Based on the selected similarity type, the most similar beam from the other 2 beam standards will be displayed in the table generated, in order of similarity.
   * From the drop-down menu, choose the desired **yield strength**.

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Fig. 1.2: Select Similarity Type Fig. 1.3: Select Similarity Type

1. **View Beam Properties:**
   * After selecting the options, click the **Generate Properties from Database** button. This will display a table with the beam’s properties such as dimensions, second moment of area, elastic modulus, etc. Web and flange classification is also calculated based on dimensions and selected **yield strength**.

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Fig. 1.4: Properties Table

1. **I-Beam Diagram:**
   * The I-beam diagram will automatically be drawn based on the selected beam type. The diagram will display the beam’s geometry and label key dimensions for easy visualization.

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Fig. 1.5: Beam Section Display

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Fig. 1.6: Section Library output example

**2. Custom Beam**

In this section, you can define custom beam dimensions and visualize the resulting properties. You can input specific values for the beam's dimensions, and the tool will generate the corresponding beam diagram.

**Steps:**

1. **Select Beam Type:**
   * Choose a **beam type** from the drop-down menu. This will set default values for the beam’s dimensions. (E.g. Circular Beam – Diameter and Thickness)

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Fig. 2.1: Beam Type Selection

1. **Enter Custom Dimensions (I-Beam):**
   * **Height**: Enter beam height.
   * **Width**: Enter beam width.
   * **Flange Thickness (Tf)**: Enter thickness of the top and bottom flanges.
   * **Web Thickness (Tw)**: Enter thickness of the vertical web.

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Fig. 2.2: Custom Dimensions Input

1. **Select Similarity Type and Yield Strength (MPa):**
   * From the drop-down menu, choose the desired **similarity type**. Based on the selected similarity type, the most similar beam from **all 3 beam standards** will be displayed in the table generated, in order of similarity.
   * From the drop-down menu, choose the desired **yield strength**.

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Fig. 2.3: Select Similarity Type Fig. 2.4: Select Similarity Type

1. **Generate Beam Properties:**
   * After entering the dimensions, click the **Generate Properties** button. This will display a table with the beam’s properties such as dimensions, second moment of area, elastic modulus, etc. Web and flange classification is also calculated based on dimensions and selected yield strength.

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Fig. 2.5: Custom Beam Properties Table

1. **I-Beam** **Diagram:**
   * The I-beam diagram will automatically be drawn based on the selected beam type. The diagram will display the beam's geometry and label key dimensions for easy visualization.

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Fig. 2.6: Custom Beam Section Display

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Fig. 2.7: Custom Beam output example

**3. Beam Analyzer**

In this section, you can simulate a beam under load and view the reactions, shear force diagram, and bending moment diagram. This is ideal for analyzing the behavior of the beam under various loading conditions.

**Steps:**

1. **Enter Beam Parameters:**
   * **Beam Span (m)**: Enter the span (length) of the beam.
   * **Left Support Type**: Choose the type of support at the left end of the beam (either "Pinned" or "Fixed").
   * **Right Support Type**: Choose the type of support at the right end of the beam (either "Pinned" or "Fixed").
   * **Load Location (m)**: Enter the distance of point load from left support.
   * **Load Magnitude (kN)**: Enter the magnitude of the applied load in kilonewtons.

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Fig. 3.1: Beam parameters input

1. **Generate Diagrams:**
   * Once all the parameters are entered, click the **Generate Diagrams** button. This will generate three diagrams:
     + **Beam Diagram**: A visual representation of the beam with supports and the applied load.

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Fig. 3.2: Beam diagram with supports and load.

* + - **Shear Force Diagram**: A graph showing the shear force at various points along the beam.

A graph with a blue line

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Fig. 3.3: Shear Force Diagram

* + - **Bending Moment Diagram**: A graph showing the bending moment at various points along the beam.

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Fig. 3.4: Bending Moment Diagram

**4. Help and Support**

If you need assistance or encounter issues while using the application, please refer to the following resources:

1. **Frequently Asked Questions (FAQ) (in progress)**:  
   Access the FAQ section for common queries about beam properties, how to interpret diagrams, or troubleshooting tips.
2. **Contact Support**:  
   If you have more specific questions or need help, you can contact support.

**Additional Notes**

* **Units**: All dimensions are assumed to be in **millimeters (mm)** for custom beam geometry, whereas **meters (m)** for beam analyzer and all loads are assumed to be in **kilonewtons (kN)**.
* **Reactions and Moments**: The reactions and moments at the beam supports are automatically calculated based on the span, load magnitude, and load location.

Thank you for using **MODEC Beam Sensei**! We hope this helps in your structural analysis tasks.