



**STEEL-STR-008 | ONLINE COURSE**

**DESIGN OF**

**PEB**

**STRUCTURES**

**(WITH CRANE)**

**(PART- 2)**

**IS 800:2007 | AISC 360-22**

**STAAD.Pro | RAM Connection | RCDC**

 **steel@sqveconsultants.com**

 **<https://sqveconsultants.com/steel-str-008>**

## INTRODUCTION

Following the successful launch of **STEEL-STR-007: Design of PEB Structures – Part 1**, which focused on warehouse-type PEB structures without cranes, we are pleased to introduce the next module in this series – **STEEL-STR-008: Design of PEB Structures with Crane (Part 2)**. This unique online course is designed to address the structural design of Pre-Engineered Buildings (PEB) equipped with cranes, covering both fundamental concepts and advanced applications. The course will commence from **7-AUG-25**.

The course will begin with essential theoretical concepts related to **elastic stability in slender steel structures**, providing a strong foundation for understanding the behavior of such systems under various loading conditions. This will be followed by an in-depth discussion on **cranes**, including functional requirements, types of loads, common issues in crane runway design, and the pros and cons of various detailing strategies.

Participants will then be guided through a **case study for the design of a 20T crane girder**, which will lead into a comprehensive case study for the design of an entire **PEB structure (29.5m × 97.5m)** equipped with a crane. This case study will cover every critical step in the design process, including:

- Selection of structural system, preliminary sizing of members, geometry modeling, gravity load application, wind load and earthquake load calculations, load combinations, second-order elastic analysis, design and manual verification of typical members, Connection design, Base plate and foundation design, etc.

The structural design will be carried out in accordance with **IS 800:2007**, utilizing **STAAD Pro** and **RAM Connection** for modeling and design.

Given the frequent queries we receive regarding the use of American codes for design in India, the course will also include a dedicated segment on **ASCE 7-16**, covering different risk categories, importance factors, wind and seismic load calculations, and load combinations for both **LRFD** and **ASD**. This will be followed by a detailed discussion on **AISC 360-22**, covering section classification, direct analysis method, effective length method, horizontal notional loads, design of slender members, member design under combined forces

As part of the learning process, participants will be encouraged to take up an **exercise problem**, where they can define their own structure geometry and inputs. This approach will allow for a variety of case studies, enriching peer discussions and exposure. Each participant will design the structure first as per **IS 800:2007**, and subsequently using **ASCE 7-16 and AISC 360-22**, facilitating a comparative learning experience.

This course covers a wide range of concepts—from basic principles to advanced design techniques—and offers a valuable platform to engage in discussions on current **gray areas in industrial practices** related to PEB design.

## WHO SHOULD ATTEND?

This course will be useful for following :

- ✓ **Practicing Structural Consultants**
- ✓ **PEB design engineers**
- ✓ **Owner's consultant**
- ✓ **Proof checking consultants**
- ✓ **Senior Structural Engineers in the company**
- ✓ **Junior Structural Engineers in the company**
- ✓ **Government representatives who are involved in PEB design**
- ✓ **Civil/structural engineers who do not have prior exposure of steel structures and want to learn from first fundamental**
- ✓ **Post Graduate students in Structural Engineering**
- ✓ **Civil engineering students who are interested in Structural Engineering.**

## WHAT IS UNIQUE ABOUT THIS COURSE?

The course is designed by the **experienced engineer** (Mr. Bhavin Shah) who has 25 years of experience in the field of structural engineering.

- ✓ The entire course is designed from the **practical aspects** which can be readily used in the real projects.
- ✓ The course is designed to have an **interactive mode** so that the problems / doubts of the participants can be addressed effectively.
- ✓ A WhatsApp group will be created for **quick communication** between the participants and the faculty. The participants will be able to share the discussion points, doubts, queries, etc. in the group. The details in the group will be collated for further discussion in the next sessions.
- ✓ All sessions will be recorded, and the recordings will be shared **within a few hours** of each session. If a participant misses a live session, they can watch the recording before attending the next one. After going through the recording, participants are encouraged to share their doubts or queries in the designated WhatsApp group, which will be addressed in the following session.
- ✓ **If attending the live sessions is not convenient**, participants have the option to complete the entire course in a self-paced mode.
- ✓ **Case study** of PEB structure with crane will be discussed from geometry generation to the foundation design.
- ✓ Participants will be encouraged to **select an alternative PEB structure geometry** and, as the course progresses, develop the model, perform analysis, and carry out the design. Their findings or any queries arising from this exercise will be discussed during the sessions.
- ✓ **Recording** will be available with all the participants for **180 days**.
- ✓ **Certificate** will be issued on successful completion of the course (exercise problem with analysis and design as per IS & American code to be submitted through email: steel@sqveconsultants.com ).
- ✓ The course is designed as a **process of learning together**.

## COURSE FACULTY

### Bhavin Shah – Founder & CEO, SQVe Consultants



**Mr. Bhavin Shah** is passionate about Engineering profession with two decades of experience. He is having a dream for enhancing the engineering profession in different organisations. He completed graduation in Civil Engineering and Masters in Structures from Sardar Patel University. He is having unique experience of working in the specialized firm of civil / structural consultancy which grew as multidisciplinary firm (VMS), large multidisciplinary firm (L&T Chiyoda Ltd.) and owner based engineering set up (Adani Infra (I) Ltd.). He worked in different organisations at different levels, starting from junior design engineer to CEO. He is Founder & CEO of **SQVe Consultants**.

## METHODOLOGY

- ✓ The entire course is designed in the **ONLINE mode**.
- ✓ The course will have **approximate 54+ contact hours**.
- ✓ During nearly one month of a time, the interaction can be done with faculty and the participants using **WhatsApp**.
- ✓ Participants will be given the **exercises** to further strengthen their learning.
- ✓ The participants will be encouraged to share their **real project problems** during the course. We will discuss possible solutions for the same.
- ✓ Participants will have **ample opportunities** for raising their doubts / queries related to the subject.
- ✓ The online sessions will be conducted using **ZOOM** software.
- ✓ The course is designed as a **process of learning together**.

## COURSE SCHEDULE

<b>Start Date</b>	<b>7-AUG-2025</b>
<b>End Date</b>	<b>29-AUG-2025</b>
<b>Total contact hours</b>	<b>54+</b> (~27 contact hours for online sessions + ~27 contact hours for offline exercises. Sessions will be arranged from <b>Monday to Friday</b> from <b>8:30 PM to 10:00 PM IST</b> .)
<b>Details of each session</b>	Please refer subsequent page for details of each session.

## FEES FOR THE COURSE\*\*

<b>Participant <u>from India</u></b>	Cost per participant shall be <b>12,750 INR</b> (inclusive of 18% GST).
<b>Students pursuing Post graduation or Graduation <u>from India</u></b>	Cost per participant shall be <b>10,200 INR</b> (inclusive of 18% GST).
<b>Participants joining from <u>outside India</u></b>	Cost per participant shall be <b>185 USD</b> .

**\*\*Important notes:**

**1. Discount offered:**

- ✓ If you have attended our previous course **STEEL-STR-007** then you will be eligible for **20%** discount (maximum) on the above-mentioned fees. Please connect with us at email address for payment details: [steel@sqveconsultants.com](mailto:steel@sqveconsultants.com)
- ✓ To avail discounted **fees for student**, the participant shall have official email address of the institute. Please connect with us at email address for more details: [steel@sqveconsultants.com](mailto:steel@sqveconsultants.com)
- ✓ **For continuous learner:** If you have attended earlier one course of SQVe Consultants than **5%** of discount will be offered. For prior two courses, **10%** of discount will be offered. For three or more prior courses, **15%** of discount will be offered. To avail the discount, please connect us at [steel@sqveconsultants.com](mailto:steel@sqveconsultants.com). We will arrange to send an invoice / payment link considering the discount for online payment.
- ✓ **Group participation** from a company or institute is encouraged to get the discounts on this course. For more details, pl contact us at the email address: [steel@sqveconsultants.com](mailto:steel@sqveconsultants.com)

**2. Payment in installments:**

Participants have the option to pay the total applicable fees in **six monthly installments**. In this case, the total fee amount will increase by approximately **3%**. For example, if the total applicable fee is **₹12,750**, the monthly installment will be **₹2,189** (i.e.,  $₹2,189 \times 6 = ₹13,134$ ).

To avail this facility, please contact us at [steel@sqveconsultants.com](mailto:steel@sqveconsultants.com). We will create a **subscription plan through Razorpay** with an auto-pay feature.

## HOW TO REGISTER FOR THE COURSE?

Please click on the following link and thereafter click on “**Register Now**” button at bottom of the page. You will be directed to the **payment page**. Your registration will be confirmed after receipt of the payment at portal.

<https://sqveconsultants.com/steel-str-008>

### Important notes:

- 1) **Discounts and installment options** are not automated on the online portal. If you wish to avail a discount or opt for the installment payment facility, please contact us at [steel@sqveconsultants.com](mailto:steel@sqveconsultants.com). We will generate a custom payment link for you accordingly.
- 2) The payment gateway on the above-mentioned portal is configured only for participants from India. Interested international participants are requested to contact us at [steel@sqveconsultants.com](mailto:steel@sqveconsultants.com). A payment invoice will be shared via PayPal to facilitate online payment.

**Kindly note that there are limited seats.**

Your any queries/ doubts related to the course shall be addressed to the above-mentioned email address.

## SCHEDULE OF THE COURSE : STEEL-STR-008

Session no.	Brief details	Date	Time (IST)
1	<p><b>Structural behaviour and Stability concepts for design of shed type of structure (Part 1)</b></p> <ul style="list-style-type: none"> <li>• Learning from failures</li> <li>• Different structural elements like, column, rafter, purlin, girt, sheeting, sag rod, etc.</li> <li>• Comparison of structural behaviour with and without slope for two dimensional portal frame</li> <li>• Flexural buckling, Lateral torsional buckling (LTB) and local buckling, etc.</li> </ul>	7-AUG-25	8:30 PM TO 10:00 PM

Session no.	Brief details	Date	Time (IST)
2	<p><b>Structural behaviour and Stability concepts for design of shed type of structure (Part 2)</b></p> <ul style="list-style-type: none"> <li>• Finite element modelling of rafter for simulation of lateral torsional buckling</li> <li>• Concept of flange bracing and it's importance</li> <li>• Importance of flange bracing</li> <li>• How to design flange bracings?</li> <li>• Simulating the flange bracing concept in the FEM model of rafter</li> <li>• Comparison of results obtained from FEM modelling and as per IS 800:2007 for rafter, etc.</li> </ul>	8-AUG-25	8:30 PM TO 10:00 PM
3	<p><b>Structural behaviour and Stability concepts for design of shed type of structure (Part 3)</b></p> <ul style="list-style-type: none"> <li>• Importance of purlins and girts for elastic stability of the shed</li> <li>• Function of sag rod</li> <li>• Simulating lateral torsional buckling of purlin through FEM model</li> <li>• Impact of sag rod on behaviour of the purlin</li> <li>• Comparison of Z purlin capacity obtained from FEM model and as per brochure of purlin manufacturer, etc.</li> </ul>	11-AUG-25	8:30 PM TO 10:00 PM
4	<p><b>Crane supporting structure   Detailed discussion</b></p> <ul style="list-style-type: none"> <li>• Different types of crane</li> <li>• Introduction to different components of crane such as rail, crane bridge, trolley, crab, end truck, crane girder, crane stop, etc.</li> <li>• Input required for designing the crane girder</li> <li>• Important of interface to reduce rework</li> <li>• Forces generated by the crane: vertical load, lateral thrust, longitudinal thrust along with impact</li> <li>• Different types of cross-sections for crane girder</li> </ul>	12-AUG-25	8:30 PM TO 10:00 PM

Session no.	Brief details	Date	Time (IST)
	<ul style="list-style-type: none"> <li>Different arrangement of columns for supporting the crane girder, etc.</li> </ul>		
5	<p><b>Common problems associated with crane runway</b></p> <ul style="list-style-type: none"> <li>Why crane girder is considered as simply supported for design and detailing?</li> <li>Crane runway and design considerations</li> <li>Fixed rails vs floating rails, splice joint in rails</li> <li>Permissible deflection values for crane girder</li> <li>Detailing of different types of cross-sections for crane girder – Pros &amp; Cons of different types of detailing</li> <li>Vertical bracing for resisting longitudinal thrust from crane, etc.</li> </ul>	13-AUG-25	8:30 PM TO 10:00 PM
6	<p><b>Case study for design of 20 T EOT crane supported on crane girder with span of 7.5m</b></p> <ul style="list-style-type: none"> <li>Understanding input for the design of the crane</li> <li>Calculation of wheel loads   Vertical   Lateral thrust   Longitudinal thrust   With impact</li> <li>Generating moving load in STAAD Pro to find out the maximum bending moment &amp; maximum shear force</li> <li>Creating cross-section of crane girder using shape editor option in STAAD Pro   User defined section</li> <li>Performing design of the crane girder in STAAD Pro</li> <li>Do's and Don'ts in software application for the design of crane girder, etc.</li> </ul>	14-AUG-25	8:30 PM TO 10:00 PM
7	<p><b>Design of PEB shed with 20 T EOT crane, 29.5mX97.5m using STAAD Pro (Part 1)</b></p> <ul style="list-style-type: none"> <li>Deciding structural system for the structure</li> <li>Preliminary sizing of the members for initial run of the computer</li> </ul>	15-AUG-25	8:30 PM TO 10:00 PM

Session no.	Brief details	Date	Time (IST)
	<ul style="list-style-type: none"> <li>Finalising different types of connections</li> <li>Deciding fixed vs pinned condition at bottom of the steel structure</li> <li>Geometry generation in the software</li> <li>Important points for user defined section using shape editor for crane column</li> <li>Applying gravity loads on the structure   Dead load   Collateral load   Erection load   Live load</li> <li>Reference load for seismic load calculations in the software, etc.</li> <li>Changes made in NBC 2016 with reference to section 12</li> <li>Applying seismic load in the software</li> <li>Observing behaviour of structure under gravity load, etc.</li> </ul>		
8	<p><b>Design of PEB shed with 20 T EOT crane, 29.5mX97.5m using STAAD Pro (Part 2)</b></p> <ul style="list-style-type: none"> <li>Discussion on wind load for low rise structures as per IS 875 (Part 3) : 2015</li> <li>External pressure coefficient, local pressure coefficients, etc.</li> <li>Permeability coefficient</li> <li>Reading coefficients for the shed from the IS code, etc.</li> </ul>	18-AUG-25	8:30 PM TO 10:00 PM
9	<p><b>Design of PEB shed with 20 T EOT crane, 29.5mX97.5m using STAAD Pro (Part 3)</b></p> <ul style="list-style-type: none"> <li>Calculation of basic wind speed and design wind pressure as per IS 875 (Part 3):2015</li> <li>Identifying different conditions for wind load</li> <li>Preparation of summary for the different wind loads</li> <li>Application of wind load in the software</li> <li>Observing behaviour of structure under different wind loads, etc.</li> </ul>	19-AUG-25	8:30 PM TO 10:00 PM

Session no.	Brief details	Date	Time (IST)
	<ul style="list-style-type: none"> <li>Applying crane loads in the structure   Different options for applying the crane loads   Pros &amp; Cons of each option</li> <li>Temperature load   Application in STAAD Pro, etc.</li> </ul>		
10	<p><b>Design of PEB shed with 20 T EOT crane, 29.5mX97.5m using STAAD Pro (Part 4)</b></p> <ul style="list-style-type: none"> <li>Defining load combinations for strength and serviceability</li> <li>Crane load to be considered as leading load or accompanying load?</li> <li>Load combinations vs repeat load</li> <li>Use of envelope function in the software for design of steel structures</li> <li>Understanding of Design parameters for steel structures in the software for IS 800:2007</li> <li>Application of the design parameters in the software, etc.</li> </ul>	20-AUG-25	8:30 PM TO 10:00 PM
11	<p><b>Design of PEB shed with 20 T EOT crane, 29.5mX97.5m using STAAD Pro (Part 5)</b></p> <ul style="list-style-type: none"> <li>Performing design of steel structure in the software</li> <li>Observations on the design results</li> <li>Design of column, rafter, bracing, etc. in the software</li> <li>Checking the design of taper steel member with the slender web in the software, etc.</li> </ul>	21-AUG-25	8:30 PM TO 10:00 PM
12	<p><b>Design of PEB shed with 20 T EOT crane, 29.5mX97.5m using STAAD Pro (Part 6)</b></p> <ul style="list-style-type: none"> <li>Manual calculations for capacity of taper member with slender web for following conditions: <ul style="list-style-type: none"> <li>✓ Axial tension</li> <li>✓ Axial compression</li> <li>✓ Shear</li> <li>✓ Bending</li> </ul> </li> </ul>	22-AUG-25	8:30 PM TO 10:00 PM

Session no.	Brief details	Date	Time (IST)
	<ul style="list-style-type: none"> <li>✓ Combination of forces, etc.</li> </ul>		
13	<p><b>Design of PEB shed with 20 T EOT crane, 29.5mX97.5m using STAAD Pro (Part 7)</b></p> <ul style="list-style-type: none"> <li>• Design of connections using RAM software</li> <li>• Integration of STAAD Pro and RAM connection software for connection design</li> <li>• Performing design of below mentioned connections in RAM connection software</li> <li>✓ Column to rafter moment connection</li> <li>✓ Requirements of different types of stiffeners</li> <li>✓ Splice connection</li> <li>✓ Base plate connection</li> <li>✓ Deciding number of anchor bolts, etc.</li> </ul>	25-AUG-25	8:30 PM TO 10:00 PM
14	<p><b>Design of PEB shed with 20 T EOT crane, 29.5mX97.5m using STAAD Pro (Part 8)</b></p> <ul style="list-style-type: none"> <li>• Sizing of RCC pedestal to accommodate base plate and anchor bolts</li> <li>• Design of RCC pedestal and tie beams</li> <li>• Design of foundations using RCDC software</li> <li>• Important parameters in the software RCDC for foundation design</li> <li>• Observations on the design results obtained from the software, etc.</li> </ul> <p><b>Design of base plate and anchor bolts</b></p> <ul style="list-style-type: none"> <li>• Detailed discussion for the design of base plate</li> <li>• Critical load combination for design of base plate</li> <li>• How to find out pressure below the base plate and tension in the anchor bolts?</li> <li>• What is prying action?</li> <li>• Calculation of required base plate thickness   Stiffener requirements  </li> </ul>	26-AUG-25	8:30 PM TO 10:00 PM

Session no.	Brief details	Date	Time (IST)
	<p>Roark's formula</p> <ul style="list-style-type: none"> <li>• How to decide numbers and diameter of anchor bolts?</li> <li>• Calculation for capacity of the anchor bolt</li> <li>• Reinforcement requirement for the anchor bolts   Tension   Shear</li> <li>• Provision of shear key in the base plate</li> <li>• Performing design of base plate in RAM connection software   Manual check for the software results, etc.</li> </ul>		
15	<p><b>Detailed discussion for load calculations as per ASCE 7-16 (Part 1)</b></p> <ul style="list-style-type: none"> <li>• How to identify risk category of the building?</li> <li>• Importance factor for different risk categories</li> <li>• Load combinations for LRFD and ASD methods</li> <li>• How to identify seismic design category?</li> <li>• Response modification coefficient, Overstrength factor, Deflection amplification factor</li> <li>• Modelling criteria for structure   Permitted analysis procedure</li> <li>• Approximate time period of the structure</li> <li>• Drift and deformation</li> <li>• Seismic load calculations</li> <li>• Steps for calculating wind force</li> <li>• Basic wind speed, wind directionality factor, exposure, topographic factor, pressure, gust effect factor, internal pressure coefficients</li> <li>• Difference in basic wind speed with reference to risk categories</li> <li>• Concept of annual exceedance probability and MRI</li> <li>• Step by step procedure for calculation of wind load for low rise - enclosed building</li> <li>• Torsional load cases</li> <li>• Exercise</li> </ul>	27-AUG-25	8:30 PM TO 10:00 PM

Session no.	Brief details	Date	Time (IST)
16	<p><b>Detailed discussion on AISC 360-22</b></p> <ul style="list-style-type: none"> <li>• Type of section   Compact   Non-compact   Slender</li> <li>• Types of Analysis methods   Direct analysis method   Effective length method   First order elastic analysis</li> <li>• Detailed discussion on Direct Analysis Method   Horizontal notional loads</li> <li>• Design of members with slender elements for Axial compression</li> <li>• Design of members with slender elements for Flexure</li> <li>• Design of members for combination of axial compression, flexure, shear</li> <li>• Exercise</li> </ul> <p><b>Detailed discussion on design parameters in STAAD Pro as per AISC 360-22</b></p> <ul style="list-style-type: none"> <li>• Material properties</li> <li>• Coefficient <math>C_b</math> as per Chapter F</li> <li>• Slenderness ratio limit</li> <li>• Effective length parameters (<math>L_x</math>, <math>L_y</math>, <math>L_z</math>)</li> <li>• Net section factor</li> <li>• Shear lag factor</li> <li>• Web stiffeners</li> <li>• Unsupported length of the member (UNT, UNB, UNL, UNR)</li> <li>• Deflection parameters</li> <li>• For earthquake resistant design, etc.</li> <li>• Exercise</li> </ul>	28-AUG-25	8:30 PM TO 10:00 PM
17	<p><b>Open discussion   Concluding remarks</b></p> <ul style="list-style-type: none"> <li>• Balance queries from participants</li> <li>• Open discussion</li> <li>• Concluding remarks</li> <li>• Way-forward, etc.</li> </ul>	29-AUG-25	8:30 PM TO 10:00 PM

## About SQVe Consultants

**SQVe Consultants** (SQVe) is a recently established company with a vision of enhancing the engineering profession. Name of the company is derived from the first letters of major goals of engineering, i.e. **S**chedule adherence, **Q**uality assurance & **V**alue engineering. For success of any project, it is required that all these goals are considered simultaneously in the projects. However, in today's fast track projects, it is indeed difficult to address all the goals in the design engineering cycle simultaneously. We believe that for achieving these desired goals, there are many developmental activities (off-project) required in the organisations for continual improvement. Our all services are designed to assist different organizations to achieve the engineering goals. We intend to collaborate with the different organisations for long term basis and aim towards enhancing the engineering profession through our unique services. Our values are Innovation, Commitment & Integrity. Your partner for achieving engineering goals!

We also provide coaching/mentoring to the structural engineers through one-on-one sessions. Please get in touch with us for any requirements related to online training related to civil/structural engineering as well as in the area of people management.

**Learn at your own pace:**

If you prefer self-paced learning, you can purchase access to the recorded sessions of our previous online courses. For more details, please visit: <https://sqveconsultants.com/recorded-sessions>.

For any further information or assistance, feel free to contact us at [contact@sqveconsultants.com](mailto:contact@sqveconsultants.com).

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You may contact us at email address : [contact@sqveconsultants.com](mailto:contact@sqveconsultants.com)

