

DESIGN OF MACHINE FOUNDATIONS

ONLINE COURSE ID: DYN-STR-001

Link: <https://sqveconsultants.com/dyn-str-001>
Email: dynamics@sqveconsultants.com

INTRODUCTION

Design of machine foundations is considered a specialized design activity because the foundation may not necessarily become safe merely by increasing its size. Furthermore, failure of a machine foundation can severely damage costly equipment, potentially resulting in substantial financial losses due to its impact on plant performance. The earlier three batches attracted participants from different parts of India as well as from Australia, Kuwait, Algeria, Sri Lanka, Nepal, Canada, the UAE, and other countries. Recently, we received several requests to relaunch the course. Accordingly, we are pleased to announce the fourth batch of the course, commencing on **24-SEP-26**.

Designing machine foundations involves several complexities due to the dynamic interactions among the machine, foundation, soil, and surrounding structure. The following are some of the key areas that require an appropriate understanding when performing the design:

- Fundamentals of Structural dynamics
- Effective interface with the machine manufacturer
- Unbalanced dynamic loads from machines
- Fixing details of the foundation
- Thumb rules for preliminary sizing of the foundation
- Soil dynamics
- Permissible amplitude limits for the foundation
- Avoiding resonance under all relevant conditions
- Software application (Do's and Don'ts), etc.

In view of the above, we are pleased to offer this unique online course (DYN-STR-001), which provides a step-by-step approach to the design of machine foundations. The course will begin with the fundamentals of structural dynamics, including single-degree-of-freedom systems, free and forced vibration, damping, multi-degree-of-freedom systems, and resonance, along with software-based examples. Thereafter, we will discuss different types of machines, dynamic loads generated by machines, soil dynamics, spring calculations for FEM analysis, and related aspects. Detailed discussions will be held on the relevant requirements and application of IS 2974 (Part 1):2026, IS 2974 (Part 2):2026, and IS 2974 (Part 3):2026. Queries related to other relevant international standards are also welcome and will be discussed, as applicable, during the course. The course will also include actual software modelling of block foundations supporting reciprocating machines, block foundations supporting rotating equipment, and table-top foundations supporting rotating equipment. Detailed dynamic analyses will be performed in STAAD.Pro, with important modelling do's and don'ts highlighted throughout the course. The course will also demonstrate the dynamic analysis of vibrating equipment supported on floors, including frequency checks and time-history analysis to evaluate vibration behaviour and resulting amplitudes. STAAD.Pro will be used throughout the course for software demonstrations. Participants using other software are also welcome to raise software-specific queries, which will be discussed during the course.

The course will also be highly useful for developing in-house checklists, working procedures, and design-related do's and don'ts for machine foundations.

WHAT IS UNIQUE ABOUT THIS COURSE?

The course has been designed by an experienced structural engineer, Mr. Bhavin Shah, who has 26 years of experience in the field.

- ✓ The entire course is designed from a **practical perspective**, with concepts and approaches that can be readily applied to real projects.
- ✓ The course is designed to provide an **interactive learning experience** so that participants' questions and doubts can be addressed effectively.
- ✓ A WhatsApp group will be created for **quick communication** between participants and the faculty. Participants will be able to share discussion points, questions, queries, and other relevant matters in the group. The discussion points raised in the group will be collated for further discussion in the next session.
- ✓ All sessions will be **recorded**, and the recording of each session will be shared by next day. If a participant misses a live session, they can watch the recording before attending the next session. After watching the recording, participants **can share questions or queries** in the WhatsApp group, which will be addressed in the next session.
- ✓ **Recordings** will remain available to all participants for **180 days**.
- ✓ Participants who successfully complete the prescribed exercises and quizzes during the program will receive a **Certificate** of Successful Completion. Participants who do not fulfil the completion requirements will receive a Certificate of Participation. The distinction between the two certificates will be reflected in the total learning hours credited to the participant.
- ✓ The course is designed as a collaborative learning experience.

WHO SHOULD ATTEND?

This course will be useful for following:

- ✓ **Practicing Structural Consultants**
- ✓ **Senior Structural Engineers in the company**
- ✓ **Junior Structural Engineers in the company**
- ✓ **Owner's consultants**
- ✓ **Proof checking consultants**
- ✓ **Research scholars, Academicians**
- ✓ **Post Graduate students in Structural Engineering**
- ✓ **Civil engineering students who are interested in Structural Engineering.**

COURSE FACULTY

Bhavin Shah – Founder & CEO, SQVe Consultants



Mr. Bhavin Shah is passionate about the engineering profession and has 26 years of overall experience. He has a vision of enhancing the engineering profession across different organisations. He completed his graduation in Civil Engineering and his Master's degree in Structural Engineering from Sardar Patel University. He has diverse experience working with a specialized civil/structural consultancy, a multidisciplinary organisation (VMS), a large multidisciplinary organisation (L&T Chiyoda Ltd.), and an owner-based engineering organisation (Adani Infra (I) Ltd.). He has worked in different organisations and at various levels, progressing from Junior Design Engineer to CEO. He is the Founder & CEO of **SQVe Consultants**.

METHODOLOGY

- ✓ The entire course will be conducted **online** through live sessions.
- ✓ The course will span approximately **three weeks and include 40+ learning hours**.
- ✓ During the program, participants can interact with the faculty and other participants through **WhatsApp**.
- ✓ Fundamentals and key concepts will be demonstrated through **study models** in the **software**.
- ✓ The online sessions will be conducted using **Zoom**.

COURSE SCHEDULE

Start Date	24-SEP-26
End Date	9-OCT-26
Total learning hours	40+ hours (~20 hours online + ~20 hours for assignments) (Sessions will be arranged on Monday to Saturday from 8:30 PM to 10:00 PM IST .)
Details of each session	Please refer subsequent page for details of each session.

FEES FOR THE COURSE**

Participants <u>from India</u>	The cost per participant is INR 14,500 (inclusive of 18% GST).
Participants <u>from outside India</u>	The cost per participant is USD 216 .

**Important notes:

1. Discount offered:

- ✓ **For continuous learner**: If you have previously attended one course offered by SQVe Consultants, a **5%** discount will be offered. For two previously attended courses, a **10%** discount will be offered. For three or more prior courses, a **15%** of discount will be offered. To avail of the discount, please send us an email at dynamics@sqveconsultants.com. We will arrange an invoice reflecting the applicable discount for online payment.
- ✓ **Group participation** Group participation from companies or institutes is encouraged, and special discounts may be available. Please contact us at the above-mentioned email address.

2. Payment in installments:

Participants have the option to pay the total applicable fees in six monthly installments. In this case, the total fee will increase by approximately 3%. For example, if the applicable fee is ₹14,500, the monthly installment will be ₹2,490 (i.e., ₹2,490 × 6 = ₹14,940).

- To avail of this facility, please drop a message at dynamics@sqveconsultants.com and please mention your name, email address, WhatsApp number and city. 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 then click the “**Register Now**” button at the bottom of the page. You will be directed to the **payment page**. Your registration will be confirmed upon receipt of payment through the portal.

<https://sqveconsultants.com/dyn-str-001>

Important notes:

- ⇒ Several modes of payment are available at the above link, including net banking, card, UPI, etc. For payment through Google Pay, please contact us at the following email address.
- ⇒ The payment gateway at the above-mentioned portal is configured for Indian participants only. Interested international participants can contact us at the email address: **dynamics@sqveconsultants.com**. An invoice will be shared through **PayPal** for online payment.

Kindly note that there are limited seats.

Any queries related to the online course are welcome at the above-mentioned email address.

SCHEDULE OF THE COURSE : DYN-STR-001

Session no.	Title	Date	Time (IST)
1	Fundamentals of structural dynamics (PART 1) - Basics of structural dynamics - Single Degree of Freedom System (SDOF) - Importance of SDOF in structural dynamics - Time period - Modelling of SDOF in STAAD.Pro - Understanding of free vibration, forced vibration, damping using computer model - Natural frequency vs forcing frequency, etc.	24-SEP-26	8:30 PM TO 10:00 PM

Session no.	Title	Date	Time (IST)
2	Fundamentals of structural dynamics (PART 2) • Multi degree of freedom systems (MDOF) • Mode shapes • Generating MDOF system in STAAD.Pro • Damping • Phase angle • Resonance • Importance of damping during resonance • Transient response and Steady state response • Understanding of underdamped system, overdamped system, resonance through computer models in STAAD.Pro, etc.	25-SEP-26	8:30 PM TO 10:00 PM
3	Different types of machine foundations Step-by-step approach for design of machine foundations • Different types of machines • Input required for the design of machine foundations • What are unbalanced dynamic loads? • Unbalanced dynamic loads generated by reciprocating equipment • Unbalanced dynamic loads generated by rotating equipment • Permissible amplitude for design of the foundations • Single amplitude vs Double amplitude • Different types of foundations • Step-by-step procedure for design of machine foundations • Preliminary sizing criteria, etc.	26-SEP-26	8:30 PM TO 10:00 PM
4	Modelling of Machine Foundations in STAAD.Pro Dynamic soil properties Calculation of Soil Spring Constants • Use of 3D solid elements for modelling in STAAD.Pro for block foundation and table top foundation	28-SEP-26	8:30 PM TO 10:00 PM

Session no.	Title	Date	Time (IST)
	• 3D solid elements in STAAD.Pro • Bottom slab to be modelled or not? • Importance of geotechnical parameters in the design of machine foundations • Dynamic shear modulus • Calculation of spring values in the vertical and lateral direction for the foundation • Spring values for pile foundations • Range of spring values to be considered, etc.		
5	Discussion on important clauses of IS 2974 (Part 1) : 2026 & IS 2974 (Part 2):2026 related to Foundation for reciprocating type machines • System of axis and six degrees of freedom • Data to be provided by machine manufacturer • Frequency ratio • Permissible amplitude • Dynamic modulus of elasticity • Minimum reinforcement in block foundations	29-SEP-26	8:30 PM TO 10:00 PM
6	Design of reciprocating equipment foundation Model 1 • Modelling of foundation in STAAD.Pro for reciprocating equipment • Block foundation using 3D solid elements • Calculations for spring values • Application of unbalanced dynamic loads • Performing dynamic analysis • Interpretation of results • Impact on the results by varying different parameters	30-SEP-26	8:30 PM TO 10:00 PM

Session no.	Title	Date	Time (IST)
7	Design of reciprocating equipment foundation Block foundation Model 2 • Modelling of foundation in STAAD.Pro for reciprocating equipment • Block foundation using 3D solid elements • Calculations for spring values • Application of unbalanced dynamic loads • Performing dynamic analysis • Interpretation of results • Impact on the results by varying different parameters	1-OCT-26	8:30 PM TO 10:00 PM
8	Discussion on important clauses of IS 2974 (Part 1) : 2026 & IS 2974 (Part 2):2026 related to Foundation for rotating type equipment Block foundations • Unbalanced loads from equipment • Data to be provided by machine manufacturer • Frequency ratio • Permissible amplitude • Dynamic modulus of elasticity • Minimum reinforcement in block foundations, etc.	2-OCT-26	8:30 PM TO 10:00 PM
9	Design of rotating equipment foundation Block foundation Model 3 • Modelling of foundation in STAAD.Pro for rotating equipment • Block foundation using 3D solid elements • Calculations for spring values • Application of unbalanced dynamic loads • Performing dynamic analysis • Interpretation of results • Impact on the results by varying different parameters	3-OCT-26	8:30 PM TO 10:00 PM
10	Discussion on important clauses of IS 2974 (Part 1) : 2026 & IS 2974 (Part 3):2026 related to Foundation for rotating type machines Frame Foundations	5-OCT-26	8:30 PM TO 10:00 PM

Session no.	Title	Date	Time (IST)
	• Isolation from adjacent structures • Data to be provided by machine manufacturer • Loading on the foundation • Sizing of the top deck • Sizing of the column • Forced vibration analysis • Static design • Minimum reinforcement requirement, etc.		
11	Design of rotating equipment foundation Table top foundation Model 4 • Modelling of foundation in STAAD.Pro for rotating equipment • Table top foundation using 3D solid elements • Calculations for spring values • Application of unbalanced dynamic loads • Performing dynamic analysis • Interpretation of results • Impact on the results by varying different parameters	6-OCT-26	8:30 PM TO 10:00 PM
12	Comparison of Table Top foundation with different options • Modelling of top slab with plate elements Columns with frame elements • Model with and without a base slab • Support conditions: fixed supports versus actual spring values • Consideration of soil mass, etc.	7-OCT-26	8:30 PM TO 10:00 PM
13	Dynamic Analysis of Structures Supporting Vibrating Equipment on Floors • Introduction to detailed dynamic analysis for supporting structure • Performing eigenvalue analysis to determine natural frequencies and mode shapes • Checking frequency separation	8-OCT-26	

Session no.	Title	Date	Time (IST)
	- Performing time history analysis to find out amplitudes of the vibration - Discussion on static design of the structure considering seismic and machine loads		
14	Open discussion Way forward - Remaining queries from the participants - Discussion of queries related to participants' ongoing projects, if any - Concluding remarks - Way forward	9-OCT-26	8:30 PM TO 10:00 PM

About SQVe Consultants

SQVe Consultants (SQVe) was established with a vision of enhancing the engineering profession. The 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. All our services are designed to assist different organizations to achieve the engineering goals. We intend to collaborate with 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 look forward for long term association with different organisations for enhancement of engineering profession through our following unique services.

- ✓ Training on customised areas as per specific requirements of the company
- ✓ Consultation on the areas related to structural engineering
- ✓ Induction training program for new joiners in the company
- ✓ Improvement in Quality Assurance of the company
- ✓ One-on-one training sessions for structural engineers, etc.

For more information, please get in touch with us to schedule for a free call to understand the details.

For more details, please visit our website : <https://sqveconsultants.com>

You may contact us at email address : contact@sqveconsultants.com

Download software for 30 Day Free Trial Period:

SQVE-MV-ET-01_Ver 2.0 – Structural Model Verification Tool for ETABS

Link: <https://sqve-academy.thinkific.com/courses/sqve-mv-et-01>

Self-paced learning (12 packages):

Get access to 286 recorded sessions with 536 contact hours. Twelve specialized packages have been created from 18 unique online courses: <https://sqveconsultants.com/recorded-sessions>

Get access to free e-books:

1. Design of gravity columns:
<https://academy.sqveconsultants.com/offers/sGWGCTth/checkout>
2. Comments on draft of IS 1893 (Part 4):
<https://academy.sqveconsultants.com/offers/KsFTBovx/checkout>

Individual online courses (self-paced mode of learning):

RCC-STR-003: Foundation engineering (Part 1) : <https://sqveconsultants.com/rcc-str-003>

RCC-STR-002: Design of liquid retaining structures: <https://sqveconsultants.com/rcc-str-002>

ONG-STR-001: Design of Pipe-rack for oil & gas industry: <https://sqveconsultants.com/ong-str-001>

STEEL-STR-007: Design of PEB structure: <https://sqveconsultants.com/steel-str-007>

STEEL-STR-005: Design of steel structure as per American codes: <https://sqveconsultants.com/steel-str-005>

STEEL-STR-006: Design of connections for steel structures: <https://sqveconsultants.com/steel-str-006>

EQ-STR-004: Push-over analysis, P-delta analysis, Nonlinear dynamic analysis, Response spectrum analysis: <https://sqveconsultants.com/eq-str-004>

RCC-STR-001: Comparison of design results of RC between STAAD Pro, RCDC & ETABS:
<https://sqveconsultants.com/rcc-str-001>

Visit online store of SQVe Academy: <https://academy.sqveconsultants.com/store>

Join our telegram group for technical discussion related to structural engineering (8K+ engineers):
<https://t.me/structuralengineering1>

Link for joining WhatsApp community of SQVe Academy:

<https://chat.whatsapp.com/JHSph6kemaGJLMasodebhW>

View the playlist of member-only videos:

https://www.youtube.com/playlist?list=UUMOwkjEFL_gGDE6peoapW8Few

You are welcome to join the channel using the following link:

https://www.youtube.com/channel/UCwkjEFL_gGDE6peoapW8Few/join

To identify the most appropriate online course for your specific requirements, feel free to contact us at: contact@sqveconsultants.com

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