VIBRATION ANALYSIS

Event No	ME001
Organizing Department	Mechanical Engineering
Associate Dept. | NSC	The Institution of Engineers (India)
Date	10/02/2024
Time	09:30 AM to 10:30 AM
Event Type	Expert Talk
Event Level	Dept. Level
Venue	ONLINE
Meeting Medium	
Meeting Link	https://meet.google.com/iwg-erxh-pas
Total Participants	126
Faculty - Internal	2
Students - Internal	124

Related SDG

Resource Persons

Sl	Type	Name	Designation	Company	Email	Phone
1	Resource Person	Kavya L	Simulation Engineer NVH	Volvo Group India Private Limited | Bangalore	kavyaloganathang@gmail.com	xxxxxxxxxx

Involved Staffs

Sl	Name	Role
1	Dharani Kumar S	Coordinator
2	Prabhu Loganathan	Coordinator

Outcome

Students can comprehend the dual nature of vibrations, recognizing their advantages and disadvantages in various applications such as pendulum dynamics, musical instruments, phones, tuning forks, etc.Students can classify vibrations as free, forced, damped, undamped, resonant, and self-excitedStudents can define and understand the roles of mass, spring, and damper in a vibration system.Students can distinguish between single-degree-of-freedom (SDOF) and two-degree-of-freedom (2DOF) systems, understanding their characteristics and applications.Students can recognize the significance of vibration measurements in failure analysis, durability tests, and reliability assessments. They will also understand the use of seismographs in earthquake detection and aftermath analysis.Students can analyze components and understand the properties of a system using various methods.Students gained in detailed understanding of the Finite Element Method (FEM), including the process of discretization and the subsequent steps from discretization to post-processing.The significance of postprocessing in the Finite Element Analysis (FEA) process and its role in extracting meaningful insights from simulation results.The wide-ranging applications of Finite Element Analysis (FEA) in structural analysis, heat transfer, fluid dynamics, electromagnetics, and multi-physics, gaining a holistic understanding of its capabilities.

Event Summary

Ms. Kavya L from Volvo India Pvt Ltd conducted a comprehensive online web session focusing on the intricate topic of vibrations. The session was organised for III Year Mechanical students, supplementing their course for the present semester, "U21ME601- Finite Element Analysis". It was organised by Dr. S Dharanikumar and Dr. L Prabhu from Department of Mechanical Engineering. It was held through Google Meet Platform on the 10th of February, 2024. The session covered a broad spectrum of subjects, including the applications of vibrations in various fields such as pendulum dynamics, musical instruments, phones, tuning forks, and more. An emphasis was placed on

the dual nature of vibrations, being both advantageous and detrimental depending on the application. The discussion delved into the classification of vibrations, encompassing free, forced, damped, undamped, resonant, and self-excited vibrations. A pivotal concept explored during the session was resonance, where the external frequency matches the natural frequency, resulting in an increase in amplitude. Ms. Kavya explained that the frequency of vibrations is contingent on the stiffness and mass of a system, and manipulating these factors can bring about changes in frequency. The components of a vibration system, namely mass, spring, and damper, were elucidated, along with the significance of global and local coordinates in degrees of freedom. The distinction between single-degree-of-freedom (SDOF) and two-degree-of-freedom (2DOF) systems was highlighted. The session transitioned to the measurement of vibrations, underscoring their relevance in failure analysis, durability tests, and reliability assessments. The application of seismographs in earthquake detection and aftermath analysis was also discussed. The concept of analysis was thoroughly examined, with Ms. Kavya defining it as the examination of components and understanding the properties of a system. Various types of analysis methods were explored, including Finite Element Method (FEM), Boundary Element Method (BEM), Computational Fluid Dynamics (CFD), Multi-Body Dynamics (MBD), Structural Analysis (SEA), and Multi-Disciplinary Optimization (MDO). The focus was particularly on FEM, with a detailed explanation of its process, involving the discretization of a component into small finite elements and the subsequent steps from discretization to post-processing. The importance of postprocessing in the FEA (Finite Element Analysis) process was underscored, and the wide-ranging applications of FEA in structural analysis, heat transfer, fluid dynamics, electromagnetics, and multi-physics were discussed, providing a holistic understanding of the subject matter. The webinar ended with a Q&A session where many enthusiastic participants put forward their questions to which Ms. Kavya L gave pristine answers. Vote of Thanks was delivered as the closure.

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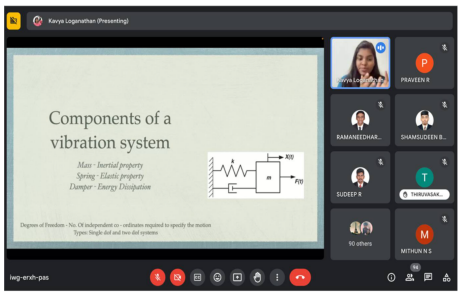

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