

NVSAGE

Newsletter on Noise and
Vibration Engineering

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FOREWORD

By Krishna Balamurali,
Principal Engineer

We have refreshed the look, feel and presentation of the newsletter in tune with the dynamics of our activities, hope this change is received well.

This is our 89th edition of the newsletter; what started as a 25 count emailer about 10 years back is now being circulated to over 4000 contacts, organically developed over the years. Many readers actively engage by share their feedback on the technical contents and the variety of Noise and Vibration tasks we present - this is really becoming a mutually learning platform.

The financial year ended just past and I am happy to share that we had a great year both in terms of revenues and the variety of projects. Our foray into metro rail related activities increased substantially - one of the key projects we executed was of PITCMRL (Pune metro line 3) which was a full bundled N&V task with multiple stages of assessments along with recommendations on vibration mitigations and addressing metro station noise issues.

We are currently working with Surat and Ahmedabad metro rail at multiple levels of involvement and are working on the submitting bids for MMRDA, BMRCL, DMRCL, BEML and more metro rail related activities.

To cater to the increasing demand of activities, we have placed an order on SIEMENS for the procurement of 12 more hardware channels to the existing XS platform; In addition to this, orders for 8 more low mass tri-axials and 6 ultra low frequency, seismic grade sensors are also placed to augment our resources.

NV Dynamics is excited to enter the new FY with a strong focus on growth across different business verticals complimented by our core engineering values, quality and delivery model in place.

NOISE AND VIBRATION ASSESSMENTS FOR PUNE METRO LINE - 3

By Chiranjeevi AM, Engineer - Technical Services

THE CHALLENGES AND APPROACH

The IT corridor of the Pune metro spans 23 kilometers, connecting diverse residential areas of Pune city to IT office spaces. Featuring 23 stations, including three specially identified stations for commercial development, this corridor caters to various needs. Concerns over air-borne noise and ground-borne vibrations, especially in older parts of the city and within the IT corridor due to nearby noise sensitive buildings, prompted careful consideration. Analyzing strata and bore log data alongside a desktop model of noise boundary conditions, a detailed testing plan was devised to gather Noise and Vibration data systematically along the entire metro line alignment.

TASK TAKEAWAY

The task and its deliverables met all the customer expectations and the target timelines for implementing the recommendations made by NV Dynamics. This task also re-affirmed our capability as a core noise and vibration services team with project management capability, technical competence and overall service delivery quality within the given time constraints.

SITE ACTIVITIES

Most international standards recommend 24-hour continuous noise monitoring to establish background data for comparing with actual noise from metro operations. Advanced autonomous type-1 noise data loggers were employed to record data in sensitive areas, with relevant information extracted. Rigorous vibration transmissibility tests, utilizing qualified force dropping rigs, were carried out in various sensitive zones, considering nearby buildings and their ground coupling factors. Seismic-grade sensors were used to measure force energy loss through connected ground mass at fixed distances from force drop locations. Additionally, three of the property development stations underwent comprehensive tests and validations, including structural response verification, concourse volume space analysis for reverberation characteristics, and assessment of vibro-acoustic behavior using volume velocity source.



VIBRATION INVESTIGATION AND RCA FOR EOT CRANES

By Deepak D, Engineer - Technical Services

THE CHALLENGES AND APPROACH

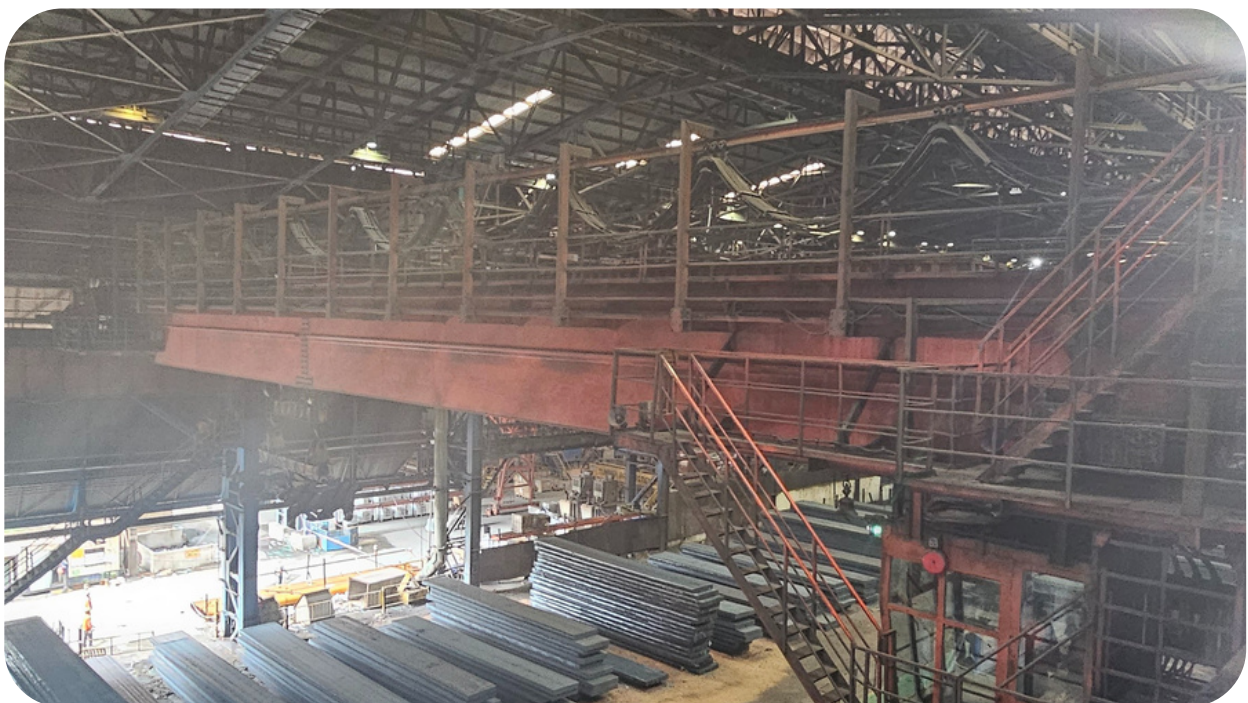
The EOT cranes are mechanical systems comprising of moving sub-systems, axis drive motors, lifting motors, gear-box kinematics, long travel and cross travel platforms on rail bogies. Dynamic loads and vibration response vary due to intermittent and continuous operations. Factors such as crane span, mass, structural stiffness, loads on the hook, accelerations, and braking cause vibrations. In one such case, an in-depth investigation focused on a hot steel mill EOT crane, in service for over 50 years, operating on a 24/7 basis needed to be evaluated for its state of health, endurance, continued usability and to determine the root cause of reported high vibrations to recommend measures/ reduce the overall vibration amplitudes on the cranes.

TASK TAKEAWAY

Meeting customer expectations involved implementing systematic maintenance practices, addressing crucial aspects like brake system adjustments and synchronized motor starts. NV Dynamics could demonstrate its capability to identify and mitigate potential issues effectively.

SITE ACTIVITIES

The challenge commenced with sourcing design data for the crane, including motor specs and gearbox details. Limited/old drawings provided basic insights into prime movers and drive components. It was crucial for determining motor speeds and gear ratios. A thorough vibration assessment plan was then executed, identifying critical measurement areas. Extensive mapping of vibration data covered main motors, gearboxes, and bogie structures during various operational scenarios. Structural analyses determined natural frequencies of girders and ground columns. Data processing unveiled intriguing vibration patterns, revealing issues such as irregular braking forces and gear engagement faults. These insights facilitated a comprehensive assessment of the crane's performance.



➤➤➤ PHYSICS TO KNOW



Vibrations can influence the behavior of molecules. In a field known as "sonochemistry," scientists study how sound waves can accelerate chemical reactions by causing molecules to vibrate. These vibrations can break apart chemical bonds or promote reactions that might not occur under normal conditions. Sonochemistry has applications in various fields, from industrial processes to environmental remediation and even medicine. This intersection of sound and chemistry showcases the intricate ways in which energy transfer through vibrations can have profound effects at the molecular level.

➤➤➤ GREAT MINDS & THEIR CONTRIBUTION TO THE WORLD OF SCIENCE

Narinder Singh Kapany, born in India in 1926, is revered as the "Father of Fiber Optics." His groundbreaking research in the 1950s paved the way for the development of modern fiber optic technology, revolutionizing telecommunications and enabling high-speed internet connectivity. Kapany's innovative experiments demonstrated the transmission of light through fibers, challenging conventional wisdom and sparking a technological revolution. Beyond his scientific achievements, Kapany was a successful entrepreneur, founding several companies focused on fiber optics and other technologies. His work, encompassing over 100 patents, earned him numerous accolades, including the Padma Bhushan, one of India's highest civilian honors. Kapany's legacy continues to inspire future generations, underscoring the transformative power of curiosity, innovation, and perseverance in shaping the modern world.



CERTIFICATIONS



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