

# NVSAGE

Newsletter on Noise and  
Vibration Engineering

[www.nvdynamics.com](http://www.nvdynamics.com)

[services@nvdynamics.com](mailto:services@nvdynamics.com) | +91 7760381818



## FOREWORD

By Ajith Krishna,  
Lead Engineer

As we begin a new financial year, it is encouraging to reflect on a quarter marked by diverse engagements across sectors, each reinforcing the evolving demands of Noise and Vibration engineering.

During this period, we strengthened our presence in the maritime domain by conducting noise and vibration assessments consecutively for the 4<sup>th</sup> Ship built at Udupi Cochin Shipyard. Our work with ACE Designers, IISC and Applied Materials involved detailed ground/floor vibration assessments, addressing the challenges posed by vibration-sensitive manufacturing & research environments; in the rail sector, we had the opportunity to contribute to a premier high-speed rail project in India through rail decay testing - an essential step in understanding track dynamics and noise emission characteristics during train operation.

We also expanded our footprint in building acoustics and automotive applications. Acoustic benchmarking for a premier 1000-seater auditorium

enabled a comprehensive understanding of performance metrics in large enclosed spaces, while our collaboration with the TATA Motors team in Pune focused on a comprehensive four-day automotive NVH training program, which was met with highly positive feedback.

Looking ahead, the coming year presents strong opportunities across semiconductor fabs, metro infrastructure and process industries. While geopolitical uncertainties remain, they also underscore the importance of resilient and adaptive engineering solutions combined with localised resource building.

We remain committed to delivering consistent value in our deliverables and look forward to a productive year ahead.

# GROUND BORNE VIBRATION ASSESSMENT FOR UPCOMING MACHINE SHOP FACILITY

By Hruthik H R, Engineer - Technical Services

## BACKGROUND

M/s. Ace Designers Limited engaged NV Dynamics to perform ground-borne vibration assessments within their Minnapura plant located in Nelamangala Taluk near Bengaluru. The study was undertaken in view of a new precision machine shop facility planned at north-east corner of the premises, which houses vibration sensitive instrumentation. A foundry plant situated immediately south of the proposed machine shop facility periodically performs vibration shakeout operations that induces ground vibrations. Since such vibrations may affect precision equipment, an assessment was necessary to understand the existing vibration levels and evaluate whether the proposed machine shop area would remain within acceptable vibration limits for sensitive equipment installations.

## TASK TAKEAWAY

The assessment indicated that vibrations from the foundry shakeout operations were noticeable, primarily near locations closest to the foundry, while the proposed development area showed minimal influence from these activities. Most vibrations recorded in the proposed development area were associated with localized plant operations (WTP & STP) and vehicular movement. Proper planning of internal roadways and controlled vehicle access is recommended to minimize the influence from ground borne- vibrations.

## SITE ACTIVITIES

Vibration assessments were carried out at ten (10) customer identified locations distributed across the plant premises. Ultra-low frequency seismic-grade vibration transducers were installed by coupling them to metal piles inserted into the virgin soil/hard ground. Vibration data was recorded in three orthogonal directions. At each location, ground borne vibrations were monitored continuously for two hours using a multi-channel data acquisition system to capture both ambient vibrations and vibrations generated during foundry shakeout operations.

During the monitoring period, the intermittent shakeout process carried out using a single motor, operating at approximately 960 RPM which translated to 16 Hz was observed along with other operational activities such as pump operations from the nearby water treatment plant (WTP) and sewage treatment plant (STP). The recorded vibration data was subsequently processed and represented in 1/3-octave band spectra for comparison with standard vibration criteria curves.



# NOISE & VIBRATION STUDY FOR CONSTRUCTION AND OPERATIONAL PHASES OF AN UPCOMING METRO PROJECT IN A DEVELOPING ASIAN CITY

By Varun Yadav, Engineer - Technical Services

## ➤➤➤ BACKGROUND

Urban metro systems are essential for improving mobility. One such system is currently being developed in a growing Asian capital (location withheld due to confidentiality). However, constructing metro infrastructure in dense urban environments requires careful assessment of ground-borne vibrations and their potential effects on nearby buildings and occupants. Metro alignments—whether underground, at-grade or elevated often run close to existing buildings, making vibration assessment—a critical aspect of project planning.

Vibrations are generated during both construction and operational phases. Construction activities such as piling, excavation and tunnelling introduce dynamic forces into the ground, while operational vibrations arise from rail-wheel interaction, rolling stock dynamics, and track-structure systems. These vibrations propagate through soil and structural elements before being perceived at nearby receptors.

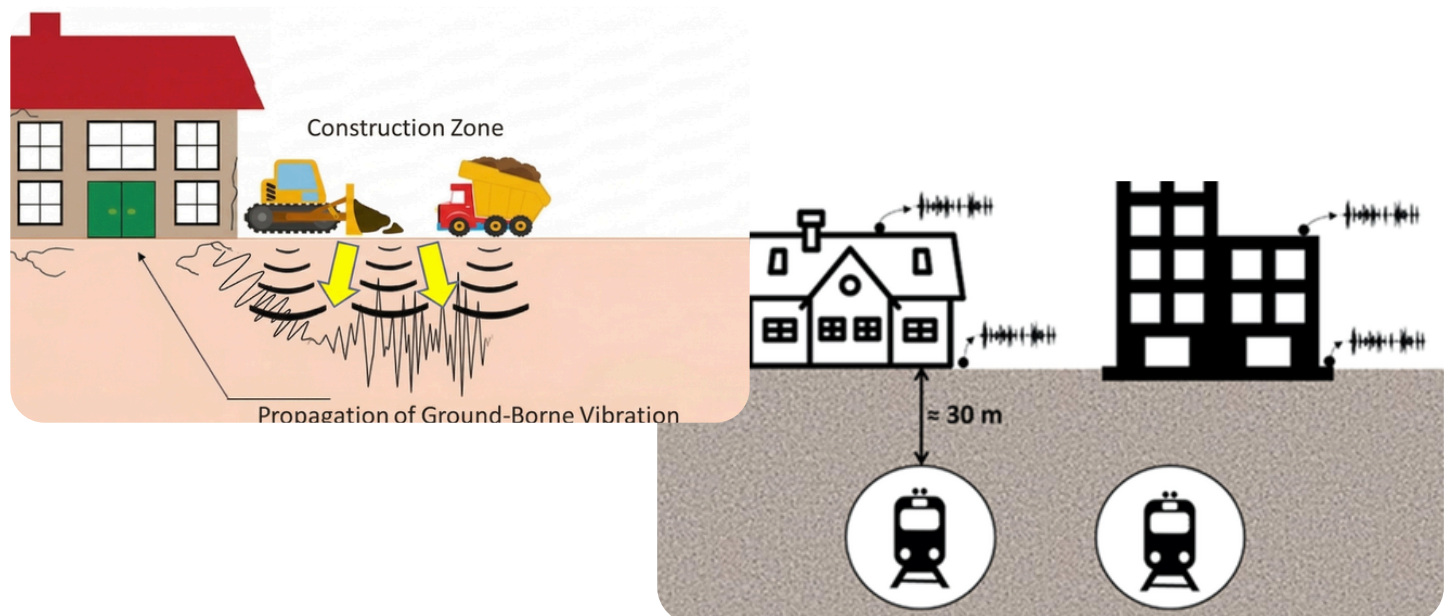
## TASK INSIGHTS

This assessment demonstrates the importance of early-stage vibration studies in metro projects. The use of established frameworks such as the FTA guidance ensures a consistent and reliable approach to predict vibration impacts during both construction and operational phase. Such an approach supports timely implementation of mitigation measures, ensures compliance with international standards, minimizes disturbance to surrounding communities and contributes to the safe and sustainable development of urban transit systems.

## ➤➤➤ METHODOLOGY

The assessment included identification and screening of vibration-sensitive receptors along the alignment, followed by categorization based on land use and occupancy. Construction-phase impacts were evaluated by analysing equipment like pile rig, earthmovers, TBM and their proximity to the nearest sensitive receptor location. Vibration levels were predicted in terms of peak particle velocity (PPV) and RMS velocity using methodologies outlined in the Federal Transit Administration (FTA) guidelines.

Operational vibration modelling was carried out using a source-path-receiver approach, incorporating parameters such as train speed, track characteristics, ground conditions and receptor proximity. Standard FTA procedures were adopted to develop attenuation relationships and apply correction factors for building response, enabling estimation of vibration levels at receptor locations. The study identified locations where vibration exceedances may occur and assessed impacts against relevant criteria for structural safety and human comfort.



## ➤➤➤ PHYSICS TO KNOW



**Scorpions** use substrate vibrations to detect prey, mates, and predators, functioning as a highly sensitive, touch-based navigation system in darkness. Their legs are equipped with specialized sensors called slit sensilla, which detect and measure tiny vibrations in sand. This allows scorpions to pinpoint moving insects from up to 50 cm away, making them skilled nocturnal hunters. Scientists study this remarkable ability to better understand the scorpion's behavior and ecology, helping protect these ancient arachnids and the delicate ecosystems they inhabit.

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

**Suri Bhagavantam** (October 14, 1909 – February 6, 1989) was an Indian physicist and scientific administrator, renowned for his work in light scattering, spectroscopy and crystal physics. Born in Agiripalli, Andhra Pradesh, he specialized in the Raman Effect and applied group theory to study crystal properties. At a young age, he joined Nobel laureate CV Raman's research group in Calcutta, contributing to pioneering discoveries in spectroscopy and crystal dynamics. He authored *The Theory of Groups and its Physical Applications*, shaping a generation of physicists. Bhagavantam also served as Director of the Indian Institute of Science and the Defence Research and Development Organisation, strengthening research and defence science. His legacy continues to influence physics education, research and scientific leadership in India.



Watch our latest podcast on  **YouTube**

### CERTIFICATIONS



### CLIENTELE

