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NVSAGE

Newsletter on Noise and Vibration Engineering

www.nvdynamics.com
services@nvdynamics.com | +91 7760381818

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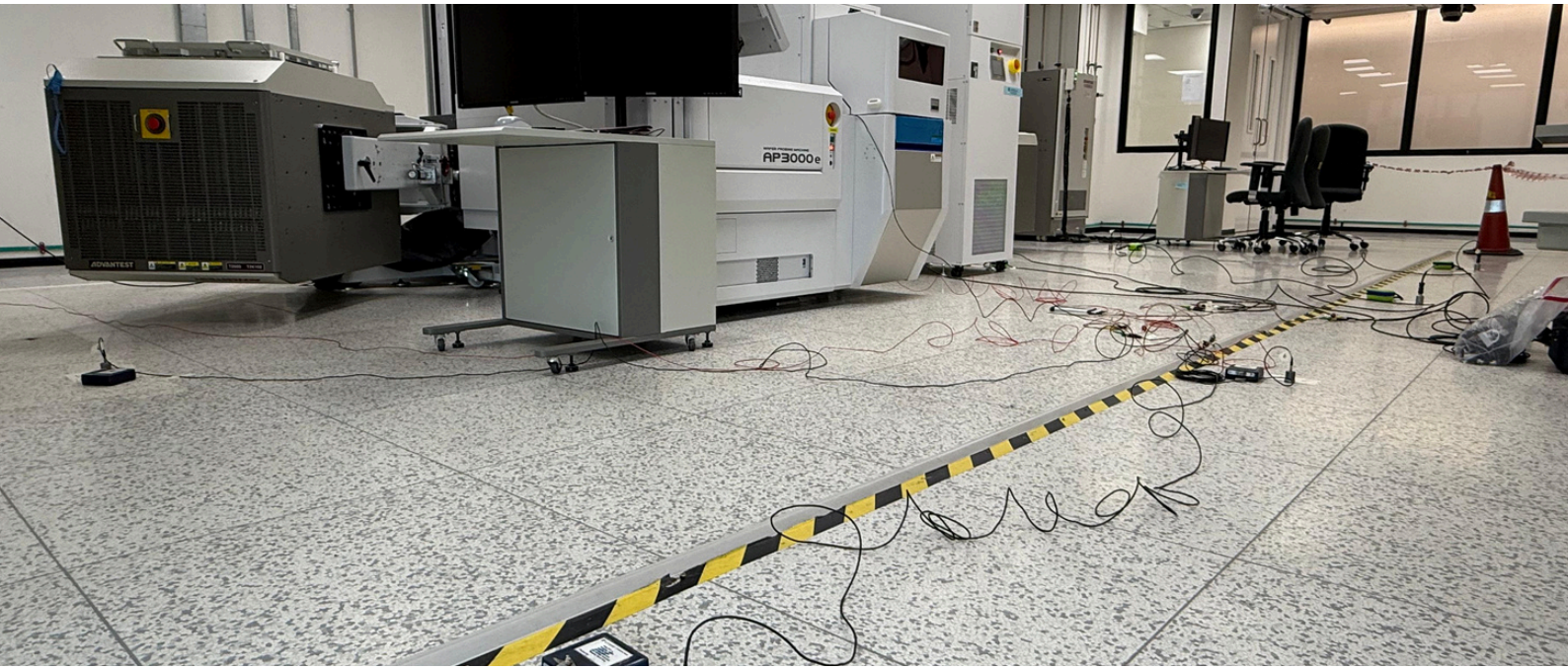


FOREWORD

By Krishna Balamurali, Principal Engineer

To the time this newsletter gets published, the 24-25 FY would have ended and I have some good things to share from the last quarter.

Over the years, our experience of conducting multiple assignments of ground borne vibrations for our diverse clintele have got us into mastering this procedure. A complete eco-system of instrumentation, engineering expertise and assessing the data to comply to end requirements are all in place.

What started as a routine ground vibration qualification for Indian Metro rail got refined and got consolidated over time. Our current activities of ground vibration assessments are in ***micro and nano engineering laboratories, semiconductor research and manufacturing setups, bio and analytical facilities*** wherein the entire scope of ground vibration is re-visited right from the type of sensors to be used, data acquisition & processing methodology and to finally depicting the outputs to comply with stringent compliance requirements. Our current tasks are with some of the who's who of electronic and chip making industries such as On-Semi, AMAT, Lam Research, Foxconn, Tata Electronics to name a few.

This segment of vibration testing, analysis and proposing credible mitigation plans have increased substantially in the past 2 years and is contributing to over 20% of the overall revenues. This has triggered in improving our hardware resources to cater to simultaneous assignments and also to work through applicable standards for semi-conductor based industries.

The last quarter also witnessed a pile of queries from shipping, metro rail and such other large transport verticals. We bagged the order from Udupi Cochin ship yard for a BV certified Noise and vibration audit task with an assured 14 ships to be tested over next 2 years.

All in all, the new quarter to start is with all good hopes and with a good number of assignments queued up.

ACOUSTIC SOLUTION FOR BHS MOTORS ABOVE IMMIGRATION HALL CEILING OF BIAL - TERMINAL 2

By Varun Yadav, Engineer - Technical Services

BACKGROUND

Kempegowda International Airport – Terminal 2, serves as a modern gateway offering seamless connectivity and world-class facilities that reflect the city's dynamic growth and global connections. This newly opened terminal elevates the travel experience with its cutting-edge design, sustainable features, and passenger-focused amenities, ensuring a smooth and welcoming journey for travellers worldwide.

A high-tech Baggage Handling System (BHS) is present in the ceiling void of the Kempegowda International Airport - Terminal 2. With its state-of-the-art automation, real-time tracking, and efficient baggage sorting, the system guarantees smooth and reliable luggage management. Featuring numerous integrated motors, it ensures fast and dependable handling of passenger baggage.

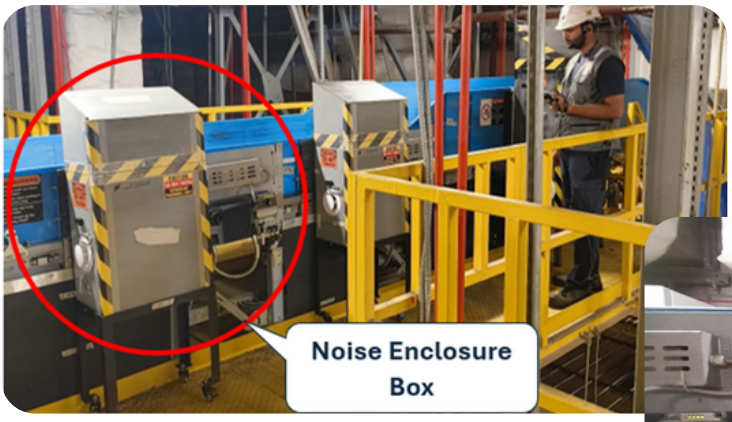
TASK TAKEAWAY

After the installation of these acoustic boxes, the noise levels in the BHS area and the immigration area were evaluated. The results indicated a considerable reduction (~10 dB) in the overall noise levels. Throughout this process, several challenges were addressed, including space constraints on the BHS maintenance walkway, limitations on modifying the BHS conveyors, and the need for adequate ventilation to manage heating issues.

SITE ACTIVITIES

The motors of the BHS, situated directly above the immigration and passenger arrival hall of Terminal 2, have been generating noise that contributes to higher ambient levels. This noise has been causing discomfort for both immigration officials and passengers alike in the arrival hall. To address this issue, BIAL engaged NV Dynamics to assess the situation and implement noise mitigation measures for the BHS motors.

Following an initial assessment of the issue and evaluation of various potential mitigation measures, decision was made to design acoustic enclosure box to encase the BHS motor. A total of 30 motor-specific-acoustic enclosure boxes were designed, fabricated and deployed at site. These acoustic enclosure boxes are made of specific acoustic panels and is lined with acoustic materials; the box has high sound absorption characteristics and have best-in-class fire rating. Proper ventilation was also incorporated at the top of each box to facilitate air flow & hot air dissipation.



STRUCTURAL VIBRATION ANALYSIS OF EOT CRANE AND OPERATOR CABIN

By Hruthik H R, Engineer - Technical Services

BACKGROUND

Electric Overhead Travelling Cranes (EOT) are one of the most commonly used cranes in manufacturing industries to move heavy objects across parallel runways. As the name suggests, these are electrically operated and typically have single or double girders (bridges) that span the gap between the runways. The girders carry a hoist that can lift and lower the load and the whole crane assembly can travel horizontally along the runways. Based on the load and application, each crane is designed with a specific lifting speed, travel speed and span length.

M/s. TATA Steel Ltd being one of the largest organizations in the field of steel production, hired NV Dynamics to assess one of such cranes in the CRM shop at their steel factory in Jamshedpur, to determine the root cause of the reported perceived vibrations in the crane operator cabin.

TASK TAKEAWAY

After thorough testing and data analysis, the root cause of the vibrations in the operator cabin was identified. Detailed observations regarding the issue were compiled and reported, providing a clear understanding of the underlying factors contributing to the vibrations along with a clear summary of mitigation plans to minimize operator cabin vibrations.

SITE ACTIVITIES

To accurately evaluate the dynamic behaviour of the crane and identify any sources of excessive vibrations, a comprehensive testing procedure was followed. Multiple vibration response tests were conducted on the crane operator cabin to analyse its frequency and generate operational deflection shapes for loaded conditions to assess its dynamic behaviour during regular operation. Furthermore, a separate vibration measurement was performed on the cabin to assess its vibration with respect to the girder vibration during the crane operation.

In addition to the vibration response tests, impact-based tests on the crane girders were also conducted to assess the natural frequencies and co-relate them with the operating frequencies of the crane.

PHYSICS TO KNOW

Bornean tree-hole frogs (Metaphrynella sundana) make active use of the acoustic properties of cavities in tree trunks that are partially filled with water, typically serving as egg-deposition sites. By adjusting their vocalizations to match the resonant frequency of these cavities, which changes depending on the water level, the frogs effectively amplify the sound. This strategy increases their ability to attract females, improving their chances of successful mating.

GREAT MINDS & THEIR CONTRIBUTION TO THE WORLD OF SCIENCE

Dr. S. K. Shivakumar was a distinguished Indian scientist from Karnataka, renowned for his contributions to the Indian Space Research Organisation (ISRO). Born in Mysuru, he earned his BSc from Mysuru University, followed by a BE in Electrical Communications Engineering and an MTech in Physical Engineering from the Indian Institute of Science, Bengaluru. He completed his PhD in Electronics in 2014 from Kuvempu University. Shivakumar joined ISRO in 1976, where he significantly contributed to various satellite missions and served as the project director for the 32-meter dish antenna of the Indian Deep Space Network. He played a pivotal role in the success of missions like Chandrayaan-1 and Mangalyaan. Awarded the Padma Shri in 2015, he was also a key figure in setting up ISRO's Deep Space Network.