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## **Technical Seminar Organized by the Department of Mechanical Engineering**

### **Technical Seminar on Advances in Experimental Structural Dynamics of Aerospace Products**

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The Department of Mechanical Engineering, MVJ College of Engineering, organized a technical seminar on ‘Advances in Experimental Structural Dynamics of Aerospace Products’. The Resource Person was Dr. N Chandra, Principal Scientist, Structural Technologies Division, CSIR - National Aerospace Laboratories, Bengaluru.

The session was conducted at Smt. Rajalakshmi Jayaraman Seminar Hall, MVJCE, from 11.30 am to 1.30 pm, on 07.09.2019.

#### **Participants**

The Technical Seminar was attended by students of 3<sup>rd</sup>, 5<sup>th</sup> and 7<sup>th</sup> Semester, and Faculty members of the Department of Mechanical Engineering.

#### **About the Speaker**

Dr. N Chandra obtained his B.E. in Mechanical Engineering from Visvesvaraya Technological University and M.Tech. in Aerospace Engineering from Indian Institute of Technology – Madras (IIT-M). He further obtained his PhD from the Department of Aerospace Engineering, IIT-M, for his thesis titled ‘Analytical and Experimental Investigations on Vibro-acoustic Behaviour of Functionally Graded Plates’. He has been working in the areas of experimental structural dynamics and vibro-acoustics, since he joined NAL in 1999. Initially, he was involved in acoustic qualification testing of various satellites and launch vehicles of Indian Space Research Organization, at the Acoustic Test Facility. He was a core member in the design and development of ‘High Frequency Jet Noise Generator’. Later, he moved to the Structural Technologies Divisions in 2004, where he worked on aircraft structures.

He is presently Sr. Scientist, and leading two major activities; ground vibration testing of full scale aircraft/aerospace structures and vibro-acoustics. He has contributed significantly to many national projects: SARAS, HANSA, ALH and LCA. His contribution to strategic sector includes upgradation of MiG 29, Jaguar, Mirage 2000 and Su-30MKI aircrafts, for integration of next generation advanced missiles. He was responsible for establishing a state-of-the-art vibro-acoustic simulation and test facility. His R&D focus is on active-passive noise control strategies for aircraft panels and development of vibro-acoustically efficient advanced composite structures.

He has to his credit, a number of publications, that include 8 journal papers, 20 conference papers and 50+ technical reports. He has received CSIR-NAL awards 10 times, for excellence in project execution and R&D, including the Technology Shield Award. He is a reviewer in many international journals: Journal of Sound and Vibration, International Journal of Applied Mechanics, International Journal of Mechanical Sciences, Journal of Optimization, Journal of Testing and Evaluation and Journal of Vibration and Control. He has guided many bachelor and master students for their projects, and trained many interns. He has visited Ireland, Germany and Australia for training and project execution. He is a member of Board of Studies, CMR university, Bengaluru.

### **Inauguration of the event**

The Technical Seminar started with welcoming the speaker and the gathering, followed by the Invocation song and lighting of the lamp. Dr. Nagaraj Sitaram, Principal, MVJCE, welcomed the Chief Guest Dr. N Chandra, by presenting a flower bouquet. Dr. P Venkatachalem, HOD, Mechanical Engineering welcomed Dr. Nagaraj Sitaram, Principal, MVJCE, by presenting a flower bouquet.

### **The Contents of the Technical Seminar – a Brief account**

The Seminar started with a brief introduction of the activities carried out at CSIR (Council of Scientific and Industrial Research) and NAL (National Aerospace Laboratories). The Seminar addressed the advances made in experimental structural dynamics, related to aerospace structures. Core areas of expertise related to Mechanical Engineering students, such as aerodynamics, computational fluid dynamics, wind tunnel testing, advanced composite materials and structures were highlighted. Specialized design, simulation and testing capabilities of

structural technologies including mechanical systems and design, ground vibration testing and aeroelasticity, static and dynamic test, impact and crashworthiness were presented. Before presenting the advances in experimental structural dynamics, a brief introduction to vibrations and modal analysis was given by the Resource Person. The application of experimental modal analysis in design qualification was presented in detail, through the SARAS aircraft programme. The development of GVT based flutter analysis scheme was explained for an aircraft without design data or finite element model. Application of this scheme to qualify weapon integration on various fighter aircrafts, design modification of a civil aircraft, validation of composite repair technology on an unmanned aerial vehicle and composite manufacturing process verification – all these topics were presented in detail. The case studies of experimental modal analysis for different aircrafts were analysed. Numerical simulations of the modal analysis were presented.



**Technical Seminar on “Advances in Experimental Structural Dynamics of Aerospace Products” organised by Department of Mechanical Engineering.** The resource person Dr. N Chandra, Principal Scientist, Structural Technologies Division, CSIR - National Aerospace Laboratories, Bengaluru-India is lighting a lamp during inuagraution of the technical seminar at Rajlakshmi seminar hall on 7<sup>th</sup> Sept. 2019.



**Technical Seminar on “Advances in Experimental Structural Dynamics of Aerospace Products” organised by Department of Mechanical Engineering.** The resource person Dr. N Chandra, Principal Scientist, Structural Technologies Division, CSIR - National Aerospace Laboratories, Bengaluru-India delivering technical seminar on Advances in Experimental Structural Dynamics of Aerospace Products at Rajlakshmi seminar hall on 7<sup>th</sup> Sept. 2019.



**Technical Seminar on “Advances in Experimental Structural Dynamics of Aerospace Products” organised by Department of Mechanical Engineering.** Students and faculty members from Department of Mechanical Engineering, during the technical seminar at Rajlakshmi seminar hall on 7<sup>th</sup> Sept. 2019.

### **Outcome of the Event:**

The Technical Seminar enabled students to understand experimental modal analysis techniques used in structural dynamic studies of aerospace components, and the numerical tools used to carry modal analysis using finite element methods. The brief outline of modal analysis of various air craft’s motivated students to learn these techniques and understand how to implement them.