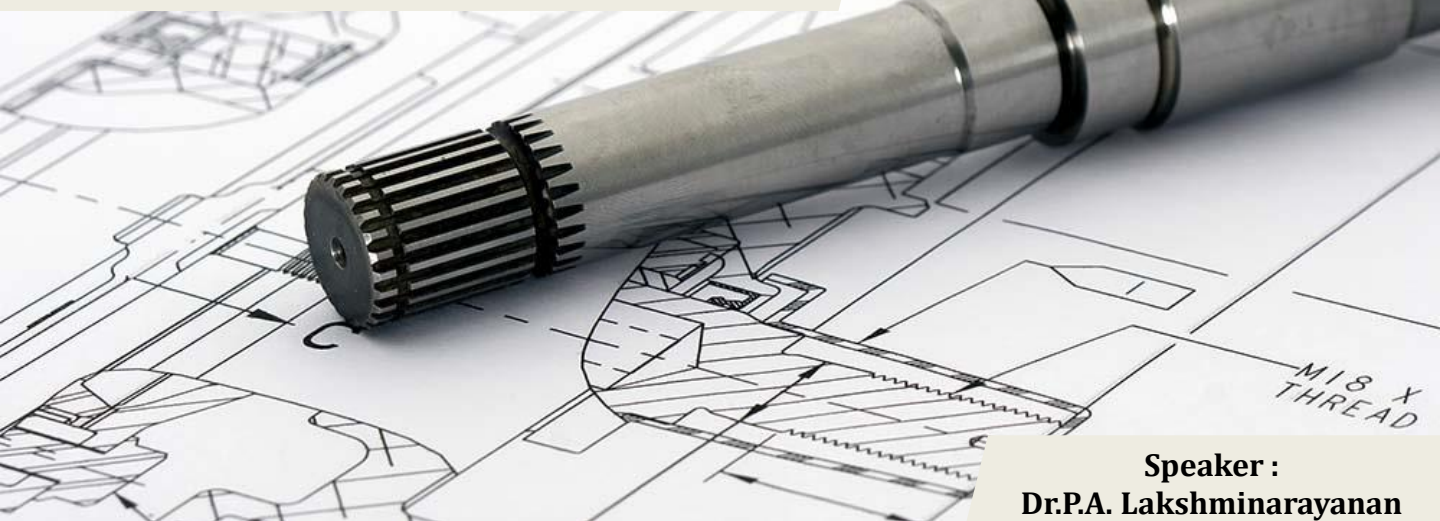


SAEISS Online Lecture Series on
**Fatigue: Physics, Models and Design of
Machine Elements**



Speaker :
Dr.P.A. Lakshminarayanan



29 & 30 January 2022



10.00 am to 01.00pm 02.00pm to 04.00pm (Saturday & Sunday)

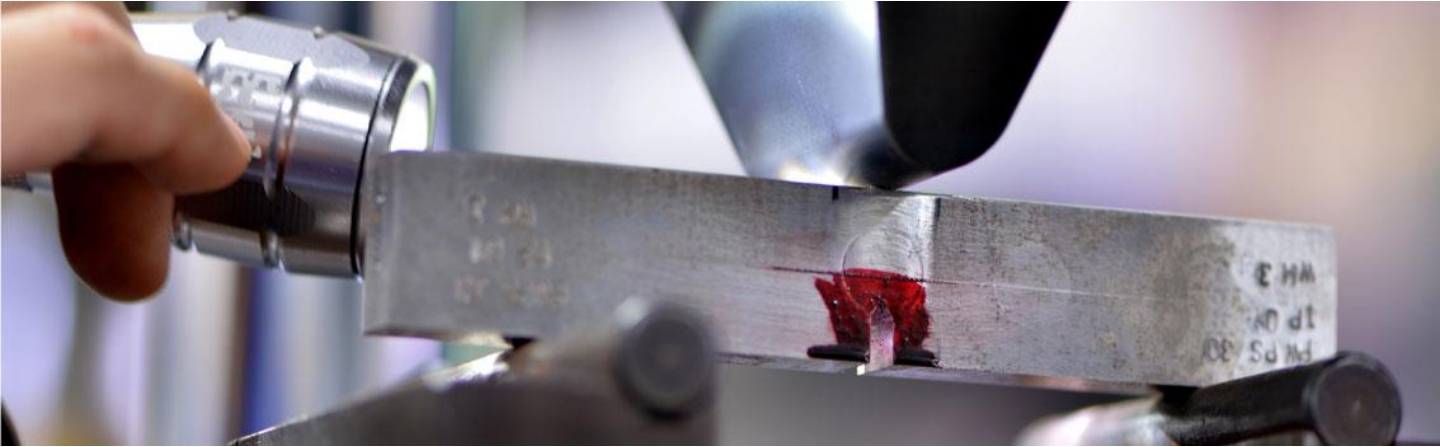
About the Course

The subject of fatigue is the basis of the design of many machine elements. When a fluctuating load beyond some critical limit is applied, minute defects naturally present in any material grow as cracks, propagate initially in hiccups forming beach marks and then fail. The minimum load leading to the vicious crack propagation is far less than the yield or ultimate strength of the material. The physics of crack formation and its growth leading to the ultimate failure of a part is treated from basics. The load fluctuation can be of any type and methods exist to comprehend them meaningfully. Examples are provided to enable the design of parts for limited life in terms of load cycles using Paris, Gomez, and Anderson models.

Then, some machine elements must last forever under fluctuating loads, for example, the crankshaft or the valve spring of an engine. The established models of Gerber, Morrow, and Goodman are useful in describing the life of parts, finite as well as infinite for different types of loads. Though the fatigue models are well developed for ductile materials like steel, copper and aluminium, brittle materials like cast iron can also be analysed using these techniques. Many examples are discussed.

Fatigue of springs is a specialized subject. the findings of Zimmerli and Sine help treat compression, extension, and torsion springs of helical form.

Though paper and pencil calculations are important to unravel the mysteries of fatigue quantitatively, modern computer software help handle some mind-boggling number-crunching involved in .real-world load cycles while using the fatigue models described in the lecture.



Speaker Profile

Dr. P. A. Lakshminarayanan

P. A. Lakshminarayanan (born 1950) studied at the Indian Institute of Technology, Madras for his B. Tech, M.S., and Ph.D. degrees. He worked at the Loughborough University of Technology and Kirloskar Oil Engines Ltd. for about five and 20 years respectively, before moving to Ashok Leyland in 2002 to head the Engine R&D. From 2011 till 2019, he was the CTO, and the Technical Adviser at Simpson and Co. Ltd. Now, he teaches at IIT Kanpur and Industrial Academies.

With his teams, he has developed more than eight diesel and CNG engine platforms and 150 engine types commercially successful for efficiency and cost-effectiveness. Two engine designs received prizes from the Institute of Directors (India). Twelve ideas were patented during the development of engines for over 40 years.

He has authored 60 research papers in journals and conferences of international repute. Four of them received prizes for integrity and quality of contents from the SAE (Arch Colwell Award), Combustion Society (India), AVL (Graz), and AVL (India) in 1983, 1993, 2005, and 2011. He is the recipient of the “Automotive Engineer of the year award” from the Institute of Automotive Engineers (India) (now SAE India), 1994, and the “Lifetime Achievement Award” from the ISEES, 2021. He has co-authored two books titled “Modeling Diesel Combustion” (Springer: First Edition in 2010, Second Edition in 2022) and “Critical Component Wear of Parts in heavy Duty Engines” (John Wiley 2011). He has coedited a handbook “Design and Development of Heavy-Duty Diesel Engines” (Springer, 2020), and his fourth book “Thermal Management of Engines” (Springer, 2021).

He is elected to the fellowships of SAE (2009), INAE (2013), and ISEES (2018).



Who should attend?

Engineers, executives, Managers, R&D professionals, faculty, students with affinity to Automotive Engineering and interested in any field of product development like design, marketing, testing, manufacturing, CAD, Engineering Analysis



Course Fee

Non-SAEINDIA Member - Rs. 5,000 + GST

SAE INDIA Member - Rs. 3,600 + GST

Faculty - Rs. 2,000 + GST

Last Date of Registration : 28.01.2022



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