



ME Seminar



From manufacturing on Earth to manufacturing in extra-terrestrial spaces

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ABSTRACT

While technologies are being developed for manufacturing launch vehicles, satellites etc. on the earth for use in space, the near future will require technologies that will enable manufacturing in space itself for use there in space and for use back in the earth. This need has arisen because of the human endeavor, in the era of Space 2.0, to explore space like never before including long term presence in orbits, creating settlements in faraway locations that will require extensive time to be spent on-board a space craft just to reach there. In addition, the lure of micro-gravity and the advantages it offers to control, and tailor material structures cannot be ignored. The manufacturing technologies needed for space will differ substantially from the earth-based ones owing to the constraints posed by limited space, limited power, micro-gravity influence, and limitations to track process inputs and outputs and to effectively recycle by-products. A Centre of Excellence to develop technologies for Extra Terrestrial Manufacturing (ExTeM) is being planned to fill in a big lacuna currently in the space-related manufacturing research in India. The centre will address both fundamental studies and technology developments. Micro-gravity influence in several physical phenomenon will be studied, and the know-how will influence the process technologies developed. To this end, phase 01 tasks of the centre is in progress, where several micro-gravity tests are on-going in drop-towers and planned on parabolic flights. Extensive parabolic flights are planned in Phase 02 with one experiment also being planned in orbital platforms. This talk about the efforts involved in launching the centre and the on-going activities.

ABOUT THE SPEAKER

Sathyan Subbiah obtained his B. Tech from IIT Madras in 1997, MS from UIUC in 1999, and PhD from Georgia Tech in 2006. His MS and PhD training has been in fixturing and micro-machining. He has worked for 3 years in the automotive industry in the Detroit area between his MS and PhD programs of study. He was with SIMTech, Singapore briefly before taking up a faculty position at NTU Singapore in 2007. He joined IIT Madras as a faculty in 2014 and is currently a professor at the Department of Mechanical Engineering. Recently he has taken a passion to realize a childhood fancy for space by initiating research and development for manufacturing in space and attempting to establish a centre of excellence in extra-terrestrial manufacturing.



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