# Industry Expectations from Academia

B.N. Suresh

President, Indian Academy of Engineering, Delhi
Honorary Distinguished Professor, ISRO HQ, Bangalore

INDUSTRY EXPECTATIONS

- Expects quality human resources with needed skills, good aptitude for team work and basic knowledge of system engineering.
- Wants academic programmes and curriculum to stay aligned with Industries needs to the extent possible.
- Looks for inputs from academia in specific designs, process improvement and also bettering the machine performance.
- Participation in technology development which requires specific research or development work.
- Use of specialised Labs in Academia for developmental and testing requirements.
- Involvement in long term research needed by Industry.

Linkage with Industry and Education
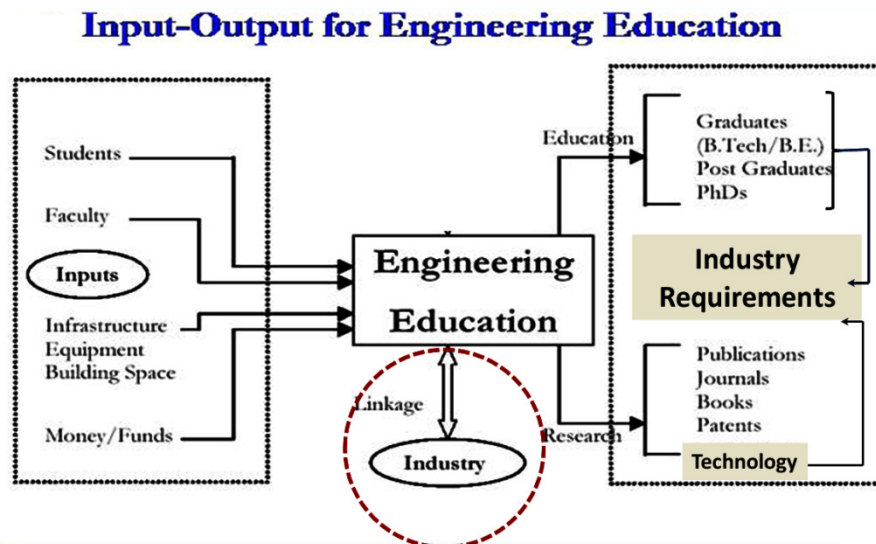
Human Resource Skills needed for Industries

- Abilities to apply knowledge of engineering or management sciences for development or overall management.

- Knowledge and aptitude for product and systems, facility build up, management of plants and facilities.
- Meeting the production needs understanding the quantity & quality requirements, the economic, constraints, environmental aspects and other related issues.
- System engineering and teamwork skills to function on multidisciplinary systems.
- Capability to identify, formulate and solve engineering problems of products and systems of the Industry.
- Self education and continuous learning relevant to the products, systems and management.
- Use of various techniques, skills and modern tools for engineering development and enhancement of production.

Possible Actions to Meet Industry HR Needs

- To give realistic practical orientation maximally by having close links with appropriate industrial establishments
- Design of innovative laboratories at institutions to include state-of-the art industrial experiments
- Focus on hands-on industrial experience with 'real life' experiments linking with curriculum right from day one.
- To set up suitable mechanisms to promote continuous interactions.
- Creation of "virtual" laboratories to mimic industrial environment, which can be funded from industry.
- Some of these suggestions are being practiced at IIST an Institute of Space Department.

Understanding the Academic Aspirations

- Academic focus is by and large the addition of knowledge in their area of expertise.
- Prefers the research content and tries to solve by considering the multiple options. Time consuming.
- Research leads to publication of papers or filing the patents rather than realising the proto products in deliverable form.
- Question of patent rights where joint industry academia research is involved.
- Lack of interest or experience in transforming the Lab to technology development and to commercially viable production.

Gap between Industry Expectation and Academia

- Industry focus is always production orientation with commercial viability. Investment in research is very poor.
- HR needs are met by attitude based selection and impart intense training for the needed skills.
- The industry research, if any is need based, mostly application and economic oriented.
- Academic research is always open ended, mostly peer reviewed and publication oriented.
- Minimal interaction between academia, R&D engineers and industries in education and research projects.

## How to bridge this Gap between Industry and Academia

- Suitable mechanism to have continuous interaction to change the perceptions of research, technology development and production.
- Carry out gap analysis periodically and tune the curriculum to meet the industry needs without affecting the academic requirements.
- Introducing the add-on or guest lectures from industry experts on the subject they learn aligning with curriculum.
- Arranging the visit for students to relevant identified Industries to expose them to practical applications of the subject they study.
- Seek the help of Industries in procuring the suitable equipment and machineries. Industries can even provide the old working equipments to academia.

Suggested Practical Solutions

- Faculty members to go on sabbatical at Industrial establishments relevant to their area of expertise.
- Establish a research wing in the Industry with enhanced funding and involve academic experts.
- Joint development of advanced products needed by Industry in collaboration with academia.
- Introduce Industry experts in committees which frame academic programmes.
- Setting up Industry parks near the academic Institutions. (These exercises are successful in a few Institutions).

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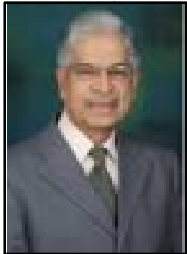
Dr. B.N. Suresh obtained his degree in Science and Engineering from Mysore University and completed his Post Graduation from IIT Madras. He obtained his Doctorate under Commonwealth Scholarship in Control Systems from Salford University, UK. He joined Vikram Sarabhai Space Centre (VSSC), Department of Space, Trivandrum in 1969 and discharged several responsibilities as Head, Control & Guidance Division, Group Director, Guidance and Simulation Group, Deputy Director, Avionics etc before taking over as Director, Vikram Sarabhai Space Centre in 2003. He served in that capacity for four and half years till end November 2007. As Distinguished Scientist and Director VSSC, he provided the dynamic leadership for the development of launch vehicles and contributed significantly for the successful launches of ASLV, PSLV and GSLV. He pioneered the development of complex technologies like, space navigation guidance and control systems involving hardware and software, aerospace control actuation systems, integrated simulation for launch systems and R&D management. He is instrumental in establishing full fledged and state-of-the-art laboratories needed for the evaluation of complex systems. He has nurtured and built world class actuation systems and launch vehicle simulation laboratories. His role in defining the activities for advanced technology development and their planning for space transportation is very significant. He played a crucial role in steering the very complex Space Capsule Recovery Experiment (SRE), which involved several new and critical technologies. The module was flight tested successfully with perfect re-entry and recovery operations.

Dr. Suresh took over as Founder Director for the Indian Institute of Space Science and Technology (IIST) at Trivandrum in 2007 and served for three and half years till Nov 2010. He was responsible in establishing this autonomous Space Institute to prepare the bright and young students to meet the human resource needs for future programmes of ISRO. He has contributed significantly to structure the state-of-the-art curriculum for all graduation and post graduation courses. He gave a big thrust to research activities and established excellent research laboratories. He ensured that the Institute was shifted to its new campus at Valiamala within a short span of two years after establishing all the needed infrastructure. In the short span of three years IIST has been recognised as one of the premier Institutions in the country not only by Indian academia but by many foreign academic Institutions.

He took keen interest in promoting the system engineering activities in the Country and was actively involved in the activities of System Society of India (SSI). He was the President, SSI, for 6 years and organised a number of National System Conferences all across the Country. He was Co-Chair for the International programme Committee and Chairman for the Nation Planning Committee for the International Astronautical Congress held at Hyderabad in 2007 with more than 2500 delegates out of which 1100 were foreign delegates. Presently Dr. Suresh is Honorary Distinguished Professor at ISRO HQ. In the last five years, he is actively involved in Mission Readiness Reviews (MRR) for all launch vehicles of ISRO as Chairman MRR. He also chaired the integrated technical review for GSLV Mk 3 and also for Reusable Launch Vehicle (RLV) with members drawn from several National R&D and academic Institutions to review all systems of these vehicles for their smooth function in flight. During this period, he has written a book "Integrated Design of Space

Transportation System" in association with one of his colleagues and the book is released recently. This Book addresses the integrated design aspects of launch vehicle involving multiple disciplines and also the complex issues associated with this system.

He was also distinguished Professor at IIT, Bombay and MIT Manipal for 4 years. During this period he has interacted with a number of graduate, post graduate and research students and delivered lectures in a few selected areas in Aerospace Engineering. He is a member of Board of Governors, IIT Madras. He is a Fellow of several professional bodies like Indian National Academy of Engineering (INAE), Astronautical Society of India (ASI), Aeronautical Society of India (AeSI) and International Academy of Astronautics (IAA) at Paris. He is also Fellow and Past President of System Society of India (SSI). He was head of Indian delegation for the United Nations Committee on Peaceful Uses of Outer Space (UN-COPUOS) at Vienna, Austria during 2004-07. He was selected as Chairman of the prestigious United Nations Scientific and Technical Committee for the year 2006 by the Countries of the Asia Pacific. This has been a unique distinction for India, as for the first time, a technical expert from a developing Country was selected for this coveted post since its inception 42 years ago. Dr. Suresh has delivered several prestigious guest lectures like, Ramanujam memorial, Vikram Sarabhai memorial, Dr. Srinivasan memorial and many more in prominent Institutions and national conferences. He has also delivered invited lectures at several International Institutions like European Space Policy Institute, Paris, Space Institute at Strasbourg, United Nations conferences at Vienna and many more. He has published more than 45 technical papers in prominent international and national Journals, Conferences and Symposiums. He has guided more than 450 technical reports on various technology developments at VSSC during his tenure of 38 years.

Dr. Suresh has been conferred with several awards & honours and prominent among them are "Dr. Biren Roy Space Science design Award" from Aeronautical Society of India, "Agni Award" from DRDO for achieving self reliance, "ASI Award" for contribution to space technologies, by Astronautical Society of India, "Distinguished Alumni Award" from IIT Madras, "Ramanujam Award" by PSG Institute of Technology for System Engineering, "Technical Excellence Award" by Lions International, "Outstanding Achievement Award" by Dept of Space, Govt. of India, "Lifetime Contribution in Engineering Award" by Indian National Academy of Engineering (INAE) for his significant contributions to space technologies, "National Systems Gold Medal" for lifetime contributions to large systems from System Society of India, "Aryabhata Award" the highest award by Astronautical Society for his invaluable contributions to aerospace developments and "Big Kannadiga Award" by FM 93.7 Radio for Science in 2014, the Karnataka " State Rajyotsava Award" for 2014 for Science & Technology and the "Lifetime Achievement Award" by the Karnataka State Science and Technology Academy for his contributions in Science and Technologies. In recognition of his meritorious contributions to Science and Technology, Govt. of India conferred on him "Padma Shri" Award during the year 2002 and "Padma Bhushan" during the year 2013.