

## *Guest Editorial*

Due to technology denial by advanced countries to India, it is of paramount importance to develop advance aerospace technologies indigenously to achieve the goal of self-reliance. The theme *Quality through Design and Competitiveness through Quality* is timely and relevant. Quality assurance and reliability engineering are very important in aerospace technologies due to stringent requirement of weight-to-strength considerations and the need for highly reliable systems. In the first year of this millenium, India has demonstrated its commitment and capability with successful launch of geosynchronous satellite launch vehicle (GSLV), polar satellite launch vehicle (PSLV), successful flight of light combat aircraft (LCA), *Agni* and other missiles.

In comparison to advancements in the first seven decades of world aviation, there has been a major leap-frogging in aerospace technologies in the past three decades. The new generation military aircraft and missile systems incorporate design concepts and system features that are far more advanced than what had been feasible in their counterparts of just the previous generation. Unorthodox aerodynamic configuration, fly-by-wire flight control system, composite structure, glass cockpit, advanced engine, stealth features, smart weapons, etc., have added tremendously to the operational and performance capabilities of the present-day aerospace systems.

Quality engineering that has evolved almost concurrently with the new aerospace technologies has rendered it possible to build highly reliable aerospace systems with hitherto unknown complexity and sophistication. The techniques and tools of quality engineering in today's aerospace world include: Failure mode effect and criticality analysis (FMECA), fault-tree analysis, hazard analysis, computational fluid dynamics studies, evaluation of real-time simulators and test rigs, advanced non-destructive testing methods, static and dynamic tests sweeping the entire performance and environment envelops of the systems, etc. Design and manufacturing tools like computer-aided design (CAD) and computer-aided manufacturing (CAM) also contribute to the inherent quality and reliability of the systems developed. It is common knowledge that the advances made in computer capabilities have been centrally responsible for the revolutionary gains in the system technologies, Integration, verification and validation of the enormous amount of software going into the subsystems has therefore become a mandatory exercise to ensure the operational reliability of systems under all possible combinations of critical situations.

The first National Conference on Quality Engineering in Aerospace Technologies, the QUEST'95, held in Hyderabad, helped in bringing together eminent scientists, technologists and engineers in the aerospace field to discuss interactively and appraise the challenges ahead in the furtherance of national programmes and interests. The second National Conference, QUEST'99, held on 20 and 21 August 1999 in Bangalore, carried forward the efforts with a declared theme to impart 'thrust-to-indigenisation and self-reliance'. QUEST'2001, the third National Conference in series organised by Vikram Sarabhai Space Centre (VSSC), Thiruvananthapuram was held on 23 and 24 November 2001.

There has been an overwhelming response from the authors with over 58 papers for presentation in QUEST'2001. The papers covered quality engineering aspects in all areas of aerospace activity in the right proportions. The papers covered the topics like design of systems, manufacturing technologies, quality management, software validation, testing techniques, failure analysis, and qualification and type certification. Three invited lectures on 'Quality Assurance of Launch Vehicles', 'Missiles', and 'Certification of Airworthiness' were delivered by Shri RV Pirumal, Project Director, GSLV Project, ISRO; Shri Prahlada, Director, Defence Research and Development Laboratory (DRDL), Hyderabad; and Shri JK Sharma, Chief Executive, Centre for Military Airworthiness and Certification (CEMILAC), Bangalore, respectively. Six representative papers from those received for the Conference have been selected for inclusion in this Special Issue of *Defence Science Journal*. The invited lecture on 'Quality and Reliability of Missile System' by Director, DRDL has also been included.

We would like to thank the Organising Committee for permission to publish the best papers presented in the Conference. We greatly value and appreciate the initiative taken by Dr Mohinder Singh, Director, DESIDOC and his editorial team in bringing out this Special Issue.

Dr JS Soni  
Scientist E  
Defence Research &  
Development Laboratory (DRDL)  
Hyderabad-500 058

S Sankara Iyer  
Scientist SG  
Vikram Sarabhai Space Centre (VSSC)  
Thiruvananthapuram-695 022