

Sitaram Rao Valluri (1924–2019)

On 23 January 2019, the Indian scientific community lost Dr S. R. Valluri, former Director of the (then) National Aeronautical Laboratory (NAL) and Director-General (DG) of the Aeronautical Development Agency (ADA), Bengaluru. Seldom does an outstanding young researcher morph into an institution-builder, manager and formulator of administrative policy, whose legacy will continue to be cherished and admired by future generations. Most would agree that Valluri was indeed an exceptional leader. The few who may hesitate, would have to admire the resoluteness of a young engineering student who decided he would 'go to the US for further studies, and return to head a research institution here'. As mentioned in his memoirs, that is precisely what young Valluri resolved to do into his third year as an engineering student of Banaras Hindu University (BHU), Varanasi.

Rao, as Valluri was fondly called by friends, was born on 25 June 1924, in Eluru, West Godavari district, Andhra Pradesh, in a doctor's family of moderate means with nine siblings. After obtaining B Sc (Engg) degree in 1946 from BHU, he went on to pursue postgraduate studies on a Madras Government scholarship at the newly formed Engineering Department of Aeronautical Engineering, Indian Institute of Science (IISc), Bengaluru. Later, he was to become the Founder-President of the IISc Alumni Association. In 1949, Valluri proceeded on a Pauley Scholarship to the California Institute of Technology (Caltech), USA, for further studies leading to a Ph D in Aeronautical Engineering. His doctoral thesis submitted in 1954 related to metal fatigue, and involved intricate and cumbersome measurements of internal friction and its correlation with the fatigue process under cyclic loading. This work and its potential applications to aeronautical fatigue made Valluri a sought-after consultant for the US aerospace companies as well as the US Air Force Laboratories.

After a brief stint from late 1963 as Professor and Head of the Department of Aeronautics and Applied Mechanics at the Indian Institute of Technology-Madras, Chennai, Valluri took charge as Director of NAL on 23 November 1965, after Dr Nilakantan, NAL's founding Director, unexpectedly passed away in

1964. Valluri's vision of building a world-class engineering laboratory had several key elements: selection of applied research areas based on requirements of next-generation aircraft, building industrial-scale test facilities, nurturing development of new materials and advanced manufacturing technologies, developing excellent supporting infrastructure and, last but not the least, recruiting the best available scientific and technical talent.

Over the next 19 years, Valluri proceeded to literally 'script, sculpt, paint and conduct' what was to emerge as the 'crown jewel' of the Council for Scientific and Industrial Research (CSIR). His long association with Caltech and with senior personnel in the US aerospace industry may have moulded his perception of what drives the success of R&D in high-technology fields such as aerospace. But to translate this perception into reality demanded the requisite infra-

structure, more importantly the required people, and most importantly the resources to support them and the skills to manage them. Valluri realized right away that this meant setting aside his personal research interests. Indeed, one is unlikely to find any original research publications by Valluri on metal fatigue from work at NAL. Not even in co-authorship, because he was against attaching his name to someone else's work. He did not need to. What he did achieve is monumental.

The first half of Valluri's 19-year tenure at NAL was devoted to institution-building, with a focus on laying the foundation for developing essential technologies that go into an aircraft, technologies that did not exist at the time in India. Nilakantan had already set the ball rolling with a wind tunnel facility. Valluri first saw his predecessor's project to successful closure as a world-class facility, which has now been used during the last five decades for over 50,000 blowdowns



S. R. Valluri with S. Chandrasekhar and S. Ramaseshan in 1966.



S. R. Valluri with S. Dhawan.

PERSONAL NEWS

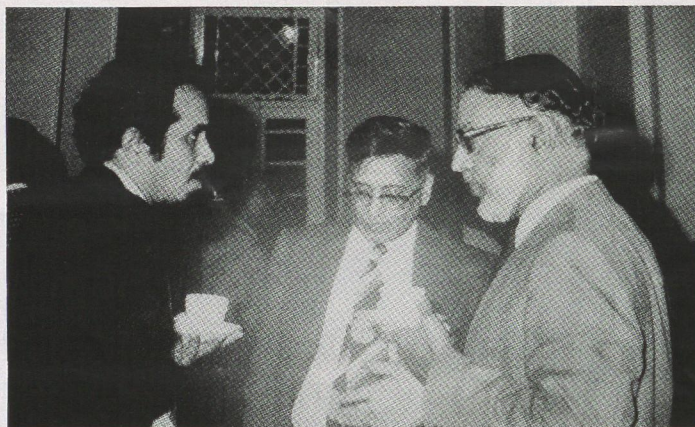
generating aerodynamic data in subsonic, transonic and supersonic range for indigenously designed aircraft, rockets and missiles. The key to its success was a high-level committee that was established by Valluri, with representation of user agencies to run the tunnel as a national facility with an agreed scheme for sharing tunnel time as well as fixed and variable costs of its operation and its continued development.

A state-of-the-art aircraft represents the best of technologies emerging from a variety of disciplines. These include high-grade materials with the best properties, light but strong structures, propulsion systems, and controls that serve as the brain of an aircraft. So Valluri went on to create the infrastructure around the Propulsion, Materials, Structures and Systems Divisions of NAL, in addition to the Aerodynamics Division. Over this period, the two campuses of NAL (respectively at Kodihalli and Belur) emerged as a closely knit network of full-fledged operational facilities that would address most of the critical elements associated with an aircraft as a system. Valluri realized that people determine the success of any endeavour. He set about recruiting the best talent to make this possible, and at one point, around 90 Ph Ds formed the core of the NAL team, arguably the largest across national laboratories. This included scientists in a wide variety of disciplines ranging from basic research right up to the level of technologists ready to exercise science in industrial application. Never mind how unrelated the activity was to the core discipline of aeronautics, he strove to get only the best involved. Thus, the Graphic Arts Department of NAL was headed by C. Rajagopal, a renowned photographer and Honorary Fellow of the Photography Societies of several countries, including the US, Britain and France. Apart from state-of-the-art equipment for research, workshops, pilot plants and test rigs also came up at NAL, many of in-house design that were later to serve as an insurance against the consequences of technology denials from foreign sources; and some of them actually made it to the global market.

Valluri created a system of management in which research activities of the Divisions at NAL were organized in projects with identified title, objectives, rationale, schedule, project leader and project team, and budget. Each Division

had its Scientific Advisory Committee, with members from academia and industry. These committees would meet twice a year to review existing in-house and sponsored projects and proposals for starting new projects. Their recommen-

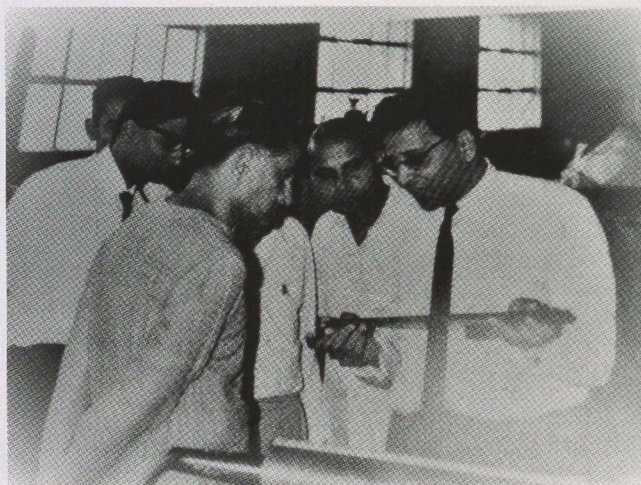
dations formed an input to the agenda of the highest laboratory committee, which was the Research Council in later years. Tracking of the progress of the projects and related documentation was handled by a Project Monitoring Cell. Valluri



S. R. Valluri with M. G. K. Menon and R. Narasimha.



S. R. Valluri with Air Marshal I. H. Latif in 1979.



S. R. Valluri with Vikram Sarabhai around 1967.

also held periodical meetings of senior staff, which included the Heads of the Divisions and senior scientists. These meetings discussed formulation of policies and delicate matters. The meetings were known for free and frank discussions. Valluri was fond of saying that he believed in collegiate management, and scientists did not fear persecution for expressing their views. However, Valluri had strong views on discipline. If a staff member was found to have misused or abused facilities or his position, he would be almost invariably taken to task.

Valluri attached paramount importance to honesty and ethics in the practice and management of science. He used every opportunity to illustrate through meetings, circulars and spot discussions the importance of integrity in research. This obviously played an important role in the elevation of the quality of research and development at NAL as perceived by its partners and customers alike.

Valluri expected nothing short of excellence from this team in the pursuit of research. He tried hard to avoid the atmosphere of subordination and hierarchy typical of many government offices. He made sure his attention could be sought by any employee of NAL, even if it meant hearing a voice of dissent or protest. He constantly underscored the importance of this feedback loop as a necessary element for management, even if in the end the decision would always be his own and he would, of course, own responsibility for the consequences as Director. Obviously, office meetings would be lively, if not heated. Valluri's daily routine would involve unannounced random visits to individual divisional facilities, often with visitors, during which discussion and comments would get down to the last detail. He seemed to know the name of each of the 1500-odd employees at NAL. This was by no means micromanagement. It reflects Valluri's meticulousness and attention to detail in his pursuit of excellence across the institution, be it an experiment in progress, a research seminar, a selection interview, the next building under construction, or the landscaping and gardens across the campus. This was how an entire institution was groomed over almost two decades that now, even some 30 years later, serves as an operational monument to his tenacious efforts.

In this age of subcontracting, outsourcing and labour mobility in the tech-

nology sectors, nothing seems to matter more than the bottom line on a spreadsheet. Modern-day CEOs may wish to consider what was achieved by Valluri's determination that in the long term, it is not just human resources in terms of their qualifications that matter, but also the prospects of their growth, their welfare and that of their families. In ensuring these, Valluri strived to put in place processes that were not only fair in their definition, but equally so in their enforcement. He promoted the recruitment and fair treatment of women scientists long before this emerged as a subject of discussion in the country (many leading women scientists at NAL recruited during his time have actually long retired). Valluri went out of his way to ensure justice when cases were brought to his attention of scientists being unfairly treated, even if this had nothing to do with NAL. His contributions to reforms in the assessment and promotion process impacted the employees of the entire CSIR system. Valluri's initiatives resulted in the emergence of a Kendriya Vidyalaya on campus and even a Nursery School (whose operations were graciously overseen over many years by his wife, who, in spite of her position, would ride to work on her moped). These benefitted employees of both NAL as well as the neighbouring ISRO Satellite Centre. Valluri's legacy also includes a well-equipped and well-staffed modern Health Centre at NAL.

Valluri recognized from his experience in the US that the R&D process starting from applied research and technology development to final integration in a flying aircraft has large timescales. So he advocated vertical integration of research related to aeronautics with aircraft industry in the form of an Aeronautics Commission, similar to commissions in atomic energy and space. His relentless championing of the cause of self-reliance in aeronautics led to a vigorous coordinated proposal with HAL and IISc to develop a new family of aircraft designed for India's needs that builds on existing capacities. Thus, if as a third-year engineering student Valluri had resolved to one day head a research institution, it should not come as a surprise that upon assuming the Directorship of NAL, he was attracted to an even loftier goal. His perseverance in mustering the support of other leaders and officials ultimately led to the formation of ADA, of which he

assumed charge as Director-General in 1984. The agency was entrusted with the development of the Light Combat Aircraft (LCA) that has since entered service with the Indian Air Force. Thus, the LCA, which effectively signals the final coming of age of India's aircraft development programme, may serve as a flying legacy of Valluri. Indeed, this state-of-the-art aircraft reflects a number of technological achievements of the National Aerospace Laboratories. Its aerodynamics, controls and carbon fibre wing serve as stand-out examples of fruits from saplings that this outstanding scientist, manager and human being planted and nurtured over the two decades that he was associated with the country's aeronautical scene.

Valluri never sought personal recognition. At every opportunity, he would ask visitors for critical comments that would help improve the work at NAL. If compliments came instead, he would immediately attribute success to the effort of his 'brilliant colleagues'. Recognition was conferred on him on many occasions. Of note are the Wright Brothers Medal for his research on metal fatigue, the Vasvik Award and Padma Shri. Valluri's own description of his experiences can be found in his memoir written in 2006, which his family has now kindly agreed to release to the public (<http://www.instint.in/wp-content/uploads/2019/02/EventsInLifeSRValluri.pdf>). In this age of scams and 'fake news', its contents are, at the very least, likely to throw some light on why we are where we are. One can be sure it would also serve as an inspiration and guide for the new generation of scientists aspiring to reach the kind of heights that Valluri was able to conquer. In doing so, they may do well to follow his oft repeated aphorism 'if you don't get facts, facts will get you'.

Valluri is survived by his wife, a son and a daughter, and two grandchildren.

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Remembering S. R. Valluri

An appreciation of S. R. Valluri, one of the titans of Indian aeronautics

The name of Dr Sitaram Rao Valluri, who passed away on 23 January 2019, aged 94, will forever be linked with the National Aeronautical Laboratory (NAL; now National Aerospace Laboratories), Bengaluru.

Valluri had many stellar accomplishments in his distinguished career, but his 19 long years (1965–1984) as Director of NAL were so intense, passionate and momentous that everything before and after those two decades pales somewhat in comparison.

Valluri was born in Eluru in Andhra Pradesh (AP) on 25 June 1924, as the first child in a family of ten children. From his father, a doctor, he inherited a liberal attitude, the virtue of being truthful, and a short temper, which, he candidly admitted, was always a trifle embarrassing.

Student days at BHU and IISc

The young Valluri, who apparently ran behind a light aeroplane while in school, was sure he wanted to become an aeronautical engineer. This was not going to be easy for someone staying in the middle of nowhere in AP, but help came from an unlikely benefactor: India's future President Sarvepalli Radhakrishnan. Then Vice-Chancellor of Banaras Hindu University (BHU), Varanasi, Radhakrishnan offered Valluri admission in BHU's Engineering College in 1942, after reassuring himself that the young man had the requisite ability.

After obtaining his B Sc (Engineering) from BHU, Valluri spent a few valuable years (1946–1949) at the Department of Aeronautical Engineering in the Indian Institute of Science (IISc), Bengaluru where he had the opportunity to interact with stalwarts like V. M. Ghatage, and O. G. Tietjens. Then came the big moment: obtaining the Pauley Scholarship and joining the Guggenheim Aeronautical Laboratories at the California Institute of Technology (Caltech), USA in September 1949.

Valluri at Caltech and Douglas

Caltech, and more generally USA, impressed and overwhelmed Valluri. There

were opportunities to meet the aeronautics master and high priest Theodore von Karman; be a student of the brilliant Hans Liepmann; establish a lifelong friendship with Anatol Roshko; bond with that 'extraordinary human being' Satish Dhawan (those days in Caltech) and suddenly realize that the person sitting next to you at the lunch table is Richard Feynman.

Valluri's Ph D adviser at Caltech was the well-known Chinese scientist Y. C. Fung, but it was Ernest E. Sechler's work, on design practices for aircraft structures, that excited Valluri the most. Sechler went on to become a mentor of sorts: he also probably opened doors that allowed Valluri to work as a design consultant for Douglas Aircraft Company, USA, during the late 1950s and early 1960s.

It was during this phase that Valluri established considerable reputation as an expert in aircraft fatigue and fracture. His research interests were also getting more diverse: he enjoyed designing complex experiments with high-speed cameras, making intricate measurements, pondering over the parameters that influence fatigue crack propagation, worrying about factors that could lead to catastrophic fatigue failure, etc. It was, therefore, not a surprise when Valluri won the coveted Wright Brothers Medal in 1963. He would later describe this as the 'most satisfactory research period' in his life.

By the end of 1962, Valluri had logged in enough years with his 'green card' to become eligible for the US citizenship. Before taking the final leap across the Atlantic Ocean, Valluri decided to spend some time in India to test the waters back home. Not surprisingly, he received a lot of attractive offers: IIT Kanpur and IIT Madras wanted him; NAL's first Director, P. Nilakantan, wanted Valluri to start a new division on aircraft materials and structures, and Satish Dhawan, now back at IISc, encouraged Valluri to join him and Krishnamurthy Karamcheti (they were all together at Caltech) to do something truly worthwhile and valuable for Indian aeronautics. This 'strong compulsion to try to do something for the country that nurtured me', eventually persuaded

Valluri 'to tear up (his) US green card'. He accepted the IIT Madras offer to be a Senior Professor.

Within months of joining IIT Madras, Valluri started getting disillusioned, and even considered the idea of returning to the US. But a series of events intervened to completely change the course of his life: NAL's Director Nilakantan passed away suddenly on 18 April 1964; Karamcheti, who was the first choice to succeed Nilakantan, did not wish to give up his US citizenship, and Jagan P. Chawla, who was the next choice, requested terms of appointment that were considered untenable. Eventually, the committee – of which Dhawan too was a member – picked Valluri, not yet 41, to become NAL's second Director. It was an inspired choice. Valluri suddenly found himself with an enormous empty canvas that he could paint any way he liked. It helped that his boss, CSIR's Director-General S. Husain Zaheer, was personally fond of Valluri (Zaheer's relation with Nilakantan had been frosty). It helped even more that the Chairman of NAL's Executive Council was the legendary J. R. D. Tata (JRD) himself.

Director of National Aeronautical Laboratory

Valluri officially took charge on 23 November 1965, ignoring his father's plea not to join on the inauspicious *amāvāsyā* day. His first task as NAL Director was to make sure that Nilakantan's big unfinished task, to build the 4 ft trisonic wind tunnel, never lost momentum or steam. It was a special moment for Indian aerospace when the roar of the tunnel's first blowdown reverberated across the (then clean and serene) Bellandur Lake on 29 May 1967. With characteristic candour and honesty, Valluri shrugged off all accolades: 'I only had a small role to play here. Nilakantan had set everything up beautifully'.

Valluri then moved – just as Nilakantan had earlier requested him – to create the Materials Science and Structures R&D Divisions at NAL. To head the Materials Science Division, Valluri invited his colleague from IIT Madras, Sivaraj

Ramaseshan; and virtually gave Ramaseshan *carte blanche* to grow the Division exactly as he wished. Ramaseshan was immensely capable and charismatic and proved to be a formidable and popular leader.

Given his research and consultancy experience in the US, relating to structural integrity of aircraft, one guesses that Valluri intended to play a more active personal role in the Structures Division. But as he became aware of the onerous responsibilities and challenges of leading a national R&D lab, Valluri consciously backed away from personal technical work; indeed, he would, for the rest of his life, vehemently argue that hardcore research was inimical to the responsibilities of a top-flight R&D manager and leader.

By deliberately walking away from serious personal research – which entailed some risk, given how an individual's worth is evaluated even now in national labs – Valluri gave himself, instead, the opportunity to become an outstanding R&D leader and create processes and mindsets that significantly improved NAL's performance.

Valluri as a leader

Valluri ran NAL in ways that directors of most other CSIR labs – still practising the prevalent bureaucracy of the times – could not even have imagined. Just as an example, he started embellishing the NAL campus with a wide variety of trees. When JRD expressed some unhappiness with NAL's buildings, Valluri decided that he would design new buildings himself. As someone who spent two decades constantly stepping in and out of these buildings, I can confirm that they had pleasing and comfortable architecture, functionality and aesthetics. It seems so appropriate that NAL's biggest auditorium, conceived by Valluri, is today named after him.

But arguably Valluri's biggest game-changer in his early years as Director was to introduce project accounting at NAL. The classical CSIR budgeting schema only had account 'heads' for salaries, capital expenses, consumables, maintenance, travel, etc. but did not report expenses project-wise. 'I had no clue how much money we spent on each project, or which was the division on which we spent the most money. This

simply wasn't on', Valluri would later explain. It would take CSIR 30 more years to implement the project monitoring process that Valluri first introduced in 1966!

Another remarkable facet of Valluri's leadership was his relentless resolve to attract the best talent to NAL; equally, he was intolerant of what he called 'second-rate' persons. 'If you appoint a second-rate person today, you would inevitably attract a third-rate person tomorrow, and the first-rate person would tend to leave', he often used to say. Valluri's benchmark for a likely first-rate person was having a Ph D degree, and he packed NAL with Ph D-degree holders (he often exulted that NAL had more scientists with a Ph D than all of DRDO and ISRO put together). Considering the intellectual ferment visible at NAL, especially during the 1970s and 1980s, one would have to agree with Valluri's appraisal. Better still, there was absolutely no bias of gender, region or religion in any appointment that Valluri ever made or permitted. CSIR – NAL's parent body – considered Valluri's evaluation model to be so effective that it asked him to draft the CSIR-wide selection and appraisal criteria for all scientific and technical positions.

As NAL's Director, Valluri had an electric presence. He walked briskly, talked rapidly and bristled with energy. He took decisions and made things happen. Often big decisions required the concurrence of CSIR HQ, so the impatient Valluri would fly to Delhi to argue his case and quickly close the matter. There were occasions when Valluri's decisions evoked dismay or discord, but he rarely flinched: 'I'm here to run a national lab, not win a popularity contest', he would declare matter-of-factly.

Valluri also realized that, to succeed as Director, he needed to be strongly connected with NAL's natural partners: IAF, HAL, IISc and DRDO. In particular, Valluri always hit off very well with the IAF top brass, with the Air Chief often becoming a personal friend. An outstanding outcome of NAL and IAF working together was the full-scale fatigue testing facility that NAL created in the early 1970s. This facility allowed IAF to significantly extend the service life of its operational aircraft such as the Gnat, Ajeet and, later, the MiG-21s.

As Valluri grew in stature and success, awards and distinctions started coming

his way. He was elected Fellow of the Indian Academy of Sciences in circumstances that can be best described as unusual. While speaking at the Academy about crack propagation in 1970, C. V. Raman suddenly asked Valluri to define a crack. Raman was so impressed with his reply that he remarked that Valluri deserved to be a Fellow. The Fellowship came in 1971, just after Raman passed away. Valluri would receive the Padma Shri in 1974 and the Vasvik Award in 1978.

Valluri's contributions to NAL

Making NAL the best lab in CSIR was not just Valluri's endeavour; it was his crusade. He created NAL's grand foundation; but, just as important, he also created a formidable supporting infrastructure. Visiting NAL's library used to be a thing of joy; NAL's photo and printing facility was led by arguably Bangalore's best photographer of the time, and NAL's health centre offered excellent medical care. It was in the fairness of things that NAL's doctors intervened successfully to diagnose Valluri's meningitis as he collapsed into a deathly coma in February 1989.

How would one rate Valluri's performance as NAL Director? Without a doubt, it was exceptional, but, rather curiously, the Valluri years overlapped with a period when Indian aeronautics itself went into a bit of a coma. After the heady adventures of the 1950s and the 1960s, there was a lull in the 1970s following the HF-24 crash on 10 January 1970. NAL, however, continued to prosper: Valluri initiated the first moves to develop composite technologies, built remarkable capability for failure analysis and accident investigations, created even more testing and modelling infrastructure, and lobbied for funds so that NAL could build its first small plane. This prompted Dhawan to remark that NAL looked like 'a beautiful bride, all decked up, but with nowhere to go!'

So where could this beautiful bride go? The 1980s held great promise, and Valluri was eager and excited. Having been Director of NAL for over a decade, and being actively involved in every national initiative in aeronautics, Valluri held the vantage position. His big dream was to help create an Aeronautics Commission, serviced by a Department of

Aeronautics, along the lines of the Space and Atomic Energy Commissions. The Aeronautics Commission would integrate aircraft research, design, development, manufacture and operations under a single umbrella.

It always seemed like a bridge too far. In an informal conversation at an award's event, Roddam Narasimha, who would succeed Valluri as NAL's third Director, asked the then Prime Minister (PM) Indira Gandhi why her government did not support programmes in aeronautics the way it supported programmes in space and atomic energy. The PM replied that she would 'if everyone stopped quarrelling'.

While the Aeronautics Commission never happened – and Valluri would regret this all his life – the next best thing did happen. Narasimha, who had taken time off from IISc to spend a few years at HAL in the late 1970s, argued that it was both feasible and desirable to build an Indian light combat aircraft (LCA) in large numbers. His arguments achieved a rare resonance: IAF changed its perception, and Raja Ramanna, then the Scientific Adviser to the Defence Minister (SA to RM), was sufficiently enthused to ask Narasimha to lead a team of experts from IAF, HAL and DRDO to visit Germany, France, Sweden and England to obtain more insights and data. The team returned with a unanimous verdict endorsing the LCA concept. For the first time all the principal actors in Indian aeronautics appeared to be on the same page.

In response, the Government invited Valluri to head a high-level committee, which included all the big aeronautical players such as IAF, HAL and DRDO, and of course Narasimha, to make the final recommendation on the LCA concept. The earlier Narasimha committee had concluded the LCA *could* be done; the new Valluri committee had to decide if the LCA *should* be done and *how*. After a detailed feasibility exercise, the Valluri committee gave the formal 'can-go-ahead' verdict – again unanimously. It took the Defence Minister R. Venkataraman just two minutes to clear the LCA programme!

There was never any doubt who would lead the LCA programme. It had to be Valluri. A new entity, Aeronautical Development Agency (ADA), was created to fund, manage and monitor the LCA programme, and Valluri would be its Director-General (DG-ADA).

Director-General of Aeronautical Development Agency

Valluri assumed office as DG-ADA on 2 July 1984, after receiving a fond and emotional farewell from NAL. Valluri had transformed the contours of NAL during his 19 years.

ADA, which was to build India's first supersonic fighter, did not even have four walls when it started its existence. Valluri operated out of an NAL office – that we used to fondly call the 'blue room' because of its somewhat hideous blue carpet. I have memories of some truly enjoyable conversations with Valluri in the blue room: he could be at his eloquent best when he talked of self-reliance in aeronautics or of Caltech's 'honor code'. I also became familiar with Valluri's favourite expressions: 'apparently' was a word that he truly relished; then there was 'high-science-high-technology', and, above all, the most intriguing 'Hobson's choice with a Faustian bargain'.

It was hard to kick-start ADA – it is very hard to kick-start any new establishment with public funding – but Valluri invested all the energy and passion that he could, and NAL, now under Narasimha's tutelage, responded with commendable alacrity: The Advanced Composites Unit was off to a promising start (today's LCA, now called Tejas, has almost 45% composite structures), the wind tunnels started preparing in right earnest for the impending avalanche of tests, and 'fly-by-wire' soon became a buzzword in NAL's corridors.

However, all was not well with ADA's (and Valluri's) interactions with DRDO and its leadership. It would be pointless to talk, at this juncture, about events in 1985 that led to Valluri and Raj Mahindra's exit from ADA. Valluri felt hurt and aggrieved – and even privately speculated how the story would have panned out if he had accepted the Government's offer to become SA to RM in 1981. Mahindra, on his part, cheerfully moved on to the next aircraft design adventure involving NAL's light transport aircraft (LTA, now SARAS).

Retirement

Valluri's early retirement years were not the most comfortable; he must have felt like a batsman hoping to hit a century but

being suddenly given out lbw for 62. To make things harder, his pension was meagre, and would stay meagre till his US Social Security benefits kicked in early 1988.

However, Valluri plunged headlong into other interesting ventures: Realizing that Bengaluru's HAL airport would soon start choking, He prepared a comprehensive plan for how and where a new airport should be (one of Valluri's recommendations was indeed an airport beyond Yelahanka at Devanahalli; another was to 'take over' the runway at Yelahanka Air Force Base and move the IAF base elsewhere).

Valluri also proposed a scheme to revise Bengaluru's house numbering. Alas, this scheme never took off and he lived all his life horrified how his house number 659 on Indiranagar's 100 Feet Road was barely 100 ft away from house number 284.

For some years into retirement, Valluri also readily accepted invitations to speak at public functions. His talks were always scintillating: he had great stories to tell, a commendable turn of phrase, a twinkle in the eyes, and unabashed honesty. Most of all, he had a phenomenal memory, both for names and numbers.

All his life Valluri championed ethical professional practices and personal honesty. His criterion to judge the integrity of every action was to ask: 'Would Satish (Dhawan) approve?'. Valluri would be outraged every time he saw a lapse, digression or failure, and spoke out (and wrote) loudly against the misdemeanour. He could get really angry and it was hard to face his wrath. But he was always open to dialogue and debate and did not hesitate to apologize publicly if he found that he had erred.

I last met Valluri when U. N. Sinha and I went to greet him on his 93rd birthday. He seemed only slightly frail, and easily recognized both of us. He spoke for a few minutes with customary warmth, provided us a brief glimpse of the famed Valluri charm, but then lapsed into silence. We knew it was time to go and, deep down, I sensed that this would be our last meeting.

Valluri was a towering Indian. We will miss him.

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