

Illustrious Master

What I learned from my interactions with Prof. Roddam Narasimha.

BY **PADMANABHAN JAYASIMHA**

ONE learns many things from association with certain persons. It is a strong indicator of that person's positive attributes and the personal character that wields its influence on others. One such person is Prof. Roddam Narasimha, whose name and style caught my attention in 1973 when I joined the Aero Department of Indian Institute of Science (IISc) in Bangalore for my Master's programme. I had learnt about his impeccable credentials from my seniors and was most impressed by his brisk movements that included literally running up the staircase to his room on the first floor above the machine shop. He offered two elective courses during my study period, one on hypersonic flows and the other on real gas dynamics. Since I was clear in my mind that I would sooner or later end up in an aircraft design office, anything more than supersonic speed was not of interest to me. Secondly, I was told that both the courses would involve high level mathematics that I was least interested in adding to my skill sets. Hence, I missed an opportunity to be in his class during those two years.

After I joined Hindustan Aeronautics Limited (HAL) in 1973, I was working in the Aerodynamics Group of Aircraft Design Bureau (as it was called in those days). After Raj Mahindra took over as Director (Design), it was announced that a new project called HF25, namely HF24 modified with a single R25 engine, would be taken up. Surprisingly, it was also learnt that Prof. Narasimha would be steering this project. The youngsters were happy that a person of that stature would be with us, but

the elders were apprehensive how an academic would solve their problems. Prof. Narasimha (RN hereafter) called each of the group leaders and made them present their work. He got all the work documented together, the first time we saw a consolidated document of all the work that had gone on, in a volume arranged chapter by chapter. RN was meticulous about checking the spellings and formatting. I still remember that the corrections he made, in red ink, would be sent back punctually within a few days of submission.

It was during this period that I was introduced to him as the person who was working on aircraft performance using computers and could

generate plots on the computer. Those days we were working on ICL 1901A system (a third-generation mainframe with 14K words memory). The computer program was using up all the memory even with overlay features and virtually no trace facility. He would call me every week and ask for some more features to be added. Pleading with him that we had no memory space left would cut no ice with him. So the rest of the week would be spent in finding a way and squeezing his demands in. When I showed him that I was able to meet his requirement, he would characteristically say, "I told you, it would be possible." He would add some more requirements to add to my woes. It



RODDAM NARASIMHA presenting Padmanabhan Jayasimha with the Eminent Aerodynamicist award at SAROD 2015 held in Thiruvananthapuram on December 3, 2015.

BY SPECIAL ARRANGEMENT

was a challenge that I could not refuse and he would not yield so easily. This exercise gave me a lot of insight into the working of computers and the operating systems called GEORGE IS. We were also fascinated by the lunch he would bring—a sandwich, a fruit, a carrot, and he would get coffee from the HAL canteen. During the course of our discussions, we also came to know many incidents from AVRO studies, for which he had worked under Dr Satish Dhawan's leadership.

SEEKING SOLUTIONS

The first one was regarding engine calibration. To put it in his own words, "Some of the engines were found to be developing less than rated power. A meeting was arranged in London. The engineer, who was working on the 'Dart engines in India', arrived with a long roll of paper. After listening to the Indian side, he unrolled the paper that he was carrying and said as per his records, there was a load cell change on a particular date and the readings after this date appeared to be on the lower side. According to him, the problem could be in the calibration of load cell. This message was communicated to Engine Test Bed through telex, the fastest and the most efficient mode of communication in those days. After a day or two, a reply was received that the load cell was recalibrated and the power levels now recorded were in order. We felt like fools, being offered a solution 5,000 miles away from home, when the answer was only a few miles away from us." The message from this episode was clear. One has to look for solutions from nearby sources, before embarking on long journeys, finally to learn that the solution was nearby, if only we had cared to find out.

The other relates to the AVRO climb segment. Again, in his own words, "There was a deficiency noticed in the AVRO HS 748 second segment climb performance. Armed with sufficient data to back our findings, a meeting was arranged with the Designers of HS748. After hearing us, they confirmed that our find-

ings were, in fact, right. Based on the reliability levels achieved, they had taken a concession from the Certification Authorities for permitting a deficiency in this parameter. We believe blindly everyone else is meeting all the stipulated requirements and put ourselves at a disadvantage." From this episode, it becomes clear that we create problems for ourselves trying to do the impossible, which we believe others are able to achieve.

LIGHT COMBAT AIRCRAFT

After the closure of the HF25 project came the New Generation Fighter (NGF) studies. With a 2,000kg warload, the max wing loading was to be fixed at 450 kg/sq m (based on F20/F5E aircraft), twin Adour engines and the internal fuel to cater to 200 km Radius of Action in Lo-Lo profile. This concept later became the Light Combat Aircraft (LCA). A top level OR was received from Air Headquarters. The first report on the LCA was released in October 1979.

It was about this time that the personnel of the Aircraft Design Bureau got divided based on projects. Three large groups were formed, namely HPT32, Ajeet/Ajeet Trainer and Other Projects (Kiran MkI/IA/II, HF24 and others such as the re-engined HT-2). In addition, a four-member New Project (NP) team (that included me) was also formed to technically report to the Chief Project Coordinator (CPC-NP), Prof. R. Narasimha. At that time I tried to convey my feelings of such changes on the morale of the personnel. Indiscreetly I mentioned about Prof. Ananthasayanam working with him on the Indian atmospheric model. He made it clear to me immediately that academic institutes such as the IISc did not have a pyramidal reporting structure as in industry. He said people were at different levels on the basis of their qualifications, academic performance and experience, but they were all independent. The department has a Chairman, purely for administrative purposes. In a few minutes, he drove home the point and I have never had any doubts about the working principles in academia from that time onwards.

We were submitting, through RN, one report every month that included studies of single engine configurations with different engines, to Raj Mahindra, the then Managing Director (D&D), HAL. An internal committee was set up under RN's chairmanship to decide the requirements of the LCA. After a couple of meetings, he decided that it would not lead anyone anywhere. Then there was a period of low activity, and RN had stopped coming to HAL on a regular basis.

NEW PROGRAMMES

As per the Jaguar contract, BAe needed to provide consultancy on our new programmes. In that phase, there was a substantial difference between BAe and HAL in fuel burn for a particular mission. When this was pointed out to Raj Mahindra, he wanted me to consult RN. So, I went and met him in his house at IISc. We had a short discussion and he was convinced we were right. Apparently, as I later learnt from him, a message was sent to BAe, which agreed that due to oversight it had sent a wrong set of data and concurred that our computations were right. This further enhanced our confidence level. RN also expressed confidence in our capabilities to do performance computations.

An Indian team visited BAe and Rolls-Royce in June 1980, when RB199 Stage A was offered for the LCA programme. When RN briefed the then Chairman, HAL, the latter apparently told him, "Professor do not sit in an ivory tower", a remark that did not go well with RN. However, it was clear that a single RB199 would be a better option than twin Adour engines. An LCA committee was formed under Dr S.R. Valluri in June 1981. A presentation was made to the Defence Minister (Indira Gandhi), after which it was decided that the feasibility studies should be done by foreign companies and, accordingly, the contract was given to four companies. A team headed by Dr Valluri went for mid-term review to the four companies. Interestingly, M.N. Sreenivasan and I were asked to prepare the report by Raj Mahin-



K. MURALI KUMAR

INDIA'S LIGHT COMBAT AIRCRAFT Tejas takes off from HAL Airport during the Initial Operational Clearance process in Bengaluru on January 10, 2011. Prof. Narasimha set the ball rolling in the development of the LCA.

dra. When we went to meet RN to seek a few clarifications, he was upset that instead of writing it themselves, this task had been given to us. However, we assured and convinced him that this would help us understand many aspects of the discussions better. I remember working on a holiday to complete the report and hand it over to Dr Valluri at his Indiranagar residence. As we were about to leave, he stood at the gate, with a distant look and staring at the sky. We waited for a couple of minutes and he finally said, "For all the efforts you have put in, I hope the project finally comes [through]." Today (in 2019), I can proudly say that the project had not only come, but also the product has been successfully inducted into the Indian Air Force.

I used to meet RN at IISc on Saturdays, sometimes with my senior, Ibrahim. We discussed many day-to-day problems of ours, such as personal time management. He would tell us his daily schedule and advise us "go to bed if you are tired, but get up early and spend quality time reading in the morning".

The feasibility study by the four companies was completed by 1984 and detailed presentations were made. Our task was to compare all the reports and bring them to the same base. That was called normalisation studies. RN, after a detailed review, was convinced of our studies.

During this period, intense discussions were held with the German aerospace company MBB, which had proposed the tailless delta configuration that promised to best meet the air staff requirement (ASR). In one

such meeting, there was a discussion on a technical point. When I pointed out an error in the assumption being made, the MBB team was surprised and did not agree. RN turned back and asked if I was certain about what I was saying. When I stuck to my stand, he told Raj Mahindra that I would not be making such statements unless I was sure. Raj Mahindra told the German team that we would have a relook and discuss it the next day. The next morning, I wrote out my arguments and handed it over to the MBB team. After they came back from lunch, I was specifically called and told that I was right and they were sorry to have not accepted my statement the previous evening. I was indeed thrilled, not that the MBB was convinced, but on account of the trust RN had in me on this issue.

RN succeeded Dr Valluri as the Director of NAL in 1985. Sometime during 1986 or 1987, I was told by my office that there was a call from Director, NAL, and he wanted to speak to me. When I called him, he asked me whether I could drop in at his office one of the evenings on my way back home. So, within a few days one evening I was in his office. After the initial pleasantries, he asked me, "Are you happy with what you are doing?" Since my policy had been "Do what you like or if not, like what you do", I answered in the affirmative. He just said "that is good" and went back about the LCA tasks and what I had been doing. At the end, I could not resist asking him what he would have said if my answer to his question had been that I was not

happy with my current job. He simply brushed it aside saying that it was irrelevant since I had said I was happy and that the most important aspect of work was to like what you were doing. I was curious as to why he had called me. It was after a couple of months that I came to know from Dr K. Yegna Narayan [the former head and Saras Project Director at NAL's Centre for Civil Aircraft Design & Development (C-CADD)] that RN had discussed with him about hiring me at NAL for their civil aircraft programmes.

INTERACTIONS

I used to meet him at all LCA reviews at the Aeronautical Development Agency (ADA). During the early days of Intermediate Jet Trainer (IJT), I was invited by RN to give a talk at the Aero Department of IISc. Later, after I retired in 2010, I was a member of a committee for recommending wing plan form patent at the Jawaharlal Nehru Centre for Advanced Scientific Research (JNCASR), in which he was involved. I also met him in review meetings during my NCAD (National Civil Aircraft Department) days at NAL.

I was invited to SAROD 2015 (Symposium on Applied Aerodynamics and Design of Aerospace Vehicles) held at Thiruvananthapuram to be honoured as an Eminent Aerodynamicist. It was a surprise to me that RN was the Chief Guest and it was indeed my greatest privilege to receive the award from RN.

It has been a great experience being associated with RN and I hope the above has brought out many unique qualities of RN and his involvement in the LCA programme. I have always considered it a privilege to talk to him as he always had something interesting for us to know about and learn. □

Padmanabhan Jayasimha did his ME (Aero) in IISc and joined Hindustan Aeronautics Ltd (HAL) in 1972. He was appointed Chief Designer (Aerodynamics) in 2005 and retired as General Manager (Aircraft Design and Research Centre) in 2010. He is currently Consultant (Aerospace).