

We need to concentrate on research, futuristic systems: DRDO Chief

G. Satheesh Reddy is targeting a rapid effort to build next class of fighter jets

By Pradip R Sagar

Dr G. Satheesh Reddy has had a fascinating first year in office as chairman of the country's premier defence research agency, the Defence Research and Development Organisation (DRDO).

After achieving the final operational clearance (FOC) of the Light Combat Aircraft Tejas, which made the fighter jet 'battleworthy', and successful test of an anti-satellite missile, Reddy is now targeting a rapid, multipronged effort to build the next class of fighter jets. Besides developing more powerful engines and potent weaponry, the DRDO is now working on building advanced fighter aircraft.

With so many concerns about the depleting combat fleet of the Indian Air Force, the country's indigenous capability of aircraft manufacturing will be a major force multiplier. And at a time when China is aiding Pakistan to develop its next-generation fighter jet, the DRDO's fighter jet project will provide extra firepower to the Indian Air Force. In an exclusive interview to THE WEEK, India's topmost defence scientist talks of DRDO's big plans.

You have completed one year as the head of DRDO. What are the changes you have been able to bring into the field of defence research?

The first year as the head of DRDO has been very eventful for me. We are in a phase of consolidation as well as expanding into futuristic technologies in defence research at DRDO. We are converting our experience and skills into matured technologies and expanding our product range to fulfil the requirements of the three services. We could successfully demonstrate anti-satellite (ASAT) capability and became the fourth nation in the world to do so.

At the same time, I have initiated research into advanced technologies like quantum technologies, artificial intelligence, asymmetric technologies and advanced materials and sensors to have products with cutting-edge capabilities in defence. Defence technologies for space and cyber-security are other areas where we have started work in a big way. Work on indigenous air-independent propulsion systems is progressing well. Trials of the Nirbhay cruise missile, Nag missile and man-portable anti-tank guided missile and other systems have been successfully conducted in the past one year.

What were your priorities when you took over as the head of the country's premier defence research institution? What are the challenges you faced on the road to self-reliance in defence?

As envisaged in the creation of DRDO, our priority is to meet the tri-services' requirements through development of indigenous weapon systems. The priority areas are development of long-range surface-to-air missiles, air-to-ground missiles, long-range radars, BMD (ballistic missile defence), directed energy weapons, Advanced Medium Combat Aircraft, long-endurance UAV, guns and ammunition and so forth.

The challenges are many. First and foremost is planning and motivating the teams to embark on major futuristic projects. Reorienting the organisation to meet immediate demands, while keeping adequate focus on futuristic technologies, is another challenge. Addressing the diverse demands of the soldier in the field with available manpower and resources, and assuring the country of indigenous capability, is another challenge. But we are prepared to face the challenges. I have advised my lab directors to focus on three categories based on timelines and priorities.

The first category is research in futuristic technologies. Being an R&D organisation, we need to work on futuristic research. We need to focus on research, supported by basic research being done by the academia. This is essential for any country to progress. The second category is to pursue current technologies, which we need to work upon for the next five years, for development of weapons, systems and platforms. The third category includes projects and programmes already under progress.

We have drawn a very clear roadmap, based on the above, for all our laboratories. This lays down targets for the next 10 years, five years and two years, respectively. All the laboratories are working to meet the targets within the given timeframe.

Can you name some of the key upcoming projects of DRDO? And at what stages are those projects at the moment?

The new platform systems, into which work is being initiated, include the Advanced Medium Combat Aircraft (AMCA), new-generation main battle tank (NGMBT), long-range radars, airborne warning and control system (AWACS), sonar suite, high-thrust aero engines, engines for wheeled platforms, underwater autonomous vehicles and hypersonic glide vehicles.

Some of the systems under advanced development include long-range surface-to-air missile, man-portable ATGM, Stand-off Anti-Tank Missile (SANT), Akash NG, advanced torpedoes and medium-range surface-to-air missile (MRSAM) for the Army. In addition, a ship-launched short-range surface-to-air missile (SRSAM) for the Navy, Astra Mk-II air-to-air missile and short-range naval anti-ship missile are also being developed.

These systems are at various stages of development and trials. The progress made in all these new systems is highly satisfactory as the technology levels in these areas have matured. Today, we are self-reliant in development of all types of missiles, EW systems, communication systems, radars and sonars.

LCA Tejas had received final operation clearance in February. At what stage is LCA Tejas?

The final operational clearance for LCA (Indian Air Force) was accorded in February 2019 and HAL, which is the designated production agency, has commenced the series production. Deliveries to the IAF are planned shortly. There are few nations in the world that have achieved this feat to make a fighter aircraft of their own. And we are one of them. It has taken about three decades of struggle.

Production and delivery of aircraft with initial operating capability has been completed and the aircraft are in operation with the Indian Air Force. HAL has also commenced production activities for Tejas trainers.

Two prototypes for the Indian Navy have also been built and are undergoing flight tests.

Can you shed some light on the Tejas Mk-II programme?

Tejas Mk-II is a medium-weight fighter aircraft, which will replace the Mirage fighters. The preliminary design phase has been completed and detailed design work is in progress. It will have a higher-thrust engine compared with the LCA Mk-I.

Tejas Mk-II will be a medium-weight fighter (MWF) and its design is ready. The current Tejas weighs 6.5 tonnes and the MWF is the next class and is targeted to weigh around 17 tonnes. The Indian Air Force will be taking these aircraft in large numbers to meet its requirements. The first flight of the Mk-II will happen in 2022 and will take another five to six years to get into production. By that time, the Mirage 2000 fighters will complete their lifespan and the LCA Mk-II should get into production.

And where is AMCA (Advanced Medium Combat Aircraft) project?

AMCA is a fifth-generation twin-engine stealth aircraft. Feasibility studies have been completed and configuration has been finalised. AMCA will be initially propelled by a US-origin GE F414 engine with a thrust of over 90kN. But this will be an interim step till a higher-thrust engine of 110kN is finalised.

With the development of LCA Mk-II and AMCA, the country shall become self-sufficient in all combat aircraft in future.

Where have we reached with the DRDO's Advanced Towed Artillery Gun System (ATAGS) programme and its production and delivery schedule?

Development of ATAGS is completed. Private industry has been involved in the development of ATAGS in a big way, in tune with the 'Make in India' programme of the government. Development trials have been completed at various places, from the deserts of Rajasthan to the heights of Sikkim.

And user trials will begin shortly. The DAC (Defence Acquisition Council) has approved production of 150 ATAGS units by industry based on the DRDO design. The production process of ATAGS is expected to start after completion of user trials.

Pakistan recently test-fired its nuclear-capable surface-to-surface ballistic missile Ghaznavi. Has the DRDO been able to develop significant deterrence against any missile threat from Pakistan? Do we have enough indigenous BMD systems to tackle any Pakistani threat, especially under the current security scenario?

Yes, we have developed and demonstrated the ballistic missile defence system in its entirety, through both simulation and actual interception of live targets. We have adequate resources like radars and other sensors to detect and engage the emerging threats.

Both exo- and endo-atmospheric interceptor capabilities to engage targets at different altitudes have been successfully demonstrated. I would like to add here that India is one of the few countries in the world to successfully pursue a BMD programme. We have taken significant strides in this domain. We have also demonstrated kinetic kill capability and all the necessary technologies needed for this have been developed indigenously, with major participation from industry. I would not comment on operational aspects, but I can assure you that we have developed the BMD system that can tackle potential threats.

And the recent success of ASAT Mission Shakti demonstrated our deterrence capability against the space-based threats.

Do you think that we have achieved enough in aircraft manufacturing technology?

Though the country will be busy with lot more technology to be developed, during three decades of developing a fighter jet, many basic technologies were developed. Today, [India] can design and configure the airframe and develop software and avionics. So, all these things are available. And, in fact, if you can make a layout of the overall configuration of an aircraft, you know where to plug in all the subsystems. We have reached that stage.

You mean to say that India has reached a higher level of aircraft development?

Yes, now onwards, aircraft development will not face the same issues that we have faced during development of the Tejas. Many technologies have been developed. The ecosystem of a fighter aircraft has been developed. More so, India can also develop a commercial aircraft as well with the LCA core technologies available with us. Technologically, the basis of what is required is also with us. So, India can now manufacture commercial aircraft also. With National Aeronautics Limited and other people coming together, we should be able to do that.

Where we have reached in developing aircraft engines?

Aircraft engine is an important element that we have not developed completely for LCA. But, even if you look worldwide, engine makers are very few. Only five countries in the world produce [aircraft] engines. It means not every country has engine technologies. DRDO is now in talks with international engine houses to develop a jet engine that will be of 110Kn (kilonewton) power. So far, no such engine exists in the world.

It means the Kaveri engine is heading nowhere?

It is not being shelved.

While developing the Kaveri engine, a number of subsystems and material technologies have been developed. Today, with the backdrop of Kaveri, we are in the advanced stages of developing an engine for the Nirbhay cruise missile. A Kaveri 'dry' engine is also getting tested for unmanned aerial vehicles. In [making] the dry engine, we are very confident today; some ground tests are being done, which will be followed by flight tests. This is what [Kaveri] has given to us. Now, we have to work on the engine for AMCA. We are looking for partners who can work with us, nationally and internationally. It is going to be a high-power engine. We need to work on it.

What have we achieved in missile development programmes?

So far, we have been able to induct the Akash and BrahMos missiles. The Akash is for both the IAF and Army and Brahmos for all the three services. The next version of the Akash is under development for the Army, along with the seeker. Already, some successful trials have happened. LRSAM (an Indo-Israeli programme) is under production for the Navy and is also being delivered to the forces. Production of MRSAM for the IAF will start by the end of this year.

And what about development of our family of anti-tank guided missiles?

Trials of the Nag anti-tank guided missile are going on very successfully. It is at the user trials stage now. Then comes Helina, a helicopter-launched anti-tank guided missile, which is also going very successfully in the trials. I am sure Nag and Helina will complete their trials this year. And the man-portable anti tank guided missile (MPATGM) will also complete its trials. Here, I want to mention that industry is participating in a big way. In the Akash missiles, 85 per cent of the items by value are coming from industry to BDL.

Please shed some light on the development of radars and electronic warfare systems?

Over the years, we have become very strong in areas like developing radars. The laboratory in Bengaluru called Electronics and Radar Development Establishment is making several types of radars. You talk about radars like Akash, Revathi and Atulya. We are able to produce long-range radars also. We have also developed the capabilities for sonars. In the areas of developing towed-array sonars and decoys for submarine and ships, we are very strong. In case of development of torpedoes, the Varunastra is getting produced in numbers and is in the induction process.

In the area of electronic warfare systems, we are able to make many systems for the armed forces today, whether it is for the Navy, Army and Air Force. We are even able to develop software-defined radios for the Navy, which is using them in their ships and for airborne applications also. So, we have become stronger and are expanding our areas of expertise in multiple areas.

Where do you want to see DRDO in the years to come?

I want the roles of DRDO, industries and academia to be redefined. In the changed scenario, as the requirements (for state-of-the-art systems) are expanding and as the capabilities of all the elements are increasing, the industry should be able to take on most of the development, production and maintenance work.

The DRDO should concentrate on research and development of futuristic systems. Till now, we have [looked at] design, development, production, maintenance and everything else. It is very difficult. We need to concentrate on research for futuristic systems and handhold the industry [in the development and production side]. My endeavour is to make DRDO emerge as a futuristic technology leader in the next few years.

<https://www.theweek.in/theweek/current/2019/09/20/we-need-to-concentrate-on-research-futuristic-systems-drdo-chief.html>