

THE MACHINIST

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We have been committed to the cause of indigenous manufacturing for India's space programs for about three decades and will continue to do so in the future.

At the forefront in India's space programs

S. M. Vaidya, Executive Vice President and Business Head, Godrej & Boyce talks to The Machinist about the company's involvement and plans in the space programs.

By Swati Deshpande

Q India has been emphasising on its space programs since last few years. Please tell us the role that Godrej & Boyce is playing in making these missions successful.

Since 1985, Godrej Aerospace has increasingly been entrusted with work from ISRO, especially for complex equipment such as liquid propulsion engines for PSLV and GSLV rockets, thrusters for satellites and antenna systems. Chandrayaan was Godrej's first successful space project. We have been committed to the cause of indigenous manufacturing for India's space programs for about three decades and will continue to do so in the future. Partnering the Indian space program is a way to push the nation's technological advancement as far as possible. Our very first project was to make control module component for space. We also made the liquid propulsion engine for satellite launch vehicles and cryogenic engine for satellite launch vehicles.

Q What specific technology/product/solution did the company provide to Mangalyaan mission?

Mangalyaan mission was one of the most prestigious projects Godrej aerospace worked for. The team built several components that were critical for the mission such as the liquid fuel engine used in the Polar Satellite Launch Vehicle (PSLV), precision components for the orbiter thruster as well as the

ground system and onboard antennae. The team working on Mangalyaan designed and fabricated components that had to take into account the unique parameters for space flight.

In the design and planning phase, the scientists relied heavily on data documented during previous missions as a framework. The documentation was backed by software required for validation, simulation and proving the constants. Real challenge scientists faced before the launch was calculating the satellite's trajectory. The relative position of Earth and Mars keeps changing. Not only did the satellite's trajectory have to take this into account, it had to be done a year before the launch and yet had to be precise to the exact millisecond. This was a crucial challenge -- a gap of even 100km could have led to the team losing contact with Mangalyaan and the mission might have had to be aborted.

Scientists have to deal with a time lag of 12 minutes while communicating with Mangalyaan. That is how long it takes for a signal to cross that distance and for the scientist to receive feedback on whether a command has been activated. The satellite has so far managed to send back crucial data including pictures of Mars' surface and of its moon, Phobos. Despite the odds, Mangalyaan's successful functioning has been a testament to the hard work and determination of ISRO scientists and engineers and the Godrej Aerospace team.



Q What specific solution did you provide to Chandrayaan mission?

Godrej has been contributing to India's space program led by the ISRO. Chandrayaan-1 was one of the most successful projects we worked for ISRO. We were actively involved in all the aspects of the systems used in it. We developed the launch vehicle, lunar orbiter, remote sensing antenna and ground system antenna for this mission. ISRO identified PSLV as the launch vehicle to put the satellite into polar/solar orbit for remote sensing purpose. The second stage of the PSLV called Vikas Engine is manufactured by Precision Components & Systems (PCS) division. So far we have delivered 50 such engines. Also, the 50N thruster of the fourth stage reaction control system of the launch vehicle was also supplied by PCS.

The challenge for ISRO was to design a light weight spacecraft, which can carry maximum payload and orbit the moon for a long duration of two years. Thrusters of 10N and 22N capacities have been supplied by PCS which were used for maneuvering this spacecraft as per the planned trajectory and also during its orbiting across the moon, throughout its life span.

Due to the far distance it travelled, Chandrayaan-1 required to have a very powerful antenna for receiving and sensing signals and due to the limitation of weight, was required to be made out of composites. PCS supplied the mould of very high accuracy and surface finish for casting this antenna.

Q The company has been working closely with various Indian organisations such as BrahMos, ISRO, etc. How has been the technological prowess of the country transformed in over the period of time?

The Indian aerospace industry is one of the fastest-growing aerospace markets. With the low cost of labour and a pool of engineers, India has emerged as a player in the global market. The growth in India's manufacturing sector and the rising stock of its R&D capabilities are bound to have repercussions not only in India but also in the international aerospace markets. Hence, it has attracted major global aerospace companies to India. All segments in the aerospace industry, including civil and military aviation and space, are showing a significant level of growth. What is needed is a better understanding of where the Indian aerospace is heading to in a highly dynamic political, economic, social and technological environment.

There are several factors driving growth in manufacturing in India's aerospace industry. These include both macro and micro factors—strong economic growth that has resulted in rapidly growing domestic aircraft demand, the liberalisation of civil aviation policies, offset requirements, a strong domestic manufacturing base, cost advantages, a well-educated talent pool, the ability to leverage IT competitiveness and a liberal Special Economic Zones law that provides attractive fiscal benefits for developers and manufacturers. The challenges include access to technology, funding, poor availability and high cost of raw material and certification processes.

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Q Aerospace projects in the defence field, commercial field and space programs have different needs and challenges. How do you work on the same?

The different needs and challenges ask for different types of capabilities to work. We have been working with our expertise in defense and space programs based on the requirements from our customers. The challenges faced in our work have always enhanced our skill sets.

We have acquired expertise in metal joining, surface treatment, NDT processes, He Leak testing, flow calibration testing, Rubber lining etc. Within metal joining, we have exotic material welding (Aluminium alloys, Titanium, Steel grades), friction welding, resistance seam welding, vacuum brazing. Initial development takes time however being AS9100 organisation everything gets documented well and the database keeps on improving. We have NADCAP approval for special processes in welding, NDT, Heat treatment and chemical processing under merit program. We have industry partners who help us in special operations where volumes do not support investment in infrastructure.

Q What other projects is the company undertaking in the area of aerospace in Indian and globally?

Currently we are in built to print—metallic detailed parts and assemblies, which require HT/ST/NDT/Functional Tests. We are working with Tier 1 suppliers of aerospace primes globally. Moreover, we are diversifying to rubber and composites as it is future and most of the metallic structures are already replaced with non-metallic. Rubber & composites infrastructure is already in place. We are adding tube bending capabilities, sheet metal hot forming & hydro forming capabilities. Also, we are exploring in built to specification category as it will give huge domestic market under Make in India.

Q Since aerospace is one of the niche areas, how do you ensure that every employee working in the division has right know-how? Is there emphasis on training?

We have tie-ups with various institutions like IIT, TWI, DRDL, HEMRL labs, etc. Our experts participate in seminars and programs arranged by CII, NCAIR, IIT, etc. Additionally, we participate in training programs organised by certification bodies like Performance Review Institute (PRI) and customers training sessions, which includes quality management systems as well as Self Release Authorisation. Besides, we have internal subject matter experts for planned training sessions who will percolate the latest know-how to the team. 🤖