

FUTURE OF AEROSPACE IN INDIA: STATUS AND STRATEGY

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I deem it a great privilege to have this opportunity to speak at the Air Marshal Lal memorial lecture which has had some very prominent speakers in the past years. I am not sure if I can measure up to those past dignitaries but I shall attempt to put in perspective my thoughts on the future of aerospace in India. Having also had some exposure to civil aviation in another responsibility, I shall attempt to put before the august gathering a layman's view of the economic situation and opportunity for the nation and also the potential within the country for the growth of the aerospace industry

Today's technological innovations are making the world a flatter place and are rapidly changing the way we live on this planet. Changes in the world order, the integration and interdependence of the world on economic and commercial matters are increasingly contributing to the world becoming a closer place, with air travel playing an increasingly significant role in bridging the far flung corners of the earth.

India's economic growth over the last four years and the brighter prospects that lie in the years ahead portend faster changes to come. The Indian economy has been growing at a pace of 8 per cent over the last four years, is poised to breach the 9 per cent mark this year and is expected to maintain a significant

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growth rate for many years to come. Improvisation in the nation's infrastructure is expected to significantly contribute to the pace of the growth of the Indian economy. After achieving worldwide recognition for its strengths in the services sector, India is also working toward realising its full potential and towards establishing itself as a manufacturing economy. Most of the progressive states have become the catalysts for growth with the realisation that attracting investments into their respective states is the only sure strategy for growth and opportunity. All these changes in India and within the region are, therefore, going to have an impact on the commercial usage of air space within India, hence, have a direct bearing on the utilisation of air space for defence and strategic uses. The nation realises the importance of aviation – an important part of the national infrastructure, a vital need when dealing with internal security, disasters and emergencies, a vital engine for the growth of the economy and employment and an important strategic element of a regional power!

THE RAPID GROWTH OF THE CIVIL AVIATION SECTOR

Air traffic in India is growing at an average of 17 per cent per annum and passengers by 24 per cent. Air travel today has become affordable to many as a result of the entrepreneurial zeal of the new age promoters of private airlines who are working out their economics on the higher utilisation and lesser

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turnaround time of commercial aircraft and through prudent planning on containing operational costs. Coupled with the rising aspirations of India's young workforce, air travel within India and the region is

experiencing exponential growth. Aviation major Airbus says it sees a quickly rising demand for aircraft in India and expects it to be the fastest growing country for air travel for the next 10 years. Air freight traffic is also expected to gain as more domestic airlines enter the scene and as better infrastructure boosts profitability. The growth is expected to be led by the travel and freight sectors and it expects Indian firms over the next 20 years to place orders for 1,100 passengers and freighters valued at about \$ 105 billion. Boeing's European rival,

and part of EADS, estimates the Indian air travel sector to grow at an average 7.7 per cent per year over the next 20 years, compared to the projection for the global average of 4.7 per cent.

The rapid pace of economic growth within the country and the manner in which the economy has opened up to the world have invariably contributed to the demand for all kinds of services, including air services. The number of aircraft, pressed into service within India heralds a new wave of opportunity not only for the services but also those related to the maintenance and overhaul of aircraft. With an existing civil aviation fleet size of over 310 aircraft with scheduled carriers and another 182 with non-scheduled operators and with another 480 aircraft on order which are expected to be inducted over the next five years, civil aviation in India is expected to open up a lot of new opportunities in aerospace engineering services. The significant numbers of corporate aircraft that are going to be dotting the Indian skies will also add to the air traffic.

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India has 130 airports on the civil aviation side of which 90 are operational while 42 are non-operational. The country has a total of 400 airstrips, including those of the Indian Air Force (IAF). Of these, 123 are with the Airports Authority of India (AAI) and 75 airfields have regular scheduled flights operating. With airlines vying to increase the number of flights every day, the number of passengers carried in 2006 was a whopping 32.5 million domestic passengers and 17.2 million international passengers and freight of one million tonnes! Comparing these figures to the operations of previous years, it is obvious that as the infrastructure improves and with more planes coming into India, the juggernaut has just begun to roll. The constraints, however, are far too many and need to be addressed urgently to enable the smooth growth of the sector.

Let us compare the above mentioned figures with those of Singapore from where 4,000 flights to 180 cities weekly handle 33 million passengers and nearly

two million tonnes of cargo every year, all from just one airport! The Indian air space today has about 3,000 flights criss-crossing the skies every day. Comparing this to the UK, which is a much smaller country with 15,000 flights over its skies and with France having 10,000 flights over its skies makes us realise the urgent need to improve the infrastructure, to incorporate state-of-the-art technology and to reorient and train our technical manpower.

All this, therefore, demands better infrastructure to support the phenomenal growth of the industry and greater planning efforts for the optimum utilisation of aerospace. On February 17 this year, Shrimati Sonia Gandhi, the chairperson of the United Progressive Alliance (UPA) government, ushered in a new era for aviation in India when she laid the foundation stone in Delhi for a new modern integrated airport. This would have Asia's longest runway and the special feature is that this infrastructure would grow in a phased manner for another 15 years! Private enterprise is playing an important role in bringing the airports infrastructure up to world standards with the upgrading work in Mumbai and Delhi and the zealous efforts at creating new airports of international standards in the rapidly growing metropolises, which are symbols of the new age economy in India, namely, cities like Bangalore and Hyderabad.

THE IAF: REACH AND CAPABILITIES

Speaking about our defence assets, the IAF alone has in its inventory close to 1,400 aircraft and helicopters. It has manpower of over 117,000 with nearly 3,500 pilots and a similar number of aeronautical engineers. The army has a large fleet of light helicopters, the strength of which one day would overtake that of the air force. The navy, a three-dimensional Service, operates the large and heavy TU-142s and the lighter IL-38s, agile fighters and special helicopters. Over a hundred exclusive airfields are operated and managed by the military, most of them by the air force. The air force manages over a dozen base repair depots most of which are high-tech engineering facilities of industrial standards. Over 20,000 skilled technicians and engineers are employed in this industrial sector of military aviation. With world class institutions of excellence, the military is 100 per cent self-sufficient in training of its personnel – technicians, engineers, pilots,

air traffic and fighter controllers, administrators and a host of other specialists. Military aviation is supported by the Centre for Military Airworthiness and Certification (CEMILAC) which is akin to the civil airworthiness authority under the Director General of Civil Aviation (DGCA). The CEMILAC is highly competent and self-sufficient to examine and award airworthiness certification for Indian military aircraft and new designs like the light combat aircraft (LCA) and advanced light helicopter (ALH).

With dedicated efforts towards the induction of force multipliers and focussed approach towards building network-centric warfare (NCW) capabilities, the IAF has, over the years, built up enormous and amazing capabilities, skills and talent. Today, air refuelling tankers refuel fighters in mid-air as a routine, in the day and at night. Our fighters have flown more than half way across the globe to Alaska, crossing many oceans, as well as to South Africa, France and back supported by in-flight refuellers. Aerial tanking has helped our Mirage-2000 set a record of flying over 4,000 km non-stop on the route to South Africa and the SU-30 MKI to stay in the air for well over nine hours at a stretch. Very soon, the air force would have complete surveillance radar up in the air in the form of the airborne warning and control system (AWACS), which would also have the capability to be refuelled in flight.

Our air force exercises routinely with friendly foreign air forces such as the air forces of the United States, France, Great Britain, Singapore and South Africa. Exercises with Japan and the USA and with China are to take place soon; military aviation diplomacy contributes immensely in strengthening bonds with friendly nations. The exercise results show our pilots, technicians and machines to be of world class. The current practice of bilateral and multilateral air exercises with nations around the globe is a strategy that enhances our exposure, exhibits our

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capabilities and leads to a better understanding of coordinated efforts in a world that is getting interdependent and facing crises from the scourge of terrorism and the rising demands of global security and peace-keeping efforts. Our air force sports a world class formation aerobatics team and a helicopter display team that have thrilled audiences within the country and abroad.

Today, the IAF has a strength of 32 squadrons and there is an urgent need to modernise and to increase the force if we are to truly mature into a transcontinental force capable of playing a role in safeguarding the economic

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and strategic interests of the nation. Quoting from the recent speech of the president of India where he expressed the hope that the IAF would be a model air force by 2025 and a force for the rest of the world to emulate, "I visualise the IAF of 2025 to be based on our scientific and technological competence in the development of communication satellites, missile systems, unmanned

supersonic aerial vehicles and electronics and communication systems. The IAF will be endowed with the very best of technology in the world, alert and agile strategic planning capability, and, above all, the most professional and dedicated air warriors." To realise this dream of the supreme commander, the nation will have to invest in advanced technologies, manpower and training while shoring up the curriculum, the labs and the faculty in our existing institutions, along with strengthening the project management and manufacturing capabilities of our public sector undertakings (PSUs). The parallel utilisation of the private sector's capabilities for strengthening our defence sector also needs sustained nurturing and encouragement.

IMPACT OF RECENT DEVELOPMENTS AND AEROSPACE COMMAND

India's location at the base of continental Asia astride the Indian Ocean places it at a vantage point in relation to maritime trade in the Indian Ocean. India has a strong stake in the security and stability of these waters since a large percentage

of Asian oil and gas supplies is shipped through the Indian Ocean. The Indian Air Force has the means and capability to operate in areas away from Indian shores and has been successfully playing its role alongside the Indian Navy in ensuring the security of these waters. In fact, many defence operations rely on space-based sensors and the option of having an Aerospace Defence Command would certainly help the forces in better surveillance, reconnaissance and tracking. With its growing economic and technological capabilities, India is ready to contribute significantly to cooperative measures to tackle shared challenges. India has been playing an 'active role' in discussions on the cooperative use of outer space through deployment of space-based disaster management capabilities and could play a key role in collaborative structures that tackle threats to the well-being of the nation. The need of the hour is to share experiences, perceptions and knowledge for enhanced international peace and security. With the nature of warfare changing more in the last 15 years than in the previous 150 years, aerospace power has come to occupy a dominant position. In fact, the 21st century would belong to aerospace power. Therefore, a robust programme is urgently required to transform the IAF into a dominant space power.

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The IAF has been advocating, and preparing for, the establishment of a tri-Service Aerospace Command to protect both the territorial and space assets of India. At the International Aerospace Power Seminar held at New Delhi from February 4-5, 2007, the chairman of the COSC, Air Chief Marshal S.P. Tyagi called India an aerospace power with "trans-oceanic reach," making the exploitation of its outer space vital. Although the idea for setting up an Aerospace Command was initially proposed by the IAF in the late 1990s, apparently the Chinese downing of a satellite, allegedly with a missile fired from the ground, could have proved to be a catalyst to further the argument for an aerospace command. The justification for an Aerospace Command may also be due to the massive growth of India's space programme in recent years, with its

ever-growing reliance on space-based communication satellites that sustain its information and communication technology assets.

Recent developments by our space programme and the missile programme demonstrate that India may possess the capabilities to weaponise outer space but the nation's external affairs policy desists us from following such a line. The external affairs minister has repeatedly stated in Parliament about India's stand against the weaponisation of space by any country. India has substantial assets

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in space that are poised to grow exponentially and with its ambitious programme expanding beyond launching satellites to putting an Indian on the moon in the coming decade, these assets need to be protected.

The security and safety of assets in outer space are of crucial importance for the global economic and social development. India is striving to redouble efforts to strengthen the international legal regime for the peaceful uses of outer space and guard it as the common heritage. Since its inception, the Indian space programme has focussed on developmental activities, with the ultimate target of having satellites launch capabilities for the purposes of mass education, weather forecasting, disaster management, communications and navigation. India's space programme has been commercially viable too. In 2006, "ANTRIX" the commercial arm of the Indian Space Research Organisation (ISRO), brought in more than US\$ 500 million. This is more than half the operating budget for all of ISRO. It is projected that within a decade, it would corner up to 10 per cent of the market. The proposed aerospace capabilities of "persistent surveillance and rapid response" would enable the tackling of diverse threats, ranging from non-state actors to natural disasters.

THE NATION'S AERONAUTICAL MANUFACTURING CAPABILITIES AND THE OFFSET POLICY – AN OPPORTUNITY?

Hindustan Aeronautics Limited (HAL) has been in the forefront of licensed manufacturing and production under transfer of technology (TOT) for the IAF

for a number of years. However, since the nation's commitment of the LCA programme in 1983, we have come a long way, although not exactly to the desired extent, in building the nation's indigenous aeronautics capabilities and competencies! The ADA, NAL and HAL have been the torchbearers in building and sustaining the nation's capabilities in aircraft and engine design and development, and manufacturing. A significant number of manpower hours have been invested in the aeronautical research and engine research. Beginning from scratch, the capabilities and the capacities developed so far are indeed a worthy achievement of a relatively resource constrained nation. These achievements need to be sustained and encouraged. However, the need of the hour is for better and more focussed efforts of project management to be able to deliver to the functional satisfaction of our forces. Strict discipline has to be maintained in adhering to deadlines, with better coordination with the users, namely, the armed forces.

Currently, the aerospace industry worldwide spends about \$60 billion globally on engineering, with India accounting for less than one per cent of this market as compared to 12 per cent offshoring of the overall engineering services. Most global aerospace industries are looking towards India as an outsourcing hub for the development of technology. According to a CII study, the outsourcing market in the aerospace market was around \$155 million and is expected to touch \$1 billion by 2008-10.

With the 2006 Defence Procurement Procedure (DPP-06) stipulating that Indian firms would have to perform 30 per cent of the value of contracts that exceed \$65

million (Rs. 300 crore), there is much hope that Indian defence firms can cash in on the modernisation needs of the armed forces and also improve their overall standards. The defence sector has been opened up to 100 per cent private sector participation, with foreign direct investment (FDI) capped at 26 per cent.

It is our government's resolve to introduce fairness and transparency in our dealings. With this end in view, the offset policy of our government seeks to

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provide avenues for the growth of medium and small-scale entrepreneurs.

The offset policy of the Ministry of Defence (MOD), coupled with the anticipated purchases by the IAF presents a huge opportunity for India. Major players like HAL, ISRO, NAL, DRDO labs and the software and design capabilities within India make it a very attractive destination for outsourcing and for doing the capacity building for sustaining the burgeoning industry in India. Design capabilities within India include design and development, simulation, prototyping, reengineering, and maintenance and testing services. Other areas suitable for outsourcing include navigation systems, air control management systems, high level aeronautical system design, control system design, cockpit equipment support software, interior design and ergonomics. According to a NASSCOM-BOOZ ALLEN HAMILTON analysis, by the year 2020, India's offshore market can go up to \$3 billion! Just as in the information technology (IT) sector, although the low cost of engineering design and services could lead us to a larger share of the global aerospace engineering services and the production of parts and assemblies, it is important that in the coming years the nation's strategy should be based on the abilities to emerge as a nation with a core strength of strong design and manufacturing capabilities.

According to a Goldman-Sachs report, over the next 50 years, Brazil, Russia, India and China – the BRIC economies – could become a much larger force in the world economy. In less than 40 years, the BRIC economies together could be larger than the G6 in US dollar terms. As today's advanced economies become a shrinking part of the world economy, the accompanying shifts in spending could provide significant opportunities for global companies. Being invested in, and involved in, the right markets, particularly the right emerging markets, may become an increasingly important strategic choice for these global companies.

The recent Indo-US nuclear deal and the agreement with Russia on access to navigation signals of the Russian Global Navigation Satellite System (GLONASS) for peaceful purposes, signal our government's steadfast commitment to actively engage world leaders in the field of aerospace power and space. It is evidence enough that India is willing to partner global leaders in the field in our efforts to optimise the advantages of aerospace power. Recent

declarations with nations for joint design on next generation aircraft and missiles are other worthy examples.

In the nation's quest towards creating the capability to design and produce in this competitive world, I would like to quote the Honourable Raksha Mantri who said, "We don't want relations to continue as buyer-seller any more. We want to establish a new relationship based on partnership. It should not be just purchase, technology transfer or licensed production, but a role in design and development; it should be co-production and participation in manufacture."

CIVIL-MILITARY COORDINATION

All these activities augur well for the economics opportunities and the aviation future of the nation but, of course, with the primary requirement that the aerospace management of the nation is placed in capable, responsible and accountable hands. The current scenario has the AAI and the DGCA and the Ministry of Civil Aviation (MCA) managing the various aspects of the steady growth of the civil aviation sector and its required infrastructure. The government's decision of privatise the modernisation and the expansion of some of the international airports certainly augments the efforts of the government towards accelerating the infrastructure growth of this sector. The additional needs of induction of advanced traffic management technology in airports, the reorientation and training of air traffic controllers (ATCs) to the increasing traffic scenarios and the shortage of appropriately qualified and skilled technicians, AMEs and pilots are other issues that need immediate action. Capacity building in terms of pilots and quality ATCs is of the essence and beefing up the technologies of all airports for all weather landings is an urgent necessity.

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The IAF and its institutions and manpower are a resource goldmine for the nation. CEMILAC has great depth of expertise as the military airworthiness authority due to its indulgence in the certification responsibilities of designs and upgrades for military aviation. Apart from pilots who are getting increasingly poached upon by the private airlines, a

few thousand trained specialists exit the military every year! Appropriate openings for this talent pool could definitely be identified. Similarly, over 1,000 air force technicians enter the job market every year but find it difficult to pass the civil AME licence exams. The dichotomy of the availability of skilled and experienced engineers versus the shortage of licensed engineers is an aspect that needs to be resolved between the DGCA and the military in order to overcome skilled manpower shortages.

The honourable prime minister has emphasised on various occasions, about enhancing the value-add to the skill-sets of the nation's young manpower. He has been speaking about strengthening our professional and vocational institutions and investing in the capabilities of our people to make them more productive. The air force has been a strong votary of the establishment of an Aeronautical Engineering College for the precise purpose of capacity building of the appropriately qualified and skilled workforce in aviation. This was because of the fact that the training for technicians and engineers for civil aviation has not been as organised as in the air force. The time has definitely come to imbibe these advanced skills in large numbers through the establishment of such an institute for aviation engineering through joint efforts. Encouragement to entrepreneurs

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and the private sector in establishing flying schools, pilot training simulator facilities and training establishments can certainly accelerate the nation to reach its numbers. The need to infuse significant representation of military aviation expertise in the civil aviation sector, into advisory panels of higher engineering education, into research organisations and into manufacturing is again an opportunity that cannot be missed.

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demanding skills and experience, there is scope for HAL, Air Force Base Repair Depots and facilities of Air India and Indian Airlines to share and optimise facilities. The time has come for the optimisation of resources of both the civil and military aviation in order to improve the efficiencies and capacity utilisation of facilities towards enabling the smooth progress of the sector. The timing of the opportunity has not been missed by private entrepreneurs who are exploring the idea of SEZs dedicated to MRO services in collaboration with multinationals.

However, there have also been areas of concern and conflicting interest with those of the IAF in terms of air space usage over certain airports due to increasing civil aviation traffic, the tendency to question the relevance of the extent of space occupied by the IAF in some major airports and also the urgency expressed for the transfer of defence land in some airports for the expansion of the airports due to increasing civil traffic. An audit by the IAF of its unutilised airfields and airstrips had encouraged the ministers and the officials of civil aviation and defence to sit together to evolve a mechanism for the optimum utilisation of the nation's assets towards enabling the growth of the civil sector. The mutual exchange of land between these ministries in Goa and Kochi is an example of cooperation when it comes to removing impediments in the country's growth story. Better coordination and frequent dialogue between the MOD and the MCA are important to resolve such issues as resolvable issues need not be obstacles to economic growth.

The emerging scenario, therefore, requires that the management of aerospace be done in a coordinated, responsible and responsive manner with the collective efforts of the civil aviation, the military and the government. We should definitely look at integrating and utilising our military assets and vice-versa for enabling the growth story of the country and creating the environment for more efficient aerospace management.

ASIA'S SECURITY ENVIRONMENT AND INDIA'S ROLE

Asia's security environment is unique given its geographical expanse and the political, economic and cultural diversity of the region. Our view has been that in Asia, a pluralistic security order based on a cooperative approach to security

is the answer. Only a pluralistic security order working through a network of cooperative structures can have the legitimacy as well as the wherewithal to deal with the security challenges of the 21st century.

There is a greater recognition today of India's stabilising role in the region born out of our restraint, our economic dynamism and potential, the history of **Human development in all its dimensions is, and will remain, our highest strategic priority.**

our civilisation engagement and our role as a firewall against destabilising ideas and influences.

External security depends on national power. It requires a continuous enhancement

of the country's capacity to use its tangible and intangible resources in such a manner as to affect the behaviour of other nations. While power is often conceived in narrow terms as military power, in the world that is emerging, it must be much more broadly conceived to include political, economic, technological, social and intellectual dimensions. A vibrant economy and a leading role in international affairs may be as important as a strong military for the preservation and development of national power. Internationally, we must gravitate from a state-centred, egocentric and competitive security paradigm to a cooperative security paradigm that enhances the security of each nation by reducing potential threats to all nations. Human development in all its dimensions is, and will remain, our highest strategic priority.