RECORD OF DISCUSSIONS AND RECOMMENDATIONS OF THE INTERNATIONAL CONFERENCE ON HIGH SPEED TRANSATMOSPHERIC AIR & SPACE TRANSPORTATION

Introduction

Air breathing hypersonic technologies and development of high speed air & space transportation systems. Have been attracting the attention of the aerospace community world over for low cost access to space, and transcontinental passenger transportation. The Aeronautical & Astronautical Societies of India have joined hands and organized an International Conference in this important area.

Objective of the Conference

The objective of the conference was to consolidate knowledge and experience gained in conceptualization design, development and testing of advanced aerospace systems and technologies; and lead on to an International air & Space transportation initiatives through collaborative intra-and international linkages.

Panel Discussion

In pursuit of these objectives, the Conference held panel discussion on the theme “Approach towards an International Joint Venture for safe, affordable High Speed Air & Space Transportation”. The following members participated in the panel discussion:

Members

Dr B.N. Suresh, VSSC Chairman
Dr V Adimurthy, VSSC Co-Chairman
Dr V.K. Saraswat, CC R&D (MSS), DRDO
Air Cmde. (Retd.) R Gopalaswami
Mr Avinash Chander, ASL, DRDO
Prof. Keith Gottschalk, UWC, South Africa
Prof. S.S. Bandyopadhyay, IIT, Kharagpur
Mr P Venugopalan, DRDL, DRDO

Opening Remarks

The Chairman opened the panel discussion with the remarks that the Conference was important and very timely. He said that development of full scale launch vehicle is risky and expensive proposition, and therefore technology demonstrators are an essential step forward. He requested each of the panel members to give their views for about five minutes each. He requested Co-chairman to take the panel discussion forward.

Dr Adimurthy took charge of the proceeding and said that the cost of any mission in advanced aerospace systems would be too high for any individual nation to bear. He advocated setting of an International Working group which should then meet periodically, identify options and take the initiative forward. He the requested individual panel members to articulate their views.

Views of Members

Prof. SS Bandyopadhyay: He was of the view that the conference should recommend mission essentially for benefit of all humanity. Strategic nuances are not needed and this is essential for International Cooperation. Technological maturity has not yet emerged, and no single FLOX system has been demonstrated in flight so far. He was of the view that a single flight system was required which could demonstrate all the technology options in particular the FLOX system. He advocated the setting up of a global consortium whose ultimate objective would benefit all mankind.

Shri P. Venugopalan: He was of the view that all development agencies should get together and assess the quantum of work to take the initiative forward. He was somewhat skeptical about the maturity of technology needed and felt that the need to be translated into demonstrator model within India. He felt that a national consensus need to emerge, and international participation was necessary. Funding should be obtained before co-opting international participation. He suggested that the Aeronautical and Astronautical Societies take a lead and contact various friendly countries and identify partners for critical technologies such as the FLOX system. However consensus was first needed within the nation.

Mr Keith Gottschalk: He was of the view that South Africa would support such an International initiative emerging from India. An organization is required to be set up with a Steering Committee and this would lead to unprecedented cooperation between South Africa and India. He felt that political support would have to be harnessed, and the transatmospheric vehicle mission should be seen as an International initiative for technology innovation that would harness range of experts in high technology areas. He advocated that Hypersonic Executive Jet project could be taken up as an International public/private enterprise through the existing IBSA mechanisms, which enjoys the support of the three Governments.

Mr Avinash Chander: He was of the view that there needs to be consensus on futuristic requirements.. Since technological solutions have not been found over the last twenty years of work, he wondered whether we are ready for it. He felt that India had the maturity in materials technology, but the question was how to convert the agenda for high speed Air & Space transportation into a programme. He felt that there is a need to have a demonstrable product within the next four years. He was somewhat skeptical about the possibilities of international cooperation.

Dr V. K. Saraswat: He was of the view that several critical technologies have yet to be demonstrated. There needs to be minimum critical mass of infrastructure and test facilities that need to be accessed through national and international understanding. One has to focus the development programme to meet global

demands for energy and water, and hence this would constitute societal missions alone. He emphasized the need to have clarity for short term as well as long term goals for safe, affordable high speed Air & Space transportation for civilian usage. National resources would have to be pooled especially high temperature materials. He advocated that a Steering Committee should be set up with a number of working group in various critical systems & technologies. National consensus would then emerge on the basis of the recommendation of the Working Groups and Steering Committee facilitated by the two Societies. Steps to International Cooperation should be taken up at two levels; at the Science & Technology level and at Policy level. Existing International Agreements, being coordinated by the Ministry of Science & Technology such as IBSA S&T Group and Indo-Russian Working Group on hypersonics, need to be taken into account while planning International Cooperation in the new areas of High Speed Air & Space Transportation systems.

Air Cmde. (Retd.) R. Gopalaswami : He pointed out that the concept of in-flight air liquefaction and LOX He wondered whether we are ready for iteration had emerged in 1964 from the United States. India had advocated this approach from 1988 onwards. In 1996, at an International Conference on “Low Cost Access to Space”, organized by the Aeronautical & Astronautical Society of India, The panel discussion advocated the joint development of a single flight technology demonstrator by ISRO and DRDO. Now in 2007, once again while progress has been made in both organizations on design & development in some critical technologies and sub-scale testing on the ground, still doubts prevailed about the credibility of these efforts. He felt that this was because each technology was not a stand alone product but was a systemic technology. All doubts could be resolved only if a single Multi-role Flight Technology Demonstrator, as was resolved in the 1996 conference. He felt that such a multi-role demonstrator would be a path-finder for the ultimate goal for the full scale high speed Air & Space transportation.

Views of the Participants

Shri Trivedi of DRDL felt that Pulse Detonation Engines should be considered while planning & designing future air & space transportation systems. **Shri Krishnan** of HAL felt that a national consensus should be arrived at and a “Fish Bone” concept of project management should be used with clearly defined project objectives as the “bull’s eye.”

Mr Y. Ramati of Israel felt that a business plan is required to put together such a mission because “money talks”. **Shri JRK Rao** felt that such conferences would enjoy greater public support if people from public administration were invited to participate. He felt that energy is enormously important and this should be the focus for future Aerospace Missions. A road map for innovation ecology was important.

Conclusions and Recommendations

Taking into account, the views expressed by the Panel Members and the participants, the International Conference came to the following conclusion & recommendations.

Conclusion : Co-Chairman recalled the words of the poet Rabindranath Tagore, which were more relevant now then ever before … "*where the world has not been broken into the fragments by narrow domestic walls….*" would be the appropriate theme for an approach towards an international joint venture for safe, affordable, air & space transportation…"

Recommendations: The Panel made the following recommendations:

1. The Aeronautical & Astronautical Societies of India should set up a "Steering Committee for a *Global Aerospace & Energy Mission*".

2. The Steering Committee shall in turn set up a number of Joint Working Groups serviced by a small permanent secretariat from the two Societies. This should be a team of about six to eight people drawn from the DRDO & ISRO with representatives from Aeronautical & Astronautical Societies.

3. Representatives from friendly and interested countries who wish to participate in this global initiative could be co-opted to the Steering Committee at the appropriate time and stage.

4. The objective of the Working Groups would be to generate a technological vision for a single "Multirole Flying Test Bed" that could demonstrate in flight all the critical technologies being developed independently by different agencies and institutions that have a direct relation to mission and systems for a Global Aerospace and Energy initiative.

5. The objective of the Steering Committee would be to generate a national consensus for the Global Aerospace and Energy initiative, determine the sources and uses of funding, and evolve a suitable management structure and system to plan and implement the mission.

6. The Steering Committee shall prepare a Report in respect of the technology and management vision, mission, strategy, goals, policies, structure, systems, resources, and other aspects related to planning and implementation of this Global Aerospace & Energy Mission.

7. The Report of the Steering Committee shall be placed for the approval of the appropriate authorities in Government and Industry, in India and abroad within a period of six months.

(Dr V. K. Saraswat)
Chairman, AeSI &
Panel Member

(**Dr V Adimurthy)**
Chairman of the Panel