



INSTITUTE FOR DEFENCE STUDIES & ANALYSES
Forum on Hi-Tech Defence Innovation

Thursday, 14 July 2011
Seminar Room 1, IDSA
No. 1 Development Enclave
Rao Tula Ram Marg
New Delhi, India-110010
Tel: 2671 79 83/7111/7345/7340

FORUM OVERVIEW

IDSA is organising the first meeting of the Forum on Hi-Tech Defence Innovation on 14 July, 2011 - to brainstorm on how to upgrade the technological levels of the Indian economy and defence industry sector and reduce India's dependence on high-tech imports. The Forum-Roundtable is bringing together senior experts and officials from Government agencies, the Armed Forces, Research Entities, the High-tech Production Sector of the economy, both public and private and the Educational sector.

This year, India expects to procure, mostly from abroad, billions of dollars worth of defence equipment, anticipated to rise to US \$50 billion over the next few years. India is also faced with a looming trade deficit as a huge proportion of high-tech requirements in other sectors is imported, which even the Commerce Ministry feels is unsustainable. If Indian manufacturers are to benefit from the expected offsets and launch a high-tech manufacturing revolution, India has to take many pro-active measures to reform its national innovation system and create a broad-based dual-use manufacturing base.

The potential of defence sector reforms and the easing of restrictions on transfers of high technology to India will be a focus of discussions as these provide the opening for India to elaborate its own dynamic national innovation ecosystem. Comparing the Indian system with other major high-tech defense industrial powers would also yield insights into relevant reforms needed in the Indian context.

The Forum/ Roundtable will discuss the gaps in capabilities and recommend essential reforms and partnerships required to develop a robust national innovation system in India.

Based on the discussions, the Forum-Roundtable will also aim to eventually bring out a draft National Technology Policy which will be placed on the web site for discussion, as well as a suggested road map for reform and implementation of essential measures to create a dynamic and sustainable national innovation ecosystem. Excellent speakers and experts will be participating in this venture which aims at addressing a key issue in the National Security debate

i.e. the need for India to build a high-tech economy. We look forward to your contribution and participation.

Areas of focus in discussions:

1. Do we have the domestic capabilities to develop the defence technologies that will be required to conduct warfare in the future?
2. Why has India not yet developed into an innovative, high tech power?
3. What are the organisations entrusted with R & D and how and why are they falling short?
4. Systemic gaps and reforms required in Government?
5. What has Indian industry achieved in investment in R & D, high-tech production and innovation?
6. How can Indian industry help the country meet its targets for high tech defence production and what does it expect in the way of support?
7. Are public private partnerships the most effective route for achieving these goals? How can they be optimized?
8. How can SMEs be more involved in the high value production chain?
9. What are the funding options for intensifying R & D efforts across sectors in the country?
10. Is FDI a viable interim arrangement for enabling technology transfer -what policy environment is required?
11. What is the role SMEs are playing in developing indigenous high technology and what support do they require?
12. How is China building a system capable of delivering disruptive technological innovation?
13. What are the lessons we can learn from other countries' experience?
14. Are offsets a viable tool for bringing in high-technology?
15. Should we advocate indirect offsets as China and the East Europeans have done successfully?
16. What role does civil-military integration play in other countries in delivering high-end technology and what lessons are there for India?
17. What can India do to create a dual-use industrial infrastructure and civil military integration paradigm to foster high-tech defence production?
18. What role does the education including vocational education system have to play in building a change in approach to research and innovation and fostering bottoms up innovation? Can funds generated through offsets be used for capacity development, apart from defence training?
19. Recommendations –Action Plan

Programme

0930-0945 hrs

Opening remarks: Shri N.S. Sisodia, Director General, IDSA

Inauguration: Air Vice Marshal M. Matheswaran AVSM VM PhD, ACAS OPS (Space)

0945-1130 hrs

Panel 1: Government: MOD, Armed Forces & DRDO

Chair: Air Vice Marshal M. Matheswaran AVSM VM PhD. ACAS OPS (Space)

Tri-Services Perspective: Air Vice Marshal M. Bahadur, VM, ACIDS (WSOI), Integrated Defence Staff HQs, Ministry of Defence

Presentation: Dr. G. Balachandran, Distinguished Fellow, IDSA

Panelists

- Shri Gyanesh Kumar, Joint Secretary (Shipyards), Ministry of Defence
- Commodore R.K. Rana, Principal Director, Integrated HQs of Ministry of Defence (Navy), Directorate of Indigenisation
- Shri Manik Mukherjee, Director G-Fast, Scientist G
- Major General (Ret) P. K. Chakravorty, VSM, Advisor, Strategic Studies, Brahmos, DRDO
- Brig. Gurmeet Kanwal, Director and CEO, CLAWS
- Anit Mukherjee, Fellow, IDSA

Q & A

1130: Tea break

1145-1300 hrs

Panel 2: Industry

Chair: Shri Gyanesh Kumar, Joint Secretary (Shipyards), Ministry of Defence

Panelists

- Shri Anjan Mukherjee, CEO, HyCa Technologies Pvt Ltd.
- Shri Ashok Kanodia, MD & Chairman of Precision Electronics
- Shri Rajinder Bhatia, CEO Defence, Bharat Forge
- Shri Rahul Chowdhury, CEO Tata Power Strategic Electronics Division
- Shri Bharat Singh, Deputy Director General DG / OF Board
- Mr. Sanjay K Agarwal, Group Managing Director, CbS Technologies Pvt. Ltd.
- Dr. M. Venkatraman, Vice President Essar Steel
- Shri Ajai Shukla, Defence Correspondent, Business Standard
- Shri A.S. Pundle, Advisor, Indian Machine Tools Manufacturers Association

1300-1330 hrs – Lunch break

1330-1430 hrs

Panel 2: Industry (continued)

Chair: Dr. Rajiv Kumar, Director General FICCI

Q & A

1430-1530 hrs

Panel 3: International comparisons

Chair: Ambassador Prabhat Shukla, former Ambassador to Russia

International Speaker: Prof Tai Ming Cheung: "Catching Up in Defence Innovation: The Lessons From China and other Late Industrializers".

1530-1630 hrs

Panel 4: Education and Brainstorming on Final Recommendations and Action Plan

Chair: Dr. Rajiv Kumar, FICCI.

- Is the Indian educational system nurturing innovation?
- Reforms/action suggested

Speakers:

- Dr Anil Wali, CEO, Foundation for Innovation and Technology Transfer, Indian Institute of Technology, Delhi
- All participants
- Wrapping up – Smita Purushottam, Senior Fellow and Joint Secretary (MEA)

1630 hrs

Closing address

Dr. V. Bhujanga Rao, Ph.D., FNAE, FAEFCT, CC R & D (HR), DRDO

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CURRICULUM VITAE

CHAIRS AND INTERNATIONAL SPEAKER

Air Vice Marshal M. Bahadur, VM, ACIDS (WSOI), Integrated Defence Staff HQs, Ministry of Defence

Air Vice Marshal Manmohan Bahadur, is an Experimental Test Pilot from the French Test Pilots School, a graduate of the Air Command and Staff College, USA and a post graduate in Defence and Strategic Studies from Madras University. He has commanded a frontline Helicopter Unit and two Flying Bases, was the Contingent Cdr of the first IAF United Nations Mission in Sudan and has been Head of Training Team (Air) at Defence Services Staff College, Wellington. As Asst Chief of Air Staff, AVM Bahadur was the operational head of Transport and Helicopter Operations of the Indian Air Force for two and a half years.

AVM Bahadur is presently the Asst Chief of Integrated Defence Staff in charge of procurement policies and plans of the Armed Forces.

Brig Gurmeet Kanwal (Retd) Director CEO of Centre for Land Warfare Studies (CLAWS)

Brig Gurmeet Kanwal is the Director CEO of Centre for Land Warfare Studies (CLAWS) in New Delhi, India. As an army officer he was commissioned in the Regiment of Artillery and has held several command and staff appointments including that of an instructor at the School of Artillery, Devlali. He has held the appointment of Director MO-5 in the Military Operations Directorate at Army HQ and Deputy Assistant Chief of Integrated Defence Staff (Doctrine, Organisation and Training branch). He has served as a Military Observer in UNTAG, Namibia. He commanded an Artillery Regiment in active Counter-Insurgency operations in the Kashmir Valley (Operation Rakshak, 1993-94) and an Infantry Brigade on the Line of Control during Operation Parakram (2001-03). He took pre-mature retirement to pursue his interest in writing and Defence affairs full time. He is Former Director of Security Studies at Observer Research Foundation; Senior Fellow at IDSA and Senior Fellow at Centre for Air Power Studies. Brigadier Kanwal has authored several books, among others: Nuclear Defence: Shaping the Arsenal; Indian Army: Vision 2020; Pakistan's Proxy War; Heroes of Kargil; Kargil '99: Blood, Guts and Firepower and Artillery: Honour and Glory. He writes on national security issues for leading national newspapers and is a TV commentator and regular speaker at well known international think tanks and military institutions.

Shri Gyanesh Kumar Joint Secretary (Shipyards/ Naval Systems), Department of Defence Production, Ministry of Defence

Shri Gyanesh Kumar is presently the Joint Secretary (Shipyards/ Naval Systems) in the Department of Defence Production, Ministry of Defence. He is an officer of the Indian Administrative Service, (1988 batch). Shri Kumar did his B. Tech in Civil Engineering from IIT-Kanpur, diploma in Business Finance from ICFAI-Hyderabad and Environmental Economics from HIDD Workshop from Harvard University. As an IAS officer he has worked in different capacities. He is also the Director General of National Institute for Research and Development in Defence Shipbuilding (NIRDESH). He is also in the Board of Directors of MIDHANI (Mishra Dhatu Nigam Limited).

Dr. Rajiv Kumar
Secretary General, FICCI

Dr. Rajiv Kumar is currently the Secretary General of Federation of Indian Chambers of Commerce & Industry (FICCI). He is a well known economist and the author of several books, joined the Federation of Indian Chambers of Commerce and Industry (FICCI) as Director General in October 2010. Prior to FICCI, he was Director and Chief Executive of the Indian Council for Research on International Economic Relations (ICRIER), one of India's leading independent economic policy think tanks. He is a non-executive member of the Central Board of Directors of the State Bank of India; a member of the G-20 Advisory Group, Ministry of Finance, Government of India; Member of India Brand Equity Foundation (IBEF) Board of Trustees; and has a seat on the Board of Directors for the United States-India Educational Foundation (USIEF). He is also a member of the Expert Committee of the National Small Savings Fund, (NSSF) of the Ministry of Finance, Government of India. Dr. Kumar was a member of the National Security Advisory Board for 2006-2008.

From 1987-1989, Dr Kumar taught at the Indian Institute of Foreign Trade; subsequently, he worked for the Government of India from 1989 to 1995, first in the Bureau of Industrial Costs and Prices, Ministry of Industry and then as Economic Adviser in the Department of Economic Affairs Ministry of Finance. In 1995, Dr. Kumar joined the Asian Development Bank, in Manila and assumed several positions during his ten year term. In 2004, he returned to India to join the Confederation of Indian Industries, New Delhi as Chief Economist. He has a D.Phil. in Economics from Oxford University and a Ph.D from Lucknow University. His latest book, Many Futures of India, published in April 2011 is a compilation of his columns in some of India's leading dailies. He contributes a regular column to Business Line, a leading business daily; his views on matters relating to the economy are widely sought.

Air Vice Marshal M. Matheswaran AVSM VM Ph D
AVM M Matheswaran AVSM VM Ph D, Assistant Chief of Air Staff Operations (Space).

AVM M Matheswaran AVSM VM Ph D is presently the Assistant Chief of Air Staff Operations (Space). He is a graduate of the DSSC, Wellington and National Defence College, New Delhi. The Air Officer graduated from National Defence Academy in 1973 and was commissioned as a fighter pilot in Jun 1975. He has flown various types of aircraft; he is an Experimental Test Pilot and also Fighter Combat Leader.

The Air Officer has commanded a premier Jaguar Strike Fighter Squadron and has held various key operational and staff appointments, including Commandant ASTE at Bangalore and AOC HQ MAO at Mumbai. The Air Officer holds an M Sc, M Phil and Ph D from the University of Madras. He has lectured and written extensively on the subject at national and international forums. He is recipient of Presidential awards 'Ati Vishisht Seva Medal' and 'Vayu Sena Medal'

Dr. V. Bhujanga Rao
Distinguished Scientist and the Chief Controller R&D (HR) at DRDO HQ.

Dr. V. Bhujanga Rao is Distinguished Scientist and the Chief Controller R&D (HR) at DRDO HQ. He was Director, Naval Science & Technological Laboratory (NSTL) Vishakhapatnam from 2006 to 2011. He has specialized in warship technology, weapon hydrodynamics, weapon hydro-ballistics, submersible design, integrated naval stealth (acoustics, infrared, electro-magnetics, shock, noise & vibration,) and technology management.

Dr. Rao joined DRDO on 19th May 1973 at DRDL Hyderabad, and later moved to NSTL on 08 July 1975. He has since served the organization in various capacities. He has an M.Sc in Physics

(Acoustics), M.S in Mechanical Engineering (IISc, Bangalore), Ph. D in Mechanical Engineering (Jawaharlal Nehru Technological University, Hyderabad, 1992) and Ph. D in Technology Management (Devi AhilyaViswaVidyalaya, Indore, 2002). He was a visiting scientist during 2003-04/2004-05 at School of Computational Science & Information Technology (CSIT) at the Florida State University, USA; worked with renowned Mathematics Professor M.Y. Hussaini on various mathematical models; and published 60 papers in both national/international journals/conferences. He is a Fellow at the Indian National Academy of Engineering (2009), Indian Institution of Plant Engineers, Institution of Engineers India and Honorary Fellow at International Research Institute for the Deaf. Also he is the Founder & President of Condition Monitoring Society of India, President of Acoustical Society of India (2007-2010), member of Central Pollution Control Board GOI (2005-2009) and Honorable Design Engineer at Sm Kirov Machine Building Plant Jsc, Kazakhstan. He has been a recipient of many an awards and honors—the latest being Technology Leadership Award (2010) and VASVIK award for Mechanical Sciences (May 2011).

Ambassador Prabhat Prakash Shukla
Former Ambassador to Russia

Prabhat Prakash Shukla is the former Ambassador of India. He was born on 29 March 1951 in New Delhi, where he also did his schooling and attended university. A good academic student, he finished his school and college education with honours, and finished his masters at the well-known Delhi School of Economics.

Following his Masters, he joined the Indian Foreign Service in 1974. During a career spanning 37 years, he served in Moscow, Brussels, London and Kathmandu, among other places. He served in Delhi twice, including as the Diplomatic Adviser to the Prime Minister from 1996 to 2000. He has recently retired as Ambassador of India to Moscow and has settled in New Delhi. His interests include reading, travel, and golf.

Shri Narendra Sisodia
Director General, IDSA

Shri Narendra Sisodia is the Director General of the Institute for Defence Studies and Analyses since September 2005. He was earlier Secretary in the Ministries of Finance and Defence, Government of India and Vice-Chancellor of University of Udaipur.

Mr. Sisodia graduated from St. Stephens' College Delhi and obtained a Master's Degree from Harvard University, USA, where he was a Mason Fellow. He joined the Indian Administrative Service in 1968 and served in several key economic and national security assignments at the State and Government of India level. He was Principal Secretary, Industries & Commerce; Chairman and Managing Director of the State Industrial Development & Infrastructure Corporation and Chairman, State Electricity Board, Rajasthan. In Government of India, he served as Joint Secretary, Ministry of Defence from 1988-94. As Additional Secretary in the National Security Council Secretariat, he was a member of the Task Force on Reforming the Management of Defence. He was also responsible for providing resource support to the Group of Ministers' on Reforming the National Security System. He was closely associated with the establishment and development of National Security Council's support structures like the Strategic Policy Group & the National Security Advisory Board. In August 2005, he was appointed as a member of the National Security Advisory Board. He is the Convener of Indian Pugwash Society, a member of the India-China Eminent Persons' Group and the National Security Advisory Board. He has also been a Consultant to the United Nations Development Programme.

Dr. Tai Ming Cheung

Associate Research Scientist, University of California's Institute on Global Conflict and Cooperation

Dr. Tai Ming Cheung is an associate research scientist at the University of California's Institute on Global Conflict and Cooperation. He is in charge of the institute's Minerva project "The Evolving Relationship Between Technology and National Security in China: Innovation, Defense Transformation, and China's Place in the Global Technology Order." This five-year research and training program—funded by the U.S. Department of Defense—examines China's efforts to become a world-class science and technology power.

Dr. Cheung is a long-time analyst of Chinese and East Asian defense and national security affairs. He was based in Asia from the mid-1980s to 2002 covering political, economic and strategic developments in greater China. He was also a journalist and political and business risk consultant in northeast Asia. He received his Ph.D. from the War Studies Department at King's College, London University in 2006. His latest book, *Fortifying China: The Struggle to Build a Modern Defense Economy*, was published by Cornell University Press in 2009 and is one of the best analyses of China's technology model available. He is an associate adjunct professor at the School of International Relations and Pacific Studies (IR/PS) at UC San Diego, where he teaches courses on Asian security, Chinese security and technology, and Chinese politics.

PANELISTS

Mr. Sanjay K. Agarwal

CbS Technologies Pvt. Ltd. group promoter & Group Managing Director

Mr. Sanjay K Agarwal heads the CbS Technologies Pvt. Ltd. group as promoter & Group Managing Director. CbS is a diversified group having interests in Engineering and Technology field, Bio Toilets and focusing on import substitution for defense, Railways. CbS is a production partner of DRDO under MOD. Mr. Agarwal is an Engineer with post graduation in Management having 23 years national and international experience. He will speak on how SME's can be encouraged to participate in technology upgradation and creative adaptation.

Dr. G. Balachandran

Consulting Fellow, IDSA

Dr. G. Balachandran presently is a Consulting Fellow at the Institute for Defense Studies and Analyses (IDSA). He has a PhD in Economics and Computer Science from the University of Wisconsin. His specialization includes issues related to economics and technology. He is associated with the National Maritime Foundation, New Delhi. He is a Consultant both to the Americas Division of the Indian Ministry of External Affairs and to the Confederation of Indian Industry. Dr. Balachandran has conducted studies and published widely on the India-United States Next Steps in Strategic Partnership as well as on India-US Civil Nuclear Co-operation Agreement. He has also carried out studies on Pakistan's Defence Expenditure, on US Export Control Procedures and policy. He is currently engaged in a study on Pakistan's Energy Security.

Prior to this Dr. Balachandran has worked as software development programmer with IBM at their European Research laboratory in UK. He was a journalist too. He has directed the national office of an UNDP project on an international trade information network. As a visiting professor at Carnegie Mellon University he had conducted a number of studies on Indian and Pakistani defence expenditure, industry and trade and other studies such as the effect of US nuclear related sanctions on India in May 1998; US export control laws and the NSSP etc. He has also been a

consultant on country risk analysis for some international management associates. He will speak on the gaps in our understanding the issues relating to "Hi-tech" defence innovation and production which need to be filled before one can meaningfully come out with any sort of prescription for future policy making.

He will speak on the gaps in our understanding the issues relating to "Hi-tech" defence innovation and production.

Shri Rajinder Singh Bhatia
Executive Vice President and CEO of Bharat Forge.

Rajinder Singh Bhatia, a Gold Medalist from Punjab University, is an engineer with post graduation in Structures. He is a Fellow of Institute of Engineers and a member of All India Management Association. He has done his Master Diploma in Management from Symbiosis and Masters in Management Studies from Osmania University. He has been instructor and directing staff at College of Military Engineering, Indian Military Academy and College Of Defence Management. He has also served as Defence Adviser at Mauritius.

In his last appointment with the Largest Engineering Company in the country, he was instrumental in setting up and operating a Green field plant for manufacture of defense equipment in a record time equipped with world class facilities.

He is part of CII National Defense Council and FICCI National Committee on Defence.

He is currently employed with Kalyani Group as Executive Vice President and CEO of the Flagship Company Bharat Forge.

Major General (Retd) P. K. Chakravorty, VSM
Advisor for Strategic Studies, Brahmos

Maj. Gen. P. K. Chakravorty is currently the Advisor for Strategic Studies, Brahmos. He was commissioned in the Army on 31 March 1972. He served in the Regiment of Artillery. He has completed all courses and staff appointments. He has commanded a regiment, an Artillery Brigade during OP PARAKRAM and served as Major General Artillery in an operational command. He also commanded the Selection Centre South in Bangalore and Additional General Artillery A at Artillery Directorate Army Headquarters. Maj. Gen. Chakravorty has dealt extensively in the field of procurement of equipment and is an expert on Fire Power. Retired on 31 Dec 2010, he continues to pursue his interest in Indigenisation of Equipment.

He will focus on Defence and Technology Innovation: the Way Ahead.

Shri Rahul Chaudhry
CEO of Tata Power SED

Rahul Chaudhry is presently the CEO of Tata Power SED (Strategic Electronics Division). He has over two decades of experience in high technology arena such as Digital Switching, Network Management systems, Wireless infrastructure and services, security, and m-commerce for 2.5 G and 3G applications. Before moving into the TATA group as the CEO of TATA Power Broadband in 2001 from UK, he worked with AT&T, Motorola and British Telecom. He brings in an extensive multinational experience in Technology, Project management, Business Development, Mergers & Acquisitions, Operations, Corporate Governance and Developing Strategic Partnership. His key strength is to evaluate complex technology issues for their efficacy in meeting customer requirements, developing partnerships and uncovering win-win situations.

Rahul Chaudhry was nominated as a member of Vijay Kelkar Committee constituted by Hon. Raksha Mantri to recommend measures for strengthening self-reliance in Defence Preparedness with increased participation of Indian industry. He is also a member of National Committee on Defence, IT at CII and Co-Chairman of the FICCI Defence Committee. He is also a fellow of IETE.

Ashok K. Kanodia

Founder and Managing Director of Precision Electronics Ltd.

Mr. Ashok Kanodia is the Founder and Managing Director of Precision Electronics Ltd. since 1979. He is also the Chairman of the Board of Directors. Since its inception, Mr. Kanodia has promoted the company to new heights and a wide range of products and customers. His leadership extends to shaping National Policies and Regulations as Member of the IT/Telecom Hardware Task Force set up by the Prime Minister of India and as President of the Telecommunication Equipment Manufacturers Association (TEMA) of India. He served back-to-back terms from 1999-2001. He is currently the Chairman of the Specialist group on Defence Communications and Information Warfare of the Confederation of Indian Industry (CII), an apex Forum for Industry in India and has made several contributions as industry representative in CII-Defence seminars, exhibitions and delegations around the world.

Mr. Kanodia is one of the four industry representative in the "Kelkar Committee" set up by the Defence Minister 'Towards strengthening self-reliance in Defence preparedness'. The committee's focus has been to recommend policy measures for greater involvement of the Private industry in National defence capability building. Born in Calcutta, India on January 7, 1951, he is a graduate in Electrical Engineering and Business Management from Massachusetts Institute of Technology (M.I.T.), USA.

Shri Anit Mukherjee

Research Fellow, IDSA

Shri Anit Mukherjee is a Research Fellow at the Institute for Defence Studies and Analyses (IDSA), a think tank funded by the Ministry of Defence. Currently he is also a doctoral candidate at the School of Advanced International Studies, Johns Hopkins University in Washington DC. He earned his M.A. at Johns Hopkins University concentrating in South Asia Studies and Strategic Studies. While at university, he has conducted research projects at the United Service Institution of India and the Brookings Institution. Most recently he worked at RAND as a Summer Associate. Prior to his education he was a Major in the Indian Army and had various tenures including in the Rashtriya Rifles. His areas of interest are civil-military relations, counterinsurgency and India's Foreign and Security Policies. He is currently working on civil-military relations in India. He has published in the *New York Times*, *India Review*, *Wall Street Journal* among others. He is an alumnus of the National Defence Academy, Khadakwasla.

Anjan Mukherjee

MD of HyCa Technologies Pvt Ltd

Mr. Anjan Mukherjee is co-founder and managing director of HyCa Technologies Pvt Ltd, an emerging technology company in the cleantech sector with pioneering pending patents and has more than two & half decades of combined experience in engineering, sales, consultancy and general management. Previously he was the India head of a Norwegian multinational, sailed on merchant ships as chief engineer and co-authored a seminal technical book. He was nominated by the President of India to the Planning & Academic Board of the Indian Maritime University.

Mr. Mukherjee has recently been awarded the ET:NOW/Bajaj Hindustan "leap of faith" green entrepreneur of the year and FE-EVI awarded HyCa as a green technology honouree on the World

Environment Day. Mr. Mukherjee is a postgraduate in management from the Indian Institute of Management, Bangalore (IIM-B) and earlier completed his basic marine engineering from DMET, Kolkata.

Shri Manik Mukherjee
Director G-FAST

Shri Manik Mukherjee took over the charge of Director G-FAST in October 2006. He did his Masters in Physics from Guwahati University in 1978 and M. Tech in computer Science and Engineering from IIT, Mumbai. He joined the Plasma Physics research group at Physical Research Laboratory (PRL), Ahmedabad as Visiting Member in 1979 and in the year 1981 he joined DRDO as Scientist 'B'.

Shri Mukherjee started his professional career at Electronics and Radar Development Establishment (LRDE), Bangalore in the area of Electro-magnetic Engineering, Communication and Radar systems design, Electro-magnetic Compatibility design and Computer Simulations of Electromagnetic problems in defence systems. He moved to DRDO HQ during 1995 as OSD and contributed in technology planning and special project implementation and review at the HQ. He was instrumental in the formation of the first G-FAST at the HQ. During the year 2003-2005 Shri Mukherjee served as Counselor Defence Technology at the Embassy of India, Washington D.C. He has several publications in the area of Electromagnetic Compatibility Engineering of defence systems and general science and engineering.

Shri A.S Pundle
Advisor

Indian Machine Tool Manufacturers' Association [IMTMA]

BE (Mechanical Engg) from Bombay University in 1974. Worked as Trainee Engineer/Industrial Engineer for 18 months in the Industrial Engineering Department of Bharat Bijlee Limited, Mumbai. Based on the result of Combined Engineering Services Examination conducted by UPSC in 1974, I joined Government of India, Ministry of Industry in 1975 as Group A officer. After working with Ministry of Industry, Government of India at various levels for 22, I took voluntary retirement in 1997. Since 1997 I am working with Indian Machine Tool manufacturers Association - IMTMA. Although I retired from IMTMA during April 2010, I continue to be associated with them as Advisor with limited responsibilities.

Commodore (DR) R K Rana

Principal Director at Integrated Headquarters, Ministry of Defence (Navy), New Delhi

Commodore (Dr) Rakesh Kumar Rana is presently serving as Principal Director at Integrated Headquarters, Ministry of Defence (Navy), New Delhi and has been recently entrusted responsibility of Indian Navy's indigenous development programme after having long stint in the premier warship design organisation of Navy, where he contributed immensely in the marine engineering systems design of the first indigenous aircraft carrier and other warships.

Commodore Rana was commissioned in Indian Navy on 01 Aug 1979. He completed his post graduation from Royal Naval Engineering College, UK. He was awarded with PhD degree by IIT, Madras in Jul 1996. Officer has served in a variety of organizations in the Navy encompassing training, research, dockyard, staff, design and onboard ships. He was awarded Commendations by Director and Dean twice at IAT Pune in 1986/87 and by CNS in 1992 for his pioneering contribution in the field of marine engineering training & research and marinization of Kaveri gas turbine at GTRE respectively. Commodore Rana has more than 38 technical publications on various marine engineering and other associated subjects to his credit and has been invited as a Patron and Session Chairman during International Naval Engineering Conferences since 2004. He

is a member of The American Society of Naval Engineers, USA; Fellow of The Institute of Marine Engineering, Science and Technology, UK and has been granted a status of Chartered Engineer by The Engineering Council, UK.

Mr. Ajai Shukla

Consulting Editor (Strategic Affairs) for Business Standard

Mr. Ajai Shukla, a journalist and former TV news anchor, is the Consulting Editor (Strategic Affairs) for Business Standard, India's most reputed business daily. Mr. Shukla specialises in defence and strategic policy, with special focus on defence procurement and production. He is working on a book on the post-1947 history of the McMahon Line, for which he lived and researched in the Tawang area for a year in 2009. Earlier, Mr. Shukla had worked for NDTV as a war correspondent, reporting extensively from Afghanistan, Iraq, Pakistan, Lebanon, Jordan, Syria and Kuwait, and from India's insurgency-ridden areas like J&K.

Before his career as a journalist, Mr. Shukla was in the army, retiring as a colonel after commanding Hodson's Horse. He has served two tenures in J&K, as well as in Nagaland, Manipur, Arunachal Pradesh, Punjab and Rajasthan and a year with the UN Peacekeeping Mission in Mozambique. Mr. Shukla has an MA from King's College, London. Whilst in the army, he completed the Defence Services Staff College course in Wellington and the Senior Command course in the Army War College, Mhow. He did his schooling in the Lawrence School, Sanawar, and then joined the National Defence Academy in 1976.

Shri Bharat Singh, Deputy Director General DG / OF Board

Dr. Mahadevan Venkatraman

Sr. Vice President, ESSAR Steel Ltd.

Dr. M. Venkatraman, is the Sr. Vice President of product development, Marketing and Application Engineering at ESSAR Steel Ltd. He has about 30 years of research and industrial experience in high strength materials, metallurgy of steel, product development and application. He has worked as Assistant Director, Naval Chemical and Metallurgical Lab at Mumbai. He was the Scientific Advisor, and Head – Technology, in Tata Iron and Steel. A Ph.D. in Metallurgy from Indian Institute of Science, Bangalore, did his Postdoctoral work at the University of Alabama and the University of Wisconsin, USA on Binary high strength alloys and phase diagrams.

Dr. Venkatraman was an Alexander Von Humboldt Scholar, Universitat Osnabruck, Germany, 1991-1993 and at Institute fur Eisenhuthenhunde (IEHK) Aachen, Germany, in 2001. He was a recipient of Europe research fellow from the Humboldt foundation, University of Vienna, Austria, and in 2002 a Consultant at Centro SviluppoMateriali, Rome, Italy. During this period he also worked at Dufercolaluviere, Belgium on the assignment of hot strip rolling mill for producing critical grades. He is a life member, Indian Institute of Metals and Member of the Indian National Academy of Sciences. Dr. Venkatraman has 45 publications in refereed international journals in the area of steel processing and product metallurgy and has written one book. He is the international category editor for tantalum binary alloys a program sponsored by the international alloy phase diagram commission.

Dr. Anil Wali

Managing Director at Foundation for Innovation and Technology Transfer (FITT)

Dr. Anil Wali is the Managing Director at Foundation for Innovation and Technology Transfer (FITT)—an autonomous industry interface organization of IIT Delhi. He has a Ph. D from IIT Delhi. He has worked in the chemical industry for 19 years before taking up the present position at FITT.

Besides several publications, patents and reports to his credit, Dr. Wali has a strategic customer and quality orientation, and brings a practical perspective to solving technical problems. Currently, he is managing technologies and driving innovations and enterprise at the academia besides looking at issues of concern to SMEs. He is also called upon to deliberate and participate in the area of clean technology and sustainability. His multifaceted experience towards technology innovation and management, industry partnership, project issues, entrepreneurship, IPR, education, training, etc is sought for advice/association with several committees and programmes.

Contacts:

Smita Purushottam, Snr. Fellow, IDSA & JS, MEA

Smita Purushottam joined the Institute of Defence Studies & Analyses (IDSA), New Delhi, as Senior Fellow on May 31, 2010. She previously served as Joint Secretary at the Foreign Service Institute, MEA, Joint Secretary in the Integrated Defence Staff Headquarters in the Ministry of Defence, Director/Under Secretary (East Europe/Soviet Union) and SAARC, and Under Secretary (Bhutan) in MEA. She served in India's missions abroad as Deputy Chief of Mission in the Embassy of India in Berlin, Minister (Political) at the High Commission of India, London, Counsellor at the Indian Embassy in Beijing, Counsellor/First Secretary in India's Embassy in Brussels and language-trainee cum information second secretary at the Embassy of India, Moscow. She helped to write the Indian Diaspora report and spent a year as Fellow at Harvard where she prepared a paper "Can India Overtake China?" (2001) – in which she compared their respective reform experiences. Ms. Purushottam earned a Master's (1st Class) in History from Delhi University. She won a Fellowship for a PhD at Cornell University in the same year (1980) that she qualified for the Indian Foreign Service, which she joined. She speaks Russian and limited French. At IDSA, she has started the Eurasia cluster and has written on Russian and Chinese foreign policy, the Reset and Technology issues.

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Ms. Lobo is a Research Assistant at the Institute for Defence Studies and Analyses (IDSA), New Delhi, having joined the organization in October 2010. At IDSA, Miss Joyce S. Lobo is focussing on Energy Diplomacy; Eurasian Security Issues including Military and Security Policies, especially on Russia; and Russia's Policy towards West (Europe and USA). Her other areas of interest are Political issues especially related to institutions with partial inclination towards political economy in relation to Russia and post-Socialist countries. She had submitted her doctoral thesis, on 28 July 2010 (viva pending, at Jawaharlal Nehru University (JNU), New Delhi; M. Phil from Centre for Russian and Central Asian Studies (JNU) and MA in Political Science (JNU); B A from St. Aloysius's College, Mangalore University. Also she holds PG Diploma in Human Rights from Indian Institute of Human Rights, New Delhi. Prior to joining IDSA, she had a brief stint (August to October 2010) in Shri Ram College of Commerce as guest faculty, teaching papers: (a) Politics, Ethics and Social Responsibility of Business. (b) Democracy and Governance in India. She has assisted as research scholar at Society for All Round Development (SARD-an NGO) on the topic of "Anti-Personnel Landmines" (2004).

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Thursday, July 14, 2011.