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*Sun, 28 July 2019*

# APJ Abdul Kalam's last advice to DRDO Chief before his demise proves he was way ahead of his time

***DRDO chief Satheesh Reddy who was then the Scientific Adviser to the Defence Minister recalls his meeting with APJ Abdul Kalam***

***KEY HIGHLIGHTS***

- ***Kalam, who joined the Defence Research and Development Organisation (DRDO) in 1958, achieved many milestones in his forty-year career as a scientist***
- ***Later, he joined the ISRO where he was instrumental in putting the Rohini-I satellite in low-earth orbit***
- ***After giving 19 years to ISRO, he returned to DRDO to lead the India's integrated Missile Development Programme***

New Delhi: A great humanitarian and a visionary who dreamt of a strong India, APJ Abdul Kalam once said that innovation is born out of cultural excellence. A risk-taker, he believed that excellence is a process when an individual or a nation contrives to fulfil the dream with calculated risks.

For Kalam, no dream was ever too big and his next goal was to produce a reusable missile, an extraordinary feat which no country in the world has been able to produce.

Going by his earlier achievements and inquisitive mind, this incredible feat was not impossible for the genius.

Kalam, who joined the Defence Research and Development Organisation (DRDO) in 1958, achieved many milestones in his forty-year career as a scientist. Later, he joined the ISRO (Indian Space Research Organisation) where he was instrumental in putting the Rohini-I satellite in low-earth orbit with help of the SLV-III (Satellite Launch Vehicle).

In the 70s, Kalam was called to direct two highly classified projects, *Project Devil* and *Project Valiant*, with the sole aim of developing ballistic missiles. Indira Gandhi was the PM at that time and despite the disapproval of the Union Cabinet, secret funds were allocated for these aerospace programs under Kalam's guidance and leadership.

After giving 19 years to ISRO, he returned to DRDO to lead India's Integrated Missile Development Programme, which led to the successful launch of the Agni and Prithvi missiles.

Not many people know that developing reusable rockets for India's space program was his next big project. However, due to ill health, he couldn't go ahead with this highly ambitious plan.

Just a month before his demise, the former President called DRDO chief Satheesh Reddy advising him to work on reusable missiles system that can deliver a payload and launch it, come back and take another payload.

Reddy who was then the Scientific Adviser to the Defence Minister recalls his meeting with Kalam which was held at the library.

"After I became a scientific adviser, I met him (Kalam) at his residence just a month before his demise. He came up with the idea of a reusable missile, delivering a payload, coming back, then take another payload and launch it... 'Work on this type of system', he told me," Reddy said adding that this was the vision he had.

As a young scientist - Satheesh Reddy - now the DRDO Chairman, first came in contact with Kalam in 1986.

In 2012, the then DRDO Chairman VK Saraswat, in an interview to Doordarshan, said India plans to develop reusable missile system.

"We have propulsion technology, we have re-entry technologies, we have the technology which can take a re-entry system which will deliver a payload and have yet another re-entry system which will bring the missile back when it re-enters the atmosphere on its return journey," PTI quoted Saraswat as saying.

Reusable rockets are currently the next big thing, and with the entry of private players in this highly competitive field, the future of spacefaring looks bright.

ISRO successfully flight tested Reusable Launch Vehicle-Technology Demonstrator (RLV-TD) on May 2016 and the final version is expected to take 10 to 15 years to develop.

Once fully developed, the RLV is expected to take off vertically like any other rocket, deploy the satellite in orbit, and return to Earth followed by successful landing on a runway.

*https://www.timesnownews.com/india/article/apj-abdul-kalam-s-last-advice-to-drdo-chief-before-his-demise-proves-he-was-way-ahead-of-his-time/459963*

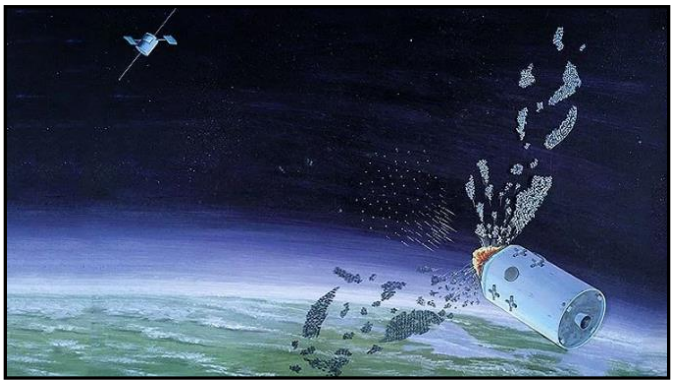
The Indian EXPRESS

***Sun, 28 July 2019***

# Mission Shakti DRDO scientist: Only 30-40 people knew of ASAT launch

***Rajababu, the Ballistic Missile Defence (BMD) programme director, said that more than 150 scientists were involved in the launch of ASAT, but only a handful knew what exactly they were working for***

Mumbai: Claiming that they "used deception to maintain secrecy" about Mission Shakti, Defence Research and Development Organisation (DRDO) scientist Dr U Rajababu on Saturday said that till the time of launch of Anti-Satellite Missile Test (ASAT) on March 27, only 30-40 people knew about the strategic weapon's launch.



Rajababu, the Ballistic Missile Defence (BMD) programme director, was addressing a seminar on Mission Shakti in Nehru Science Centre on Saturday. Most in audience were school children. He said that more than 150 scientists were involved in the launch of ASAT, but only a handful knew what exactly they were working for.

• "In the first two months, only three people knew. In six months, only 10 people knew about ASAT launch," he said, adding that they had to shield the actual launch from their own scientists by claiming the work was for electronic targeting.

On the night of March 27, India became the fourth country to enter the elite league where sophisticated technology was used to destroy a high velocity satellite within 10 cm of accuracy. The ASAT was launched from Dr APJ Abdul Kalam Island launch complex near Balasore, Odisha,

because of its strategic location to offer a long range. The missile neutralised the satellite 283 km from Earth's surface.

"We could have targeted a higher orbit, but we wanted to limit to a small fraction of space debris. About 120 km above the target satellite was the international space station that also had to be avoided," Rajababu said. Space debris, he said, is inevitable.

"The interception happened at such a high velocity and it appears some fragments of the satellite went up in space. But these are few fragments compared to lakhs of fragments of Chinese or US satellites," he added.

*https://indianexpress.com/article/india/mission-shakti-drdo-scientist-only-30-40-people-knew-of-asat-launch-5857593/*

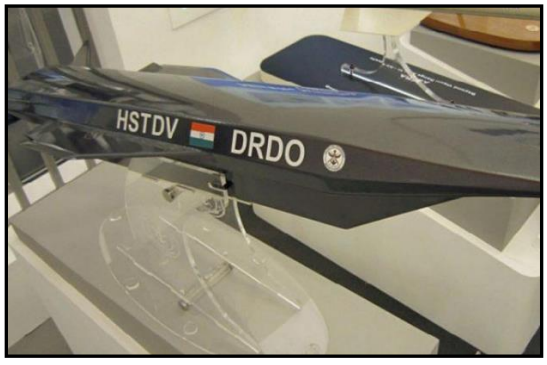
***Sun, 28 July 2019***

# HSTDV project takes firm shape, India strives hard to be included in club

***HSTDV project is aiming to position India amongst elite club of nations who have already demonstrated this technology successfully***

***By Chaitraly Deshmukh***

Aeronautical Society of India (AeSI) is a professional body which is devoted to the advancement of aeronautical sciences and engineering in India. To promote the advancement and dissemination of knowledge of Aeronautical and Aerospace Sciences/Technologies and to strive for the elevation of Aeronautical and Aerospace profession, AeSI has been organizing talks, workshops, seminars, aero-modelling competitions etc. from time to time. Under this aegis, an expert talk by Dr Debasis Chakraborthy, Outstanding Scientist, DRDL, Hyderabad on the subject "Hypersonic Propulsion" on Friday at HEMRL, Sutarwadi, Pune is organized jointly by Aeronautical Society of India, Pune Branch & DRDO, Ministry of Defence. Students & Scientists from various institutions & academia are participating in this event.




Dr Debasis Chakraborthy, an outstanding scientist at DRDL, is currently the Group Director (Design) and leading the activities of Directorate of Systems, Aerodynamics, Flight Structures, Thermal Engg., Computational Dynamics, HWT & HSTDV. He has been working in VSSC and DRDL for the past three decades. He leads the project HSTDV as Programme Director. He has worked extensively in numerical simulations of high speed reacting & non-reacting flows and provided useful aerodynamics & propulsion design inputs for satellite launch vehicle, strategic and tactical missiles. He received the DRDO Scientist of the Year Award in 2012 & DRDO Award for Best Innovation / Futuristic Development in 2010.

Hypersonic Propulsion Technology is a 'path-breaking' technology. Hypersonic vehicle based on this technology is designed to travel at 6-24 times faster than the speed of sound. With minimum speed, i.e. at 6 Mach, it can reach target placed at 45 km in barely 20 seconds. These vehicles described as 'game-changing vehicle, have a variety of potential applications. From a civil application

point of view, these vehicles can be used for the energy-efficient launch of satellites at enormous speed.

Indian defence capability can also be strengthened manifold with the use of hypersonic propulsion technology in the field of a long-range ballistic missile, high-speed reconnaissance drone, air defence interceptor missiles, etc. A hypersonic missile /drone can prove to be a hostile weapon in taking out airborne attack/with improved safety & quick response time, thus giving an edge to our defence forces.

In the last one decade, India's hypersonic vehicle demonstration vehicle (HSTDV) project has taken a firm shape. HSTDV project is aiming to position India amongst elite club of nations who have already demonstrated this technology successfully. After the US, Russia, Japan, China & European agency, India is striving hard to be included in this club.

*https://www.mid-day.com/articles/hstdv-project-takes-firm-shape-india-strives-hard-to-be-included-in-club/21431160*

United News of India

***Sun, 28 July 2019***

# Floral tributes paid to Abdul Kalam on his fourth death anniversary

Rameswaram, Jul 27 (UNI) Hundreds of people paid floral tributes to former President Dr APJ.Abdul Kalam on his fourth death anniversary here on Saturday.

People from all walks of life, students and representatives of political parties made a beeline to Kalam National Memorial, where his burial site was located at Pei Karumbu here and paid their homage by placing wreaths and lighting candles, since this morning.

Ramanathapuram District Collector K.Veera Raghava Rao, senior revenue officials, besides scientists from the DRDO also paid their homage at the memorial.

A.P.J.Mohammed Muthu Meeran Maraikayar, elder brother of Dr.Kalam and his family members offered "dua" (prayers) at the burial site.

To mark the 4th death anniversary, the 'Dr APJ Abdul Kalam International Foundation' (AKIF) launched a massive one Crore tree plantation programme today under the 'Dr APJ Abdul Kalam Social Forest Plantation Drive 2.0. ' .

APJMJ Sheik Saleem, grand nephew of Dr Kalam and Managing Trustee of AKIF told newsmen here that the foundation would plant one crore saplings in all the districts in the State by December 2020 by involving school and college students and youth who believed in Kalam's clean and green India ideals.

To mark the death anniversary of peoples President, a "Support AKIF Students Rally" was taken out by students from the "Mandapam Panchayat Union Elementary School," here where Kalam did his primary education, to promote clean and green environment and water preservation. The rally culminated at Kalam's memorial.

Born on October 15, 1931 in Rameswaram, the eminent scientist, educationist, author, visionary, Kalam served as the 11th President of India between 2002 and 2007.

He was instrumental in India's Missile programmes and played a crucial role in the 1998 Pokhran-II nuclear tests. He was also associated with country's space programmes.

Kalam died due to a cardiac arrest while delivering a lecture at the Indian Institute of Management in Shillong on July 27, 2015.

*http://www.uniindia.com/~/floral-tributes-paid-to-abdul-kalam-on-his-fourth-death-anniversary/States/news/1679426.html*

BIG NEWS NETWORK.com

*Sun, 28 July 2019*

# Specialist cadre needed for space warfare, feel defence forces

New Delhi [India], Jul 28 (ANI): During country's maiden space warfare exercise, the defence forces have realised that there is a need for developing a specialist cadre from the military and scientific community to further strengthen Indian expertise in the space arena.

The three services held their first table-top space warfare exercise to develop a doctrine in space warfare in this regard code named IndSpaceEx.

"One of the main outcomes of the exercise was that there was a need felt for developing a specialist cadre from military and DRDO along with the Other scientific community," Defence sources told ANI.

The exercise was first such attempt by the defence forces to develop a doctrine for space warfare after the Mission Shakti and a large number of participants from the three services, DRDO, academia, thinktanks took part in the event.

Sources said that another realisation during the war game was that there is already infrastructure in the country in the form of start-ups and space technology industry for developing military utilisation of space, they said.

The forces are developing a Joint Space Doctrine which will help India to prepare for future space wars.

The defence forces are also working in conjunction with the Defence Space research agency which has been created to provide new capabilities to the defence forces in space warfare.

Sources said the participants in the exercise felt that India is ready for production and launch of satellites for space military requirements but there is a need for coordination between the stakeholders including the NITI Aayog, DRDO, ISRO and other related agencies.

The sources said the Prime Minister's Office is also close to coming out with a space policy in the near future. (ANI)

*https://www.bignewsnetwork.com/news/261880551/specialist-cadre-needed-for-space-warfare-feel-defence-forces*