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# समाचार पत्रों से चयित अंश Newspapers Clippings

A Daily service to keep DRDO Fraternity abreast with DRDO Technologies, Defence Technologies, Defence Policies, International Relations and Science & Technology

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**DRDO at Aero India 2021**

**Press Information Bureau**  
**Government of India**

**Ministry of Defence**

*Wed, 03 Feb 2021 6:27PM*

## **Raksha Mantri Shri Rajnath Singh releases DRDO Documents & Procedures at Aero India 2021**

Raksha Mantri Shri Rajnath Singh released the Export Compendium of Defence Research and Development Organisation (DRDO) which consists of defence systems and platforms, which can be exported to friendly countries at Aero-India 2021 on the inaugural day.

A major revision of Design, Development & Production of Military Airborne Stores (DDPMAS) document has also been released. DDPMAS document is followed by the aeronautics fraternity for design, development, production and certification of airborne systems. The new airworthiness framework emphasizes on Atma Nirbhar Bharat for self-reliance, empowering the organisations and industries with liberal certification procedures. The document released by the certification agency CEMILAC would enable Defence PSUs, MSMEs and R&D Establishments to develop and deliver world class products to our Defence Services.

Commemorating the golden jubilee of the Aeronautical Research & Development Board (AR&DB), RM released a Stamp and a book on the journey of AR&DB's contributions to the field of aeronautics. The book highlights the major achievements of AR&DB since its formation. The AR&DB was constituted by DRDO in 1971 to promote research and take India towards self-reliance in aeronautics.

Raksha Mantri also released a DRDO Monograph "Radiance in Skies – The Tejas Saga" during the function. The monograph authored by Air Marshal P Rajkumar (Retd) and Shri BR Srikanth highlights the interesting journey of DRDO's Light Combat Aircraft Tejas.

Addressing the scientists, aerospace professionals and industrialists present at the function, Raksha Mantri complimented DRDO for multiple initiatives undertaken to enhance the technological capabilities of the Indian industry and playing a significant role in making the country Atma Nirbhar in the area of defence manufacturing. He said that technologies being developed by DRDO are continuously transferred to industries, making them confident to produce indigenous defence systems. He further said that release of the golden jubilee stamp of ADR&DB shows the long R&D path travelled by DRDO in partnership with Indian academia in the area of aeronautics. He also said that export compendium released today will further enhance the strategic partnership with friendly countries and make India a major player in the global defence market.

Chief of Defence Staff General Bipin Rawat, Air Chief Marshal Rakesh Kumar Singh Bhadauria Chief of Army Staff General Manoj Mukund Naravane, Secretary Department of Defence Research and Development Dr G Satheesh Reddy, Secretary Defence Production Shri Raj Kumar, Dr Tessa Thomas, Director General (Aeronautical Systems) and Chief Postmaster General Ms Sharda Sampath were present at the function, which was presided over by Hon'ble Raksha Mantri.

Aero India, the country's biennial air show started on 3rd of February, 2021 at Yelahanka Bengaluru. In sync with the Atma Nirbhar Bharat theme of this year's Aero India, DRDO is participating with more than 300 products, technologies, innovations in the indoor pavilion, outdoor, static and flying displays during the show. More than thirty laboratories of DRDO connected with aeronautical technology development are exhibiting their products and technological achievements in the mega event this year.

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पत्र सूचना कार्यालय  
भारत सरकार

रक्षा मंत्रालय

Wed, 03 Feb 2021 6:27PM

## रक्षा मंत्री श्री राजनाथ सिंह ने एयरो इंडिया 2021 में डीआरडीओ दस्तावेज़ एवं प्रक्रियाएं जारी की

रक्षा मंत्री श्री राजनाथ सिंह ने एयरो-इंडिया 2021 के उद्घाटन के दिन रक्षा अनुसंधान एवं विकास संगठन (डीआरडीओ) के निर्यात संग्रह का विमोचन किया जिसमें वह रक्षा प्रणालियां और प्लेटफॉर्मस शामिल हैं, जिन्हें मित्र देशों को निर्यात किया जा सकता है।

मिलिट्री एयरबोर्न स्टोर्स (डीडीपीएमएस) दस्तावेज के डिजाइन, विकास और उत्पादन में एक प्रमुख संशोधन भी जारी किया गया है। डीडीपीएमएस दस्तावेज के बाद एयरोनॉटिक्स बिरादरी द्वारा एयरबोर्न सिस्टम के डिजाइन, विकास, उत्पादन और प्रमाणन का दस्तावेज जारी किया गया। नया हवाई योग्यता ढांचा आत्मनिर्भरता के लिए आत्मनिर्भर भारत पर, संगठनों एवं उद्योगों को उदार प्रमाणन प्रक्रियाओं के ज़रिए सशक्त बनाने पर जोर देता है। प्रमाणन एजेंसी सीईएमआईएलएसी द्वारा जारी दस्तावेज से रक्षा सार्वजनिक क्षेत्र के उपक्रम, एमएसएमई और अनुसंधान एवं विकास प्रतिष्ठान हमारी रक्षा सेवाओं के लिये विश्वस्तरीय उत्पादों को विकसित और वितरित कर पाने में सक्षम होंगे।

एयरोनॉटिकल रिसर्च एंड डेवलपमेंट बोर्ड (एआरएंडबी) की स्वर्ण जयंती के उपलक्ष्य में रक्षा मंत्री ने एयरोनॉटिक्स के क्षेत्र में एयरोनॉटिकल रिसर्च एंड डेवलपमेंट बोर्ड (एआरएंडबी) के योगदान की यात्रा पर एक स्टांप और एक पुस्तक का विमोचन किया। इस पुस्तक में एयरोनॉटिकल रिसर्च एंड डेवलपमेंट बोर्ड (एआरएंडबी) के गठन के बाद से ही प्रमुख उपलब्धियों पर प्रकाश डाला गया है। एयरोनॉटिकल रिसर्च एंड डेवलपमेंट बोर्ड (एआरएंडबी) का गठन रक्षा अनुसंधान एवं विकास संगठन (डीआरडीओ) ने 1971 में किया था ताकि अनुसंधान को बढ़ावा दिया जा सके और भारत को एयरोनॉटिक्स में आत्मनिर्भरता की ओर ले जाया जा सके।

रक्षा मंत्री ने समारोह के दौरान रक्षा अनुसंधान एवं विकास संगठन (डीआरडीओ) के मोनोग्राफ "रेडियंस इन स्काइस- द तेजस सागा" का विमोचन भी किया। एयर मार्शल पी राजकुमार (सेवानिवृत्त) और श्री बीआर श्रीकांत द्वारा तैयार मोनोग्राफ डीआरडीओ के हल्के लड़ाकू विमान तेजस की दिलचस्प यात्रा पर प्रकाश डालता है।

समारोह में मौजूद वैज्ञानिकों, एयरोस्पेस पेशेवरों और उद्योगपतियों को संबोधित करते हुए रक्षा मंत्री ने भारतीय उद्योग की तकनीकी क्षमताओं को बढ़ाने और रक्षा विनिर्माण के क्षेत्र में देश को आत्मनिर्भर

बनाने में महत्वपूर्ण भूमिका निभाने के लिए रक्षा अनुसंधान एवं विकास संगठन (डीआरडीओ) की सराहना की। उन्होंने कहा कि डीआरडीओ द्वारा विकसित की जा रही प्रौद्योगिकियां लगातार उद्योगों को हस्तांतरित की जा रही हैं, जिससे यह उद्योग स्वदेशी रक्षा प्रणालियों का उत्पादन करने के प्रति आश्वस्त हैं। उन्होंने आगे कहा कि एडीआर एंड डीबी के स्वर्ण जयंती टिकट के विमोचन से पता चलता है कि एयरोनॉटिक्स के क्षेत्र में भारतीय शिक्षाविदों के साथ साझेदारी में रक्षा अनुसंधान एवं विकास संगठन (डीआरडीओ) द्वारा तय की गई यात्रा उसके लंबे अनुसंधान और विकास पथ को दर्शाती है। उन्होंने यह भी कहा कि आज जारी निर्यात संग्रह मित्र देशों के साथ रणनीतिक साझेदारी को और बढ़ाएगा और भारत को वैश्विक रक्षा बाजार में एक प्रमुख स्तंभ बनाएगा।

इस अवसर पर चीफ ऑफ डिफेंस स्टाफ जनरल बिपिन रावत, वायुसेना प्रमुख एयर चीफ मार्शल राकेश कुमार सिंह भदौरिया, सेना प्रमुख जनरल मनोज मुकुंद नरवणे, रक्षा अनुसंधान एवं विकास विभाग के सचिव डॉ जी सतीश रेड्डी, रक्षा उत्पादन सचिव श्री राज कुमार, डॉ टेसी थॉमस, महानिदेशक (एयरोनॉटिकल सिस्टम्स) और चीफ पोस्टमास्टर जनरल शारदा संपत मौजूद थे, जिसकी अध्यक्षता माननीय रक्षा मंत्री ने की।

देश का द्विवार्षिक एयर शो एयरो इंडिया 3 फरवरी, 2021 को येलहंका बेंगलुरु में शुरू हुआ था। इस साल एयरो इंडिया आत्मनिर्भर भारत थीम के अनुरूप रक्षा अनुसंधान एवं विकास संगठन (डीआरडीओ) शो के दौरान 300 से अधिक उत्पादों, प्रौद्योगिकियों, इंजोर पवेलियन में नवाचार, आउटडोर, स्थैतिक और फ्लाइंग डिस्प्ले के साथ भाग ले रहा है। एयरोनॉटिकल प्रौद्योगिकी विकास से जुड़ी रक्षा अनुसंधान एवं विकास संगठन (डीआरडीओ) की तीस से अधिक प्रयोगशालाएं इस वर्ष मेगा इवेंट में अपने उत्पादों और तकनीकी उपलब्धियों का प्रदर्शन कर रही हैं।

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## **Rs. 48,000 Crore Contract for 83 Light Combat Aircraft (LCA) Tejas handed over to HAL at the Inaugural Ceremony of Aero India 2021**

Today at Inaugural Ceremony of Aero India 2021, in the presence of Raksha Mantri Shri Rajnath Singh, the Contract for 83 Light Combat Aircraft Tejas was handed over to Hindustan Aeronautics Limited (HAL). The Cabinet Committee on Security under the Chairmanship of Prime Minister Shri Narendra Modi had approved procurement of 73 LCA Tejas Mk-1A fighter aircrafts and 10 LCA Tejas Mk-1 Trainer aircrafts at a cost of Rs. 45,696 Cr along with Design & Development and Infrastructure sanctions worth Rs. 1,202 Cr on 13th January, 2021. The contract is valued at close to Rs. 48,000 crores.

This is the largest ever Defence contract for indigenous manufacture till date. This significant step provides great impetus to indigenous fighter aircraft capability of the nation. A stellar display of Tejas platform was made today in Aero India 2021 in the presence of large number of international and national participants.

The deliveries of all 83 aircraft shall be completed in 8 years from now. HAL will be delivering the first 3 aircraft in the 3rd year and 16 aircrafts per year for subsequent 5 years. On 2nd February Raksha Mantri Shri Rajnath Singh inaugurated the second production facility (Plant II) to augment the production capacity and ensure timely supply of aircraft to IAF. The induction of Light Combat Aircraft Tejas Mk-1A in Indian Air Force will enhance operational capabilities and improve the aircraft strength.

Light Combat Aircraft Mk-1A variant is an indigenously designed, developed and manufactured state of the art modern 4+ generation fighter aircraft. This aircraft is equipped with critical operational capabilities of Active Electronically Scanned Array (AESA) Radar, Beyond Visual Range (BVR) Missile, Electronic Warfare (EW) Suite and Air to Air Refuelling (AAR) would be a potent platform to meet the operational requirements of Indian Air Force. It is the first “Buy (Indian-Indigenously Designed Developed and Manufactured)” category procurement of combat aircrafts with an indigenous content of 50% which will progressively reach 60% by the end of the programme and about 250 out of 344 systems fitted in the aircraft will be indigenous.

Responding to Prime Minister Shri Narendra Modi’s clarion call for Aatmanirbhar Bharat Abhiyaan, India is continuously growing in its power to indigenously design, develop and manufacture advanced cutting edge technologies and systems in the Defence Sector. The manufacturing of Light Combat Aircraft by HAL will give a further push to Aatmanirbhar Bharat initiative and boost indigenization of defence production and the defence industry in the country. About 500 Indian companies including MSMEs in the design and manufacturing sectors will be working with HAL in this procurement. Some of these companies have displayed their systems at Aero India 2021. Today, the nation is self-reliant in most of the Military Fighter Aircraft Contemporary technologies and this has been possible largely due to Tejas Programme. The programme would act as a catalyst for transforming the Indian aerospace manufacturing ecosystem into a vibrant Aatmanirbhar-self-sustaining ecosystem.

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## एयरो इंडिया 2021 के उद्घाटन समारोह में 83 हल्के लड़ाकू विमान(एलसीए) तेजस के लिए 48,000 करोड़ रुपये का अनुबंध एचएएल को सौंपा गया

एयरो इंडिया 2021 के उद्घाटन समारोह में आज रक्षा मंत्री श्री राजनाथ सिंह की उपस्थिति में 83 हल्के लड़ाकू विमान तेजस के लिए अनुबंध हिंदुस्तान एयरोनॉटिक्स लिमिटेड (एचएएल) को सौंपा गया। प्रधानमंत्री श्री नरेंद्र मोदी की अध्यक्षता में सुरक्षा संबंधी कैबिनेट समिति ने 13 जनवरी, 2021 को 1,202 करोड़ रुपये के डिजाइन व डेवलपमेंट और इंफ्रास्ट्रक्चर सैंक्शंस के साथ 45,696 करोड़ रुपयों की लागत पर 73 एलसीए तेजस एमके-1ए लड़ाकू विमान और 10 एलसीए तेजस एमके-1 प्रशिक्षण विमानों की खरीद को मंजूरी दी थी। इस अनुबंध का मूल्य लगभग 48,000 करोड़ रुपये है।

यह स्वदेशी निर्माण के लिए अब तक का सबसे बड़ा रक्षा अनुबंध है। यह महत्वपूर्ण कदम राष्ट्र में स्वदेशी लड़ाकू विमान की क्षमता को प्रोत्साहन देता है। बड़ी संख्या में अन्तर्राष्ट्रीय और राष्ट्रीय हिस्सेदारों की मौजूदगी में आज एयरो इंडिया 2021 में तेजस प्लैटफॉर्म का शानदार प्रदर्शन किया गया।

सभी 83 विमानों की डिलीवरी आज से 8 साल में कर दी जाएगी। एचएएल पहले 3 विमानों की डिलीवरी तीसरे साल में करेगा और अगले 5 साल तक प्रत्येक साल 16 विमानों की डिलीवरी करेगा। भारतीय वायुसेना को विमानों की समय से आपूर्ति सुनिश्चित करने और उत्पादन क्षमता को बढ़ाने के लिए रक्षा मंत्री श्री राजनाथ सिंह ने 2 फरवरी को दूसरे प्रोडक्शन फैसिलिटी (प्लांट 2) का उद्घाटन किया था। भारतीय वायुसेना में हल्के लड़ाकू विमान तेजस एमके-1ए के शामिल होने से परिचालन क्षमताओं में वृद्धि होगी और विमान की शक्ति में सुधार होगा।

हल्के लड़ाकू विमान एमके-1ए का यह प्रकार आधुनिक 4+ पीढ़ी के लड़ाकू विमान का स्वदेशी डिजाइन, विकसित और निर्मित रूप है। यह विमान इलेक्ट्रॉनिक रूप से सक्रिय स्कैन ऐरे (ईईएसए) रडार, बियॉन्ड विजुअल रेंज (बीवीआर) मिसाइल, इलेक्ट्रॉनिक वॉरफेयर (ईडब्ल्यू) सुइट और हवा से हवा में रिफ्यूइंग (एएआर) जैसी महत्वपूर्ण संचालन क्षमताओं से सुसज्जित है जो कि भारतीय वायुसेना के संचालन आवश्यकताओं को पूरा करने के लिए प्रभावी होगा। यह लड़ाकू विमान श्रेणी की पहली “(भारतीय-स्वदेशी डिजाइन द्वारा विकसित और निर्मित) खरीद” है जिसमें 50% सामग्री स्वदेशी होगी जो कि इस कार्यक्रम के अंत तक 60% तक पहुंच जाएगी और एयरक्राफ्ट में लगे 344 में से लगभग 250 सिस्टम स्वदेश निर्मित होंगे।

आत्मनिर्भर भारत अभियान के लिए प्रधानमंत्री श्री नरेंद्र मोदी के आवाहनके जवाब में, भारत लगातार रक्षा क्षेत्र में उन्नत और अत्याधुनिक तकनीकों और सिस्टम के स्वदेशी डिजाइन, विकास और निर्माण में अपनी ताकत को बढ़ा रहा है। एचएएल द्वारा हल्के लड़ाकू विमानों का निर्माण देश में आत्मनिर्भर भारत पहल को बढ़ावा देगा और रक्षा उद्योग और रक्षा उत्पादन के स्वदेशीकरण में वृद्धि होगी। इस खरीद में एचएएल के साथ लगभग 500 भारतीय कंपनियां काम करेंगी जिसमें डिजाइन और

निर्माण में एमएसएमई भी शामिल होगी। इनमें से कुछ कंपनियों ने एयरो इंडिया 2021 में अपने सिस्टम का प्रदर्शन भी किया। आज देश समकालीन तकनीकों के अधिकतर सैन्य लड़ाकू विमान बनाने में आत्मनिर्भर है और यह काफी हद तक तेजस कार्यक्रम के कारण संभव हुआ है। यह भारतीय एयरोस्पेस निर्माण इकोसिस्टम को सक्रिय आत्मनिर्भर-स्वपोषित इकोसिस्टम में बदलने में उत्प्रेरक की भूमिका निभाएगा।

<https://pib.gov.in/PressReleasePage.aspx?PRID=1695033>



**Press Information Bureau**  
**Government of India**

**Ministry of Defence**

*Wed, 03 Feb 2021 6:45PM*

## **Aero-India 2021 gets off to a flying start**

**Aero India to showcase India's growing defence capabilities, says Raksha Mantri Shri Rajnath Singh;**

**Spectators treated to awe inspiring acrobatics;**

**Delegates from more than 55 countries  
& over 540 exhibitors in attendance**

The Inaugural ceremony for Aero India 2021, Asia's largest Aerospace and Defence Exhibition is being held at Air Force Station, Yelahanka, Bengaluru between February 03-05, 2021. This year Aero India 2021 has been organised in hybrid mode with a concurrent virtual exhibition to encourage maximum participation. Opening the proceedings Secretary (Defence Production) Shri Raj Kumar addressed the gathering and said that India has taken a leap in organising a completely COVID compliant Aero and Defence exhibition. He expressed his gratitude to ambassadors and delegates from more than 55 nations who were in attendance. Shri Raj Kumar said that the large attendance at Aero India 2021 reflects positive temperament of people across the world and renewed global interest in the capabilities of India. He said that Aero India 2021 would provide a platform for exchange of ideas and forge partnerships in the aerospace and Defence sectors. He also provided a brief about the events to be organized during Aero India 2021, including the Chief of Air Staffs Conclave, the Bandhan ceremony and the India Pavilion.

Later contract documents to produce Light Combat Aircraft Tejas were handed over by the Ministry of Defence to Hindustan Aeronautics Limited (HAL). Chairman and Managing Director, HAL Shri R Madhavan presented a model of the Light Combat Aircraft (LCA) Tejas to Raksha Mantri Shri Rajnath Singh. This was followed by the screening of a short film on the journey of the aircraft.

Addressing the gathering Raksha Mantri Shri Rajnath Singh expressed his happiness at the attendance of delegates from around the world at Aero India 2021. He said that the existing supply chains developed over the years by aerospace and engineering firms and an investor friendly government with simplified procedures and single window clearance mechanism makes Karnataka an attractive destination for industry. He expressed his gratitude to Chief Minister of Karnataka Shri B S Yediyurappa for extending full support in organising Aero India 2021.

Speaking on Aero India 2021 Shri Rajnath Singh said the exhibition would display the vast potential and the multifarious opportunities that our country offers in the field of defence and aerospace sector. He added that it promises to be the world's first ever hybrid aero & defence exhibition with a concurrent virtual exhibition making it a truly digital and global event.



Raksha Mantri appreciated the growing optimism of the global community, reflected in the participation of over 540 exhibitors including 80 foreign companies and defence ministers, delegates, service chiefs and officials from more than 55 nations. He highlighted that the unique opportunity in defence and aerospace manufacturing that India offers through a “Sangam” of rising demand, greater innovation, conducive policies and maturing ecosystem in the sector.

Shri Rajnath Singh also announced that the government plans to spend 130 billion dollars on military modernisation over the next seven years. He said that steps had been taken to strengthen the nation’s security apparatus with domestic manufacturing and complex Defence platforms becoming the focus of the Aatmanirbhar Policy. He said that the government had enhanced Foreign Direct Investment in the Defence Sector up to 74 per cent through the automatic route and 100 per cent through the government route. Hailing the reforms brought in by the government since 2014 he said that they would create a conducive system for exports, foreign direct investment and offset discharge. The Newly introduced (Buy Global-Manufacture in India) category of capital procurement in Defence Acquisition Policy 2020 allows outright purchase of equipment from foreign vendors and indigenous manufacture through an Indian subsidiary, a joint venture or an Indian agency. He said a large number of indigenous Defence equipment had been developed by Defence Research and Development Organisation to cater to the needs of the nation’s defence forces.

Raksha Mantri informed that reforms aimed at bringing ease in doing business, have shown good results. India has jumped from 77<sup>th</sup> rank in 2019 to the 63<sup>rd</sup> rank in the World Bank’s Ease of Doing Business Rankings. He added that industrial licensing requirements have been eliminated for a number of items in the defence sector. More than 500 companies have now taken defence licences, doubling the number in the last 6 years. Shri Rajnath Singh invited business leaders from across the globe to take advantage of the various initiatives of the government of India and set up manufacturing units.

Shri Rajnath Singh said that the India pavilion at Aero India 2021 would showcase India’s design and manufacturing supply chain associated with various facets of the rotary wing system. Raksha Mantri expressed great happiness that HAL got the orders for 83 new indigenous LCA - Tejas MK1A for Indian Air Force valued at more than Rs 48,000 crore, the biggest “Make in India” defence contract till date. He said with a strong and diversified Micro, Small, Medium Enterprise sector composed of more than active 5000 units, India has the potential to become a reliable supplier of defence equipment to many of its friendly nations.

Raksha Mantri shared the vision of making India one of the biggest countries of the world in defence sector, from design to production, with active participation of public and private sector. He said that to achieve the twin goals of self-reliance and exports, we have set a target to achieve Rs 1,75,000 crore turnover, including export of Rs 35,000 crore in aerospace and defence goods and services by 2024. Shri Rajnath Singh recognised India’s interests beyond its shores and said that it was India’s duty to remain capable and willing to assist them in times of natural calamities and security challenges. He expressed happiness at the organisation of the first Indian Ocean Region’s Defence Ministers’ Conclave with the theme “Enhanced peace, Security and cooperation in the Indian Ocean Region” in this edition of Aero India. He said that this was an implementation of the concept of the Indian Ocean built around Security and Growth for All (SAGAR), visualised during Prime Minister Narendra Modi’s visit to Indian Ocean Island states in 2015.

Raksha Mantri said that India is also a victim of the global threat of state sponsored and state inflicted terrorism. He said that the nation has long witnessed attempts by other to change the status quo along our borders. He assured that India is vigilant and prepared to counter and defeat any misadventure as well as to defend its territorial integrity and its people. He said that this resolve is exhibited in India’s growing defence capabilities, which will be showcased in Aero India 2021. Raksha Mantri Shri Rajnath Singh concluded his address by declaring Aero India open.

Chief Minister of Karnataka Shri B S Yediyurappa said it was a matter of pride for people of Karnataka and Bengaluru for being selected to host yet another edition of Aero India. He said that the holding of Aero India this year was an expression of confidence in the ability of the state

administration to tackle the COVID-19 pandemic and assured that his government has taken measures to ensure the safety of participants and delegates. The Chief Minister said that Karnataka made a significant contribution to the nation's aerospace and defence sector of India and was the first state to announce an aerospace policy with a proposed investment of close to Rs 14,700 crore and employment potential for about 10,600 people. He highlighted the role of Micro, Small and Medium scale enterprises in the growth of the country's industry. The Chief Minister said that "Laghu Udyog Bharati" and IMS foundation with the support of Government of Karnataka would be organising the MSME, Aerospace and Defence expo in Bengaluru from 27th to 29th September, 2021 to realise the potential of MSMEs and requested the support of the Ministry of Defence in this endeavor. He thanked Raksha Mantri Shri Rajnath Singh for reposing faith in the Karnataka Government for Aero India.

Additional Secretary (Defence Production) Shri Sanjay Jaju delivered the vote of thanks at the inauguration. Minister of Chemicals and Fertilizers Shri D V Sadananda Gowda, Chief of Defence Staff General Bipin Rawat, Chief of Air Staff Air Chief Marshal Rakesh Kumar Singh Bhadauria, Chief of Army Staff General M M Naravane, Chief of Naval Staff Admiral Karambir Singh, Defence Secretary Dr Ajay Kumar, Secretary, Department of Defence R&D and Chairman, DRDO Dr G Sathesh Reddy, Civil Aviation Secretary Shri Pradeep Singh Kharola and Defence Ministers, service chiefs and ambassadors of various countries were also in attendance. The event concluded with a glorious fly past as patriotic tunes played in the background, enthralling those in attendance.

<https://pib.gov.in/PressReleasePage.aspx?PRID=1694848>



**Press Information Bureau**  
**Government of India**

**Ministry of Defence**

*Wed, 03 Feb 2021 7:11PM*

## **Shortage of Fighter Aircraft**

The deficiencies in number of fighter squadrons arise from time to time due to obsolescence and phasing out of equipment. These deficiencies are made good by planned induction, which is a continuous process.

The Government has approved induction of four squadrons of indigenously designed, developed and manufactured TEJAS Mk-IA aircraft. A total of 83 TEJAS Mk-IA are planned to be manufactured by HAL and inducted into IAF.

The salient steps undertaken to achieve self sufficiency in defence sector are as under:-

- Defence Procurement Procedure (DPP) 2016 has been revised as Defence Acquisition Procedure (DAP)-2020, which is driven by the tenets of Defence Reforms announced as part of 'Atmanirbhar Bharat Abhiyan'.
- Opened North & South Defence Industrial corridors to promote setting up of industries supporting defence equipment.
- Permitted acceptance of "Suo Moto" proposals from industry for undertaking indigenous design & development for items needed for defence services.
- Formulated the iDEX (Innovation in Defence Excellence) framework to provide an ecosystem for Startups/individual innovators/MSMEs to engage with Ministry of Defence/Academia and other such agencies for manufacture of defence related items.
- Institutionalised the Technology Development Fund and its processes to facilitate the DRDO to engage with Indian industry for technology development needs.

- Army Design Bureau (ADB): Indian Army (IA) launched the ADB on 31st August, 2016. The role of the ADB is to act as a facilitator for research & development efforts and procurement of indigenously developed weapons and equipment extensive outreach programme for industry, MSMEs, Startups and Academia across the country for promoting 'Make in India'. The outreach programmes, apart from generating awareness about the modernization requirements, will help to meet the technology needs of the IA from within the confines of domestic resources and talent.
- Army Technology Board (ATB): The ATB enables indigenous Research and Development efforts in accordance with the operational needs of the IA.
- Technology Development Fund (TDF): TDF has been launched by the Government to giving impetus to research and development projects beyond the proof of concept stage. It has been provided with a budget of Rs.100 crores.
- The Indian Navy in coordination with Aeronautical Development Agency (ADA) is pursuing the indigenous development and acquisition of a Twin Engine Deck Base Fighter (TEDBF).
- Ministry of Defence has notified a 'Negative list' of 101 items for which there would be an embargo on the import beyond the timeline indicated against them. This is a big step towards self-reliance in defence. This would offer a great opportunity to the Indian defence industry to manufacture these items using their own design and development capabilities to meet the requirements of the Armed Forces in the coming years.

This information was tabled in a written reply by Raksha Rajya Mantri Shri Shripad Naik to a question asked by Shri Balak Nath in Lok Sabha today.

<https://pib.gov.in/PressReleasePage.aspx?PRID=1694875>



Thu, 04 Feb 2021

## DRDO continuously developing technology for new India, says Rajnath Singh

*"Today, when the world is changing so fast and a new world order is emerging in front of us. We have to focus on new goals for our new India..." Singh said in Bengaluru at Aero India 2021*

Bengaluru: Asserting that India has to focus on new goals for new India, Defence Minister Rajnath Singh on Wednesday said the Defence Research and Development Organisation (DRDO) is continuously developing technology that will help the country in achieving these goals.

"Today, when the world is changing so fast and a new world order is emerging in front of us. We have to focus on new goals for our new India, I am happy to see that the DRDO is continuously developing technology that will help us in achieving these goals," Singh said in Bengaluru at Aero India 2021.

"It is in pursuit of these goals that we had many successful trials recently like Akash NG Missile, Anti-Radiation Missile-RUDRAM and MRSAM. In many of our tests, we have got success in our maiden attempt itself, this is our great achievement," he added.

Commenting on the recent decision of induction of 83 TEJAS into Indian Air Force (IAF) by the government and the successes of indigenously developed systems like bombs, radars sonar,



Defence Minister Rajnath Singh addresses during the inauguration of the HAL's new LCA-Tejas Production Line in Bengaluru. (Photo | Shriram BN, EPS)

communication systems and armaments, he said the induction reflects the role of DRDO towards self-reliant India. "I have come to know that last year, 225 Licences Agreements were signed by DRDO with industry. This shows the industries' trust in homegrown technologies developed by DRDO," he said.

Meanwhile, the BrahMos supersonic cruise missile was also displayed at the event in coastal defence role. Indian Navy is going to induct the missile as part of the Next Generation Maritime Marine Coastal Defence battery role.

"We have already demonstrated the underwater launch capability of the BrahMos missile. Whenever the Indian Navy makes submarines indigenously, I am 100 per cent sure that the BrahMos submarine-launched version would be equipped on it," BrahMos DG Sudhir Mishra told ANI. American B-1B Lancer aircraft also took part in the show. The aircraft flew from an American airbase in South Dakota, United States for over 26 hours to reach the city.

Moreover, Singh was briefed by a Hindustan Aeronautics Limited (HAL) official about the VIP version of an indigenous chopper at the show.

<https://www.newindianexpress.com/nation/2021/feb/03/drdo-continuously-developing-technology-for-new-india-says-rajnath-singh-2259031.html>

## THE HINDU BusinessLine

Thu, 04 Feb 2021

# DRDO has signed 225 licence agreements with industry in 2020: Rajnath Singh

By Anil Urs

Yelahanka (Bengaluru): In 2020, Defence Research and Development Organisation (DRDO) has signed 225 licence agreements with industry.

After releasing DRDO-India documents and procedures at AeroIndia2021 at the Air Force Station, Yelahanka (Bengaluru) on Wednesday, Union Defence Minister Rajnath Singh said "These 225 agreements that were signed with industry show the industries' trust in home grown technologies developed by DRDO."



"The recent decision to induct 83 TEJAS in IAF by the government and the successes of indigenously developed systems like bombs, radars sonar, communication systems, armaments reflect the role of DRDO in the country's self-reliance. It is in pursuit of these goals that we had many successful trials recently like 'Akash NG Missile, Anti-Radiation Missile-RUDRAM, MRSAM etc. In many of our tests, we have got success in our maiden attempt itself."

Singh said "Today, when the world is changing so fast we have to focus on new goals for our new India, I am happy to see that DRDO is continuously developing technology that will help us in achieving these goals."

The policy revisions done is expected to facilitate the design, development, production and certification of next-generation air systems. The new airworthiness framework will empower the organisations and industries with liberal certification procedures.

Paying tributes to Roddam Narasimha, Singh said "On the golden jubilee of 'Aeronautics Research and Development Board,' I pay tributes to Prof Roddam Narasimha, who passed away a couple of months back. By setting up the Aeronautical Research and Development Board, he worked to realise many futuristic scientific developments."

<https://www.thehindubusinessline.com/news/national/drdo-has-signed-225-licence-agreements-with-industry-in-2020-rajnath-singh/article33742662.ece>

Thu, 04 Feb 2021

## DRDO Chief lauds govt after HAL bags contract to manufacture 83 LCA

*The Defence Research & Development Organisation (DRDO) chief G Satheesh Reddy on Wednesday lauded the Defence Ministry for handing over the contract to manufacture 83 Light Combat Aircraft (LCA) Tejas Mark-1A fighters to the Hindustan Aeronautics Limited (HAL)*

Bengaluru: The Defence Research & Development Organisation (DRDO) chief G Satheesh Reddy on Wednesday lauded the Defence Ministry for handing over the contract to manufacture 83 Light Combat Aircraft (LCA) Tejas Mark-1A fighters to the Hindustan Aeronautics Limited (HAL). "83 LCA order from Indian Air Force is the single largest order ever from the air force as the number of aircraft is concerned," Reddy told ANI adding that it will be giving a major boost to the aeronautics of the country.

Terming the decision of the government 'historical', he said that this is will pave the way for the development of the new aircraft.

"The LCA Tejas Mark-1A aircraft is supposed to replace Mirage and Jaguar aircraft and it is being developed on the right track. Rafale is a slightly different class of aircraft but LCA has many modern and advanced technological features which any modern aircraft has got," Reddy said.

A contract to manufacture 83 Light Combat Aircraft (LCA) Tejas fighters were handed over to the Hindustan Aeronautics Limited (HAL) by the Defence Ministry at the Aero India international air show in Bengaluru today.

The first LCA Mark 1A aircraft is likely to be produced by 2023 once the HAL is done with the supply of the initial 40 planes in the Initial Operational Clearance and Final Operational Clearance standards which have already taken part and proven themselves in the IAF operational exercises such as the Exercise Gagan Shakti.

LCA Mark 1A is the advanced version of Tejas aircraft. (ANI)

*(This story has not been edited by Devdiscourse staff and is auto-generated from a syndicated feed.)*

<https://www.devdiscourse.com/article/law-order/1434683-drdo-chief-lauds-govt-after-hal-bags-contract-to-manufacture-83-lca>



DRDO chief G Satheesh Reddy (Photo/ANI). Image Credit: ANI

## डीआरडीओ प्रमुख ने तेजस विमान सौदे के लिए सरकार की जमकर की तारीफ

बंगलूरु: डीआरडीओ प्रमुख जी सतीश रेड्डी ने हिंदुस्तान एयरोनॉटिक्स लिमिटेड (एचएएल) के साथ 83 हल्के तेजस लड़ाकू विमान निर्माण का सौदा करने के लिए रक्षा मंत्रालय की तारीफ की। उन्होंने कहा कि भारतीय वायुसेना की तरफ से 83 एलसीए का ऑर्डर अब तक का सबसे बड़ा ऑर्डर है। इससे देश में एयरोनॉटिक्स को बहुत बड़ा बूस्ट मिलेगा।

सरकार के फैसले को ऐतिहासिक बताते हुए उन्होंने कहा कि इससे देश में नए एयरक्राफ्ट बनाने का रास्ता भी साफ होगा। उन्होंने कहा कि एलसीए तेजस मार्क-1ए एयरक्राफ्ट आने वाले समय में मिराज और जगुआर की जगह लेंगे और इसका निर्माण सही दिशा में हो रहा है।

उन्होंने कहा कि राफेल की एक अलग श्रेणी का विमान है लेकिन तेजस एलसीए में कई आधुनिक और एडवांस तकनीक हैं जो किसी भी आधुनिक विमान में होती हैं।



डीआरडीओ प्रमुख जी सतीश रेड्डी - फोटो : ANI

### तेजस एलसीए की खरीद का सौदा

सरकार ने 83 तेजस हल्के लड़ाकू विमान खरीदने के लिए सरकारी हिंदुस्तान एयरोनॉटिक्स लिमिटेड (एचएएल) के साथ बुधवार को 48,000 करोड़ रुपये के सौदे पर औपचारिक मुहर लगा दी। सरकार की तरफ से इस सौदे को रक्षा क्षेत्र में सबसे बड़ा 'मेक इन इंडिया' अनुबंध करार दिया गया।

रक्षा मंत्रालय के खरीद मामलों के महानिदेशक वी एल कांता राव ने एचएएल के प्रबंध निदेशक एवं अध्यक्ष आर माधवन को यह अनुबंध 'एयरो इंडिया-2021' के उद्घाटन के अवसर पर रक्षा मंत्री राजनाथ सिंह की मौजूदगी में सौंपा।

इस अवसर पर राजनाथ सिंह ने कहा, 'मैं बहुत खुश हूँ की एचएएल को भारतीय वायुसेना से 83 नए स्वदेशी एलसीए तेजस एमके1ए के निर्माण का अनुबंध मिला है, जिसकी अनुमानित लागत 48,000 करोड़ रुपये से अधिक है।

रक्षा मंत्री ने कहा, यह संभवतः आज तक का सबसे बड़ा 'मेक इन इंडिया' रक्षा अनुबंध है। एचएएल द्वारा निर्मित तेजस एक इंजन वाला, बेहद कुशल बहुउद्देश्यीय सुपरसोनिक लड़ाकू विमान है।

गौरतलब है कि प्रधानमंत्री नरेंद्र मोदी की अध्यक्षता वाली सुरक्षा मामलों की मंत्रिमंडल समिति (सीसीएस) ने भारतीय वायुसेना की लड़ाकू क्षमताओं को बढ़ाने के लिए पिछले माह एचएएल से 73 तेजस एमके-1ए तथा 10 एलसीए तेजस एमके-1 प्रशिक्षु विमान खरीद की मंजूरी दी थी।

<https://www.amarujala.com/india-news/drdo-chief-praises-government-for-tejas-aircraft-deal>

## Aero India 2021: All you need to know

*Aero India enables industry professional to gain market insights and announce new developments. It also offers a unique platform to international aviation sector to bolster business*

*Edited By Amit Chaturvedi*

Bengaluru is hosting the 13th edition of the Aero India international air show, organised by the Defence Research and Development Organisation (DRDO).

The DRDO is exhibiting its latest defence technologies and demonstrating many systems at the air show. Major attractions include flying displays of Airborne Early Warning and Control (AEW&C) system, Light Combat Aircraft (LCA) Tejas and LCA Navy.



Security personnel stand guard as an Indian Air Force's Sukhoi Su-30MKI fighter jet lands during the first day of the Aero India 2021 air show in Bengaluru on Wednesday, (AFP Photo)

Here is everything you need to know about Aero India 2021:

- According to government, the exhibition is organised every alternate year. It is one of the major exhibitions for aerospace and defence industries with a public air show.
- Aero India enables industry professional to gain market insights and announce new developments. It also offers a unique platform to international aviation sector to bolster business.
- The air show will continue till February 5, 2021.
- The logo for Aero India is inspired by the Tejas Light Combat Aircraft (LCA). The Tejas LCA, together with its variants, is the smallest and lightest multi-role supersonic fighter aircraft of its class, according to the government.
- The air show has been organised in accordance with Covid-19 guidelines, in view of the risk the disease poses. Some of the initiatives that have been implemented are utilising mobile app for access, geo location for clocking in/out, stagger break times for support personnel and introducing additional space in the food courts.
- Enforcement and incident reaction teams have been formulated to ensure that the physical distancing norms are monitored and guest are guided at all times.
- Visitors and support staff interaction at areas such as information desks, badge distribution or material/information handout desks and security booths have transparent partitions to reduce the transmission risk.
- All the entry points have thermal scanners to check body temperature. The DRDO has also adopted the 'no mask no entry' principle.

<https://www.hindustantimes.com/india-news/aero-india-2021-all-you-need-to-knowuntitled-story-101612334152291-amp.html>

## Photos: 13th edition of Aero India 2021

### Aero India 2021: 13th edition of air show begins today

The 13th edition of Aero India International air show begins today at the Air Force Station Yelahanka, Bengaluru. The air show is organised by the Defence Research and Development Organisation (DRDO).

### Aero India celebrates Silver jubilee

Defence Minister Rajnath Singh has inaugurated the event today and released the DRDO export compendium, a new Procedure for Design, Development and Production of Military Aircraft and Airborne Stores (DDPMAS) document and other documents.

The journey of the air show goes a long back. It started in 1996 and is celebrating its 25th year in this post-coronavirus era.

### Karnataka CM B. S. Yediyurappa, Defence Minister Rajnath Singh among others attend the mega event

"The Organisation with its vast defence design and development capability has been working towards Atmanirbhar Bharat and has taken up many policy initiatives to work closely with all stakeholders of the ecosystem. More than thirty laboratories of DRDO connected to aeronautical development are exhibiting their products and technological achievements in this mega event," the statement said.

### Aero India show in times of pandemic!

Over 300 products, technologies and innovations will be showcased in indoor, outdoor, static and flying displays at the biennial event. Due to the coronavirus pandemic, multimedia-based presentations and product and technology brochures are being provided digitally for download based on QR code.

### Defence Minister eyes for military modernisation

"We have taken many steps to strengthen our security apparatus recently. Domestic manufacturing of bigger and complex defence platforms has now become the focus of our policy under the "Atmanirbhar Bharat Abhiyan". We plan to spend 130 Billion Dollar on military modernisation," said the Defence Minister.

### India is a victim of state-sponsored and state inflicted terrorism: Defence Minister

"India also faces threats and challenges emanating from multiple fronts. India is a victim of state-sponsored and state inflicted terrorism, which is now a global threat. Our resolve towards this end is shown by our growing defence capabilities. The Aero India 21 will showcase this commitment. The Seminars section in Aero India is also powering the dream of Aatmanirbhar Bharat," Rajnath Singh further added.





### **Aero India show to conclude on February 5**

The 13th edition of Aero India International air show will conclude on February 5. Defence Minister Rajnath Singh said at the inaugural ceremony, "I am confident that these three days will prove to be productive and fulfilling. I am also sure that our shared vision and values will forge new relations and carry forth the existing relationships and associations to the next level."



<https://bangaloremirror.indiatimes.com/photos/news/photos-13th-edition-of-aero-india-2021-/photostory/80666148.cms?picid=80666285>

## **Defence News**

## **Defence Strategic: National/International**



**Press Information Bureau  
Government of India**

**Ministry of Defence**

*Wed, 03 Feb 2021 4:38PM*

### **India to host Indian Ocean Region Defence Ministers' Conclave on the sidelines of Aero India 2021**

India will host Indian Ocean Region (IOR) Defence Ministers' Conclave on February 04, 2021 on the margins of Aero India 2021 - Asia's largest Aero show to be held at Bengaluru from February 3-5, 2021. The broad theme of the conclave will be 'Enhanced Peace, Security and Cooperation in the Indian Ocean'. The event will commence with welcome address by Defence Secretary and addresses by Defence Ministers of different IOR Countries. Raksha Mantri Shri Rajnath Singh will give the concluding remarks.

Till January 30, 2021, there is total confirmed physical participation from 18 countries including Defence Ministers of four countries (Maldives, Comoros, Iran and Madagascar), six Ambassadors/High Commissioners representing their countries (Australia, Kenya, Seychelles, Mauritius, Kuwait and Myanmar), Defence Secretary of Sudan and Service Chief of 10 countries. Also, six countries are either participating virtually or sending their recorded messages.

The conclave is an initiative to promote dialogue in an institutional, economic and cooperative environment that can foster the development of peace, stability and prosperity in the Indian Ocean region. The conclave would address aspects related to Defence Industry co-operation amongst participating countries, sharing of resources available in Indian defence shipyards for design & shipbuilding, Indian Ports with friendly countries, Information-sharing towards increased maritime domain awareness, maritime surveillance and co-operation, Humanitarian Assistance & Disaster Relief (HADR), Marine Pollution Response activities, Development of technologies and capabilities for harnessing marine resources, etc.

The Defence Ministers' Conclave will be followed by two seminars. The first seminar will be conducted by Indian Navy and Naval Maritime Foundation on February 04, 2021 and the second seminar will be organised by Indian Coast Guard/Bharat Shakti/Invest India/Indian Defence Shipyards and Industry on February 05, 2021.

The conclave and the two follow up seminars will be instrumental in realising IOR into a region of 'Peace, Progress and Prosperity' and enhancing the co-operation and coordination among countries of the region for sustainable development and mutual coexistence.

India is geographically central to the Indian Ocean and has a vast coastline of 7,500 kms. India's vision for Security and Growth for All (SAGAR), as articulated by Prime Minister Shri Narendra Modi, cannot be realised without close cooperation and engagements amongst countries in the Indian Ocean Region (IOR). Navigating through the pandemic year of 2020, India is taking the lead in organizing an international platform for the world Aerospace and Defence (A&D) leaders to exchange ideas and forge partnerships towards synergizing the efforts in the A&D sector.

<https://pib.gov.in/PressReleasePage.aspx?PRID=1694780>



पत्र सूचना कार्यालय

भारत सरकार

रक्षा मंत्रालय

Wed, 03 Feb 2021 4:38PM

## एयरो इंडिया 2021 के दौरान भारत हिंद महासागर क्षेत्र के रक्षा मंत्रियों के सम्मेलन की मेज़बानी करेगा

भारत 04 फरवरी, 2021 को एयरो इंडिया 2021 - 3 से 5 फरवरी, 2021 तक बेंगलुरु में आयोजित होने वाले एशिया के सबसे बड़े एयरो शो- के दौरान हिंद महासागर क्षेत्र (आईओआर) के रक्षा मंत्रियों के सम्मेलन की मेज़बानी करेगा। सम्मेलन का व्यापक विषय 'हिंद महासागर में शांति, सुरक्षा और सहयोग में वृद्धि' करना होगा। यह आयोजन रक्षा सचिव के स्वागत भाषण और हिन्द महासागर क्षेत्र के विभिन्न देशों के रक्षा मंत्रियों के संबोधन के साथ शुरू होगा। रक्षा मंत्री श्री राजनाथ सिंह इस दौरान समापन भाषण देंगे।

दिनांक 30 जनवरी 2021 तक चार देशों (मालदीव, कोमोरोस, ईरान और मेडागास्कर) के रक्षा मंत्रियों, छह देशों (ऑस्ट्रेलिया, केन्या, सेशेल्स, मॉरीशस, कुवैत और म्यांमार) के राजदूतों/ उच्चायुक्तों, सूडान के रक्षा सचिव और 10 देशों के सेना प्रमुखों समेत कुल 18 देशों से सम्मेलन में भागीदारी की पुष्टि हुई है। इसके अलावा छह देश या तो सीधे आभासी रूप से भाग ले रहे हैं या अपने रिकॉर्डेड संदेश भेज रहे हैं।

यह सम्मेलन एक संस्थागत, आर्थिक और सहकारी वातावरण में बातचीत को बढ़ावा देने की एक पहल है जो हिंद महासागर क्षेत्र में शांति, स्थिरता और समृद्धि के विकास को बढ़ावा दे सकता है। यह सम्मेलन भाग लेने वाले देशों के बीच रक्षा उद्योग सहयोग से जुड़े विषयों, डिजाइन और जहाज निर्माण के लिए भारतीय रक्षा शिपयार्डों में उपलब्ध संसाधनों का आदान-प्रदान, मित्र देशों के साथ भारतीय बंदरगाहों, बढ़ी हुई समुद्री डोमेन जागरूकता की दिशा में सूचना साझा करने, समुद्री निगरानी और सहयोग, मानवीय सहायता और आपदा राहत (एचएडीआर), समुद्री प्रदूषण की प्रतिक्रिया संबंधी गतिविधियों, समुद्री संसाधनों के इस्तेमाल के लिए प्रौद्योगिकियों और क्षमताओं का विकास इत्यादि विषयों पर चर्चा करेगा।

रक्षा मंत्रियों के सम्मेलन के बाद दो सेमिनार होंगे। पहला सेमिनार भारतीय नौसेना और नौसेना मैरीटाइम फाउंडेशन द्वारा 4 फरवरी, 2021 को आयोजित किया जाएगा और दूसरा सेमिनार भारतीय तटरक्षक/ भारत शक्ति/इन्वेस्ट इंडिया/ भारतीय रक्षा शिपयार्ड एंड इंडस्ट्री द्वारा दिनांक 5 फरवरी, 2021 को आयोजित किया जाएगा।

कॉन्क्लेव और दोनों अनुवर्ती सेमिनार 'शांति, प्रगति औरसमृद्धि' के क्षेत्र में हिन्द महासागर क्षेत्र को साकार करने और सतत विकासऔर पारस्परिक सह-अस्तित्व के लिए क्षेत्र के देशों के बीच सहयोग और समन्वयको बढ़ाने में महत्वपूर्ण भूमिका निभाते रहेंगे।

भारत भौगोलिक रूप से हिंद महासागर के लिए केंद्रीय देश है औरइसका 7,500 किलोमीटर का विशाल समुद्र तट है । प्रधानमंत्री श्री नरेंद्रमोदी द्वारा व्यक्त भारत के दृष्टिकोण सिक्योरिटी एंड ग्रोथ फॉर ऑल (सागर)को हिंद महासागर क्षेत्र (आईओआर) के देशों के बीच घनिष्ठ सहयोग के बिनासाकार नहीं किया जा सकता है । 2020 के महामारी वर्ष के बीच भारत विश्वएयरोस्पेस और रक्षा (एएंडडी) नेताओं के लिए एक अंतरराष्ट्रीय मंच के आयोजनमें अग्रणी भूमिका निभा रहा है ताकि विचारों का आदान-प्रदान किया जा सके औरएयरोस्पेस और रक्षा (एएंडडी) क्षेत्र में सहयोग की दिशा में साझेदारियांहों।

<https://pib.gov.in/PressReleasePage.aspx?PRID=1694926>



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*Wed, 03 Feb 2021 8:04PM*

## **Chiefs of Air Staff Conclave at Aero India 2021**

**Air power has major role in maintaining regional stability and peace in Indian Ocean Region, says Raksha Mantri Shri Rajnath Singh;**

**First ever such gathering attracts participation from 40 countries**

The Chiefs of Air Staff Conclave began at Aero India 2021 at Air Force Station, Yelahanka on February 03, 2021. Chiefs of Air Staff (CAS) of more than 24 countries are attending the conclave physically and 16 virtually. The theme of the two-day event is “Leveraging Aerospace Power for Security and Stability”.

Raksha Mantri Rajnath Singh in his address said that Aero India 2021 isintended to showcase India’s intent to be among the top countries in defence and aerospace industries citing the example of the Light Combat Aircraft (LCA) that has been successfully operationalised and inducted into the Indian Air Force (IAF) with state-of-the-art weaponry. Shri Rajnath Singh said that the superior performance of this aircraft has impressed aviation experts around the world.

Raksha Mantri said that the LCA Mk-1A will be indigenously designed, developed and manufactured and would bolster the “Make in India”initiative of the nation. He added that close to 500 indigenous design and production agencies are involved in the manufacture of the LCA. Speaking of the success stories of the indigenous defence industry he applauded the Defence Research and Development Organisation (DRDO) for testing 12 missile types spanning the spectrum of ranges and purposes in a matter of one and a half months.

Shri Rajnath Singh added that the IAF has launched a major indigenisation drive for sustenance of all aircraft fleets and maintenance aspects and expressed belief that this will prove to be the growth engine for Indian’s domestic aerospace manufacturing capability.

Raksha Mantri said that the country has reached an inflection point in domestic defence manufacturing and the trajectory from here on would only be upwards.He expressed the intention

of the country to cooperate with defence partners in these niche technologies with focus on knowledge sharing and co-production.

Shri Rajnath Singh assured that India can take on the role of being the net security provider in the region adding that air power has and would continue to play a critical role in maintaining regional stability and peace in the region. Recalling Prime Minister Shri Narendra Modi's historic keynote address at ShangriLa Dialogue-2018, Shri Rajnath Singh said that the Prime Minister had articulated the key role of India's Armed Forces in building partnerships in the Indo-Pacific region for peace and security, as well as humanitarian assistance and disaster relief.

Raksha Mantri further said that India's unique disposition in the Indian Ocean Region complimented by a potent airlift capability of IAF enables it to contribute significantly in Humanitarian Aid and Disaster Relief (HADR) missions. He pointed out that in the last five years itself India has tackled roughly about 100 contingencies during which more than 6,000 sorties have been flown evacuating over 44,000 persons in distress. He said India had been regularly conducting exercises to deepen HADR cooperation and coordination with neighbours with focus on sharing expertise and assisting capability building.

Earlier in his opening remarks, Chief of Air Staff Air Chief Marshal RKS Bhadauria pointed out that amid the COVID-19 pandemic, rising mistrust and geopolitical tensions have reinforced the need for mature and balanced cooperation at the international level. In this backdrop, there is a need to strengthen mutual understanding and existing security frameworks based on the principles of cooperation, collaboration and co-existence, he stressed, recalling that the IAF has built bridges of friendship through numerous bilateral and multilateral exercises with a large number of nations who share common values and interest in maintaining peace and stability. He said conclaves such as the current one, provide an opportunity to discuss current and emerging security challenges and enhance cooperation among the air forces.

Referring to the changing nature of warfare Chief of Air Staff said that advent of new technology and cross linking of physical, digital and cognitive domains have complicated the art of fighting. The understanding of national boundaries has shifted beyond classical definitions, he said. He added that low cost and easy availability of technology to state or non-state actors have made them more lethal and capable of generating disproportionate effects. He said that the IAF was closely observing these developments and was working on capabilities in the unmanned and optionally manned platforms, manned unmanned teaming and anti-drone technology. He highlighted the growing criticality of space-based technologies for modern warfare and the importance of software capabilities in the digital great game. Chief of Defence Staff General Bipin Rawat was also present in the Conclave.

<https://pib.gov.in/PressReleasePage.aspx?PRID=1694914>



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*Wed, 03 Feb 2021 7:18PM*

## **Manufacture of Equipment**

The Government has taken a decision to put an interim embargo on import of 101 defence weapons/platforms with an intention to promote manufacture by Indian Industries.

In order to provide impetus to self-reliance in defence manufacturing as part of Atmanirbhar Bharat, the Department of Military Affairs (DMA) under Ministry of Defence vide their office Memorandum dated 21/08/2020 has issued a negative list of imports comprising of 101 weapon/platforms, alongwith indicative timelines/year of import embargo for these items. The Department of Defence Production (DDP) has done capability mapping of DPSUs/OFB/Private Sector for manufacturing 101 items after taking feedback from DPSUs/OFB and private industry associations.

In order to achieve self reliance, the Government has taken various initiatives which, inter-alia, include priority to procure defence items from Indian Vendors as per Defence Acquisition Procedure 2020; simplification of Make Procedure; liberalisation of FDI Policy; launching of SRIJAN Portal to promote indigenization; reforms in offset policy; launch of Innovation for Defence Excellence (iDEX) scheme; and implementation of 'Public Procurement (Preference to Make in India)' Order-2017.

This information was tabled in a written reply by Raksha Rajya Mantri Shri Shripad Naik to a question asked by Shri Jagdambika Pal in Lok Sabha today.

<https://pib.gov.in/PressReleasePage.aspx?PRID=1694884>



**Press Information Bureau  
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**Ministry of Defence**

*Wed, 03 Feb 2021 7:13PM*

## **Ease of doing business in Defence Manufacturing**

The initial validity of industrial licenses under the I(D&R) Act, 1951 which was earlier 7 years, extendable up to 3 years for existing as well as future licenses, issued vide DPIIT Press Note 5 (2015 Series) dated 27.04.2015 has been revised to 15 years, further extendable up to 18 years for existing as well as future licenses vide Press Note 10 (2015 Series) dated 22.09.2015. Further, under Arms Act 1959/Arms Rules 2016, license granted shall be valid for the life time of the licensee company provided the licensee shall be required to setup facility and fulfill other conditions within a period of seven years from the date of grant of a license.

- Guidelines have been issued to streamline the processing of applications for grant of extension of validity of Industrial Licence.
- Partial commencement of production is treated as commencement of production of all the items included in the licence.
- The advanced version of National Industrial Classification (NIC-2008) has been adopted, which is a superior/sophisticated industrial classification.
- The 'Security Manual for Licensed Defence Industry' has been issued. With the issue of the Security Manual, the requirement of affidavit from the applicants has been done away with.

- Restriction of annual capacity in the Industrial Licence for Defence Sector has been removed under Industries (Development & Regulation) Act, 1951.
- Licensee has been allowed to sell the defence items to the government entities under the control of Ministry of Home Affairs (MHA), Public Sector Undertakings (PSUs), State Governments and other Defence Licensee companies without approval of Department of Defence Production.
- Mapping of Sector specific FDI policy with NIC-2008 code has been completed and Press Note issued.
- Licensee has been allowed to manufacture enhanced capacity up to fifteen percent of the existing capacity with prior intimation to the licensing authority under Arms Act, 1959.
- A new online portal has been developed for facilitating filing of online applications for Industrial Licence under Industries (Development & Regulation)-IDR Act, 1951/Arms Act, 1959. The link of the portal is <https://services.dipp.gov.in>. This online portal is available for Public with effect from 16.10.2018 for filing applications.
- Subsequent to issue of MHA Notification No. S.O. 6203(E) dated 14.12.2018, Defence products list requiring compulsory licence from DPIIT under Industries (Development & Regulation) Act, 1951 and Arms Act, 1959 has been pruned, and DPIIT Press Note 1(2019 Series) dated 01.01.2019 has been issued. This is in supersession of DPIIT Press Note 3(2014 Series) dated 26.06.2014. With issue of Press Note 1(2019 Series), the licensing in defence sector has been further liberalized.
- To facilitate further ease of doing business in Industrial Licensing Press Note 2(2019 Series) dated 11.09.2019 has been issued clarifying that No Industrial Licence/Arms Licence is required for manufacture of any parts or accessories in Defence Sector, unless they are specifically listed in any of the Annexures of Press Note 1(2019 Series). This shall not apply to issue of Arms Licence for small arms by MHA.
- Press Note 3(2019 Series) dated 11.09.2019 was issued thereby withdrawing Press Note 17(1984 Series).
- Final notification regarding Amendment in the Registration and Licensing of Industrial Undertaking Rules, 1952 under Industries (Development & Regulation) Act, 1951 was published vide Notification No. G.S.R. 637(E) dated 04.09.2019 and the Registration and Licensing of Industrial Undertaking Rules, 2019 has been laid on the table of the Houses of Parliament in the Winter Session, 2019.

The License applications are processed in consultation with various stakeholders. Currently, 28 License applications in MoD and 30 in Department for Promotion of Industry and Internal Trade (DPIIT) are under examination and stakeholders' consultation as per laid down procedure.

As per Registration and Licensing of Industrial Undertaking (Amendment) Rules, 2019 dated 04.09.2019 notified by Ministry of Commerce & Industry, the timeline for processing the application is 5 months from the date of registration.

Meetings of Standing Committee on Private Sector Participation are convened at regular intervals and comments are conveyed to Licensing Authorities.

This information was tabled in a written reply by Raksha Rajya Mantri Shri Shripad Naik to a question asked by Col Rajyavardhan Rathore (Retd) in Lok Sabha today.

<https://pib.gov.in/PressReleasePage.aspx?PRID=1694879>



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*Wed, 03 Feb 2021 7:11PM*

## **Make in India Initiative**

Make in India initiative was launched by the Government on September 25, 2014 with the objective of facilitating investment, fostering innovation, building the best in class manufacturing infrastructure, making it easy to do business and enhancing skill development. The initiative is further aimed at creating a conducive environment for investment, modern and efficient infrastructure, opening up new sectors for foreign investment and forging a partnership between government and industry through positive mind-set.

‘Make in India’ initiative in defence sector is implemented through various policy initiatives which promotes indigenous design, development and manufacture of defence items. These initiatives, inter-alia, include priority to procurement of capital items from domestic sources under Defence Acquisition Procedure (DAP) 2020; notification of ‘Negative list’ of 101 items for which there would be an embargo on the import beyond the timeline indicated against them; simplification of Industrial licensing process; liberalization of FDI policy; simplification of Make Procedure; launch of Innovations for Defence Excellence (iDEX) scheme; and implementation of ‘Public Procurement (Preference to Make in India), Order 2017.

In the last three financial years i.e. from 2017-18 to 2019-2020, Government has accorded Acceptance of Necessity (AoN) to 123 Defence proposals, worth Rs. 169,750 Crore approximately, under the various categories of Capital Acquisition, which promotes domestic manufacturing as per the Defence Acquisition Procedure.

Many significant projects including 155mm Artillery Gun system ‘Dhanush’, Bridge Laying Tank, Thermal Imaging Sight Mark-II for T-72 tank, Light Combat Aircraft ‘Tejas’, ‘Akash’ Surface to Air Missile system, Attack Submarine ‘INS Kalvari’, ‘INS Chennai’, Arjun Armoured Repair and Recovery Vehicle, Medium Bullet Proof vehicle etc, have been produced in the country under ‘Make in India’ of the Government in the last few years.

Based on the Authorisation/License issued by Department of Defence Production and actual exports done by Ordnance Factory Board (OFB) & Defence Public Sector Undertakings (DPSUs), some of major items exported in the past few years are Fast Patrol Vessels, Coastal Surveillance System (CSS), Light Weight Torpedoes, Light Weight Torpedo Launcher and Parts, Do-228 Aircraft, Wheeled Infantry Carrier, Light Specialist Vehicle, Mine Protected Vehicle, Passive Night Sights, Battle Field Surveillance Radar Extended Range, Integrated Anti-Submarine Warfare, Advanced Weapons Simulator, Personal Protective items, 155mm Artillery Gun Ammunition, Small Arms and Ammunitions, Weapon locating Radars, Identification of Friend or Foe (IFF) –Interrogator etc. Considering the strategic sensitivity of the matter, in the interest of national security, the country-wise details of exports cannot be divulged.

The contracts for various capital acquisition requirements of the Government in the Defence Sector are awarded to domestic, public & private sector companies including those situated in State of Tamil Nadu, as per the extant provisions prescribed in Defence Acquisition Procedure. In addition, the OFB & DPSUs place orders on Indian vendors including those situated in Tamil Nadu for supply of various items, components etc. as per their requirements. A decision has been taken to set up a Defence Industrial Corridor in the State of Tamil Nadu with 5 nodes at Chennai, Coimbatore, Hosur, Salem and Tiruchirappalli to develop defence manufacturing ecosystem and promote indigenous manufacturing.

This information was tabled in a written reply by Raksha Rajya Mantri Shri Shripad Naik to a question asked by Dr Kalanidhi Veeraswamy in Lok Sabha today.

<https://pib.gov.in/PressReleasePage.aspx?PRID=1694873>

## Business Standard

Thu, 04 Feb 2021

### Human Space Programme: ISRO to send first unmanned flight by this December

*Under Gaganyaan mission, India plans to send three astronauts into space. They will orbit at about 400 km above the earth for five to seven days before returning*

*By T E Narasimhan*

Chennai: The Indian Space Research Organisation (ISRO) is planning to send the first unmanned flight into space by the end of 2021.

In a written reply to a question in the Lok Sabha, Minister of State in the Department of Space and Department of Atomic Energy, Jitendra Singh said that the first manned mission of Gaganyaan is planned after two unmanned flights, and the first unmanned flight is scheduled by December 2021.

It may be noted that under Gaganyaan mission, India plans to send three astronauts into space. They will orbit at about 400 km above the earth for five to seven days before returning.

Prior to that, there will be two unmanned space missions to test the rocket and the crew module systems.

ISRO has got a structured technology transfer mechanism to transfer the identified technologies developed by ISRO for spin-off and other commercial applications on non-exclusive basis, said the Minister. He added, the commercialization will be done by NSIL, the commercial arm of DOS (Department of Space). So far around 363 technologies have been transferred to more than 235 industries. Some of the popular technologies are Li-ion, NavIC receiver, Distress alert transmitter, sensor, special materials, coatings, etc.

The government has created a National Level Autonomous Nodal Agency namely Indian National Space Promotion and Authorisation Centre (IN-SPACe) under DOS as the enabling mechanism for private players to carry out Space Activities.

Till now, the Department of Space has been approached by 26 Indian private industries seeking support for their space activities, spanning across the complete spectrum of space activities including developing launcher, building satellites, developing applications, establishing ground infrastructure. Department of Space is extending every possible support to all the Indian industries in their space activities, including technical guidance, reviews, facility sharing, launch support etc, he said.

[https://www.business-standard.com/article/current-affairs/human-space-programme-isro-to-send-first-unmanned-flight-by-this-december-121020301528\\_1.html](https://www.business-standard.com/article/current-affairs/human-space-programme-isro-to-send-first-unmanned-flight-by-this-december-121020301528_1.html)



Under Gaganyaan mission, India plans to send three astronauts into space



## Pact with ISRO boosts Skyroot's bid to launch India's first private rocket

*Skyroot Aerospace's programme to launch India's first-ever privately-designed and developed rocket, Vikram-1, received a boost*

Hyderabad: Skyroot Aerospace's programme to launch India's first-ever privately-designed and developed rocket, Vikram-1, received a boost with the Department of Space entering into a non-disclosure agreement (NDA) with the Hyderabad-based company building small satellite launch vehicles.

The NDA signed on Tuesday will enable the company, run by former ISRO scientists, to access the facilities and technical expertise available in ISRO centres to proceed with its launch vehicle development programme.

Indian Space Research Organisation's Scientific Secretary R. Umamaheswaran signed the agreement on behalf of Department of Space and Skyroot Aerospace CEO Pawan Kumar Chandana signed the agreement from the company's side. Skyroot representatives also met ISRO chief Dr K. Sivan, who assured all support to Skyroot for testing and qualifying their launch vehicle.



Representational photo: Shutterstock

Chandana told IANS that the NDA marks the formal beginning of their working with ISRO.

"From this point onwards, we will exchange data and we will exchange technical expertise, especially from ISRO to us that will enable us to do our programme faster and more reliably because we will have ISRO's strength along with us now and we get to use all testing facilities including testing and launching," he said.

Chandana, a former ISRO scientist, pointed out that the national space agency has a committee which gives all approvals including for utilisation of test facilities.

Chandana, who founded Skyroot along with former ISRO scientists Naga Bharath Daka and Vasudevan Gnanagandhi, said they plan to launch their first rocket by the end of 2021.

"We are planning to do a launch by the end of this year. For that, all hardware, propulsion will be tested at ISRO," he said.

The company's vision for Indian space is rapid development of complex aerospace systems with lean use of resources. "We are building the first private Indian launch vehicle to put a satellite in orbit and marching ahead to compete for a reasonable share in the international small satellite launch market which is estimated to be \$16Bn in the next decade," says Chandana on the company website. Skyroot is developing a family of rockets especially crafted for the small satellite market and named after Vikram Sarabhai, the father of India's space programme.

Built on common architecture and covering a wide range of payloads, they offer the most affordable and on demand ride to space.

Vikram-I requires minimal range infrastructure and can be assembled and launched within 24 hours from any launch site. Skyroot has already achieved few milestones in its journey to launch the first rocket. It successfully test-fired its first solid rocket propulsion stage demonstrator. Named Kalam-5, it is first of the five engines the company plans to test.

Backed by investors like Myntra founder Mukesh Bansal, the company has raised \$4.3 million till now and plans to raise another \$15 million during the current year.

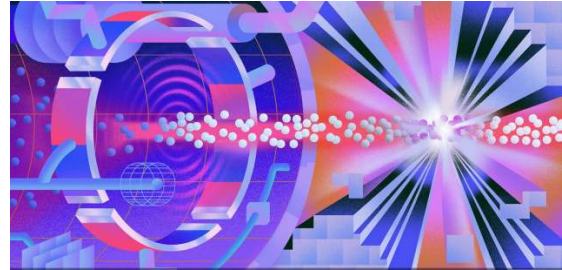
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[https://www.business-standard.com/article/current-affairs/pact-with-isro-boosts-skyroot-s-bid-to-launch-india-s-first-private-rocket-121020301470\\_1.html](https://www.business-standard.com/article/current-affairs/pact-with-isro-boosts-skyroot-s-bid-to-launch-india-s-first-private-rocket-121020301470_1.html)

## What does 'luminosity' mean in particle physics?

Even on the hottest and driest days, rays from the sun are too weak to ignite a fire. But with a magnifying glass (or, in some unfortunate cases, a glass garden ornament), you can focus sunlight into a beam bright enough to set tinder ablaze.

At the Large Hadron Collider, scientists apply this same principle when focusing beams of protons (or sometimes heavy ions) before passing them through the accelerator's four collision points. High-energy particle collisions allow scientists to study the fundamental laws of physics and search for new particles, fields and forces.



Credit: Sandbox Studio, Chicago/Ariel Davis

By tightly focusing the proton beams right before colliding them, scientists can quickly grow the number of collision events they have to study.

Scientists, engineers and technicians at CERN and around the world—including at Fermi National Accelerator Laboratory, Brookhaven National Laboratory and Lawrence Berkeley National Laboratory, together as part of the US Department of Energy Office of Science's High-Luminosity LHC Accelerator Upgrade Program—are building new focusing magnets, which will squeeze the colliding protons into even smaller volumes. They're also designing new kicker magnets, which will bump the trajectories of the incoming particles to help the two beams meet face-to-face at the collision point.

In the late 2020s, scientists will turn on a turbocharged High-Luminosity LHC. The upgrade will increase the total number of potential collisions scientists have to study by at least a factor of 10.

### Why luminosity and not collisions?

As you may have noticed, when physicists talk about particle collisions, they talk about a measurement called luminosity. It doesn't tell scientists exactly how many particle collisions are happening inside a collider; rather, luminosity measures how tightly packed the particles are in the beams that cross. The tighter the squeeze, the more likely it is that some of the particles will collide.

In the HL-LHC, 220 billion protons are expected to pass through another 220 billion protons every 25 nanoseconds at the accelerator's four experimental intersections. But the vast majority of the protons will not actually interact with one another. Even with today's best beam-focusing technology, the odds of a proton colliding with another proton inside the LHC ring is still significantly less than the odds of winning the Mega Millions Jackpot.

Protons aren't solid orbs that bounce, break or shatter when they come into contact with each other. Rather, they are messy packages of fields and even smaller particles called quarks.

Two protons could pass right through each other, and there's a chance all they would do is replay that scene from the movie *Ghost* in which actor Patrick Swayze, playing the titular phantom, sticks his ethereal head into a moving train—to no effect. You can bring the protons into a head-on collision, but you can't make them interact.

Even if two protons do interact, does it count as a collision? If two protons zip past one another and the shockwave from their intersecting electromagnetic fields ejects a few photons, does that count? What if one of these stray photons plunges through the heart of another proton? What if two protons graze each other and shoot off a bunch of particles, but stay intact?

Collisions are complicated. So physicists talk about luminosity instead.

### Collision rate

The rate at which particles are brought together to collide is called "instantaneous luminosity."

"The instantaneous luminosity depends on the number of particles in each colliding beam and the area of the beams," says Paul Lujan, a postdoc at the University of Canterbury who works on luminosity measurements for the CMS experiment. "A smaller beam size means more potential collisions per second."

In 2017, LHC physicists achieved a new record when they measured an instantaneous luminosity of  $2.06 \times 10^{34}$  per square centimeter per second. (Multiply together the number of protons in each beam, then divide by the beam area—in square centimeters—over time.)

"The units of luminosity are a bit non-intuitive," Lujan says, "but it gives us exactly the information we need."

When scientists load up the LHC with a new batch of particles to collide, they keep them running as long as the beams are in good enough condition with enough particles left to have a good instantaneous luminosity.

Considering an average LHC fill lasts between 10 and 20 hours, the number of potential collisions can climb very quickly. So scientists don't just care about instantaneous luminosity; they also care about "integrated luminosity," how many potential collisions accumulate over those hours of running.

### **Couldn't hit the broad side of a barn door**

The difference between instantaneous luminosity and integrated luminosity is the difference between, "Right now I'm driving at 60 miles per hour," and "Over ten hours, I drove 600 miles."

For integrated luminosity, physicists switch from squared centimeters to a new unit of area: the barn, a reference to the idiom, "Couldn't hit the broad side of a barn." From a subatomic particle's point of view, "the barn" is so massive that it would be difficult to miss.

The barn was invented during the 1940s. Its actual size—10–24 centimeters squared—was classified until the end of World War II. That's because it is equivalent to the size of a uranium nucleus, a key ingredient in the then-newly developed atomic bomb.

The barn stuck around after the war and became a standard way to measure area in nuclear and particle physics.

Talking in barns—and an even smaller unit equal to  $10^{-15}$  barns called the "femtobarn"—allows physicists to take an enormous number and convert it, turning it from something too long to write out on the side of an actual barn into something that could fit on a postcard.

Physicists also use femtobarns to measure the probability of a subatomic process, called its "cross section."

"Imagine a food fight in a cafeteria," Lujan says. "We can predict the number of people who will get splattered with a stray meatball [a "meatball interaction," if you will] based on the number of people present, the area and dimensions of the cafeteria, how long the food fight lasts [which can be used to calculate the "integrated luminosity" of all possible interactions, including meatball interactions] as well as the likelihood of that particular process [the "cross section" of a meatball interaction]."

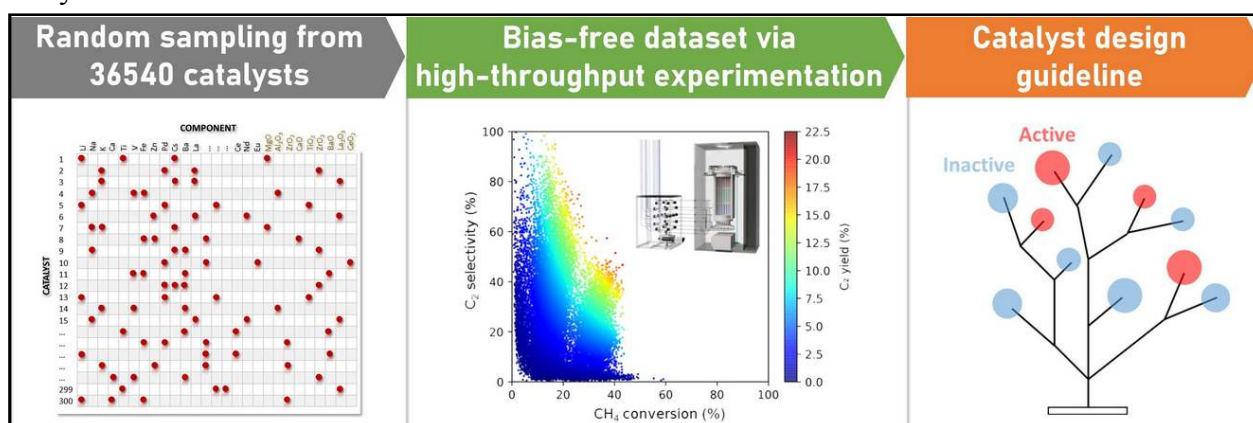
To test the laws of physics, physicists compare their predictions about the probability of certain processes to what they actually see in practice.

With the HL-LHC upgrade, scientists are increasing the number of protons, decreasing the diameter of the collision points, and better aligning the protons' trajectories. All of these changes help to increase the likelihood that protons will interact with each other when they cruise through the LHC's intersections. The increased number of collision opportunities will help physicists find and study rare processes and particles that are key to understanding the fundamental laws of physics.

<https://phys.org/news/2021-02-luminosity-particle-physics.html>

## Thanks to machine learning, the future of catalyst research is now

To date, research in the field of combinatorial catalysts has relied on serendipitous discoveries of catalyst combinations. Now, scientists from Japan have streamlined a protocol that combines random sampling, high-throughput experimentation, and data science to identify synergistic combinations of catalysts. With this breakthrough, the researchers hope to remove the limits placed on research by relying on chance discoveries and have their new protocol used more often in catalyst informatics.



300 quaternary catalysts are randomly sampled from a large material space, where their performance in relation to OCM is systematically evaluated by high-throughput experimentation, followed by machine learning, to identify a bias-free dataset in order to learn the underlying patterns in catalyst performance which are eventually used for further catalyst discoveries. Credit: JAIST

Catalysts, or their combinations, are compounds that significantly lower the energy required to drive chemical reactions to completion. In the field of combinatorial catalyst design, the requirement of synergy—where one component of a catalyst complements another—and the elimination of ineffective or detrimental combinations are key considerations. However, so far, combinatorial catalysts have been designed using biased data or trial-and-error, or serendipitous discoveries of combinations that worked. A group of researchers from Japan has now sought to change this trend by trying to devise a repeatable protocol that relied on a screening instrument and software-based analysis.

Their new study, published in *ACS Catalysis*, details the identification of effective catalyst combinations, using the proposed protocol, for the oxidative coupling of methane (OCM). OCM is a widely used chemical reaction used to convert methane into useful gases in the presence of oxygen and the catalyst. Elaborating on the motivations behind the study, Dr. Toshiaki Taniike, Professor at the School of Materials Science, Japan Advanced Institute of Science and Technology and corresponding author of the study, says, "Combinatorial catalyst design is hardly generalizable, and the empirical aspect of the research has biased the literature data toward accidentally found combinations."

To derive a bias-free dataset from OCM for devising the protocol, the researchers sampled randomly 300 solid catalysts from a vast materials space containing upwards of 36,000 catalysts! Screening such a large number of catalysts is near impossible by human standards. Hence, the team used a high-throughput screening instrument to evaluate their performance at facilitating OCM. The obtained dataset was used to outline the novel protocol, aimed at providing a guideline for catalyst design. This was implemented in the form of a decision tree classification, which is a form of machine learning that helped in understanding the efficiency of the selected catalyst

combinations, in giving better OCM yield. This, in turn, helped in drawing up the required catalyst design guidelines.

Interestingly, the results showed that, even with random sampling, 51 out of the 300 catalysts gave a better OCM yield when compared to the alternative non-catalytic process. Explaining the potential implications of their discovery, Dr. Keisuke Takahashi, Associate Professor at Hokkaido University and co-author of this study, says, "The combination of high throughput experimentation and data science has already demonstrated the power of bias-free catalyst big data in finding novel catalysts as well as a catalyst design guideline. It is also important to state the essentiality of these approaches for implementing such a demanding study in a realistic time frame. By equipping all the essential techniques of the study, truly nonempirical catalyst developments could be realized."

Indeed, we can hope, along with the scientists, that this strategy will 'catalyze' several future material science discoveries.

**More information:** Thanh Nhat Nguyen et al, Learning Catalyst Design Based on Bias-Free Data Set for Oxidative Coupling of Methane, *ACS Catalysis* (2021). DOI: [10.1021/acscatal.0c04629](https://doi.org/10.1021/acscatal.0c04629)

**Journal information:** *ACS Catalysis*  
<https://phys.org/news/2021-02-machine-future-catalyst.html>



Thu, 04 Feb 2021

## Researchers demonstrate the potential of a new quantum material for creating two spintronic technologies

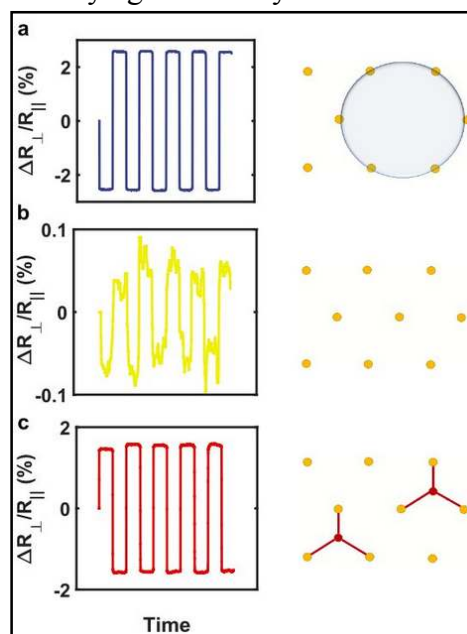
By Ingrid Fadelli

Over the past decade or so, physicists and engineers have been trying to identify new materials that could enable the development of electronic devices that are faster, smaller and more robust. This has become increasingly crucial, as existing technologies are made of materials that are gradually approaching their physical limits.

Antiferromagnetic (AFM) spintronics are devices or components for electronics that couple a flowing current of charge to the ordered spin 'texture' of specific materials. In physics, the term spin refers to the intrinsic angular momentum observed in electrons and other particles.

The successful development of AFM spintronics could have very important implications, as it could lead to the creation of devices or components that surpass Moore's law, a principle first introduced by microchip manufacturer Gordon Earle Moore. Moore's law essentially states that the memory, speed and performance of computers may be expected to double every two years due to the increase in the number of transistors that a microchip can contain.

While current technologies are reaching their physical limits, AFM spintronics could significantly outperform existing devices in both speed and performance, reaching far beyond Moore's law. Despite their advantageous qualities,



Low temperature switching for  $x = 0.31$  (a),  $0.34$  (b), and  $0.35$  (c) illustrates the stability and enhanced response while departing  $x = 1/3$  value. An illustration of the iron lattice is presented for the relevant regimes: vacancies (a), stoichiometric (b), and interstitials (c). Credit: Maniv et al.

finding materials with the exact characteristics necessary to fabricate AFM spintronics has so far proved to be highly challenging.

Researchers at the Lawrence Berkeley National Laboratory, UC Berkeley and the National High Magnetic Field Laboratory in Tallahassee have recently identified a new quantum material ( $\text{Fe}_{1/3 + \delta}\text{NbS}_2$ ) that could be used to fabricate AFM spintronic devices. In their most recent papers, published in *Science Advances* and *Nature Physics*, they demonstrated the feasibility of using this material for two AFM spintronics applications.

"The work published in *Science Advances* was motivated by our previous publication, which demonstrated antiferromagnetic switching in the intercalated transition-metal dichalcogenide (TMD)-based compounds for the first time," James G. Analytis, one of the researchers who carried out the study, told Phys.org. "In our other recent study, featured in *Nature Physics*, we showed that these same materials have a huge 'exchange bias'—a property that can be used for spin valves to ensure that the transport of spin in spintronic devices travels in one direction but not another."

Analytis and his colleagues found that ultra-low current densities enabled highly stable electrical switching in TMDs, which have shown great promise for the development of new technologies. When compared with other known switchable antiferromagnetic systems, in fact, these materials exhibited additional characteristics such as a single-pulse saturation and a significantly lower activation energy (two orders of magnitude lower).

The researchers were unsure about why these materials exhibited these extraordinary switching characteristics. An observation that they thought could help them solve this riddle was that the materials presented an additional disordered magnetic phase, known as spin glass, which coexisted with the antiferromagnetic phase.

"Our ongoing research shows that this phase coexistence is highly influenced by the iron intercalation value, and consequently, it determines how this system will respond to the injection of DC electrical pulses," Eran Maniv, the lead author of the project, told Phys.org. "Our new data showed that the switching is pronounced only when the two phases coexist and is significantly suppressed when the spin glass phase is absent."

The key objective of the researchers' recent studies was to understand how the coexistence of the spin glass and antiferromagnetic phases in transition-metal dichalcogenides could impact their electrical switching capabilities. More specifically, Analytis, Maniv and their colleagues hoped to unveil the physics behind the mechanism that enhances antiferromagnetic switching in these materials.

A spin glass is a magnetic system that exhibits randomly distributed and conflicting magnetic interactions. It could be roughly described as a disordered magnet. The spin glass state, which the researchers observed in transition-metal dichalcogenides, is not present in existing switchable antiferromagnetic systems.

"Unlike a ferromagnet or an antiferromagnet where the spins point in specific directions, a spin glass' spin points, on average, in every direction," Analytis said. "However, the spins of a spin glass are still glued to each other, just like the spins of a ferromagnet or an AFM. This makes them move together, enabling so-called collective dynamics. The origin of the new and enhanced switching mechanism we observed lies on the collective dynamics of a spin glass."

Maniv, Analytis and their colleagues found that when an electrical current pulse is injected into a spin glass, its spins collectively rotate. This phenomenon occurs because of the disordered nature of the glassy phase, which allows the frozen spins to rotate in unison without any additional energy cost.

The researchers observed that the collective motion of the spin glass can impart spin torque on the coexisting antiferromagnetic phase, which ultimately rotates the spins of an AFM, so that their domains predominantly point in one direction. The spins' collective rotation is the key mechanism behind the enhanced switching exhibited by TMDs. Interestingly, the researchers found that the interaction between the spin glass and the AFM phases also gives rise to the giant exchange bias reported in their recent paper published in *Nature Physics*.

"This antiferromagnetic switching, showing single pulse rotated domains with high efficacy, has never been observed, until now," Maniv said. "The ability to control and significantly improve the highly desirable antiferromagnetic switching is a breakthrough in spintronic-related technologies. Moreover, revealing this effect in the rich material playground of the TMDs will enable future room temperature studies and improved characteristics."

Remarkably, the new magnetic and switchable system identified by Analytis and his colleagues has ultra-fast dynamics, is robust to magnetic fields and also activates at lower current densities than any known material. This system's response to electrical pulses enables highly efficient single pulse activation and switching states that are far more stable and powerful than those observed in other known antiferromagnetic materials.

"One of our most striking observations was the possible presence of the theoretically predicted 'Halperin-Saslow (HS) Modes' (i.e., spin waves in a spin glass)," Maniv said. "These spin waves are predicted to form in certain spin glass phases and are directly related to the global collective motion enabled by electrical current pulses."

HS Modes are hydrodynamic modes that physicists Halperin and Saslow predicted would exist in spin glasses. While Analytis and his colleagues did not observe these modes directly, they found clues that could pave the way towards their experimental realization. This is a particularly interesting finding, as researchers have been trying to directly observe these modes for decades.

"We now intend to focus on revealing the spin glass—spin wave modes (i.e., HS modes)," Analytis said. "One of my co-authors on the work, Shannon Haley, is now leading new experiments to study non-local switching in focused ion beam fabricated samples. Additionally, we intend to study various intercalated TMDs which can present similar effects but at different temperatures, allowing us to access this new mechanism at room temperature."

**More information:** Antiferromagnetic switching driven by the collective dynamics of a coexisting spin glass. *Science Advances*(2021). DOI: [10.1126/sciadv.abd8452](https://doi.org/10.1126/sciadv.abd8452).

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**Journal information:** [Science Advances](#) , [Nature Physics](#) , [Nature Materials](#)  
<https://phys.org/news/2021-02-potential-quantum-material-spintronic-technologies.html>

Thu, 04 Feb 2021

## UK Covid-19 variant shows signs of further mutation

*This comes as the researchers are still trying to find out whether the mutated strains of coronavirus can evade immune cells incited by the vaccine, making vaccines less efficacious*

*By Prashasti Awasthi*

Mumbai: United Kingdom researchers have warned on Tuesday that the Covid-19 variant, currently in circulation across the country, has shown signs of further mutation.

Researchers conducted tests on samples of the Kent variant, named after the region in England, where it was first detected, showed signs of evolution called 'E484K'. However, this mutation has already been identified in South Africa and Brazil.

This comes as the researchers are still trying to find out whether the mutated strains of coronavirus can evade immune cells incited by the vaccine, making vaccines less efficacious.

The findings form part of yet-to-be peer-reviewed results of research at the Cambridge Institute of Therapeutic Immunology and Infectious Disease (CITIID), University of Cambridge, in collaboration with the National Institute for Health Research (NIHR) Covid-19 BioResource.

Professor Ravi Gupta, the lead researcher at the CITIID said: "Of particular concern, though, is the emergence of the E484K mutation, which so far has only been seen in a relatively small number of individuals. Our work suggests the vaccine is likely to be less effective when dealing with this (E484K) mutation."

He speculated that the virulent virus would continue to evolve into more contagious variants.

"So, we need to plan for the next generation of vaccines to have modifications to account for new variants. We also need to scale up vaccines as fast and as broadly as possible to get transmission down globally," he said.

The study also suggested that without the administration of the second dose of the vaccine, it will be difficult to protect the people who are over-80 old.

Dr. Dami Collier, the main co-investigator on the studies said: "Our data suggest that a significant proportion of people aged over 80 may not have developed protective neutralising antibodies against infection three weeks after their first dose of the vaccine. But it's reassuring to see that after two doses, serum from every individual was able to neutralize the virus."

The study comes at a time when the UK is carrying out urgent door-to-door testing in order to try and trace every case of the South African variant of Covid-19 in the country, as per media reports.

<https://www.thehindubusinessline.com/news/science/uk-covid-19-variant-shows-signs-of-further-mutation/article33738755.ece>





