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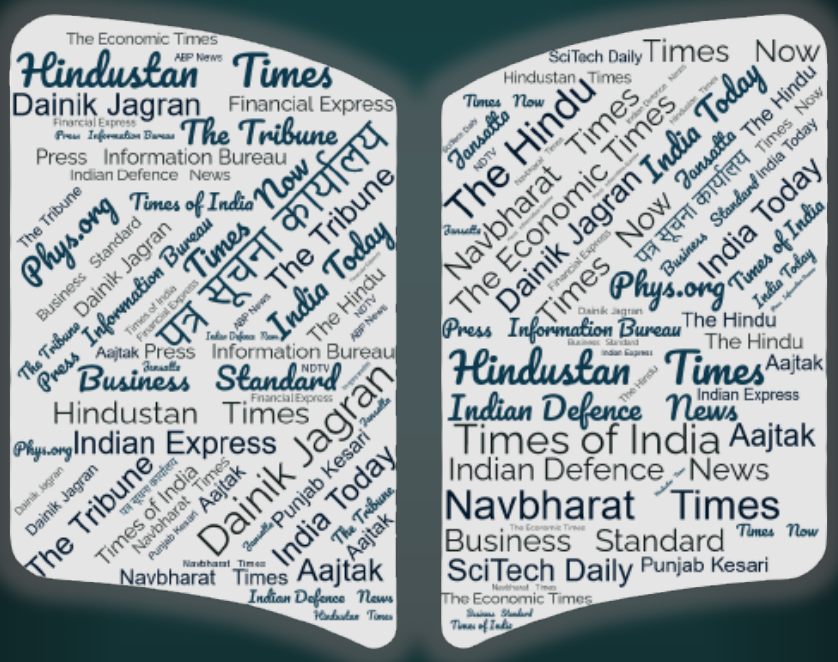

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DRDO Technology News

JANES

Thu, 01 Dec 2022

DRDO Tests Mounted Gun System

India's Defence Research and Development Organisation (DRDO) has conducted trials of the indigenously developed 155 mm/52 calibre mounted gun system (MGS). According to the DRDO, the MGS is a truck-mounted artillery gun system, deployable in desert, mountainous, and high-altitude terrains. The MGS equips a 155 mm/52 calibre Advanced Towed Artillery Gun System (ATAGS) on an eight-wheeled high-mobility vehicle (HMV) developed by Bharat Earth Movers Limited (BEML).

A DRDO official told Janes that the trials of the MGS have been going on for some time now. "The mobility and performance trials of the MGS are completed. The standalone firing trials of the armoured cabin are also completed. The MGS is ready to undergo the strength of design trials," the official said. The official added that the DRDO is manufacturing the MGS as part of the Indian Army's requirement for gun-mounted wheeled platforms. The DRDO said that the MGS is equipped with "shoot-and-scoot capability". The system is fitted with an auto gun alignment and positioning system, fire-control system (FCS), and ammunition handling system.

The system can fire up to a maximum distance of 45 km and has a maximum speed of 80 km/h. The elevation angle of the gun ranges from 0° to +72°. The system holds an ammunition-carrying capacity of 24 projectiles with an appropriate quantity of bi-modular charge system (BMCS). The MGS can onboard seven soldiers. The system's burst rate of fire is three rounds in 30 seconds, with an intense rate of fire of 12 rounds in three minutes.

https://www.janes.com/defence-news/news-detail/drdo-tests-mounted-gun-system

DRDO on Twitter

Defence News

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पत्र सूचना कार्यालय
भारत सरकार

रक्षा मंत्रालय

सिंगापुर सशस्त्र बलों के साथ संयुक्त अभ्यास अग्नि वारियर देवलाली (महाराष्ट्र) में संपन्न

सिंगापुर सेना एवं भारतीय सेना के बीच एक द्विपक्षीय अभ्यास अग्नि योद्धा का 12वां संस्करण, जो दिनांक 13 नवंबर, 2022 को फील्ड फायरिंग रेंज, देवलाली (महाराष्ट्र) में शुरू हुआ था, दिनांक 30 नवंबर, 2022 को संपन्न हुआ। अभ्यास अग्नि योद्धा के अंतर्गत दोनों देशों के सैन्य बलों ने संयुक्त रूप से फ़ायरपावर का प्रदर्शन एवं निष्पादन किया और इस अभ्यास में दोनों सेनाओं की आर्टिलरी शाखा द्वारा नई पीढ़ी के उपकरणों का उपयोग किया गया।

इस अभ्यास में संयुक्त योजना बनाने के अंतर्गत संयुक्त रूप से कंप्यूटर वॉरगेम में दोनों पक्षों ने भागीदारी की। दोनों पक्षों ने संयुक्त प्रशिक्षण चरण के अंतर्गत आला प्रौद्योगिकी और आर्टिलरी ऑब्जर्वेशन सिमुलेटर का उपयोग किया। आर्टिलरी में आधुनिक रुझानों और बेहतर आर्टिलरी योजना प्रक्रिया के विषय पर दोनों देशों के बीच विशेषज्ञ अकादमिक चर्चा आयोजित की गई। अभ्यास के अंतिम चरण के दौरान स्वदेशी रूप से निर्मित आर्टिलरी गन और हॉवित्जर तोपों ने भी भाग लिया।

इस अभ्यास ने ड्रिल्स एवं प्रक्रियाओं की आपसी समझ बढ़ाने और दोनों सेनाओं के बीच पारस्परिकता बेहतर करने में योगदान किया। समापन समारोह में भारत में सिंगापुर के उच्चायुक्त श्री वोंग वाई कुएन और आर्टिलरी स्कूल के कमांडेंट लेफ्टिनेंट जनरल एस हरिमोहन अय्यर के साथ सिंगापुर के अन्य गणमान्य लोग तथा दोनों सेनाओं के सेवारत अधिकारी उपस्थित थे।

https://pib.gov.in/PressReleasePage.aspx?PRID=1880391

Press Information Bureau
Government of India

Ministry of Defence

Thu, 01 Dec 2022

Joint Exercise Agni Warrior with Singapore Armed Forces Concludes at Devlali (Maharashtra)

The 12th Edition of Exercise Agni Warrior, a bilateral exercise between the Singapore & Indian Army, which had commenced on 13 November 2022 concluded at Field Firing Ranges, Devlali (Maharashtra) on 30 November 2022. Exercise Agni Warrior, involved showcasing joint firepower planning, execution and use of New Generation Equipment by the Artillery arm of both armies.

Exercise also included participation by both sides in a joint computer war-game as part of joint planning process. Both sides utilised niche technology and Artillery Observation Simulators as part of joint training phase. Expert academic discussions were conducted on modern trends in Artillery and refinement of Artillery planning process. Indigenously manufactured Artillery guns and howitzers also participated during the final phase of the exercise. The exercise achieved its aim of enhancing mutual understanding of drills & procedures and improving interoperability between the two armies. The closing event was witnessed by Mr Wong WieKuen, High Commissioner of Singapore to India & Lieutenant General S HarimohanIyer, Commandant, School of Artillery along with other dignitaries from Singapore & serving officers from both armies.

https://pib.gov.in/PressReleasePage.aspx?PRID=1880307

Press Information Bureau
Government of India

Ministry of Defence

Thu, 01 Dec 2022

Indian Coast Guard Advanced Light Helicopter Mk-III Squadron, 840 Sqn (CG), Commissioned in Chennai

In a major boost to further strengthening the Coast Guard Region East, 840 Sqn (CG), an Indian Coast Guard Advanced Light Helicopter (ALH) Mk-III squadron, was commi

ssioned by DG Shri VS Pathania at ICG Air Station, Chennai on November 30, 2022. The commissioning of 840 Sqn (CG) is indicative of the leap towards self-reliance in the field of helicopter manufacturing, in line with the government's vision of 'Aatmanirbhar Bharat'. It will provide a major fillip to the abilities of Indian Coast Guard in the security sensitive waters off Tamil Nadu and Andhra region.

The ALH Mk-III helicopters, indigenously manufactured by Hindustan Aeronautics Limited (HAL), features state-of-the-art equipment including advanced RADAR as well as Electro optical sensors, Shakti engines, full glass cockpit, high-intensity search light, advanced communication systems, automatic identification system as well as search-and-rescue homer. This feature enables the helicopter to undertake maritime reconnaissance as well as carry out search and rescue at extended ranges while operating from ships, both by day and night. The aircraft has the ability to switch roles from an offensive platform with heavy machine gun to that of a benign one carrying a Medical Intensive Care Unit to facilitate transfer of critically ill patients. A total of 16 ALH Mk-III aircraft have been inducted in the Indian Coast Guard in a phased manner and four of these aircraft are positioned in Chennai. Since induction, the squadron has flown over 430 hours and conducted numerous operational missions.

https://pib.gov.in/PressReleasePage.aspx?PRID=1880134

THE ECONOMIC TIMES

Thu, 01 Dec 2022

Join Hands to Counter Transnational Crimes, Make Seas Safer, Says Defence Secretary Giridhar Aramane to CSC Nations

Indian Defence Secretary Giridhar Aramane on Thursday stressed the need for Colombo Security Conclave (CSC) member nations to take concerted measures to counter transnational crimes and address identified areas to make the seas safer. Inaugurating the maiden Coastal Security Conference (CoSC) organised by the Indian Coast Guard under the aegis of Colombo Security Conclave (CSC) here, he highlighted the need to address common issues pertaining to the maritime safety and security, countering terrorism, transnational organised crime, cyber security, protection of critical coastal infrastructure and disaster relief.

The two-day conference being held under the theme: "Collaborative Efforts for Coastal Security," saw the participation of 4 member countries viz. India, Maldives, Sri Lanka and Mauritius. Representatives from Bangladesh and Seychelles, observer countries of CSC, also participated. Also, Aramane called upon the participating countries for enhanced collaboration between coast guards and maritime law enforcement agencies. Also, Aramane called upon the participating countries for enhanced collaboration between coast guards and maritime law enforcement agencies. He commended the Indian Coast Guard for establishing itself as strong professional force in just over four decades of its creation and collaborating with partner agencies in ensuring safe, secure and clean seas.

Further, he laid emphasis on addressing the maritime security by removing barriers from legitimate maritime trade, settle maritime disputes by peaceful means through international law, mitigating natural disasters and maritime threats, and encouraging responsible maritime connectivity and increase maritime trade through creation of sustainable infrastructure, as stressed by Prime Minister Narendra Modi. Deputy National Security Advisor Vikram Misri emphasised on the collaboration amongst all Coast Guard functionaries for enhancing regional maritime security. Director General, Indian Coast Guard V S Pathania said CoSC facilitates in arriving at a consensus to ensure maritime safety and security.

Heads of marine police, representatives from other national and state stakeholder ministries also participated. A range of issues including coastal security threat, collaborative response, international maritime law and role of empowered agencies, technological solutions for coastal security, realisation of blue economy through coastal security and envisaged domains for cooperation to address region coastal security concerns were discussed. The coming together of Indian Ocean region countries in the conference indicated the development of sub-regionalism on a common maritime and security platform and is significant in a wider global context of progressing the prominence of coast guard to coast guard cooperation, a release said.

https://economictimes.indiatimes.com/news/defence/join-hands-to-counter-transnational-crimes-make-seas-safer-says-defence-secretary-giridhar-aramane-to-csc-nations/articleshow/95916872.cms

दिप्रिंट

बुधवार, 30 नवंबर 2022

हिंद महासागर में चीनी घुसपैठ असामान्य नहीं, देश के हितों की रक्षा के लिए प्रतिबद्ध : भारतीय नौसेना

भारतीय नौसेना ने बुधवार को कहा कि वह हिंद महासागर क्षेत्र पर निगरानी रखती है जहां 'चीनी घुसपैठ के वाकये असामान्य नहीं हैं'. उसने कहा कि वह इस रणनीतिक क्षेत्र में देश के हितों की रक्षा के लिए प्रतिबद्ध है. दक्षिणी नौसैन्य कमान के प्रमुख वाइस एडमिरल एम ए हंपीहोली ने कहा कि भारतीय नौसेना उपग्रहों तथा समुद्री टोही विमानों की मदद से क्षेत्र में नजर रखती है. उनका बयान इन खबरों के बीच आया है कि चीन का एक जासूसी जलपोत पिछले कुछ महीने में दूसरी बार हिंद महासागर क्षेत्र में घुसा है. हंपीहोली ने चीनी जासूसी जलपोत के श्रीलंकाई बंदरगाह पहुंचने की खबरों के बारे में पूछे जाने पर यहां अपनी प्रतिक्रिया में कहा, 'हिंद महासागर क्षेत्र में चीन की घुसपैठ असामान्य नहीं है. वे पिछले कुछ समय से यहां आते रहे हैं.

मैं आपको विश्वास दिलाता हूं कि हम अपने हित वाले क्षेत्रों को पूरी तरह निगरानी में रखते हैं. हम विभिन्न तरीकों से ऐसा करते हैं.' उन्होंने कहा कि नौसेना उपग्रहों, समुद्री टोही विमानों तथा तटरक्षक एवं उनके जहाजों के सहयोग से भी निगरानी रखती है. अधिकारी ने कहा कि ऐसा नहीं है कि चीन की इन

गतिविधियों या उनकी मौजूदगी पर हमारा ध्यान नहीं होता. करीब तीन महीने पहले चीन के एक बैलिस्टिक मिसाइल और उपग्रह ट्रैकिंग जहाज ने श्रीलंका के हंबनटोटा बंदरगाह पर लंगर डाला था. श्रीलंका की सरकार ने 13 अगस्त को जहाज को उस महीने 16 से 22 तारीख तक इस शर्त पर लंगर डालने की अनुमति दी थी कि वह देश के विशेष आर्थिक क्षेत्र में अपनी स्वचालित पहचान प्रणाली (एआईएस) को बंद रखेगा और उसके जलक्षेत्र में कोई वैज्ञानिक अनुसंधान नहीं किया जाएगा. भारत ने जहाज के इस दौरे पर चिंता प्रकट की थी. उसकी चिंता जहाज की ट्रैकिंग प्रणाली से भारतीय प्रतिष्ठानों में तांकझांक की आशंका के बारे में थी.

https://hindi.theprint.in/defence/chinese-navy-indian-ocean-indian-navy/433035/

जागरण

गुरुवार, 01 दिसंबर 2022

भारतीय हेल्थकेयर सेक्टर चीन पर और पाकिस्तान की नजर, 2022 में हुए 19 लाख साइबर अटैक

इंटरनेट के विकास के तहत लोगों के साथ-साथ विभिन्न इंडस्टी खुद को ऑनलाइन अपग्रेड कर रही है। भारतीय हैल्थकेयर सेक्टर भी उन्हीं में से एक है, जिसने समय के साथ अपने डाटाबेस को ऑनलाइन ट्रांसफर कर दिया है। इससे सस्थानों के आसानी तो हुई है, लेकिन साइबर अटैक का खतरा भी बढ़ गया है।

पाकिस्तान और चीन के IP एड्रेस से हुए अटैक

साइबर सिक्योरिटी फर्म चेकप्वाइंट रिसर्च के अनुसार 2022 की सितंबर तिमाही के दौरान हेल्थकेयर को वैश्विक स्तर पर सबसे ज्यादा रैंसमवेयर हमलों का सामना करना पड़ा। इसके अलावा साइबर सुरक्षा थिंक टैंक साइबरपीस फाउंडेशन और ऑटोबोट इंफोसेक प्राइवेट लिमिटेड ने भी गुरुवार को एक रिपोर्ट प्रकाशित किया। इससे पता चला कि भारत में हैल्थकेयर सेक्टर ने इस साल 28 नवंबर तक 18,46,712 साइबर हमलों का सामना किया है। ये हमले वियतनाम, पाकिस्तान और चीन की 41,181 यूनिक IP एड्रेस से किए गए है।

साइबरपीस फाउंडेशन ने इस डाटा को अपने ई-कवच प्रोग्राम के माध्यम से जनरेट किया था। बता दें कि ई-कवच प्रोग्राम एक खुफिया सेंसर का उपयोग करता है, जो इंटरनेट ट्रैफ़िक को कैप्चर करने और संगठनों पर रियल टाइम में होने वाले साइबर हमलों का विश्लेषण करने में मददगार है । इससे ये भी पता लगाया जा सकता है कि किस जगह पर कितने हमले हुए हैं।

भारत का सबसे फेमस अस्पताल अखिल भारतीय आयुर्विज्ञान संस्थान (AIIMS) भी पिछले हफ्ते एक बड़े साइबर हमले का शिकार हुआ, जिस कारण उन्हें अपने कई सर्वर बंद करने पड़े और मैन्युअल ऑपरेशन

पर स्विच करना पड़ा। जानकारी मिली है कि हैकर्स ने AIIMS से क्रिप्टोकरेंसी में 200 करोड़ की फिरौती भी मांगी थी। लेकिन एम्स ने इन दावों का खंडन किया है। बता दें कि AIIMS ने पहले अप्रैल 2023 तक सभी सेवाओं को डिजिटाइज़ करने की योजना की घोषणा की थी। कमजोर इंटरनेट-फेसिंग सिस्टम को बनाया निशाना ज्यादातर हमले हेल्थकेयर कंपनी के नेटवर्क में दुर्भावनापूर्ण पेलोड को इंजेक्ट करने और रैनसमवेयर हमलों को ट्रिगर करने के उद्देश्य से किए गए थे। रिपोर्ट में दिखाया गया है कि ई-कवच के सेंसर को ट्रोजन और रैंसमवेयर के लिए इस्तेमाल किए गए 1527 अनोखे पेलोड मिले।

हमलावरों ने ज्यादातर कमजोर इंटरनेट-फेसिंग सिस्टम को निशाना बनाया, जिसमें रिमोट डेस्कटॉप प्रोटोकॉल (RDP), कमजोर सर्वर मैसेज ब्लॉक (SMB) और डेटाबेस सेवाएं और पुराने विंडोज सर्वर प्लेटफॉर्म शामिल हैं। हमलावरों ने फ़ाइल ट्रांसफर प्रोटोकॉल (FTP), डिजिटल इमेजिंग और कम्युनिकेशन इन मेडिसिन (DICOM), MYSQL (डेटाबेस मैनेजमेंट सिस्टम) का फायदा उठाने के लिए ब्रूट फ़ोर्स और डिक्शनरी अटैक का भी इस्तेमाल किया और मेडिकल इमेज और डायग्नोस्टिक डेटाबेस जैसे संवेदनशील पेसेंट डाटा की चोरी की है।

https://www.jagran.com/lite/technology/tech-news-indian-healthcare-sector-suffered-19-lakhs-cyber-and-ransomware-attack-in2022-23239025.html

TIMESNOW

Fri, 02 Dec 2022

'No Veto on Our Military Exercise': India Rejects Chinese Demur to US 'Yuddh Abhyas' War Games Near its Border

China has groaned that the ongoing India-US 'Yudh Abhyas' military exercise in Uttarakhand breaches Sino-Indian bilateral accords for border peace, while India has invited Beijing to reflect on its own violations of the pacts in the form of Chinese transgressions in eastern Ladakh. The exercise near the Line of Actual Control (LAC) is also seen by China as an attempt by the US to influence in India-China border relations. In response to questions about China's objections, India's ministry of external affairs (MEA) stated that India has not granted any third country a "veto" on who to conduct a military exercise with. According to the government, the exercise has nothing to do with the bilateral accords. "But since these were raised by the Chinese side, I must emphasise that the Chinese side needs to reflect and think about its own breach of the agreements of 1993 and 1996," said MEA spokesperson Arindam Bagchi.

"India exercises with whomever it chooses to and it does not give a veto to third countries on these issues," Bagchi added. The troops of India and the USA are conducting military drills ‘Yuddh Abhyas’ in Auli of Uttarakhand, which is located less than 100 km from the Chinese border. Russian-origin military helicopters were seen in the area during the drills along with dog squads, hand-to-hand combat showcasing and more. Beijing has previously addressed the issue with New Delhi, claiming that the joint military exercise staged by India and the US along the LAC violated the "spirit of relevant agreements" signed by China and India in 1993 and 1996 and did not contribute to the development of mutual confidence. The 1993 agreement deals with sustaining peace and serenity along the LAC, but the 1996

agreement deals with military confidence-building measures along the LAC with China in the 'India-China Border Areas.

https://www.timesnownews.com/india/no-veto-on-our-military-exercise-india-rejects-chinese-demur-to-us-yuddh-abhyas-war-games-near-its-border-article-95926365

Forbes INDIA

Thu, 01 Dec 2022

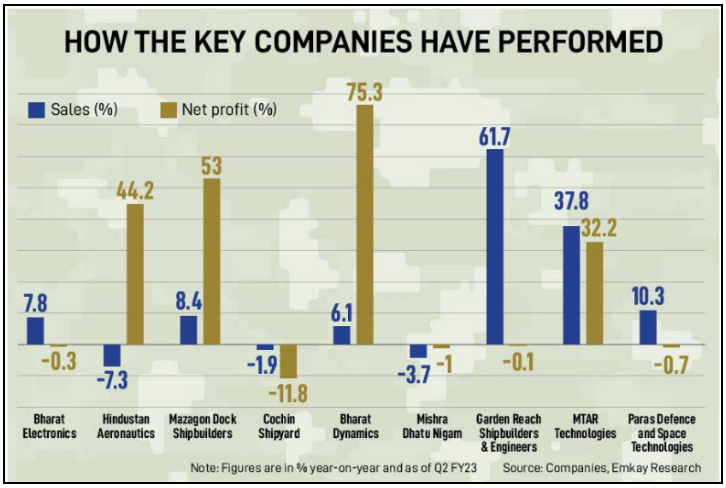
Why India's Defence Sector is Booming

Buoyed by healthy order books, revenue expansions and the government's major push for localisation, India's defence sector has turned attractive for investors. However, analysts caution that steep valuations, execution hiccups, competition pressures and cash flow generation risks may poise threats to the bumper rally defence stocks have seen recently. Sachin Trivedi, head of research and fund manager, Equity, UTI AMC, believes that the defence sector is still favourably placed, given the opportunity size (domestic and export) and potential growth over many years. Recent conflicts closer to India, Europe, and other parts of the world strengthened the urgency and need to increase capex and localise production, which made the sector attractive to investments.

"In recent conflicts, we have seen the importance of new defence equipment such as drones, anti-drone systems, missiles, air-defence systems, etc. Countries at war have struggled to get reliable supplies during a tough time. Therefore, India can't afford to rely on the external supply of equipment and critical components. Thus, pushing for localisation of production is essential, which will generate large and sustainable opportunities for domestic players," Trivedi says.

India's defence sector has undergone major reforms as the government is trying to strengthen the nation's defence prowess by reducing dependence on imports. Measures such as simplification of procedure for procurement of defence products, provision for funding of up to 70 percent of development cost by the government, and a hike in foreign direct investment (FDI) to 74 percent through the automatic route are expected to further boost investments in the sector. "In addition, the Ministry of Defence has banned the import of several components over a period of time, thus encouraging indigenisation. This clearly shows the favourable tilt of policy framework for defence companies," says Gaurav Dua, head, Capital Market Strategy, Sharekhan by BNP Paribas. Indigenisation in the defence sector refers to increasing manufacturing capacity within the country, create research and development, and boost exports.

The government has introduced a series of booster schemes and measures that have resulted in a steady flow of capital and investment opportunities in the sector. The cumulative FDI inflow in the defence industry stands at $15.71 million, during the period April 2000 to September 2022, according to the Make In India website. Earlier in 2020, the government had increased the FDI limit to 74 percent from 49 percent, under the automatic route, and up to 100 percent through the government route in the defence sector.



According to government data, India has around 194 defence start-ups building innovative tech solutions. The government has set a target of Rs 1.75 lakh crore of defence production by 2025, which includes export of Rs 35,000 crore. The Budget outlay for FY23 has been fixed at Rs 5.3 trillion, a 10 percent increase over last year. “The Indian private sector has grown since opening of the defence sector and evolved from producing components and sub-systems, to developing complete equipment and systems, system of systems and platform level solutions,” says Jayant D Patil, member of executive committee and advisor (Defence and Smart Technologies), to CEO and MD, L&T.

“This is clearly visible from the quantum [more than 90 percent] of defence exports by private defence companies. Going forward, the industry looks forward to stepping up and empowering itself with latest manufacturing practices including industry 4.0, for efficient serial production and additive manufacturing towards faster development and limited series production of high-tech parts agglomeration,” Patil adds.

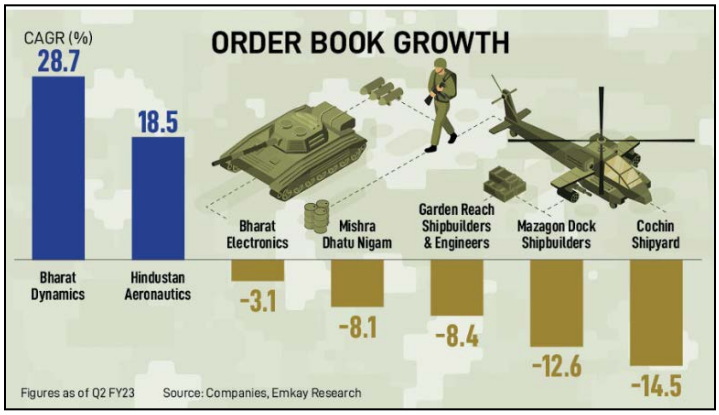
Order book growth and margin guidance

Key defence stocks like Bharat Electronics, Hindustan Aeronautics, Bharat Dynamics, Solar Industries, Garden Reach Shipbuilders & Engineers, Cochin Shipyard and Data Patterns have jumped 30 to 145 percent in 2022 so far, outperforming benchmark indices Sensex and Nifty in this period. Despite formidable stock returns of over 70 percent on average over a year, Amit Dixit, analyst, ICICI Securities feels there is further steam left in the sector on the back of robust order books and improving earnings quality. However, valuations in certain stocks seem to have run ahead of fundamental post the sharp rally in the past few quarters. So, investors need to have mid-to-long term investment horizons to make meaningful gains from investments in the defence sector, cautions Dua.

Based on the September-quarter earnings, order books of most defence sector companies are expected to grow, margins are likely to expand on sourcing efficiencies, focus on enhancing exports and peak earnings are likely for naval shipyard companies by FY25. “All the companies mentioned that the order book position is likely to improve further compared to the first half of FY23. Almost all the companies under our coverage reported higher margins year-on-year and quarterly basis owing to change in product mix [Hindustan Aeronautics and Astro Microwave] and raw material efficiencies [Mishra Dhatu Nigam, HAL and Solar Industries]. All in all, the companies have raised their revenue/margin guidance for FY23,” adds Dixit.

PSU-led company HAL expects its order book to increase by Rs 50,000 crore in the next six months from manufacturing orders. Bharat Electronics expects order book accretion of at least Rs 20,000 crore each in FY23 and FY24. Bharat Dynamics sees its order book growing twofold to Rs 25,000 crore in the next two to three years. Solar Industries expects its order book to increase to Rs 6,000 crore by year-end, with exports and defence as key enablers. Astra Microwave estimates Rs 8,000 crore worth of orders over the next six years. Garden Reach Shipbuilders & Engineers Ltd is also looking forward to tenders worth Rs 76,000 crore for next-gen corvettes, fast patrol vessels and landing platform docks.

Post September-quarter earnings, HAL has raised earnings before interest, taxes, depreciation, and amortisation (Ebitda) margin guidance to 26 to 27 percent. BEL has raised the lower-end of Ebitda guidance to 22 to 23 percent from 21 to 23 percent earlier and reiterated revenue growth guidance of 15 percent. Solar Industries has raised its revenue growth guidance for FY23 to 50 percent (year-on-year). Astra Microwave expects Q3FY23 revenue at Rs 200 crore while estimating FY23 and FY24 revenue at Rs 850 crore and Rs 1,000 crore respectively. Analysts will keep a close watch on requests for proposal (RFP) and award of orders, particularly for light combat helicopters (LCHs), light utility helicopters (LUHs), quick reaction surface-to-air missiles (QRSAM), medium-range surface-to-air missiles (MRSAM), and Akash prime and nex-gen corvettes as these are critical for the companies to meet their guidance.



L&T's current order book for defence is around Rs 14,000 crore, which is about 3.8 percent of its consolidated order book of Rs 3.72 lakh crore. "This is expected to move northwards with a robust pipeline of orders, with few being significant in value, by the end of the current financial year closure, with a leeway of a quarter here or there. The defence engineering business of L&T had reported significant increase in order inflow in FY21-22 across multiple segments of its portfolio. The major orders in this comprise multi-purpose vessels being constructed at our shipyard, and multiple naval and land based-weapon and engineering systems," says Patil.

Defence and aerospace electronics solutions provider Data Patterns expects Rs 200-250 crore worth of orders in the remaining period of FY23. Data Patterns plans to deliver upwards of Rs 400 crore in FY23. Its order book at the end of Q2FY23 was Rs 837 crore, with an order intake of Rs 471 crore in first half of FY23. "With orders received in October 2022 of Rs 47 crore and orders negotiated and finalised of Rs 128 crore, the order book was Rs 1,012 crore at the end of October. Data Patterns' order book increased from Rs 181 crore at the end of FY19 to Rs 476 crore as on March 2022. Increase in order book was mainly due to repeat production contracts for products already developed and accepted by the customers. We expect our order book to grow to Rs 2,000-3,000 crore in the next three to five years based on potential repeat contracts.

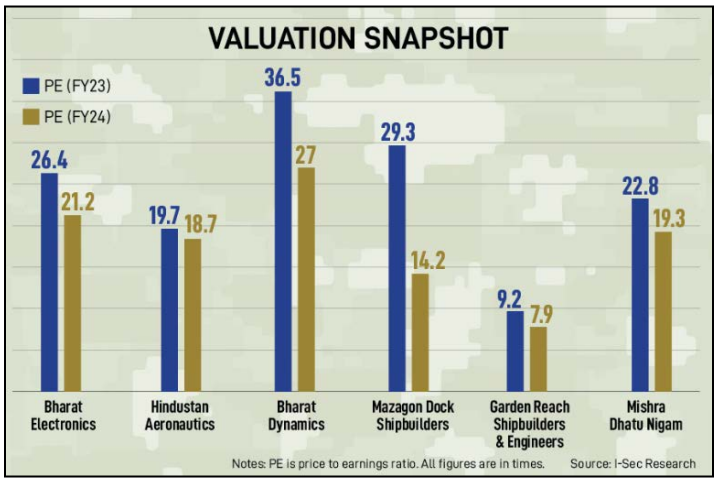
We are also participating in many MoD tenders; success in such tenders will add to our order book," says Srinivasagopalan Rangarajan, chairman and managing director, Data Patterns.

IdeaForge, manufacturer and supplier of drones, has grown its revenue by 10 times in the last two fiscal years as push for Make in India products, simplification of drone regulations, the PLI scheme and the Prime Minister's initiative to make India into the "Drone hub of the World" by 2030 has opened up multiple applications for drones in India. "The fast track procurements that happened post the Galwan incident and the Armenia-Azerbaijan war in 2020 led to a rapid procurement of our drones for our northern borders and further repeat orders for the same accentuated the acute need for homemade drones as well the confidence of the Indian Army in our capability to deliver," says Ankit Mehta, co-founder and CEO, IdeaForge.

Key challenges

According to Trivedi, the defence sector is prone to risks. "This sector is prone to long delays in order finalisations and deliveries, given the customer's need for extensive trials. Another challenge for the investor is assessing the players' capabilities, as we may overestimate the company's ability. And as the industry grows, it will attract newer players, putting pressure on their profitability," he says. Another issue, Trivedi points out, is that many private sector defence businesses are either unlisted or part of large listed conglomerates. "Few listed standalone defence businesses still need to achieve the desirable scale. So the private sector valuations should be looked at in the context of the individual company's ability to scale up," he adds.

Others concur. "As there are frequent changes, priorities and procurement schemes get modified and delayed considerably. Normal capital procurement process takes a long period from RFI to RFP as well as from RFP to contract. The actual time taken is far higher than the stipulated time frame. Such frequent delays disrupt the plans and investments made by the Indian defence industry as well as their financials. Acquisition plans are made in three stages: 15-year, five-year and two-year. There has to be a focussed effort by the government as well as services on sticking to two-year acquisitions made by services for each financial year and accountability has to be brought in for delays," says Rangarajan.



Rangarajan expects the government to extend PLI schemes for defence equipment manufacturing companies and offer incentives to domestic manufacturers in the upcoming Budget. "Tax holidays for new investments in the defence manufacturing sector will motivate existing players

to expand their activities and new players to making investments. The government may also consider additional tax deductions and incentives for R&D in the defence sector," he says.

According to Trivedi, while India's defence budget to gross domestic product (GDP) 2 percent looks comparable to other economies, there is a need to increase allocation towards acquiring capital equipment. He adds that to achieve self-reliance, defence has a priority position as it saves the country's forex and assures the smooth supply of defence equipment in times of geo-political conflicts. Further, as we develop the local value chain of the defence Industry, Indian companies will start to win more export opportunities. The multi-domain engineering talent pool, low manufacturing cost and cordial relations with most nations make us well placed to grab the potential export opportunity.

https://www.forbesindia.com/article/take-one-big-story-of-the-day/why-indias-defence-sector-is-booming/81639/1

Business Standard

Fri, 02 Dec 2022

Fighting the Naval Battle

By Ajai Shukla

A fortnight ago, navies of the four quadrilateral countries – Australia, India, Japan and the United States of America (US) – trained together in the Sea of Japan in the annual event that has been named Exercise Malabar. This year's Malabar, hosted by Japan in the Western Pacific, focused on countering attempts by China's People's Liberation Army (PLA) to take over Taiwan, or to enforce Beijing's claims over disputed islands in the South China Sea and East China Sea. This provides an opportunity to look at the Indian Navy's (IN's) wartime strategies against our two major adversarial navies – the PLA Navy, or PLAN, and the Pakistan Navy (PN), which is far less capable than the PLAN, but a formidable adversary nevertheless.

Malabar is a sophisticated and realistic exercise hosted in turn by the four Quad navies. It creates "inter-operability" by making the four partner navies cooperate in combating simulated contingencies. For example, an Australian submarine could simulate a PLAN submarine that is trying to sneak into the Indian Ocean through, say, the Sunda Strait. In Exercise Malabar, an Indian P-8I Poseidon maritime reconnaissance aircraft could be tasked to detect the submarine, for which the superbly equipped P-8I aircraft would activate its sonar, radar and magnetic anomaly detectors. The adversary submarine's signature would be passed through a library that would identify the vessel by matching its signatures, in real time, with a worldwide bank of warship signatures, painstakingly built up over time.

Having located and identified the enemy submarine, the job of destroying it would be allocated to a P-8I, or an anti-submarine corvette, or to one of our own submarines. For communicating with our submarines, India would use a VLF (very low frequency) signal, transmitted through a shore station, such as Indian Naval Ship (INS) Kattaboman, near Tirunelvelli, whose 471-metre high antenna is the world's tallest military structure. The Quad navies carry out these simulated "locate-identify-destroy drills" all year, in anti-submarine patrols that are in sync with their respective National Security Strategies (NSS).

To conform to the global maritime framework, India signed (1982) and ratified (1995) the United Nations Commission on Laws of the Seas (UNCLOS), which lays down a legal regime for the seas. International maritime law originated in 1603, when three Dutch gunboats seized a Portuguese Carrack (large cargo ship), with a cargo so valuable that it doubled the annual income of the Dutch East India Company. The outraged Portuguese demanded their ship back and, after a heated debate within Holland over ethics, the famous jurist, Hugo Grotius, was hired to write an international maritime treaty. The result was the famous Mare Liberum(the Open Seas), which postulates that the seas are mankind's common heritage and everyone enjoys freedom of action on the high seas – something that Beijing disputes today.

Mare Liberumholds that, if two nations declare war on each other, they can destroy or seize each other's vessels anywhere in the world. If India and China were at war, Mare Liberumpermits both to legitimately destroy each other's shipping in, say, the Atlantic, or the Southern Ocean. The bloody German submarine (U-boat) campaign in World War 2, which sank 3,500 Allied merchant ships and 783 German U-boats, was legitimate, says Mare Liberium, because the UK and Germany were formally at war. In the film, Master and Commander, set in the Napoleonic Wars, British and and French warships were legitimately fighting off the Galapagos Islands, in the South Atlantic. And during the American war of independence, the peaceful city of Madras found itself being bombarded by French warships that had sailed from its colony, Mauritius.

Indian strategists miscalculate that, in a Sino-Indian war, the Indian Navy (IN) could legitimately bottle up Chinese shipping in the South China Sea by blockading the four entries into the Indian Ocean – the Straits of Malacca, Lombok, Sunda and Ombai Wetar. In fact, Grotius did not provide for blockading ships of only one country. In the 1971 Indo-Pakistan war, the IN blockaded Karachi, but had to call it off after just one day because a comprehensive international blockade would be needed that did not distinguish between vessels. Theoretically, the IN could have sent warships or submarines to deter shipping to and from Pakistan, but that would have carried unforeseen escalation risks. What if Beijing responded to an IN blockade of Karachi with the announcement: "Our merchantman is coming into Karachi, escorted by a destroyer and a frigate." Clearly, there is a need for flexible terminology – e.g. "exclusion zone" or "mobile exclusion zone" – that could provide the cover for imposing a blockade on Malacca or Karachi.

The PN, while significantly smaller and weaker than India's, has a plan. War gaming with Lanchester's equations – whichcalculate the incrementalattrition between opposing forces engaged in violent confrontation – suggest that if the IN brought all its power to bear on the PN fleet, the latter would cease to exist within 24-48 hours. Therefore, the PN avoids confronting the IN in the open sea, where Indian firepower would devastate it quickly. Instead, the PN is likely to withdraw to coastal areas where shore-based Pakistani aircraft would provide cover and different calculations would apply. Here, the IN would not benefit from its superior numbers.

With the PN unwilling to join battle, the IN would have to locate and engage it in coastal waters. The IN's first problem, therefore, would be to find a way of negating the Pakistan Air Force's (PAF's) air power. The solution came in 2001, when the induction of the Israeli Barak missile, with its accuracy and range of 15 kilometres, provided the IN its first potent air defence capability. This has now been enhanced with the Long Range Surface-to-Air Missile (LR-SAM), which dramatically extends engagement ranges to 70 kilometres. This allows the IN to approach the Pakistani coast with greater impunity. Playing a major role in naval warfare now are Pakistani long-range maritime patrol (LRMP) aircraft like the P-3C Orion, or the IN's P-8I Poseidon. These LRMP aircraft provide aerial search-and-attack options, with operating

endurances of up to 16 hours and a weapons payload of anti-ship missiles, anti-submarine torpedoes and depth charges.

An LRMP aircraft can fly stealthily, using electronic warfare suites to avoid detection while it manoeuvres into a position from where it can launch an anti-ship missile (ASM). However, its location gets compromised as soon as it fires the missile. For the target vessel, or flotilla, the challenge is two-fold: First, the incoming missile must be shot down before it hits a ship. Second, integral air assets must ensure the aggressor aircraft does not get away.

The mathematics goes against the PN's LRMP aircraft. The LR-SAM that will now be standard fitment on new IN warships has a 70-kilometre range, well beyond the Pakistani ASM's range of about 50 kilometres. With INS Vikramaditya and INS Vikrant fielding LR-SAM systems and launching MiG-29K fighters from their decks, the question of a Pakistani LRMP aircraft launching a missile and getting away should not arise.

Finally, it must be noted that, with the PLAN being the fastest-growing navy in the world, the possible provision of basing rights by Pakistan, Sri Lanka and by East African states like Djibouti provide it a forward presence in the Indian Ocean. Even so, the coming together of the Quad and the Australia–UK–US (AUKUS) grouping would be a formidable adversary, moving toward the creation of a "thousand ship navy" that reins in the PLAN in the Indo-Pacific.

https://www.business-standard.com/article/opinion/fighting-the-naval-battle-122120101332_1.html

FINANCIAL EXPRESS
Read to Lead

Thu, 01 Dec 2022

India's G-20 Presidency will be Consultative, Collaborative, Decisive, Says S Jaishankar

As India assumed the presidency of G-20, External Affairs Minister S Jaishankar on Thursday said New Delhi's endeavour would be to make consensus on key global issues more relevant through a wider process of consultation. Addressing the G-20 University Connect initiative, the first event of India's presidency of the grouping, Jaishankar said it would also be India's endeavour to emerge as the voice of the global south — comprising Asia, Africa and Latin America -– that has to face the brunt of polarisation and conflict in the developed world. "As the mother of democracy, India's G-20 presidency will be consultative, it will be collaborative and it will be decisive," he said addressing university students at the Sushma Swaraj Bhawan here. Students from several universities had joined the event virtually.

"Our G20 Presidency is taking place at a very critical moment in international affairs. It is particularly vital that world leaders focus on the right issues, especially those that affect the more vulnerable sections of the world," Jaishankar said at the event that was attended by students from 75 universities across the country. He said India would flag concerns on issues such as energy security, food security, access to healthcare, climate action and climate justice during the G-20 presidency. "We must become the voice of the Global South. We share too the apprehension that sustainable development, climate action and climate justice could be side tracked due to more dominant issues," Jaishankar said. "India has to take the lead in pushing for collective action and that is exactly what we intend to do at G-20," he said.

Jaishankar said India's G20 Presidency was taking place at a very critical moment in international affairs and it was particularly vital that world leaders focus on the right issues, especially those that affect the more vulnerable sections of the world. "G-20 is a diverse platform that seeks to forge common ground on key issues among prominent countries. Our endeavour is to make that consensus more relevant through a wider process of consultation," he said. Jaishankar said harmonising various interests was something that has been deeply ingrained in India's history and culture. "We have long been a pluralistic and consultative society which have debated issues openly before we arrive at a decision. Since this is deeply ingrained in our DNA, we have never been insecure with diversity. Our essential unity is not only the basis for pluralism, but also a source of confidence for engaging the world," he said. He said India will also shine the spotlight on Misson LiFE, with its associated, environmentally sustainable and responsible choices, at the level of individual lifestyles as well as national development. The G-20 University Connect event was also attended by UGC Chairman M Jagadesh Kumar, Amitabh Kant, the Sherpa for the G-20, Harsh Vardhan Shringla, India's Chief Coordinator for G-20 and P K Mishra, the Principal Secretary to the prime minister.

https://www.financialexpress.com/defence/indias-g-20-presidency-will-be-consultative-collaborative-decisive-says-s-jaishankar/2897870

R. REPUBLICWORLD.COM

Thu, 01 Dec 2022

US Awards $1.2bn Contract to Raytheon for Air Defence Support to Ukraine as War Rages On

Paying no heed to Russia's recent warning about supplying missile defence systems to Ukraine, the Pentagon announced on Thursday that the United States Army is handing a $1.2 billion contract to defence conglomerate Raytheon Technologies Co to provide National Advanced Surface-to-Air Missile Systems (NASAMS) to the war-torn nation. According to The Guardian, the US authorised sending a total of eight NASAMS to Ukraine in order to boost the country' troops as they battle against Russian forces. The latest contract is meant for NASAMS batteries, training and logistical assistance to the Ukrainian military.

Earlier in November, Ukraine received two NASAMS. The rest of the air defence systems will be provided in the coming months following their production. The Pentagon stated that the systems that have been recently provided to Ukraine are of stellar quality, and have fully helped the country's forces intercept Russian missile strikes. "NASAMS are just the latest in the diverse set of air-defence capabilities we are delivering to Ukraine," said Bill LaPlante, Under Secretary of Defence for Acquisition and Sustainment. According to a statement by the US Army, the latest air defence systems comprise the fifth Ukraine Security Assistance Initiative (USAI) package, which was first declared on 24 August with a value of $2.98 billion. So far, the United States has committed over $19.3 billion of defence aid to Ukraine.

The initiative allows the US government to provide Ukraine with weapons which are acquired directly from the industry, instead of taking them from the country's existing arsenal. Previously, financial aid for two other NASAMS was derived from the third USAI package that was announced in the month of July.

Russia warns NATO to not supply Patriot missile defence systems to Ukraine

This comes just a week after Doug Bush, the chief weapons buyer for the Army, told journalists that the US Army is boosting the procedure of acquiring weapons due to a long backlog of contracts that are required by the country to stock up on weaponry as it has experienced a shortage of it due to sending arms to Ukraine. The Pentagon's announcement of the $1.2 billion contract comes right after Russia warned NATO to refrain from providing Ukraine with Patriot missile defence systems. Calling the intergovernmental alliance a "criminal entity", erstwhile Russian president Dmitry Medvedev said on Telegram: "If, as [NATO secretary general Jens] Stoltenberg hinted, NATO were to supply the Ukrainian fanatics with Patriot systems along with NATO personnel, they would immediately become a legitimate target of our armed forces."

https://www.republicworld.com/world-news/russia-ukraine-crisis/us-gives-1-dollars-2-cents-billion-contract-to-raytheon-for-ukraine-air-defence-support-as-war-rages-on-articleshow.html

DefenseNews

Thu, 01 Dec 2022

Raytheon Wins $1.2 Billion Surface-to-Air Missile Order for Ukraine

The U.S. Army awarded Raytheon Missiles and Defense a contract worth as much as $1.2 billion to deliver six National Advanced Surface to Air Missile System batteries for Ukraine. The contract is part of the fifth Ukraine Security Assistance Initiative package and includes training and logistical support to Ukraine's military and security forces, the Army said in a a Nov. 30 statement. Raytheon, the world's second-largest defense contractor, won a contract in August to deliver to NASAMS batteries to Ukraine as part of the third USAI package. The new contract is a follow-on.

The first two NASAMS batteries, capable of firing AIM-120 Advanced Medium-Range Air-to-Air Missiles, have been delivered and deployed and "have successfully demonstrated the effectiveness of the systems against the threat," according to the Army. Pentagon officials have said the first NASAMS were able to be purchased quickly because the bulk of the systems had already been produced. The NASAMS was developed by Norwegian defense company Kongsberg Defence & Aerospace and Raytheon. They are used to defend the National Capital Region in the U.S. from possible air threats but are otherwise not used in operations by the U.S. Army. "These are proven systems that will continue making a difference on the battlefield," William LaPlante, under secretary for defense for acquisition and sustainment, said in the statement.

It takes 24 months lead time to produce and deliver NASAMS, though the Army and industry are looking for ways to shorten that timeline. "This effort further illustrates the urgency the U.S. government is taking in its approach to acquire air-defense systems for our allies and to replenish our own munition stockpiles," the Army said. "The rapid award of this contract is another example of the Army's ability to accelerate the delivery of critical capabilities through our industry partners to our allies," Doug Bush, the Army's acquisition chief, added. The work to award Raytheon a contract was led by the Army's Program Executive Office for Missiles and

Space, along with others across the Defense Department. Ukraine has requested an integrated air and missile defense system that the U.S. and other allies are striving to fulfill.

The system would be made up of short-range, low-altitude systems; medium-range, medium-altitude systems; and long-range, high-altitude systems that together would neutralize the threat of Russian aircraft and missiles. Ukrainian forces had been using Russian-made SA-6 and SA-8 air defenses. In addition to NASAMS, the country also asked for Cold War-era Hawk systems - a medium-range, medium-altitude system, that's considered to still be effective.

https://www.defensenews.com/land/2022/12/01/raytheon-wins-12-billion-surface-to-air-missile-order-for-ukraine/

DAWN

Thu, 01 Dec 2022

Modern Techniques can Improve Defence Production: Alvi, President of Pakistan

President DrArifAlvi on Thursday said that the country's immense growth potential in the defence sector can be fully realised by improving the capacity of human resources and adopting emerging and critical technologies powered by artificial intelligence, virtual reality and robotics. He expressed these views during his visit to Pakistan Ordnance Factories (POF), Wah. He stressed the need for focusing on research and development (R&D), bringing innovation and modernisation and adopting best practices in defense production to further improve efficiency and productivity.

Referring to the country's high quality defence products, DrAlvi underlined the need for employing modern marketing techniques and improving the efficiency of supply chain to consolidate "our position in existing markets and increasing our footprint in new and non-traditional markets by promoting Pakistani defense products which are of high quality, effective and dependable in any given situation, and were at the same time very cost-effective". On this occasion, DrAlvi lauded the role of POF for its endvaour toward self-sufficiency and in meeting the growing demand of defense sector and other civilian security agencies, as well as capturing foreign markets by improving its efficiency, adopting quality financial management practices and digitalising its processes to transform POF into a self-sustainable and progressive defense industrial complex.

During his visit, DrAlvi also visited different parts of POF where he was given an overview of the production and manufacturing processes. He also took keen interest in different defense products produced by POF, which were on display. The president was also briefed on the role of POF in fulfilling the ammunition requirements of Pakistan's Armed Forces as well as other Law Enforcement Agencies (LEAs) and steps taken by it to develop academia-industry linkages.

https://www.dawn.com/news/1724196/modern-techniques-can-improve-defence-production-alvi

Fri, 02 Dec 2022

Russia is Using Dummy Nuclear-Capable Missiles to Distract Air Defences, Says Kyiv

The Ukrainian military has said that Russia is now using nuclear-capable missiles with non-explosive warheads against the country's air defences. Military official Mykola Danyliuk showed fragments of what he says are parts of Soviet-made Kh-55 cruise missiles that are designed for nuclear use. He said that they are being used to "exhaust the air-defence system of our country". "This is a substitute for a thermo-nuclear guided charge," he said. Danyliuk said the Kh-55 had not been used by Russia in Ukraine before October 31.

The official added that the pieces were tested and they did not show abnormal levels of radioactivity. Ukraine believes that having carried out several missile strikes against the country's infrastructure, Moscow's arsenal has depleted significantly. This is why it is now using blunt projectiles that still cause devastation. "The use of such missiles is intended to distract the attention of Ukraine's air defence system and tire it out." Danyliuk also said that all the Kh-55 missiles that had been discovered had their serial numbers scratched out.

Kh-55 cruise missiles are also known as AS-15 by Nato, and the pieces were found in the Lviv and Khmelnytsky regions. The missiles were designed during Soviet times to hit "strategic targets with predetermined co-ordinates". Meanwhile, the UK said the missiles were designed "exclusively as a nuclear delivery system". However, it seems the Russian military removed the nuclear warheads and replaced them with an inert system before firing them. Danyliuk noted that the missile could cause enough damage even with a non-explosive warhead because of its kinetic energy and fuel residues.

"This is evidenced by the latest strike when a Kh-55 missile hit a residential building," he said. Meanwhile, Ukraine's top security officials have ordered an investigation into the activities of a branch of the Orthodox Church linked historically to Moscow, President Volodymyr Zelensky said on Thursday. He added that the probe would look into whether the Moscow branch of the church was entitled to operate at one of Ukraine's most hallowed sites, the Pechersk Lavra complex in Kyiv. The Orthodox Church in Russia has backed Moscow's invasion of Ukraine. "We have to create conditions so that no actors dependent on the aggressor state (Russia) can manipulate Ukrainians and weaken Ukraine from within," Zelenskiy said in a video address.

https://www.wionews.com/world/russia-is-using-dummy-nuclear-capable-missiles-to-distract-air-defences-says-kyiv-539264

Thu, 01 Dec 2022

Russia could Fire Long-Range Missiles to Cripple Ukraine: UK Defence Ministry

Russia could be attempting to implement a Strategic Operation for the Destruction of Critically Important Targets (SODCIT) to “demoralise the population (of Ukraine) and ultimately force the state’s leaders to capitulate”, the UK defence ministry reported on Thursday.“Russia envisioned SODCIT as using long-range missiles to strike an enemy state’s critical national infrastructure, rather than its military forces, to demoralise the population and ultimately force the state’s leaders to capitulate,” the ministry added in a statement on Twitter.

However, the ministry also noted that its effectiveness as a strategy has likely been blunted because Russia has already expended a large proportion of its suitable missiles against tactical targets. Also, with Ukraine having successfully mobilised for nine months, material and psychological effect of the SODCIT is likely less than if it was deployed in the initial period of war. Since October 2022, Russia has repeatedly attacked Ukraine’s electricity distribution grid, primarily with cruise missiles — a key component of the military doctrine it has adopted in recent years. Russia’s strikes continue to cause power shortages resulting in indiscriminate, widespread humanitarian suffering across Ukraine.

As per The Kyiv Independent, the previous mass strike was on November 23, which resulted in power, water, heating outages, and mobile network interruptions in multiple Ukrainian cities. “Almost half of Ukraine’s energy system is out of order due to the Russian strikes, Prime Minister Denys Shmyhal said on November 18,” it added. Britain, on Wednesday, also announced a new package of 22 sanctions targeted at Russian officials behind the forced mobilisation of the country's citizens to take part in the invasion of Ukraine. The individuals sanctioned included Deputy Prime Minister Denis Manturov, who Britain said was responsible for overseeing the Russian weapons industry and equipping mobilised troops. "The Russian regime’s decision to partially mobilise Russian citizens was a desperate attempt to overwhelm the valiant Ukrainians defending their territory. It has failed," British Foreign Secretary James Cleverly said in a statement.

"Today we have sanctioned individuals who have enforced this conscription, sending thousands of Russian citizens to fight in Putin’s illegal and abhorrent war." Meanwhile, Russian Foreign Minister Sergei Lavrov said on Thursday that Moscow was ready to listen if anyone wanted to hold talks on Ukraine. Lavrov, speaking at a news conference in the 10th month of the war, said Ukrainian allegations that Russia wanted talks in order to win time to regroup and rebuild its armed forces were absurd. He said Russia would also be willing to return to talks with the West if it changed its mind about the merit of discussing security proposals that Moscow floated in December.

https://www.cnbctv18.com/world/russia-could-fire-long-range-missiles-to-cripple-ukraine-uk-defence-ministry-15309771.htm

DefenseNews

Thu, 01 Dec 2022

Aircraft Makers Lumber toward Deal for Europe's Next-Gen Fighter Jet

France's Dassault Aviation on Thursday said there is a breakthrough industry agreement that would finally allow the trinational Future Combat Air System effort to proceed. In a Dec. 1 interview with French publication Le Figaro, Dassault CEO and Chairman Eric Trappier revealed that "all road blocks have been lifted" for the partners to move forward on Phase 1B, the pre-demonstrator phase that would work on developing a fighter prototype. Le Figaro is owned by Dassault Group, the parent company of Dassault Aviation.

The envisioned Franco-German-Spanish aerial weapon has been on hold for over one year now, as two of its prime contractors, Dassault and Airbus Defence and Space, have failed to find a way to work harmoniously on the program's signature effort, the next-generation fighter. Trappier has been vocal about the fact that the program's stalling stems from a disagreement about the industry leadership role for the fighter jet pillar. He told Le Figaro that Dassault has been confirmed in its leadership and architect role for the aircraft, and has been reassured that its intellectual property would be safeguarded in the program.

He asserted in the interview that the prototype fighter would be ready to fly by 2029, two years later than originally planned. A Phase 2 contract, which would launch the prototype development period, is expected to be signed in the next two to three years, he added. Airbus confirmed the industry agreement had been signed in a Thursday email to Defense News. "All industry partners of the Future Combat Air System have now signed the respective agreements in order to launch the program's next phase, the demonstrator phase 1B," said Airbus CEO Mike Schoellhorn. The trinational program includes Dassault representing France, Airbus Defence and Space representing Germany and Indra representing Spain.

Yet the update remains just one more step before the final contract signature between the three participating nations and their industry partners, which will occur "once relevant processes have been concluded in the respective customer nations," Schoellhorn added. "We are optimistic that this can be accomplished in the very near future," he said. A Dassault spokesperson declined to comment further in an email to Defense News on Thursday, referring to Trappier's interview with Le Figaro. The announcement follows over two weeks of rising and falling hopes that companies could agree on terms.

German and Spanish government and industry officials loudly proclaimed in late November that a deal was close to being completed, only for Trappier to pour cold water on the potential development in his own interviews with the press. The FCAS program, announced in 2017, consists of seven technology pillars, to include the next-generation fighter – which will replace the participants' fleets of Dassault Rafale and Eurofighter Typhoon aircraft – a new engine for the fighter jet, a next-generation weapon system, new drones, advanced sensors and stealth technology, and an air combat cloud network. It has been stuck in the research-oriented "Phase 1A" since 2020, and was due to progress to the next level by early 2021.

French Defense Minister Sebastien Lecornu applauded the news on Thursday, calling the project "a concrete illustration of the cooperation we are conducting on the European level on defense and armaments, in which France is playing a central role." The contracts will be formally brought before France's military procurement office, the Direction Générale de l'Armement (DGA), which is managing the trinational program. According to a Thursday statement by the French Ministry of Defense, the goal remains to field the system of systems, including the next-generation fighter, around 2040.

https://www.defensenews.com/global/europe/2022/12/01/aircraft-makers-lumber-toward-deal-for-europes-next-gen-fighter-jet/

THE ECONOMIC TIMES

Fri, 02 Dec 2022

U.S. and Asian Allies Impose New Sanctions on North Korea after ICBM Test

The United States, South Korea, and Japan have imposed sanctions on North Korean officials connected to the country's weapons programs after Pyongyang's latest and largest intercontinental ballistic missile test last month. The U.S. Treasury Department on Thursday named the individuals as Jon Il Ho, Yu Jin, and Kim Su Gil, all of whom the European Union designated for sanctions in April. South Korea's foreign ministry announced sanctions on seven other individuals, including a Singaporean and a Taiwanese, and eight entities. All are already under sanctions by the United States imposed between January 2018 and October 2022, the ministry said.

Japan also designated three entities and an individual for new sanctions, Japan's foreign ministry said, including the Lazarus Group suspected of carrying out cyberattacks. China and Russia have blocked recent efforts to impose more United Nations sanctions, saying they should instead be eased to jumpstart talks and avoid humanitarian harm. That has left Washington to focus on trilateral efforts with South Korea and Japan, as well as European partners. The latest sanctions follow a Nov. 18 ICBM test by North Korea, part of a record-breaking spate of more than 60 missile launches this year, and amid concerns that it may be about to resume nuclear weapons testing, which has been suspended since 2017. A Treasury statement said Jon Il Ho and Yu Jin played major roles in the development of weapons of mass destruction while serving as vice director and director, respectively, of the North Korea's Munitions Industry Department.

It said Kim Su Gil served as director of the Korean People's Army General Political Bureau from 2018 to 2021 and oversaw implementation of decisions related to the WMD program. "Treasury is taking action in close trilateral coordination with the Republic of Korea and Japan against officials who have had leading roles in the DPRK's unlawful WMD and ballistic missile programs," Treasury Under Secretary For Terrorism And Financial Intelligence Brian Nelson said in the statement, using the initials of North Korea's official name. "Recent launches demonstrate the need for all countries to fully implement U.N. Security Council resolutions, which are intended to prevent the DPRK from acquiring the technologies, materials, and revenue Pyongyang needs to develop its prohibited WMD and ballistic missile capabilities."

The sanctions freeze any U.S.-based assets of the individuals and bar dealings with them, but appear largely symbolic. South Korea's foreign ministry said the latest move was part of its efforts to sternly respond to North Korea's growing nuclear and missile threats. Decades of U.S.-led sanctions have failed to halt North Korea's increasingly sophisticated missile and nuclear weapon programs. "Targeting senior officials inside North Korea responsible for WMD and missile activities and working with South Korea and Japan are important, but it is an inadequate and symbolic response to 60+ missile tests, including 8 ICBM tests," said Anthony Ruggiero, who headed North Korea sanctions efforts under former President Donald Trump.

"The Biden administration should sanction Pyongyang's revenue and force Kim Jong Un to make difficult decisions about his strategic priorities," he said. U.S. National Security Advisor Jake Sullivan said earlier Washington was committed to using pressure and diplomacy to entice North Korea into giving up its nuclear arsenal. He said the administration had no illusions about the challenges, but remained committed to holding Pyongyang accountable.

A spokesperson at the White House National Security Council said sanctions had been successful in "slowing down the development" of the weapons programs and Pyongyang had turned to "increasingly desperate ways to generate revenue like virtual currency heists and other cybercrime to fund its weapons programs." "The DPRK's decision to continue ignoring our outreach is not in their best interest, or in the interest of the people of the DPRK."

https://economictimes.indiatimes.com/news/defence/u-s-and-asian-allies-impose-new-sanctions-on-north-korea-after-icbm-test/articleshow/95926265.cms

The EurAsian Times

Fri, 02 Dec 2022

NASAMS Vs PATRIOT: Why Ukraine 'Desperately Wants' Patriot Missile Systems When NASAMS have Achieved 100% Kill Rate?

ByVijainder K Thakur

"I saw one report a few days ago that they were successful 100% of the time. I would check what the situation is today," Kirby said while emphasizing that Ukraine needed most at this point air defense equipment, not long-range weapons. Besides NASAMS, NATO nations have recently supplied Ukraine with other capable air defense (AD) systems, such as the French Crotale and the German IRIS-T. However, Ukraine is not satisfied with the AD systems already supplied and is pushing the US hard for Patriot systems and Israel for its Iron Dome system.

The US, in the past, has been wary of shipping Patriot missile systems to Ukraine, fearing that the supply could lead to an escalation in the conflict involving NATO. The EurAsian Times, in an analysis published earlier, explained how Patriot systems operated by Ukraine could lead to a confrontation between Russia and NATO. It now appears that Ukraine's intense lobbying for Patriot systems is succeeding and the US is once again actively considering the option.

Following a meeting of the heads of foreign affairs agencies of NATO countries in Bucharest, Ukrainian Foreign Minister DmytroKuleba, referring to Ukraine's demand for Patriot systems, pointedly said, "I'll tell you this, if earlier no one even talked about this, except for us, only we raised this issue all the time, and there was no conversation as such, now the conversation is underway. And these are very serious and substantive conversations. And we will continue to work on the result."

Israel's Iron Dome AD System

On Wednesday, speaking at a book forum The New York Times organized, Zelensky lobbied hard for the Iron Dome system, saying, "Of course, we are waiting for Israel's support. Of course, we don't want [Benyamin] Netanyahu, like his colleagues who came before him, to balance between Ukraine and Russia. He knows all the details and can help with air defense. There is nothing here, this is not a weapon attacking the Russian Federation, so there is no need to look for compromises here." Zelensky, of course, doesn't care that approximately 15% of the Israeli citizens are Russian-speaking, and the Russian-speaking community accounts for 15% of Israel's eligible voters.

Likely Reasons Why The US Is Reconsidering

The US may be reviewing its earlier reluctance to supply Patriot systems because Russia could switch to using Iranian-origin ballistic missiles to attack Ukrainian power generation infrastructure if NATO-supplied AD systems such as NASAMS, Crotale, and IRIS-T prove very effective against Russian cruise missiles. These systems are far more effective against aerial targets such as aircraft and cruise missiles than ballistic missiles. On the other hand, the Patriot has a better record of engaging ballistic missiles than slow-flying cruise missiles and drones. By acquiring Patriot systems, Ukraine could more enduringly limit Russian ability to strike at Ukrainian infrastructure.

Power Generation Infrastructure – Civil Or Military?

Preventing the collapse of Ukraine's power generation infrastructure is critical to avoiding a Ukrainian military failure. The West wrongly paints Russian attacks on Ukraine's power generation infrastructure exclusively as brutal attacks on Ukrainian civilian infrastructure and accuses Russia of weaponizing winter. The truth is, no country has ever won a war by attacking purely civilian infrastructure. Russia is not targeting apartment buildings, shopping malls, offices, or sewage treatment plants. It is attacking power generation and distribution infrastructure, which is a dual-use infrastructure.

US Claims 100% Kill Rate For NASAMS, Yet Ukraine Insists On Patriot Missile Systems To Battle RussiaWithout degrading power generation infrastructure, Russia cannot lessen Ukraine's fighting potential and hope to end the war – the electrical power runs Ukrainian plants that manufacture weapons and ammunition. Ukraine is in dire need of Soviet-era ammunition and weapons. Russian energy infrastructure attacks have degraded Ukraine's weapons and ammunition manufacturing capability. As a result, Ukrainian ground offensives are stalling – first in the Kupyansk and Krasnolimansk directions and now the offensive on Svatovo and Kremennaya. According to the Military Chronicle, Ukrainian forces are facing an acute deficit of 122mm and 152mm caliber artillery shells manufactured in Ukraine.

Energy shortage has halted the production of artillery ammunition of Soviet calibers at the Kyiv Artyom plant. Relentless Russian attacks on ammunition depots have critically depleted stocks

of stored ammunition. Energy shortage is also hobbling Ukraine's ability to operate its railroads to move heavy equipment and ammunition, including the ammunition being supplied by the West. The West is trying to offset the ammunition crunch being faced by Ukraine by settling up Soviet-era ammunition manufacturing facilities outside Ukraine.

The New York Times reported on November 27 that NATO was discussing investing in old Czech Republic, Slovakia, and Bulgaria factories to revive the manufacturing of Soviet-era shells for Ukraine. Russia is attempting to end the war with infrastructure attacks, while the West is trying to prolong the war and prevent Ukraine's early defeat by projecting the infrastructure attacks as attacks on civilians and equipping Ukraine to mitigate the impact of the attacks.

https://eurasiantimes.com/nasams-vs-patriot-why-ukraine-insists-on-patriot-missile/

शुक्रवार, 02 दिसंबर 2022

आज अमेरिकी वायुसेना को सौंपा जाएगा B-21 Raider, अब तक का सबसे शक्तिशाली मिलिट्री एयरक्राफ्ट, जानें इसकी खूबियां

संयुक्त राज्य वायु सेना आज अपने नए स्टील्थ एयरक्राफ्ट, बी -21 रायडर का अनावरण करने जा रहे हैं. इसे मिलिट्री कॉन्ट्रैक्टर नॉथ्रॉप ग्रुम्मन ने बनाया है और यह बी-21, रायडर बी-1 और बी-2 की जगह लेगा. फर्म का दावा है कि B-21 रायडर अब तक का सबसे एडवांस मिलिट्री एयरक्राफ्ट है. यह दुनिया में कहीं भी सटीक हमले करने के लिए सबसे कठिन बचाव को भेदने में सक्षम होगा.

क्या हैं इसकी खुबियां:

बताया जा रहा है कि इस नेक्स्ट जेनरेशन स्टील्थ तकनीक, उन्नत नेटवर्किंग कैपेसिटी और एक ओपन सिस्टम आर्किटेक्चर के साथ विकसित, B-21 को ऐसी जगहों के लिए बनाया गया है जहां बहुत ज्यादा खतरा हो. फर्म का दावा है कि बी-21 रायडर अमेरिकी वायु सेना को उसके सबसे मुश्किल मिशनों को पूरा करने में महत्वपूर्ण भूमिका निभाएगा. साथ ही, कंपनी का कहना है कि जरूरत पड़ने पर B-21 रायडर एंटी-एक्सेस और एरिया-डिनाइल सिस्टम को भी हरा सकता है. यह पारंपरिक और परमाणु पेलोड दोनों को डेलीवर करने में सक्षम है और स्टैंड-ऑफ और डायरेक्ट अटैक मूनिशन का इस्तेमाल कर सकता है.

नए फाइटर जेट में है डिजिटल इंफ्रास्ट्रक्चर

बी-21 एक डिजिटल बॉम्बर है जो बी-21 प्रोग्राम पर प्रोडक्शन रिस्क को कम करने के लिए चुस्त सॉफ्टवेयर डेवलपमेंट, एडवांस्ड मैन्यूफक्चरिंग टेक्निक्स और डिजिटल इंजीनियरिंग टूल्स का उपयोग करता है. नए फाइटर जेट को क्लाउड-आधारित डिजिटल इंफ्रास्ट्रक्चर के साथ सक्षम किया गया है. यह कम लागत वाले के साथ अधिक रखरखाव योग्य और सस्टेनेबल एयरक्राफ्ट होगा. हर एक एयरक्राफ्ट की अनुमानित लागत 2 बिलियन डॉलर है.

और उम्मीद है कि साल 2023 की शुरुआत से सेना इन एयरक्राफ्ट्स को इस्तेमाल करना शुरू कर देगी. द्वितीय विश्व युद्ध के डूलिटल रायड के सम्मान में नामित, बी-21 रायडर छठी जेनरेशन का एयरक्राफ्ट है!

https://www.gnttv.com/world/story/american-air-force-have-most-powerful-militry-aircraft-b-21-raider-specifications-477764-2022-12-02

The EurAsian Times

Fri, 02 Dec 2022

Stunning Display of 'Stealth Power'! Eight US B-2 Spirit Bombers Perform Elephant Walk & Show their Might!

In a statement, 509th Bomb Wing Public Affairs said that the only operational B-2 base in Whiteman, where the 509th and 131st Bomb Wings participated, saw the conclusion of the Spirit Vigilance exercises on November 7. The US Air Force currently operates only 20 B-2s; thus, the eight aircraft that took part in the elephant walk and follow-up fly-off account for 40% of all B-2s currently in service. The Whiteman Air Force Base posted a short video of B-2 bombers performing an elephant walk on its Facebook page. The fundamental purpose of elephant walks is to show that a base and its constituent units are ready and can quickly launch large numbers of aircraft in a crisis. Even while the US military has been conducting more of these training exercises lately, bombers are much less frequently seen taking part in them. The Air Force Global Strike Command's bomb wings often hold training and readiness drills, one of which is the Spirit Vigilance exercise. The Vigilance series is a set of routinely scheduled, multi-annual exercises designed to assess and improve American deterrence capabilities continuously. It also meant to increase the lethality and readiness of the Airmen who assist and carry out the mission of the B-2 Spirit stealth bomber. "We are displaying a capability here to rapidly generate and deploy [the B-2] under greater scrutiny and time restraints than the normal day-to-day flying mission," said Capt. Richard Collier, 509th Aircraft Maintenance Squadron director of operations of the Spirit Vigilance exercise. "Here, we demonstrate to our near-peer adversaries, as well as to ourselves, how well we can perform."

https://eurasiantimes.com/stunning-display-of-stealth-power-eight-us-b-2-spirit-bombers/?amp

THE ECONOMIC TIMES

Thu, 01 Dec 2022

Heaviest Ukraine Fighting Rages in East, West Seeks to Sustain Support Against Russia

Russian forces tried to advance in eastern Ukraine and trained tank, mortar and artillery fire on Kherson in the south, the Ukrainian military said, as Western allies sought to buttress Ukraine and its neighbours against Moscow. In Washington, a $1.2 billion contract for six National Advanced Surface-to-Air Missile Systems (NASAMS) for Ukraine was awarded to Raytheon,

the Pentagon said. On Wednesday Ukraine Foreign Minister DmytroKuleba had saidhis country needed U.S.-made Patriot missile defence systems to protect its civilian infrastructure, which has been under heavy attack by Russia at the start of winter.

U.S. Secretary of State Antony Blinken said Russian President Vladimir Putin had focused "his ire and his fire" on Ukraine's civilian population and warned Russia that its strategy would fail to divide Ukraine's supporters. "Heat, water, electricity ... these are President Putin's new targets. He's hitting them hard. This brutalisation of Ukraine's people is barbaric," Blinken told a news conference in Bucharest following a two-day NATO meeting.

At the NATO foreign ministers meeting, allies on Wednesday pledged to help Moldova, Georgia and Bosnia-Herzegovina as they face pressure from Russia, NATO Secretary-General Jens Stoltenberg and ministers said. Russian Foreign Ministry spokeswoman Maria Zakharova said the outcome showed NATO was "absolutely not interested in a political and diplomatic solution in Ukraine". Russia invaded Ukraine nine months ago in what it calls a "special military operation" to rid Ukraine of nationalists it considers dangerous. Ukraine and Western allies accuse Russia of an unprovoked, imperialist land grab.

In Spain, media cited police sources as saying that weapons company Instalanza in Zaragoza, which makes the C90 rocket launcher that Spain donates to Ukraine, received a suspicious package. A security officer at Ukraine's embassy in Madrid was injured earlier on Wednesday when he opened a letter bomb addressed to the ambassador, leading Kyiv to order greater security at all its representative offices abroad.

Battleground

In the Donetsk region of eastern Ukraine, site of the heaviest fighting, Russian forces tried to make further advances and shelled several towns, including Bakhmut and nearby Soledar and Opytne, the General Staff of the Ukrainian Armed Forces said in a Wednesday night statement. It said that on the southern front, Russian forces took up defensive positions and trained tank, mortar and artillery fire on Ukrainian positions and on the regional capital of Kherson, abandoned by Russian troops earlier in November. Other battleground activity was reported in northeastern and central Ukraine, the military said.

Reuters was not able to verify battlefield reports.

"We are analysing the intentions of the occupiers and preparing counter-measures - tougher countermeasures than is now the case," President VolodymyrZelenskiy said in a Wednesday evening address. KyryloTymoshenko, deputy head of Ukraine's presidential administration, said electricity had been restored to 65% of consumers in Kherson. Nearly six million customers in a majority of Ukraine's regions and in Kyiv had no electricity, Zelenskiy said on Wednesday night.

Drones

Ukrainian air force spokesman YuriyIgnat said defence forces had shot down 340 of the roughly 400 Iranian drones that Russian had launched during the war. "We haven't seen these Iranian unmanned aerial vehicles for about two weeks the first batch has probably already run out," he told Ukraine's main television network. On the economic front, a deal was close on resuming Russian ammonia exports through a pipeline to a Ukrainian Black Sea port, U.N. aid chief Martin Griffiths said. "I think we're quite close, we're edging towards it this week," Griffiths told a Reuters NEXT event. A deal aimed at easing global food shortages by helping Ukraine export its agricultural products from Black Sea ports was extended on Nov. 17 for four months, though

Russia said its own demands were yet to be fully addressed. The agreement was initially brokered in July by the United Nations with the help of Turkey.

https://economictimes.indiatimes.com/news/defence/heaviest-ukraine-fighting-rages-in-east-west-seeks-to-sustain-support-against-russia/articleshow/95917335.cms

THE ECONOMIC TIMES

Thu, 01 Dec 2022

NATO Concerned about China's 'Opaque' Military Buildup: Antony Blinken

NATO allies are concerned about China's rapid and opaque military buildup and its cooperation with Russia, and discussed concrete ways to address the challenges posed by Beijing on Wednesday, said U.S. Secretary of State Antony Blinken. "The members of our alliance remain concerned by the PRC's (People's Republic of China) coercive policies, by its use of disinformation, by its rapid, opaque military buildup, including its cooperation with Russia," Blinken told a news conference after a two-day meeting of foreign ministers from the Western defense alliance.

"But we also remain committed to maintaining a constructive dialogue with China wherever we can and we welcome opportunities to work together on common challenges. Blinken's remarks came after Moscow said Russian and Chinese strategic warplanes, including Tupolev-95 long-range "Bear" bombers, conducted joint patrols over the Sea of Japan and East China Sea and U.S. ally South Korea said it had scrambled fighter jets as two Chinese and six Russian warplanes entered its air defence zone. They also came after a Pentagon report said China would likely have a stockpile of 1,500 nuclear warheads by 2035 at its current nuclear buildup pace, underscoring mounting U.S. concerns about Beijing's intentions for its expanding arsenal.

China and Russia alarmed the United States and its allies by announcing a "no limits" strategic partnership with Russia in February, just days before Russian forces invaded Ukraine. South Korea and its neighbor Japan have since developed closer ties to NATO, attending the June NATO summit as observers and South Korean firms shipped armaments to Russian neighbor and NATO member Poland this year. Blinken said that while NATO continues to be focused on maintaining unified support for Ukraine, members also want to boost the alliance's resilience by considering new challenges, including those posed by China.

"What we talked about today is, again, making sure that we are working to adapt in concrete ways to meet the challenge," Blinken said without elaborating. The United States and its allies recognize there is a competition to shape the world beyond the Cold War divisions. "There's a recognition that there's also in many ways, what Europeans call a systemic rivalry between China and many of our countries," Blinken said. "But there's also a recognition that wherever possible, we have to find ways to cooperate on the really big issues."

https://economictimes.indiatimes.com/news/defence/nato-concerned-about-chinas-opaque-military-buildup-antony-blinken/articleshow/95917073.cms

moneycontrol

Thu, 01 Dec 2022

Finding a Cure for Rare Diseases: Centre Mulls Joint Mission with Ashoka University

The Centre is considering crucial collaborative project by a leading private university to find therapies for three types of rare diseases. Currently, the treatment available for these diseases is prohibitively expensive and out of the reach of needy patients in India. The project will involve 18 institutions (including some top government-run centres), 38 investigators and 5 clinical centres collecting data. Sonepat-based Ashoka University, which is driving the project, has begun working on a nationwide programme to decode rare diseases and find a treatment for specific muscle-degeneration diseases.

Rare diseases, also referred to as orphan diseases, are mostly rooted in genetic defects, and have an occurrence of 1 or less per 10,000 people, resulting in lower investments in research. Worldwide, about 7,000 of the rare diseases have been recognised, of which nearly 500 have been identified in India. About 7 crore people in the country are believed to be afflicted by these diseases, based on estimates by researchers from outside India. Leading biologist Alok Bhattacharya, a faculty member at Ashoka who is leading the project, titled Myo-Mission, said that the Centre's Department of Biotechnology has given greenlightedpre-clinical studies to develop therapies for the three diseases through multiple approaches, such as gene, small molecule and messenger RNA therapies.

The three diseases, which are rooted in muscle, put together affect an estimated 11 lakh people in the country and have been chosen for research as many of the methods, techniques and tools in drug development to combat them are expected to be the same. "Developing therapy means we have to do a number of other things, which means not only working in a lab but having systems to test therapeutic molecules and having animal models to test them and eventually take them towards the clinical side," Bhattacharya said. He also pointed out that for rare diseases in India, diagnosis beyond a few major centres is difficult and even after diagnosis nearly 95 percent of the ailments do not have a treatment.

"In the case of 5 percent of the diseases, where treatment may be available, the cost is very high except for a handful of them, and runs into lakhs and crores of rupees per year," Bhattacharya said. Needless to say these treatments are out of the reach of most Indians. "Most drugs are made abroad and since there are fewer patients, the cost is especially very high. For instance, one of the drugs costs more than Rs 2 crore," he explained.

Joint efforts

As part of the mission, said Bhattacharya, researchers from his university are interacting with patient groups through clinical centres. These groups, which will also help in data collection related to the project, would be crucial to get patients to participate, he added.

https://www.moneycontrol.com/news/trends/finding-a-cure-for-rare-diseases-centre-mulls-joint-mission-with-ashoka-university-9630461.html

Wed, 30 Nov 2022

Pulses Driven by Artificial Intelligence Tame Quantum Systems

It's easy to control the trajectory of a basketball: Just apply mechanical force coupled with human skill. But controlling the movement of quantum systems such as atoms and electrons is much more challenging, as these minuscule scraps of matter often fall prey to perturbations that knock them off their path in unpredictable ways. Movement within the system degrades—a process called damping—and noise from environmental effects such as temperature also disturbs its trajectory. One way to counteract the damping and the noise is to apply stabilizing pulses of light or voltage of fluctuating intensity to the quantum system. Now researchers from Okinawa Institute of Science and Technology (OIST) in Japan have shown that they can use artificial intelligence to discover these pulses in an optimized way to appropriately cool a micro-mechanical object to its quantum state and control its motion.

Their research was published in November 2022 in Physical Review Research. Micro-mechanical objects, which are large compared to an atom or electron, behave classically when kept at a high temperature, or even at room temperature. However, if such mechanical modes can be cooled down to their lowest energy state, which physicists call the ground state, quantum behavior could be realized in such systems. These kinds of mechanical modes then can be used as ultra-sensitive sensors for force, displacement, gravitational acceleration etc. as well as for quantum information processing and computing. "Technologies built from quantum systems offer immense possibilities," said Dr. BijitaSarma, the article's lead author and a Postdoctoral Scholar at OIST Quantum Machines Unit in the lab of Professor Jason Twamley.

"But to benefit from their promise for ultraprecise sensor design, high-speed quantum information processing, and quantum computing, we must learn to design ways to achieve fast cooling and control of these systems." The machine learning-based method that she and her colleagues designed demonstrates how artificial controllers can be used to discover non-intuitive, intelligent pulse sequences that can cool a mechanical object from high to ultracold temperatures faster than other standard methods. These control pulses are self-discovered by the machine learning agent. The work showcases the utility of artificial machine intelligence in the development of quantum technologies.

Quantum computing has the potential to revolutionize the world by enabling high computing speeds and reformatting cryptographic techniques. That is why, many research institutes and big-tech companies such as Google and IBM are investing a lot of resources in developing such

technologies. But to enable this, researchers must achieve complete control over the operation of such quantum systems at very high speed, so that the effects of noise and damping can be eliminated. "In order to stabilize a quantum system, control pulses must be fast—and our artificial intelligence controllers have shown the promise to achieve such [a] feat," Dr. Sarma said. "Thus, our proposed method of quantum control using an AI controller could provide a breakthrough in the field of high-speed quantum computing, and it might be a first step to achieve quantum machines that are self-driving, similar to self-driving cars. We are hopeful that such methods will attract many quantum researchers for future technological developments."

https://phys.org/news/2022-11-pulses-driven-artificial-intelligence-quantum.html

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Tiny Swimming Robots can Restructure Materials on a Microscopic Level

Controlling microscopic processes is inherently challenging. The everyday tools we use to manipulate matter on the macroscale can't simply be shrunk down to the size of cell, and even if they could, the physical forces they rely on work differently when their targets are measured in nanometers. But while it's no easy feat, attaining this type of control would pay enormous dividends: whether it's transporting drugs to tumors for precise therapies, or making functional materials out of the liquid-suspended building blocks known as colloids, Penn Engineers are working to make these processes faster, safer and more reliable.

One approach for controlling these processes is through the use of microrobots.

We typically think of robots as computerized machines like those on assembly lines or in warehouses, programmed to move cargo and to build complex structures like automobiles and cellphones. However, programming a machine smaller than a microchip presents another kind of challenge. Too small for computerization, robots on this scale need to be designed in a completely different way—and adhere to completely different sets of physical and chemical laws—than their bigger counterparts. Since they're too small for their own onboard computers, microrobots move about by means of an external magnetic force. And to manipulate equally small cargo, they need to take advantage of the different physical and chemical laws that rule the microscale.

At those sizes, every object is greatly influenced by the molecules surrounding it. Whether they are surrounded by gas, like the ambient atmosphere, or immersed in a liquid, microrobots must be designed to exploit this influence through a concept known as "physical intelligence." By understanding the system, the surrounding media and the particles within it, physically intelligent microrobots can perform diverse tasks. Kathleen Stebe, Richer & Elizabeth Goodwin Professor in Chemical and Biomolecular Engineering and Mechanical Engineering and Applied Mechanics, Tianyi Yao, a former Ph.D. student in her lab, Qi Xing Zhang, a current Ph.D. student, and collaborators in the group of Professor MihaRavnik at the University of Ljubljana are conducting fundamental research that will lay the groundwork for understanding these small-

scale interactions in a colloidal fluid of nematic liquid crystals (NLCs), the fluid that makes up each pixel in a liquid crystal display (LCD) screen.

"Nematic liquid crystals exist as a special phase, a structured fluid that is neither liquid nor solid," says Stebe. "NLCs consist of elongated molecules that self-align in a configuration that requires the least amount of energy. Think of shaking a pan of rice; the grains all align. When you disturb the nematic alignment by introducing microrobots or colloidal cargo, you get really interesting dynamics that you don't see in water, for example. It is the physics of NLCs that allow us to investigate these unique interactions." In one study, published in Advanced Functional Materials, the research team describes a four-armed, magnetically controlled microrobot that can swim, carry cargo and actively restructure particles in this complex fluid.

"We started with a complex shape, which produced complex behaviors," says Stebe. "Here, the microrobot is being controlled by an external magnetic field and is using its physical intelligence to pick up a microparticle as cargo, then it bats it around as it swims to the textured surface. The grooves in the surface material are the perfect size to attract and hold the particle. In fact, it was that surface design that inspired the design of the four-armed microrobot. We took advantage of the physical shape, surface chemistry and special dynamics of the colloid in NLCs to control it."

"But, the more we observed these sophisticated functions, the more we didn't understand," she adds. "We had to turn back to the fundamentals to actually explain what was going on here." How was this robot able to swim? How was it able to hold and move particles? In another study, published in Science Advances, the team answered those questions with a microrobot of a simpler shape. "The disk shape allowed us to better understand the microbot's swimming ability," says Stebe. "Here we can see that as one side of the disk tilts upwards, there is a topological defect that is created underneath it. The interaction between the topological defect and the disk itself creates an energy gradient that allows for self-propulsion of the disk."

The reason for the topological defect which allows for the swimming function of the robot is because of the complex organization of the NLCs, which differs dramatically from disorganized liquids like water. "Using physics of nematic liquid crystals," says Yao, the lead author of both studies, "we can build physically intelligent microrobotic systems. We can make long-range interactions, tune binding strengths and reconfigure the space. While we have proven these interactions on the microscale, the prevailing physics are also effective on very small scales, on the order of 30–50 nanometers." Being able to manipulate processes on this level is groundbreaking, and understanding how robotic systems are able to perform tasks in an indirect way, considering the fluid dynamics and physical interactions of the media as a part of the microrobot's design, is key.

Stebe and her team are now able to imagine real-world applications for this technology in the optical device industry as well as many other fields. Smart materials, aware of their environment, may be designed using temperature and light as controls for microrobotic tasks. "Together with dedicated colleagues and graduate students, we have been working hard on this technology, and are excited to see years of work come to fruition," she says. "We are now standing on the edge of real applications and ready to explore."

https://techxplore.com/news/2022-12-tiny-robots-materials-microscopic.html