June 2020

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

Volume: 45 Issue: 133 09 June 2020

रक्षा विज्ञान पुस्तकालय
Defence Science Library
रक्षा वैज्ञानिक सूचना एवं प्रलेखन केंद्र
Defence Scientific Information & Documentation Centre
मेटकॉफ हाउस, दिल्ली - 110 054
Metcalfe House, Delhi - 110 054

CONTENT

DRDO News

COVID-19: DRDO's Contribution

Outlook
THE FULLY LOADED MAGAZINE

Tue, 09 June 2020

SWR manufactures 2,252 PPE coveralls in less than two months

Bengaluru: Contributing in the fight against coronavirus, the South Western Railway said it has manufactured 2,252 high quality Personal Protective Equipment (PPE) coveralls for medical and healthcare personnel.

"Aiding the medical fraternity by providing protective gear as they battle the COVID-19 pandemic, SWR has started the manufacture of high quality PPE Coverall equipment from April 21 and so far manufactured 2,252 Coveralls as prescribed by Ministry of health and Family welfare," the SWR said in a statement.

It also said its workshops at Hubballi and Mysuru have successfully replicated the high quality PPE Coveralls.

The SWR said that the Indian Railways" doctors, medical professionals, other health workers and care-givers are working tirelessly fighting the COVID-19 disease.

Giving breakups, the SWR said its Hubballi Workshop has manufactured 1,612 coveralls whereas Mysuru Workshop has manufactured 640 coveralls.

"PPE suits are being manufactured in workshops of Hubballi and Mysuru under strict quality control as per the established standards. Railway has planned to scale up manufacturing of Personal Protective Equipment while adhering to strict quality controls as per the quality standards and each of the workshops are targeted to manufacture 8,400 Coveralls in next two months," the statement read.

The first prototype of the PPE was designed and manufactured by the Jagadhari workshop of Northern Railway.

It was later approved by the Defence Research Development Establishment Laboratory of DRDO at Gwalior.

"The coverall samples passed all the tests conducted by DRDE with the highest grades," the SWR said.

(Disclaimer: This story has not been edited by Outlook staff and is auto-generated from news agency feeds. Source: PTI)

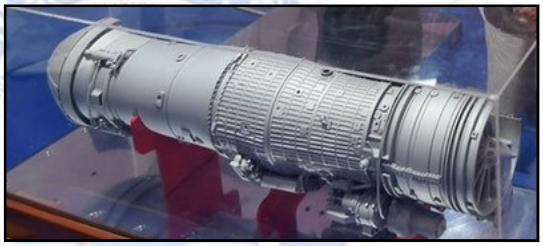
https://www.outlookindia.com/newsscroll/swr-manufactures-2252-ppe-coveralls-in-less-than-two-months/1860058

Tue, 09 June 2020

TEDBF: Can DRDO make case for IUCAV-UHF20 Engine?

By Rajesh Ahuja

India is on the path to develop a 25 tonne Twin Engine Deck Based (TEDBF) Fighter jet for Indian Navy and as per information coming in, which will be powered by Two F414-GE-INS6 afterburning turbofan engines manufactured by General Electric which generates Dry Thrust of 58 kN and Wet thrust class of 98 kN, which in Twin engine configuration will mean that TEDBF will have an excellent TWR or T/W ratio when compared to aircraft in its class. Rafale M and Mig-29K are only other two carrier-based Twin-engine fighter jets which will be in the same class as TEDBF when it is ready.



Rafale M is powered by the M-88 engine which generates a Dry Thrust of 50 kN and Wet thrust class of 75 kN, while Mig-29K is powered by RD-33MK " Sea Wasp " engines generates a have Dry Thrust of 50 kN and Wet thrust class of 88 kN.

Indian Navy operates Mig-29K from its aircraft carrier and according to open source information, TWR or T/W ratio of Mig-29K is 0.80 with a full fuel load and four AAMs (Air-to-Air Missiles), TWR or T/W ratio of Rafale M is slightly better at 0.98 again with a full fuel load and four AAMs. Rafale M enjoys a lighter empty weight and lighter engine weight due to which it has slightly better TWR ratio when compared to Mig-29K, but Indian Navy already has demonstrated that MiG-29Ks could take off from INS Vikramaditya with a full load of 5.5 tonnes, it could be any combination of AShMs, fuel tanks, precision-guided munitions and air to air missiles.

TEDBF's TWR or T/W ratio with a full fuel load and four AAMs could be around 1.10 to 1.15 if the Empty weight of the TEDBF is 10.5 tonnes and due to lightweight engine and with higher thrust engines like F-414 it could be considered one of the best, Thrust to Weight Ratio in any Fighter Plane which is usually found in Air Superiority fighter jets Class. If ADA can manage the empty weight of TEDBF around 10.5 tonnes then it won't be requiring an F-414 engine at all to perform the same operations which can be done with a lower thrust engine.

DRDO has started developing the IUCAV-UHF20 Engine which is an advanced version of Kaveri's Dry section which will have Dry Thrust of 52 kN. IUCAV-UHF20 Engine will not have an afterburner module or propelling nozzles but the addition of this module will allow this engine to generate 81.0 kN to 85 kN class of Wet thrust which should be sufficient to power TEDBF.

Since Technical specifications of TEFBF is yet to be framed, a lot of factors will play crucial factors before IUCAV-UHF20 Engine can be considered for TEDBF fighter jets. TEDBF needs to have an empty weight of lesser than 11 tonnes and After burning module of IUCAV-UHF20 Engine needs to have Wet thrust of at least 85 kN. Other important factors are that the engine is less than 1 tonne in weight and is ready, tested, Certified to enter production by 2030 when TEDBF has been planned to go into production.

(Disclaimer: Articles published under "MY TAKE" are articles written by Guest Writers and Opinions expressed within this article are the personal opinions of the author. IDRW.ORG is not responsible for the accuracy, completeness, suitability, or validity of any information on this article. All information is provided on an as-is basis. The information, facts or opinions appearing in the article do not reflect the views of IDRW.ORG and IDRW.ORG does not assume any responsibility or liability for the same. Article is for information purposes only and not intended to constitute professional advice. Article by Rajesh Ahuja, cannot be republished Partially or Full without consent from Writer or idrw.org Posted in India, My Take)
https://idrw.org/tedbf-can-drdo-make-case-for-iucav-uhf20-engine/#more-228842

Defence News

Defence Strategic: National/International

MANOHAR PARRIKAR INSTITUTE FOR DEFENCE STUDIES AND ANALYSES
मनोहर पर्रिकर रक्षा अध्ययन एवं विश्लेषण संस्थान

Tue, 09 June 2020

Refining Draft Defence Offset Guidelines 2020

By Laxman Kumar Behera

Summary: The draft offset guidelines 2020, with revamped features, is a bold attempt by the MoD to attract technology and investment and promote the export of major defence items. However, the guidelines could be further fine-tuned to keep the focus tight on their larger objectives. In particular, the MoD may consider further refining features pertaining to the applicability of offsets to IGA/FMS procurement, quantum and threshold of offsets, specific offsets through the RFP mode, banking provision, negative multiplier, methodology for value addition, the FDI cap and, more importantly, the offset management.

The draft Defence Procurement Procedure 2020 (DPP-2020), released on March 20 for public comments, has made a substantial revision to the offset guidelines.1 The focus of the new offset guidelines is export of major defence items and investment and technology transfer. Will the new guidelines be a game-changer in the Ministry of Defence's (MoD) efforts at building a strong arms industry, or require further fine-tuning to achieve the aforementioned objectives?

Background to Draft Offset Guidelines 2020

The draft offset guidelines come in the wake of MoD's experience in handling over 50 offset contracts signed until now. These contracts, signed under various DPPs since 2005, are valued nearly $12 billion and likely to be fully executed by 2024. The experience of managing these contracts is likely to have weighed heavily in effecting the change in the draft guidelines. Though the MoD's experience in handling all signed offset contracts is not available in the public domain, some idea could be formed from the key findings of a study undertaken by the Manohar Parrikar Institute for Defence Studies and Analyses (MP-IDSA) on behalf of the Department of Defence Production (DDP).2 As per the findings of the study, which were conveyed by the MoD to the Parliamentary Standing Committee on Defence, about 87 per cent of the offsets went to 15 Indian Offset Partners (IOPs), who in turn also benefited from repeat orders placed on them by the same offset providers. Moreover, more than 90 per cent of the offset obligations were discharged through the purchase of goods and services, with a few takers for the technology and investment which are considered more beneficial to the local industrial development.3 Evidently, the previous

guidelines neither helped in any meaningful expansion of the defence industrial base nor the industry's technological or infrastructural development. In other words, the previous guidelines were not fully up to the expectations of the MoD. This could be one of the main causes of change in the draft guidelines.

Notable Changes in Draft Offset Guidelines 2020

The draft has made a number of fundamental changes in the offset guidelines, including the objectives which are now much more focused on defence industrial promotion. The development of two synergistic sectors – the civil aerospace and internal security, which were part of the offset guidelines since DPP-2011, is no longer a core objective in the new guidelines.

Changes have also been made in the avenues for the discharge of offsets, the eligibility of IOPs to partner with foreign original equipment manufacturers (OEMs) for the fulfilment of latter's obligations, the list of items permitted for the discharge of offsets, and the multiplier applicable in transactions under different avenues (see Annexes 1 and 2 for the key features of the offset guidelines of Draft DPP-2020 and DPP-2016).

In comparison to the existing guidelines, the number of avenues for the discharge of offset has been reduced from six to five. The 'investment in kind', which was introduced in the DPP-2013, no longer remains a valid avenue. The Transfer of Technology (ToT), first permitted as an avenue in the DPP-2013, has been given a renewed focus by permitting the foreign OEMs to obtain direct credit for ToT to the Indian industry to manufacture eligible items, identifying a list of 49 technologies for acquisition by the government entities involved in design and manufacture of defence items, and modifying the list of technologies reserved for acquisition by the Defence Research and Development Organisation (DRDO).

Accepting a long-standing demand from the OEMs, the guidelines have for the first time allowed the fulfilment of offset discharge by entities other than the main offset provider and its Tier-I sub-vendors on a case-to-case basis. This is likely to enable the main offset providers to use their subsidiaries and other sister companies to fulfil offset obligations on their behalf.

The list of eligible products and services permitted for the fulfilment of offset obligations has been sharply pruned to seven major categories of defence items.[4] All the services, except for maintenance and repair and overhaul (MRO) related to aircraft and helicopters, are no longer eligible for discharge of offset obligations. The pruning of the list and confining it to mostly products seems to be driven by the MoD's desire to promote manufacturing, rather than services, in which India has developed a reasonable level of capability.

A noticeable change is the abolition of banking provision from the new guidelines. The provision, an integral part of offsets guidelines since its introduction in 2008, had allowed both pre- and post-banking[5] by permitting vendors to claim credits for certain permitted transactions. Though the reason for scrapping the provision is not known, one plausible factor could be the MoD's difficulty in distinguishing (especially in post-banking cases), the genuine offset-induced transactions from those undertaken as part of the OEM's routine commercial business. Suffice it to say that since India is a major hub for software, design and engineering services, it is quite possible for the OEMs to have claimed credit for certain transactions which were not necessarily driven by the MoD's offset policy.

From the perspective of the objectives of the draft guidelines and the MoD as a buyer, the key change in the offset guidelines pertains to the multiplier provision.[6] The provision is a direct yet bold attempt to achieve three broad goals: to facilitate technology transfer, attract foreign direct investment, and promote export of major defence items as opposed to parts and components. The higher multipliers (two, three and four) are reserved for investment and technology transfer. For the first time, the guidelines have stipulated a negative multiplier – 0.5 – which is applicable to purchase/export of parts and components.[7] The negative multiplier is clearly intended to discourage OEMs to resort to buying parts and components to fulfil their obligations – a practice found not so effective in furthering the domestic defence industry's core capability.

In addition, the draft guidelines have also made a number of changes, pertaining to offset period of discharge, accountability and transparency. Like in the existing guidelines, the period of discharge is now limited to a maximum of two years beyond the period of the main procurement contract. However, the warranty period, which was earlier part of the procurement period, is delinked, reducing the offset fulfilment period to that extent. Though the reason is not provided, it may be due to the MoD's attempt to enforce quick implementations of offsets. However, from the OEMs' perspective, the delinking of warranty period could be a cause of concern, especially for projects which have a long gestation period.

To improve transparency and accountability, the guidelines have made a provision for online submission of offset discharge claims. This is likely to save not only time in transmitting the bulky documents from the OEMs to the concerned agencies of the MoD, but will also help in a real-time audit of the submitted claims.

For the first time, the offset guidelines have introduced a dispute settlement mechanism in the form of Independent Monitors (IM) to resolve any differences and disputes with the OEMs. The IM is expected to submit its advice in two months. The final decision on the matter, however, rests with the MoD. From the perspective of the OEMs, this provision seems unilateral as it is not in sync with the arbitration clause of the main procurement contract, which is also applicable to the offset contract.[8]

Further Refining Draft Offset Guidelines

A Case for Subjecting IGAs/FMS to Offsets

While Chapter I of the draft DPP states that procurement through inter-governmental agreements (IGA), including the foreign military sales (FMS), are exempt from offsets, the detailed offset guidelines are silent about it. The final version of the DPP-2020, when announced, need to clarify the exact provision so as to eliminate the doubt on the applicability of offsets.

While clarifying the doubt, the MoD, however, needs to weigh the cost and benefit of its decision. It is true that offsets make IGAs/FMS deals expensive as vendors are naturally inclined to take advantage of lack of completion and load all the extra cost of offset liability onto the main contract. At the same time, since the IGAs/FMS constitute the bulk of India's arms import, exempting them from the offset purview will reduce offset inflows to a negligible amount. This will particularly impact the micro, small and medium enterprises (MSMEs) for whom offset is not only a key source of revenue but also capacity and capability augmentation. As explained later, there is a case for subjecting IGAs/FMS to offsets, though the quantum may be different from those applicable to contracts under the competition mode.

Table 1. Cross-Country Comparison of Defence Offset Quantum and Threshold

Country	Quantum (%)	Threshold ($ Million)#
Canada	100	14
India	30	267
Israel	50	05
Malaysia	100	12
South Korea	10/50*	10
UAE	60	10

Note #: Conversion to US$ based on the prevailing exchange rate; *10 per cent offsets in single-source procurement and 50 per cent in the competitive contract.

Source: Offser Policy documents of respective countries

Offset Quantum and Threshold

Though the revised guidelines are a bold attempt at attracting technology and investment as well as promoting export of major defence items, the guidelines as a whole are not in sync with the quantum and threshold of offsets. As can be seen from Table 1, India's offset quantum at 30 per cent is lowest among the select countries. On the other hand, the threshold at which offsets kick in is the highest. In other words, in comparison to other countries, India foregoes offsets in a large number of arms contracts until the value of the contract reaches $267 million, and whenever offsets apply, the inflows are much smaller. To put differently, for a given value of the contract, India's offset inflows are either nil or much smaller.

More significantly, the flow of offset could further decline if the MoD decides to exempt IGA/FMS deals from the offsets. Given that the Indian industry, especially the private sector and the MSMEs, is dependent on offsets for their business viability and technological advancement, it is imperative for the MoD to create an adequate and sustainable bank of offsets. In light of this, the MoD may like to increase the quantum of offsets to, say, 50 per cent and lower the threshold to, say, $10-15 million.

In single-source procurements such as those undertaken through IGA/FMS, the quantum may, however, be different, as is the practice in South Korea, which demands only 10 per cent offsets in uncompetitive bids whereas its offset requirement is 50 per cent in all competitive defence tenders. The lower threshold is intended to partially reduce the offset-related cost loaded to the main procurement.

Specific Offsets through RFP

With fewer yet more focused avenues for the discharge of offsets in the draft guidelines, it would be ideal if the MoD could demand few specific offsets through the request for proposal (RFP) itself instead of leaving it entirely to the discretion of the OEMs. Leaving it to their discretion does not always help as the vendors are more interested in their business interests rather than the best interests of the Indian industry or the offset policy. To begin with, a few pre-identified offsets in technology areas could be demanded as part of the RFP for the public sector entities. Limiting it to the public sector would avoid the potential allegation of favouritism which is often associated with dealings with the private sector. The specific technologies could be identified based on each procurement and through a consultative process involving the Defence Public Sector Undertakings (DPSUs), the Ordnance Factory Board (OFB) and the DRDO.

Usefulness of Banking Provision

The scrapping of baking provision has created uncertainty over the status of the credits which are either banked or in the audit/submission stage. Suffice it to say that the existing guidelines permit banked credits to remain valid for seven years from the date of acceptance. If the draft guidelines become a rule, all credits which are either banked or in the pipeline for approval would not be eligible for utilisation against any contracts signed under the DPP-2020.9 This may not find favour with the OEMs who might have contemplated of their future use, regardless of the version of DPP, and subject, of course, to the validity of seven years and other conditions of the DPP.

The scrapping of baking provision might seem logical given the difficulty in distinguishing the genuine offset-driven offsets from transactions undertaken under the normal market force, but has vital usefulness, especially in the context of the revised offset guidelines. Unlike the previous guidelines, the avenues of the revised draft guidelines are much more focused, with little incentive for the OEMs to resort to buying services or parts and components to fulfil their offset obligations. The MoD could limit the use of banking to only export of major platforms and/or technology transfers from the pre-identified list. Needless to mention that the banking provision allows a longer and continued association between the foreign OEMs and the domestic industry, which is beneficial in fostering a domestic supply chain.

Impact of Negative Multiplier on Established Supply Chains

If the draft offset guidelines in the current form become the rule, the purchase of parts and components would yield half the credits earned earlier, unless, of course, they are sourced from the MSMEs for which multiplier of 1.5 is retained. The negative multiplier would be viewed as a strong disincentive, especially by those foreign OEMs who have already established some supply chains for sourcing parts, components, assemblies and sub-assemblies from India. Given the disincentive, some OEMs might also contemplate shifting the supply chain from India to greener pastures where such sourcing attracts higher incentive. Though such a move needs to be compensated by fulfilling the offset obligations by making use of other equally tougher avenues, the MoD cannot afford to take it for granted. Given that the future offset inflows could be dramatically reduced if IGA/FMS deals are taken out of offset purview, the OEMs would not have the burden of plenty to stick to the supply chain whose return on investment is reduced by half by a stroke of a policy change. It is, therefore, important for the MoD to undertake a cost-benefit analysis of any policy change in this regard.

Indigenous Content for Determining Value Addition

The draft guidelines have kept unchanged the concept of value addition by providing a credit against the purchase and export of goods. The principle guiding the value addition is, however, not in harmony with the revised methodology for Indigenous Content (IC) estimation. Given the advanced and industry-friendly features of the new IC methodology, it would be logical to extend the new methodology for estimating value addition in offsets. As a spin-off benefit, it would push the IOPs to issue IC certificates based on a rationale and practical methodology. Also, the MoD may like to insert a provision of sample audit of IC achieved by the IOPs, so as to encourage them to adhere to the highest standard of accounting.

FDI Cap

Following Prime Minister Narendra Modi's May 12 'Local for Vocal' call through the *Atma Nirbhar Abhiyan* (Self Reliant India Movement), Finance Minister (FM) Nirmala Sitharaman announced a number of defence reforms, including a hike in the FDI cap from 49 per cent to 74 per cent under the automatic route.10 With the FM's announcement, it is only natural to expect that the new FDI rule is extended to the offset by which the OEM can choose their IOPs with up to 74 per cent foreign equity under the automatic route. A clear provision in the offset guidelines, stating the IOPs' possible equity holding structure, would avoid stakeholders from seeking clarifications on a case-to-case basis.

Strengthening Offset Management

Though the MoD has created a dedicated agency in the form of Defence Offset Management Wing (DOMW), in replacement of the erstwhile Defence Offset Facilitation Agency (DOFA), it is not designed to get the best out of offset guidelines. In its present form, the DOMW is responsible for all matters connected with post-offset contract management. However, for all the matters relating to the pre-contracting stage, it is just one of the many participants, besides the Acquisition Wing, Service Headquarters, and the DRDO. The involvement of so many stakeholders with each having different reporting structures leads to dilution of responsibility and accountability.

In comparison to the DOMW, many other countries have set up a single-window agency for managing the critical aspects of offset functions, ranging from evaluation of proposals to monitoring the progress of projects, auditing of claims and providing credit.11 The MoD may like to empower the DOMW to undertake the entire range of offset management so as to instill a greater degree of accountability. Any enhanced role for the DOMW, however, needs to be accompanied by a suitable augmentation of human resource capital, as the present number of officials are grossly inadequate to fulfil a larger mandate.

Summing Up

The draft offset guidelines 2020, with revamped features, is a bold attempt by the MoD to attract technology and investment and promote defence exports. However, to keep the focus tight on the aforementioned objectives, the MoD may consider further refining some of the features, especially

those pertaining to the applicability of offsets to IGA/FMS procurement, quantum and threshold of offsets, specific offsets through the RFP mode, banking provision, negative multiplier, methodology for value addition, the FDI cap and, more importantly, the offset management.

Annexes

Annex 1. Key Features of Offset Guidelines, Draft DPP-2020

Offset Discharge Avenue	Eligible IOP	Offset Discharge Subject To	Multiplier#
Purchase / export of eligible defence products & services	Private sector / DPSUs / OFB	List of military items, including MRO related to aircraft and helicopters (civil infrastructure generally excluded)	0.5 for components of eligible items; 1.0 for eligible items; 1.5 if IOP is MSME
Investment for manufacture of eligible defence products*	Private sector / DPSUs / OFB	List of eligible defence products in seven categories (civil infrastructure generally excluded); No restriction on production, sale or export	2.0 if investment is in notified defence industrial corridors; 1.5 in other places
Transfer of technology for manufacture of eligible products	Private sector / DPSUs / OFB	List of eligible defence products in seven categories (civil infrastructure generally excluded).	2.0
Technology acquisition for government institutions*	Government entities such as DRDO / DPSUs / OFB, etc.	Identified list of technologies in 49 areas	3.0
Technology acquisition*	DRDO	List of critical technologies in 32 areas	4.0

Note: *: Offset discharge is permitted by entities other than the main vendor and Tier-I sub-vendor on a case-to-case basis; #: Clubbing of multiplier is not permitted.

Source: Adapted from **"Draft DPP-2020"**, *Ministry of Defence*, Government of India, March 20, 2020.

Reference:

1. See Appendix D to Chapter II in **"Draft DPP-2020"**, *Ministry of Defence*, Government of India, March 20, 2020.
2. The author was the member and coordinator of the study.
3. See Para 2.18 in **"Demands for Grants (2020-21)"**, Seventh Report, Seventeenth Lok Sabha, Standing Committee on Defence (2019-20), *Lok Sabha Secretariat*, March 2020, p. 38.
4. These categories are arms, ammunition and explosives, armoured vehicles, naval platforms, aircraft, electronics and communication equipment, and other defence products.
5. Pre-banking provision allows vendors to undertake certain transactions prior to contract signing and obtain credits for the fulfilment of future offset obligations. Post-banking allows vendors to generate excess credits from the ongoing offset programmes, to meet future offset obligations. Banking provision, in theory, allows longer association between foreign and domestic companies.
6. Multiplier is a factor that influences the credit value of any given transactions. For example, a multiplier of 2 will double the credit value of any given value of the actual transaction.
7. The multiplier 0.5 would mean that for a given value of the transaction, the credit value would be half of it.
8. Amit Cowshish, "Draft DPP 2020: Legacy Issues in Offset Guidelines", *MP-IDSA Comment*, April 30, 2020.
9. It might be noted that all proposals banked under various DPPs would continue to remain valid and eligible for utilisation as long as they are used in the stipulated timeframe and in a contract that is signed under the relevant DPP under which they are banked.

10. For an analytical review of the Finance Minister's May 16, 2020 announcement of defence reforms, see Sujan R. Chinoy and Laxman K. Behera, **"Self Defence is the Best Offence"**, *The Economic Times*, May 18, 2020.

11. Laxman Kumar Behera, **"Defence Offsets: International Best Practices and Lessons for India"**, *IDSA Monograph Series*, No. 45, June 2015, pp. 83-85.

Annex 2. Key Feature of Defence Offset Guidelines, DPP-2016

Offset Discharge Avenue	Eligible IOP	Offset Discharge Subject To	Multiplier
Purchase / export of eligible defence products & services*	Private sector / DPSUs / OFB	List of eligible defence, inland/coastal security and civil aerospace products and services (civil infrastructure generally excluded)	1.5 if IOP is MSME
FDI for manufacture / maintenance (provision) of eligible products (services)*	Private sector / DPSUs / OFB	List of eligible defence, inland/coastal security and civil aerospace products and services (civil infrastructure generally excluded)	1.5 if IOP is MSME
Transfer of technology through both equity & non-equity route for manufacture / maintenance (provision) of eligible products (services)*	Private sector / DPSUs / OFB	List of eligible defence inland/coastal security and civil aerospace products and services	1.5 if IOP is MSME
Transfer of equipment through non-equity route for manufacture / maintenance (provision) of eligible products (services)*	Private sector / DPSUs / OFB	List of eligible defence inland/coastal security and civil aerospace products and services	1.5 if IOP is MSME
Transfer of technology and equipment to government institutions to augment R&D, training and education	Government entities, including DRDO		
Technology acquisition	DRDO	List of critical technologies in 26 areas	2.0 (for unlimited domestic military use), 2.5 (for unlimited domestic use) and 3.0 (for unlimited use, including for exports)

Note. *: These avenues must constitute minimum 70 per cent of total offset discharge.

Source: Adapted from **"Defence Procurement Procedure 2016 Capital Procurement"**, *Ministry of Defence*, Government of India.

(Views expressed are of the author and do not necessarily reflect the views of the IDSA or of the Government of India.)

https://idsa.in/policybrief/refining-draft-defence-offset-guidelines-2020-lkbehera

millenniumpost
NO HALF TRUTHS

Tue, 09 June 2020

Not a single bullet

India's private sector defence manufacturing will need to answer to history. Years after being mollycoddled as the country's response to expensive imports, it remains a non-starter

By Rajeev Narayan

Don't let me tell you years from now that COVID-19 had the last laugh. It made us lock ourselves in our homes to deny it, taunted us enough to put on masks, gloves, glasses, even face shields. Its mirthless grin was sinister and its countenance so ominous that we washed and sanitised ourselves and everything that entered our main door — our hands, faces, foodstuff, pets. Even our mothers, brothers and sisters, turning us into petulant turnips that couldn't be turned, roasted or trusted. Not anymore. The mere thought of the virus entering our lives turned everything flaccid. It brought our airlines, railways, bus services, and all that moves — humans, animals, emotions, sentiments, et al, to a screeching halt.

COVID-19 saw us nonchalantly force our friends, relatives and maids out of our homes, cut salaries of those employees that we didn't sack, provided of course that we didn't lose our jobs ourselves. It also did something more heinous. It killed the budding promise of a free India, maimed 30 years of economic reforms and progress and in one sledgehammer blow, put paid to India's aspirational private sector manufacturing companies, further exacerbating their already perilous situation. Ruthlessly, it pushed India's manufacturing sector into a puissant corner, cackling away and thumping its minuscule chest. It all but broke our backs, and none more so than India's fledgeling private sector defence space.

Who shall history judge?

Inevitably, we shall have to answer. Someday. Especially so as the Government's outlined estimates have fallen flat. The Government of India planned to spend $130 billion (around Rs 9,75,000 crore) on military modernisation in the next five years. Defence sector manufacturing was opened up to the private sector a few years back under the 'Make in India' initiative, in an attempt to provide impetus to indigenous manufacturing. The opening up of the industry saw international original equipment manufacturers (OEMs) enter into strategic partnerships with Indian companies. As per Government norms, 74 per cent foreign direct investment (FDI) is now allowed in the defence industry in India under the automatic route, and beyond that, up to a 100 per cent, with special approvals after scrutiny.

The Government of India's 'Make in India' campaign saw a lot of hoopla and a truck-load of hype. India, we shouted from the rooftops, would now arrive on the world stage in ways hitherto unimaginable. We would manufacture guns, assault trucks, ballistic missiles, mortars and more, adding to the few things that we do make — the essentials of submarines and the superstructure of ocean-going vessels. But for one reason or the other, the listed projects have all been non-starters.

The men in the middle

For years, the defence industry space in India has been dense with middlemen. They are omnipresent and potent, yet invisible. Few surfaces in the shiny sun and fewer still have the temerity of donning an open garb. They are our night-riders. For nearly seven decades, they have facilitated foreign deals in the defence arena, mediating purchases running into billions of dollars of vital foreign exchange. And you have to remember that the defence sector has always been under scrutiny, both by the opposition and the media, as was witnessed in the case of Bofors, AgustaWestland and, more recently, Rafale.

FDI numbers are puny

India's defence industry received foreign direct investment (FDI) of a meagre $2.18 million during 2018-19, Parliament was informed in July 2019. In 2014-15, 2015-16, and 2017-18, respectively, the sector attracted FDI worth $0.08 million, $0.10 million and $0.01 million. Shockingly, in 2016-17, the industry failed to attract any overseas investments at all. Keeping the Indian defence industry company, in terms of similar nil inflows during this last fiscal, were industries such as photographic raw film, paper and coir.

Rajeev Oberoi, who works and specialises in the defence sector, explains why without mincing words. "India is yet to really make any kind of mark in the field of defence manufacturing, seven decades after independence. In the few things that we do manufacture in the country, our companies procure most of their basic raw material from Chinese firms, even for humble defence products such as bullet-proof jackets supplied to the Indian Army. The smallest Indian companies, including some based in Kanpur, produce the best of products, be it climbing ropes, bullet-proof vests, even simple PT shoes, but they have all been reigned in over the years, bit by bit. Orders do not get through, letters of intent are not issued on time — how do you expect Indian companies to survive, let alone grow?"

Stalwarts stay the course

The Mahindras carry on. As do the Tatas. The Kalyanis. And PSU giants like L&T. They soldier on, in the true sense. For long, they have been the country's manufacturing backbone, institutions that we have proudly showcased to the world. But for all their achievements and experience, their projects in the defence space haven't really taken off. One does hope that this changes soon and that India, over 70 years after independence, can begin to get its act together. For nearly 60 years now, we have had the Indian Institute of Technology (IITs), the Defense Research and Development Organisation (DRDO) and institutions of the calibre of Hindustan Aeronautics Limited (HAL). Surely, with the right approach and intent, and with a single dynastic ruling party at the Centre, we should have graduated in these six decades to making a Rafale or two, or more, ourselves?

India's private sector is to blame for the country's defence debacle too, especially those companies and groups that announced an early march into this space. Corporate giants like the Adani Group, Anil Ambani's Reliance Group, Bharat Forge and the Hindujas made vociferous proclamations, triggering media reports and social media festivities over projects that held huge potential, ones that would change the face of India's defence preparedness. It would lead to record foreign exchange savings too, the announcements claimed. Over time, though, when there was no real, actual on-ground production or even transfer of critical and nation-building defence technologies, these promises ran thin and the script went bland. Resultantly, it eroded national confidence and stunted the euphoria – eventually leading to indifference, a loss of faith in the very prospect of Corporate India having the ability, or the required will, to actually get things moving in the defence manufacturing space.

From Lockheed Martin to Saab AB, from Airbus SE to Dassault Aviation, and from Thalles to Hanwha Defense, international defence manufacturers have been lining up for decades with their offers of military hardware to India. But repeated delays and a funding crunch has made future deals next to impossible — and with all the monies that the Government has had to fork out to battle the COVID-19 pandemic, the funding situation is only going to get worse for the foreseeable future.

Massive push by Govt

Amid all the clamour and clatter of COVID-19 bailout announcements, Union Finance Minister Nirmala Sitharaman has provided a lifeline of sorts to the defence manufacturing space, part of the Rs 20 lakh-crore package and privatisation reforms in the coal, defence, power distribution and space exploration sectors.

India has all the ingredients in place to make a major dent in the massive international market for military and defence equipment — in fact, handled right by the private entities and given the necessary impetus and support of the Government, defence manufacturing holds the potential to be

one of India's greatest grossers of both technology transfers, FDI and foreign exchange. As mentioned earlier, through the IITs, DRDO and HAL, India has all the ingredients required to develop capabilities and emerge as a force to reckon with in the defence design, development and manufacturing space. Sure, it will take some time, but a beginning has to be made.

As a nation, we should not wait much longer for this, especially not when we have two oft-repeated threats at our borders, Pakistan and China, who are constantly nipping away at our resolve and patience, and who necessitate the need for the country to be at the cutting edge of weaponry, and defence capabilities and self-sufficiency.

(The writer is a business analyst and communications specialist. Views expressed are personal)

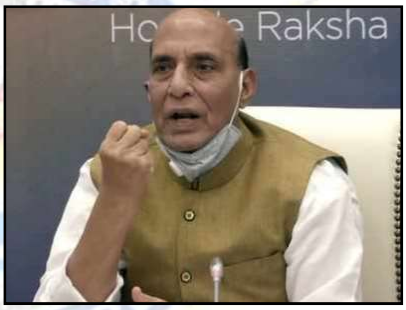
http://www.millenniumpost.in/opinion/not-a-single-bullet-410118

THE TIMES OF INDIA

Tue, 09 June 2020

CDS briefs Rajnath Singh on stand-off situation in Ladakh

New Delhi: Defence Minister Rajnath Singh met Chief of Defence Staff General Bipin Rawat and three service Chiefs on Monday to review the stand-off situation at Line of Actual Control in Eastern Ladakh.



Singh was also briefed about the deliberations that took place during the meeting of military commanders of both the countries on June 6.

"The meeting with Defence Minister was called for an assessment on the talks and future strategy as the army prepares for a long haul," a source said.

During the meeting, a plan is being drawn out to deal with issues that continue to be a cause of concern for India. The meeting went on for over an hour where General Bipin Rawat briefed Singh about the further course of action.

On Sunday, External Affairs Ministry stated that India and China have agreed to "peacefully resolve" the stand-off situation in Ladakh in accordance with various bilateral agreements. The ministry also stressed that military and diplomatic dialogue will continue to resolve the prevailing situation in Eastern Ladakh.

"The two sides will continue the military and diplomatic engagements to resolve the situation and to ensure peace and tranquility in the border areas," the ministry said in a statement.

The ministry issued a statement based on deliberations that happened during a meeting on Saturday between both countries' military delegates.

The ministry had said that a meeting was held between the Corps Commander based in Leh and the Chinese Commander on Saturday in the Chushul-Moldo region. Indian military delegate was headed by the commander of Leh based 14 Corp Lieutenant General Harinder Singh and Chinese delegate was headed by Major General Liu Lin, Commander of South Xinjiang Military Region.

It took place in a cordial and positive atmosphere, the ministry said.

"Both sides agreed to peacefully resolve the situation in the border areas in accordance with various bilateral agreements and keeping in view the agreement between the leaders that peace and tranquility in the India-China border regions is essential for the overall development of bilateral relations," the ministry had said in a statement.

The ministry had further stressed that both the countries noted that this year marked the 70th anniversary of the establishment of diplomatic relations between the two countries.

"Both the countries have agreed that an early resolution would contribute to the further development of the relationship," the ministry had said.

India and China are having dialogue to resolve the stand-off situation in Ladakh region, particularly at the north bank of Pangong Lake where the Chinese People's Liberation Army has attempted to change the status quo.

China has made attempts to change the status quo by putting up shelters and setting up a camp in areas that were under Indian control so far.

Before this dialogue, talks between major general-rank officers between the two countries took place on June 2 that remained "inconclusive".

A clash took place at Pangong Lake on May 5 when troops from both the armies were involved in the clashes leaving several from both sides wounded.

Sources further pointed out that the stand-off was not spontaneous reaction to India's road construction in Ladakh. Unusual activities were first noticed a few weeks before the clash in May.

The current stand-off in Ladakh is not the usual patrolling face-off but part of the new combative strategy that was rolled out by China after Doklam.

In 2017, there was a 73-day stand-off between India and China. The stand-off was at the India-China-Bhutan tri-junction Doklam. China's road construction in Bhutanese territory was seen as an attempt to change the status quo by India and finally the road work had to be stopped.

https://timesofindia.indiatimes.com/india/cds-briefs-rajnath-singh-on-stand-off-situation-in-ladakh/articleshow/76259743.cms

INDIAN DEFENCE RESEARCH WING

Tue, 09 June 2020

India-China military delegation talks of June 6 positive, will continue: Rajnath Singh

Defence Minister Rajnath Singh said the military delegation-level talks held on 6 June was positive. Rajnath Singh said on Monday that the talks on 6 June at Moldo, Border Personnel Meeting hut on the Chinese side of Line of Actual Control (LAC) were very positive. “Both India and China have agreed to resolve the border dispute in future and also the present tussle with talks.” He was addressing the Maharashtra BJP Karyakartas at a ‘virtual rally”.

Indian Army and the Chinese Army soldiers clashed with each other near Finger Five at the Northern Flank of Pangong Tso lake in Eastern Ladakh on the intervening night of 5-6 May. Again, there was a clash near Naku La Pass in the Muguthang sub-sector of Sikkim on 9 May. This resulted in the standoff first at Finger Four and subsequently, the Chinese soldiers entered the disputed areas of Patrolling Point 14 and Patrolling Point 15 in Galwan Valley, Gogra Post in the Hot Spring sector.

The Indian Army also moved troops to match the Chinese PLA deployment in the area. Defence Minister confirmed that India and China are talking at the military level and also at a diplomatic level. “The India China border dispute is a long-standing dispute. We want this to get resolved quickly. In no case we will let anyone hurt our respect and pride”, said Rajnath Singh.

India and China share 3488 kilometres-long LAC on which both sides have different perception which many times leads to a standoff situation.In the process of resolution of standoff, it was for the first time that military delegation-level talks were raised to the level of Corps Commander from

both sides.The Indian side was headed by Lt Gen Harinder Singh, Leh based 14 Corps Commander and the Chinese side was led by Major General Liu Lin, Commander of South Xinjiang Military Region.

There have been multiple delegation-level talks between the Brigadier level officers from both sides and there have been three Highest Level Military Commander talks before the Corps Commanders met. The talks will continue in future, as enunciated by both Indian and China.

India has clarified its position regarding the PLA reverting to status quo ante before the dispute started and the Chinese have raised the matter of infrastructure activities along the LAC.

https://idrw.org/india-china-military-delegation-talks-of-june-6-positive-will-continue-rajnath-singh/#more-228777

THE FINANCIAL EXPRESS

Tue, 09 June 2020

Sino-India border Issue: The Chinese imbroglio

The US has indicated that it's willing to recognise Taiwan and has supported the demonstrators in Hong Kong for their autonomous status

Lt Col Manoj K Channan (Retd)

The Chinese have been in the news in 2020 for all the wrong reasons starting from COVID 19 to its brashness in the South China Sea. The COVID 19 impact globally has trashed the economies and there is a surge amongst the US and China to grab the world's superpower status. The US and Europe have been direct in blaming the Chinese for lying on the Corona Virus – calling it the Chinese Virus. The US pulling out of the WHO and withdrawal of its obligation for future funding for failing to blame China; has the party hardliners in Beijing in anger.

The US has indicated that it's willing to recognise Taiwan and has supported the demonstrators in Hong Kong for their autonomous status. India's signing of the logistics treaty with Australia as part of the Quad in the Indian Ocean Region has upset the dragon.

Closer home the Chinese are trying to lock horns with the Indian Army in the Ladakh and Sikkim region. (File photo)

Closer home the Chinese are trying to lock horns with the Indian Army in the Ladakh and Sikkim region. No shots have been fired but isolated ambush of patrols leading to fist cuffs and use of nailed truncheons have injured soldiers on either side as per media reports. The Indians have been cautious of releasing "dramatic footage" on social media; whereas the Chinese have been quick to do so in trying to build up a macho image. Recently one of the state-run media company released a video of its troops being mobilised and being re-located as part of its Psychological War efforts.

This video may have been very amusing for those who have not witnessed military manoeuvres, to the serving and the Veterans it was just another day at work.

Indian Armed Forces routinely carry out collective training and retain their ability to be mobilised at short notice to take on any professional task that can be assigned to it.

The Indian Army, in particular, is one of the most battle-hardened armies in the world. In case a push comes to a shove the Armed Forces will deliver the punch at a time and place of its choosing.

The initiatives are on from India to contain the situation and restore a status quo ante. The Chinese Ambassador in Delhi in his statements indicates that China does want to settle the LAC alignment amicably; its military is on a different wavelength.

Hearing all professionals – diplomats, politicians and military leaders in a wide spectrum of discussions has brought out that the deployment this year is for the long haul.

The Indian Government has been dealing with China with kid gloves and has not had a long term clear policy. As in any developing Nation, the balance between carrying out infrastructure development is necessary to narrow the gaps between the haves and have-nots, the military modernisation takes a hit.

The political parties have huge funds and as is evident post any election, the horse-trading takes place and party with deep pockets manages to buy the requisite numbers be it MLAs or MPs. This is done in the public domain and yet no one questions the source of funds and I wonder if the income tax department puts the "politician" on a scrutiny watch for his tax payments.

The reason I raise the above point is that the Military is made to suffer as the fund crunch is imposed on the brass and the boots. The rest of the environment is able to maintain itself as unlike military equipment which tends to get obsolete very quickly in view of emerging technologies.

The Combat Potential of the Armed Forces remains critical. The National Security Advisor, the CDS and the Defence Secretary must brief the parliament on this important aspect.

The Indian Armed Forces over the last several decades have the best possible manpower available to it; it must be supported by the best weapons and equipment.

As India reboots itself post lockdown, the MoD should do well to fast track Make II projects under the DPP with assured orders and timely payments. The surge in this spending will trigger other ancillaries to kick start the economic revival. We need to lift ourselves from bootstrings upwards for all to succeed.

The raising of the Strike Mountain Corp(s) should resolve the demand and supply issue.

(The author is an Indian Army Veteran. Views expressed are personal.)

https://www.financialexpress.com/defence/sino-india-border-issue-the-chinese-imbroglio/1985045/

hindustantimes

Tue, 09 June 2020

India working on two roads in Ladakh amid border row

India is not allowing the border confrontation with China to hinder strategic road projects in forward areas, including the Ladakh sector, an official familiar with the developments said

By Rahul Singh& Sunetra Choudhury

New Delhi: India is working on two key roads near the China border in eastern Ladakh — the site of a tense weeks-long border stand-off with its northern neighbour — to provide connectivity to an important forward area that the military calls Sub-Sector North (SSN), two senior officers familiar with the developments said on Monday.

While the first is the strategic Darbuk-Shyok-Daulat Beg Oldi (DS-DBO) road that provides connectivity to the country's northern-most outpost, Daulat Beg Oldi, the second road being built from Sasoma to Saser La could eventually provide an alternative route to DBO near the Karakoram pass, said one of the two officers. The Sasoma-Saser La road axis is south-west of DBO.

Both projects are being executed by the Border Roads Organisation (BRO), which is ferrying 11,815 workers to areas near the China border in Ladakh, Himachal Pradesh and Uttarakhand for building strategic roads, as first reported by Hindustan Times on May 31.

India is not allowing the border confrontation with China to hinder strategic road projects in forward areas, including the Ladakh sector, where soldiers of the two nations are eyeball-to-eyeball at four locations along the Line of Actual Control (LAC), said the second officer cited above.

The current Chinese troop build-up in the Galwan valley threatens the critical 255-km DS-DBO road (also known as the SSN road), and top experts and China watchers have argued that India should build an alternative road to DBO.

The road from Sasoma to Saser La, at a height of almost 17,800 feet, is a tough project that falls under "Hardness Index-III", the BRO's top-most classification for hard projects, the second official added. Experts believe that the road can be extended to Brang Sa, Murgo and eventually DBO in the long term. BRO officials weren't available for a comment.

"There's a 200% need to have an alternative road to DBO in Sub-Sector North. The DS-DBO road can be interdicted at several choke points by Chinese forces during hostilities. While the road from Sasoma to Saser La can connect with DBO, it will be an engineering challenge due to the terrain. It may require construction of a tunnel too," said Lieutenant General BS Jaswal (retd), a former Northern Army commander.

HT reported on May 27 that if the DS-DBO project is blocked, the Indian Army will be forced to use aerial supply lines and also build an arduous alternative route linking Sasoma to Murgo to DBO through the glaciated Saser La. Two years ago, the BRO said the Sasoma-Saser La road would be the world's first motorable glaciated road.

Lieutenant General DS Hooda (retd), also a former Northern Army commander, said the construction of Sasoma-Saser La road in the glaciated terrain posed a huge challenge, especially in the final patches near Saser La.

"If we can build this road and further connect it to DBO, it could provide an alternative route during summer months. However, the all-weather DS-DBO road will remain very important for the army," Hooda said.

The defence ministry told Parliament's standing committee on defence last year that the Sasoma-Saser La road was a challenging project because of its peculiarities.

"Due to peculiarity of formation and shifting of moraines, the road suffers continuous shifting resulting in various gradients… The Central Road Research Institute has been approached for providing solution and the proposal based on CRRI recommendation is being prepared," the ministry told the panel.

Amid the border stand-off, top officials said the BRO would complete all 61 strategic roads assigned to it along the China border by December 2022 for swifter mobilisation of troops and stores to forward areas.

A day after the external affairs ministry said that India and China will continue military and diplomatic contacts to resolve the border stand-off, defence minister Rajnath Singh met the chief of defence staff and the three service chiefs and reviewed the situation along the disputed border in the Ladakh sector.

An hours-long meeting on Saturday between a delegation led by Lieutenant General Harinder Singh, commander of Leh-based 14 Corps, and a Chinese delegation headed by Major General Liu Lin, commander of the South Xinjiang military region, at Moldo on the Chinese side of the LAC ended without a breakthrough.

The external affairs ministry said the meeting "took place in a cordial and positive atmosphere" and both sides agreed to work towards peacefully resolving the situation.

In the first official acknowledgement of a troop build-up along the disputed border with China. Singh last week said a significant number of Chinese troops were present along the LAC and the Indian Army had matched the neighbour's military moves.

China has marshalled close to 5,000 soldiers and deployed tanks and artillery guns on its side of the disputed border in the Ladakh sector, where India has also sent military reinforcements, as reported by HT on May 26.

The situation of the ground remains unchanged in the midst of efforts to break the stalemate, said officials. They added that increased Chinese air activity had been observed on the other side of the LAC during the last few days.

https://www.hindustantimes.com/india-news/india-working-on-two-roads-in-ladakh-amid-border-row/story-lAh4LPrp20Z1wxX4AU9EON.html

THE TIMES OF INDIA

Tue, 09 June 2020

De-escalation in Ladakh to be a long-drawn process

By Rajat Pandit

New Delhi: India is prepared for the long haul in the actual de-escalation of the month-long troop confrontation in eastern Ladakh with China, though the dialogue between senior military officers on Saturday has set the ball rolling in the right direction.

India, having pumped in thousands of additional troops and heavy weaponry into the high-altitude region, will continue to press for return to the ground situation as it existed in mid-April along the Line of Actual Control (LAC), in the follow-up military and diplomatic talks that will now take place, said sources on Sunday.

The two sides resolved to defuse the confrontation in "a peaceful manner", without any further escalation and violence between the rival troops, in the seven-hour long meeting between 14 Corps commander Lt-General Harinder Singh and South Xinjiang Military District chief Major General Liu Lin on Saturday.

The Indian side, while asserting it was upgrading infrastructure well within its own territory, asked the People's Liberation Army (PLA) to adhere to the bilateral agreements and laid-down border management protocols, including specific provisions in the Border Defence Cooperation Agreement (BDCA) of 2013, said sources.

The actual de-escalation process, if and when it takes place, is likely to be a long-drawn one. There will be hard-nosed negotiations between the local commanders on the "different points of differences" and the subsequent working out of the modalities for the mutual and verifiable de-induction of troops, said sources.

The psychological warfare from across the LAC meanwhile continues unabated, as was the case during the 73-day Doklam face-off in 2017. In yet another veiled threat on Sunday, communist party-run Global Times said PLA recently held "a large-scale manoeuver" exercise to swiftly move thousands of paratroopers along with armoured vehicles to the country's high-altitude northwestern region from central China "amid the border tensions" with India. This demonstrates China's capabilities to "quickly reinforce border defences when necessary", it proclaimed.

India, however, is determined to restore status quo ante, which will be hinge on three things. One, the PLA will to have to withdraw its troops who intruded into Indian territory at the four to five confrontation sites at Pangong Tso (Tso means lake), Gogra-Hot Springs area and Galwan Valley region.

Two, the PLA will have to demolish its bunkers and other fortifications built at these sites, especially in the "Finger-4 to Finger 8" (mountainous spurs that are separated by a distance of 8-km) area on the northern bank of Pangong Tso.

The PLA since early-May has blocked all Indian patrols going west to east beyond Finger-4 by physically occupying the area right till Finger-8, the point where the LAC runs from north to south.

And three, China will have to pull-back the 5,000-7,000 PLA troops, who are backed by artillery guns and tanks, from areas along the LAC close to the face-off sites.

"With enough acclimatized troops, including additional battalions of Ladakh Scouts, along with artillery guns and tanks, the Indian Army is prepared for the long haul if it comes to that. IAF is also working closely with the Army to keep an eye on the overall situation in the region," said a source.

China's main grouse in the military domain is the fact that India is challenging its infrastructure dominance by constructing feeder links and bridges to its new 255-km Darbuk-Shyok-Daulat Beg

Oldie road, which will allow Indian troops swifter and easier access to areas like the strategically-important Karakoram Pass, Depsang plains and Galwan Valley, among other areas.

https://timesofindia.indiatimes.com/india/de-escalation-in-ladakh-to-be-a-long-drawn-process/articleshow/76251795.cms

THE TIMES OF INDIA

Tue, 09 June 2020

Chinese chopper activities go up along the LAC in Eastern Ladakh

New Delhi: Amid efforts to address the ongoing issues in Eastern Ladakh, the Chinese Army has increased the activities of its helicopters on its side of the Line of Actual Control (LAC).

The Chinese chopper activity has gone up significantly in the last seven to eight days on their side of the LAC. The reason may be to provide assistance to its troops deployed on various locations along the LAC, sources said here.

The Chinese chopper fleet operating there includes both the Mi-17s and their local medium-lift choppers, sources said.

In the last few months, China has been extensively using choppers to fly around Indian locations in the Eastern Ladakh sector including the Galwan area.

In the Galwan area, their choppers had even come above our locations and hovered over a road construction site there on one occasion recently, the sources said.

Sources said the Chinese have been frequently doing air space violations using their choppers and have been carrying out patrols near the Indian locations on the LAC.

Earlier last month, the Indian Air Force was forced to rush its fighter jet patrols in Ladakh after Chinese military choppers were found to be flying close to the Line of Actual Control. This incident happened around the same time the PLA troops and Indian army forces had face-offs in the first and second weeks of May.

"The Chinese military helicopters were flying very close to the Line of Actual Control. After their movement was picked up, the Indian Air Force fighter jets flew patrols in the area," government sources had said.

India and China have been engaged in a stand-off since May over heavy military mobilisation by the Chinese troops along the LAC. The Chinese army has also brought in its heavy artillery and armoured vehicles in the rear positions on its side of the LAC.

There have been multiple face-offs between the troops of India and China while both sides have tried to continue patrolling up to their usual points.

Both sides have had more than a dozen rounds of talks at the military level including one held on June 6 where India was represented by a Lieutenant General and China by a major general.

The talks also could not bring out any change on ground positions and both sides continue to be deployed in heavy numbers opposite each other at multiple locations from the DBO sector to the Chushul area.

https://timesofindia.indiatimes.com/india/chinese-chopper-activities-go-up-along-the-lac-in-eastern-ladakh/articleshow/76259273.cms

hindustantimes

Tue, 09 June 2020

To counter China, look for options beyond LAC

The military asymmetry helps China. India must acquire transborder capabilities and shed its sea blindness

By C Uday Bhaskar

India and China are currently engaged in an opaque military stand-off across the contested Line of Actual Control (LAC) in the eastern Ladakh region. The meeting between the two general officers from both nations on June 6 ended inconclusively. This was predictable and part of a familiar pattern. This amounts to no breakthrough or breakdown and a bland official statement on what is essentially "stasis in glacial progress" — as it has been since November 1962.

The contested LAC is symbolic of the decades-old territorial dispute, and from the Indian perspective, the October 1962 border war remains a stark reminder of the "humiliation" heaped on former PM Jawaharlal Nehru (Arvind-Yadav/HTPhoto)

Towards the end of May, Prime Minister (PM) Narendra Modi met with his core security team to review the People's Liberation Army (PLA) incursion, while Chinese President Xi Jinping called upon his military to "think about worst-case scenarios" and "to scale up battle preparedness". As part of this resolve, Beijing announced a $178 billion defence budget for 2020, and asserted that the coronavirus disease (Covid-19) pandemic would not adversely impact military preparedness.

The outcome of the latest talks is that while neither side wants military escalation leading to the exchange of ordnance, the "perception" of LAC in eastern Ladakh may have been altered in China's tactical favour, pending the final resolution of the seemingly intractable territorial dispute between the Asian giants.

Reviewing the current LAC *impasse* against the larger historical context and examining some structural trends may allow for a better understanding of India's options and the more viable way ahead to manage the China challenge.

The contested LAC is symbolic of the decades-old territorial dispute, and from the Indian perspective, the October 1962 border war remains a stark reminder of the "humiliation" heaped on former PM Jawaharlal Nehru.

However, at a deeper level, the discord between the two nations has its roots in their pedigree and self-image, that of ancient civilisations recast by the vicissitudes of history as modern nation-states now seeking to realise a glorious past.

The paths chosen were different and the contrast is striking. While Delhi opted for the yet unpaved road of democracy, diversity and Gandhian pacifism, the Chinese path to independence was through Mao's long march and a communist template. Thus, India will remain the eternal "other" in the Chinese calculus where the success of democracy and memories of Tiananmen 1989 remain the core concern for the ruling elite in Beijing. Thus, Taiwan and Hong Kong are high-octane issues that need to be resolved by President Xi lest the "democracy" virus, symbolically, reaches Tiananmen again.

Thus, while LAC and the surge in PLA presence in some areas of eastern Ladakh are causes for concern, the more relevant strand for India to be cognisant of is the unwavering Chinese focus on acquiring comprehensive military power, particularly the trans-border dimension of this military capability.

China pits itself against the United States (US) in its quest for great power status and this tape is to be breasted before 2049 — when Beijing will celebrate its centenary. The extended US-China tussle lies in the oceanic global commons, where Beijing perceives a vulnerability: The Malacca dilemma. This refers to China's marked dependence on the sea lines of communication for its vast

trade and energy imports. The Indian Ocean is the critical maritime domain and China is aware of its constraints as a Pacific Ocean power — geographical, political and naval, and the inherent US advantage in this spectrum.

It is instructive that China has maintained a steady uptick in its annual defence budget and the current allocation of $178 billion is an increase of almost seven per cent over the last year's allocation. Within this , PLA navy budget is 30% or $54 billion.

The contrast with India is more than stark. The $46 billion Indian allocation for defence was disaggregated to less than 14% for the navy, with the army and air force receiving major part of the defence budget. Thus, with the maritime domain presenting a range of opportunities and challenges for India, the annual naval budget is under $7 billion — and due to the pandemic, this is likely to shrink even further.

Steady fiscal support has allowed China to embark on a blistering pace of platform acquisition over the last few years. The PLA navy has been launching as many as 25 new vessels a year and hopes to be a 550-ship navy by 2030. As for the Indian navy, even a 175-ship figure is considered "optimistic".

The PM outlined his maritime vision in 2015 in his first term when he referred to security and growth for all in the region (SAGAR) in the Indian Ocean region. Unfortunately, this remains a vision and the fact that he did not have a full-time defence minister at that time was a major institutional constraint. Now, India has a revamped higher defence structure and one hopes that the engagement with China will be reviewed holistically and options beyond LAC considered .

Investing in the long-term acquisition of trans-border military capabilities that subsume emerging technologies is the key to managing the relationship with China. Modi has outlined the SAGAR objective. It needs a capable team that can implement this without resorting to quixotic statements. Sea blindness should not remain a permanent characteristic for Delhi.

(C Uday Bhaskar is director, Society for Policy Studies, New Delhi, The views expressed are personal)

https://www.hindustantimes.com/analysis/to-counter-china-look-for-options-beyond-lac/story-43Vqy8EoH5imAclr4h3OmO.html

THE HINDU

Tue, 09 June 2020

Fighting sea blindness

Forgoing a third aircraft carrier due to budgetary constraints could be counterproductive

By D.K. Sharma

This newspaper recently carried an article, "Third aircraft carrier not required as military's focus is on land borders: sources". In it defence sources questioned the need for a third aircraft carrier citing budgetary constraints. They propounded the immediate requirement of a strong Army supported by a capable Air Force. There can be no two views about this. What needs deliberation is whether (a) naval warfare is undertaken just for the sake of naval warfare; and (b) a maritime country like India can ever be strong without a strong Navy, since it depends on the sea for over 97% of its trade.

Representational image. | Photo Credit: Special arrangement

An incomplete understanding

One source said the Indian Navy "has seen action only twice, 1965 and 1971, on the sidelines of the land operations and the aircraft carrier had minimum role". India has seen classic naval action only once, in 1971, which was also a decisive victory. The political directions

available on record indicate that the involvement of the Navy in 1965 was kept to the minimum; in fact, it was prevented from operating beyond the north of Okha. That the 1971 war was land-centric is belied by documentary evidence. Both adversaries viewed sea communications as central to the war. Notwithstanding the attacks on Karachi by small missile boats, the 'centre of gravity' was on the Eastern front, where the carrier was deployed. Terming carrier involvement as peripheral displays an incomplete understanding of military history.

In *An Odyssey in War and Peace*, Lt Gen J.F.R Jacob noted the maritime orientation of the briefing by Gen Sam Manekshaw and the Director of Military Operations, Maj Gen K.K. Singh, who identified the ports as "prime objectives". It reads: "At the meeting, held in the operations room, Manekshaw, K.K. Singh, Arora and I were present... KK Singh spelt out the objectives, maintaining that if we captured Khulna and Chittagong... the war would come to an end". Gen Jacob recommended utilising "our naval superiority" to have an "effective naval blockade".

The official history of the Pakistan Navy *(The Story of the Pakistan Navy*) acknowledges that "the success of Pakistan's counter-plans hinged largely on reinforcements and resupply of the eastern theatre of war by sea... (by) breaking India's naval blockade". If the Indian Navy had not effectively stymied this plan, Pakistan was hopeful of a "stalemate" followed by international intervention. Almost a lakh Pakistani soldiers would possibly not have surrendered unless they had lost their "will to fight". The Indian Navy, using its lone carrier, ensured that no reinforcements or supplies were forthcoming and no escape route was possible.

Indian Naval history (*Transition to Triumph*) also records that "by themselves the ships of the Eastern Fleet were too few and too slow to enforce contraband control and help would be needed from Vikrant's aircraft. But the extraordinary extent to which Vikrant's aircraft actually succeeded in assisting ships in contraband control and apprehending merchant ships, over and above their air strikes against East Pakistan, came to be fully realised only after the war."

The contemporary argument that a carrier's utility in "future war scenarios will be short and swift" is interesting. Pakistan Navy history laments "vague concepts" such as "a short, sharp war" leading to it being accorded a lower inter-service priority. This rendered it incapable of "providing protection to the sea lines of communication between the two wings" and led to the 1971 debacle.

Another shibboleth that needs discarding is the claimed ability of any air force providing effective air cover at sea. In 1971, for example, carrier-borne aircraft repeatedly attacked Chittagong and Cox's Bazar airfields on the request of the Air Force.

Impact of parochialism

There are other counterpoints to the article too. First, stating that China went in for a carrier only after building its army is a narrow interpretation. This may have been Hobson's choice. Aircraft carrier operations take years to master even if a ship is available. Further, China's 2015 defence white paper states that "the traditional mentality that land outweighs sea must be abandoned". Even as China is reducing its land forces to focus on the sea, 'sources' are propounding that India do the exact opposite. Second, forgoing a carrier due to budgetary constraints is counterproductive. An indigenously constructed carrier can galvanise the economy given the large number of industries and MSMEs involved in the supply chain. Third, carriers being required only for global powers is debatable. India had initiated procurement of INS Vikrant within a few years of independence. Carriers cannot be built overnight. Planning for the future requires foresight. Parochialism and sea blindness in an era of COVID-19 budget cuts can have a long-term impact on comprehensive national power.

(Captain D.K. Sharma, a retired Naval Officer, was the Spokesperson, Indian Navy, at the Ministry of Defence)

https://www.thehindu.com/opinion/op-ed/fighting-sea-blindness/article31781576.ece

Tue, 09 June 2020

Future of Indian defence and the role of aircraft carriers

By Yusuf T. Unjhawala

India needs aircraft carriers – large ones with assisted take off at that, to secure the seas of the Indo-Pacific, to maintain peace, secure trade routes, provide security to the region, and in the event of a war, bring in lethal firepower. However, due to resource crunch with a slowing economy which has been further impacted by Covid-19, there is now a question mark over the acquisition of the proposed 65,000 ton aircraft carrier called Vishal with the Chief of Defence Staff General Bipin Rawat saying that the navy will have to prioritise between submarines and aircraft carriers. The navy has made it clear that it needs three carriers so that it has at least two in operation at all times – one for each of India's seaboards.

India will be the world's third largest economy in less than a decade. Trade constitutes 40% of its GDP, and nearly 20 million of its people live in foreign lands, many of which are in volatile regions. The navy needs all the resources to secure the country's interests. Asking it to prioritise submarines over aircraft carriers is like asking the Air Force to prioritise air defence systems over fighter jets. While submarines are best for sea denial, the aircraft carriers are for sea control and power projection. Both are important and needed for a major power like India.

The arguments against aircraft carriers are, that they are expensive, obsolete and vulnerable to new generation of missiles. It is akin to the obituaries of the tanks which have been written for decades now in the face of advanced anti tank missiles, attack helicopters and close air support aircrafts. But the tank continues to survive.

Vishal is estimated to cost about $7 billion to build and a further $5-8 billion for its complement of fighter jets, helicopters and surveillance aircrafts. The cost of the aircraft carrier cannot be considered in isolation. It provides a mobile air base that can be called to action in any part of the world, particularly in areas of India's interests – something that shore based or island based aircrafts cannot. Carriers take a decade to build with the costs spread over that period. It will need an initial funding to start the work and progressively increase as systems get integrated and the fighter jets ordered towards the latter half of construction. Moreover, an aircraft carrier has a life of nearly 50 years, which is twice other warships. That's not a bad investment.

India's economy will grow to about $4 trillion by 2025 and about $7 trillion by 2030. Assuming the current spending of 1.5% of the GDP on defence to remain stagnant, it will translate to $60 billion by 2025 and $100 billion by 2030 – net of pensions, and a cumulative spending of over $600 billion on defence during this decade. Of this, the navy will get $90 billion at its current allocation of 15%, of which nearly $50 billion will be capex.

The navy's big ticket projects-its submarines will take nearly 40% of its decadal capex. The six P75i submarines are expected to cost $7 billion. The navy could opt to continue the existing Scorpene class with the addition of air independent propulsion. This could save at least $2 billion. The other program is the six nuclear powered attack submarines which are expected to cost about $14 billion. A higher defence allocation and an increase in the navy's share cannot be ruled out considering the geopolitical scenario. Theatre commands, better inter-services procurement co-ordination & increase in indigenization reducing costly imports – will save money for modernisation. Although the current situation looks tight, money for a third aircraft carrier can be provisioned.

Aircraft carriers are not obsolete. The US operates ten and is building a new class of carriers, first of which is undergoing trials. The UK after pondering over the need for carriers went ahead and commissioned two. China has two and plans to operate at least six. Threatened by China's increasing naval muscle, pacifist Japan announced to convert its two Izumo class of helicopter carriers into aircraft carriers. France operates the only nuclear powered carrier apart from the US.

An aircraft carrier is not a sitting duck as it is made out to be. It is escorted by destroyers, frigates and corvettes and submarines. For India, these are armed with the 290km range Brahmos supersonic anti ship cruise missiles which can take out enemy warships at that distance in about five minutes, travelling at 3,700 kmph. The sea skimming Brahmos will not be picked up by enemy ships until it's too late. India is working on a longer range Brahmos that can strike up to 600 kms. These combatants including the carrier carry air defence systems to counter incoming missiles. A carrier is not easy to sink even if a missile hits it.

The carrier's fighter jets, currently the MiG-29K on India's INS Vikramaditya with a combat range of 850kms on fleet defence mission will be able to neutralise enemy combatants at long distances before they get close to the carrier. In the future, the carriers will be armed with even more advanced and potent fighter jets with Boeing's F-18 Super Hornet and Dassault's Rafale competing for the 57 jet program. India plans indigenous carrier borne fighter jets which will reduce acquisition costs. There are anti submarine helicopters onboard and the Indian Navy has the advanced P-8 surveillance, anti-submarine and anti-surface warship aircrafts – armed with anti-ship missiles and torpedoes. In the future there will be directed energy based defence systems.

With its air complement, carrier groups are able to control a huge expanse of the seas compared to other surface and sub-surface platforms on their own. In a conflict situation, say with Pakistan – a carrier task force will be able to bottle up Pakistan navy close to its shores and completely dominate the seas including cutting off Pakistan's supplies and undertake offensive action against it. Or make it difficult for Chinese navy to enter the Indian Ocean to undertake offensive missions.

There is a thought that India should perhaps make another Vikrant class carrier which is under construction. The Vikrant is a 45,000 ton carrier similar to INS Vikramaditya. However, it will carry only about 26 MiG-29Ks operating off a ski jump, which restricts fuel and weapons payload. With a dismal availability rate of less than 50%, only about a dozen jets are available for operations. This restricts offensive missions, with majority of the jets on fleet defence duties. Reduced fuel load reduces the range, forcing the carrier to get closer to the enemy for any offensive operation – making the carrier group vulnerable to the enemy's shore-based defences. A 65,000 ton carrier with catapult assisted takeoff will enable its fighters to carry full fuel and weapons load. Catapult assisted takeoff generates more sortie which is ideal for offensive missions. If the navy acquires either the Rafale or the Super Hornet, its offensive capabilities will increase tremendously. This carrier will also be able to launch surveillance and early warning aircrafts which cannot be operated from ski-jump carriers.

The Indian Navy's area of responsibility ranges from the east coast of Africa to the Western Pacific, where it regularly deploys its assets for joint exercises, goodwill missions, military diplomacy and humanitarian assistance and disaster relief. With nearly 50% of India's trade passing through South China Sea and China claiming the entire sea as its own, the Indian Navy will be called upon to secure India's trade and increasingly likely to be challenged by the Chinese navy which objects the presence of foreign navies in the sea. While India does not conduct any freedom of navigation operations in the South China Sea, China protests the Indian Navy's presence.

The Western side carries the other 50% of India's trade and 80% of its oil supply. The Gulf region is home to over eight million Indians and is one of the most volatile regions of the world. As a growing power, the navy's area of responsibility will likely include the west coast of Africa in the future where India has considerable investments and growing. In fact India's largest trading partner in Africa is Nigeria.

The argument, at least at the military level, is not against aircraft carriers – but money, leading to the question of prioritisation. India's slowing economy is hurting its defence preparedness. But

the question is, can India take the decision to not build a third aircraft carrier, based on what is expected to be a temporary economic slowdown – for a platform that will take at least 10 years to build and serve into the 2080s and thereby deprive itself of the most potent tool in military diplomacy?

https://www.orfonline.org/expert-speak/future-of-indian-defence-and-the-role-of-aircraft-carriers-67501/

The Indian EXPRESS

Tue, 09 June 2020

IAF unit designs isolation pod to evacuate patients with infectious diseases

The pod was developed by 3 Base Repair Depot. Air Force officers said the need for such a facility was felt after the outbreak of Covid-19

By Man Aman Singh Chhina

Chandigarh: Chandigarh based 3 Base Repair Depot (BRD) of the Indian Air Force has designed and manufactured an Airborne Rescue Pod for Isolated Transportation (ARPIT), to evacuate critical patients with infectious diseases, such as Covid-19, from high-altitude areas or isolated and remote places.

Only indigenous materials have been used to manufacture the pod. (Express photo)

IAF officials say the requirement of an air evacuation system with facility to prevent the spread of infectious diseases to the crew and others was felt when Covid-19 was declared a pandemic.

The first prototype was developed at 3 BRD AF and has undergone various modifications. "Only indigenous materials have been used to fabricate this pod. This indigenously designed system has been developed at a cost of Rs 60,000, far lower than the imported systems costing up to Rs 60 lakh," an IAF officer said.

The system has been developed as a lightweight isolation pod made from aviation certified material. It has a transparent and durable cast Perspex for enhanced patient visibility, which is larger, higher and wider than the existing models.

The isolation system provides for integration of medical monitoring instruments and ventilation to an intubated patient. In addition, it generates high constant negative pressure in the isolation chamber, to curb infection risk to aircrew, ground crew and healthcare workers involved in the air transportation.

The design integrates life support and monitoring instruments (defibrillator with multipara monitor, pulse oximeter, Infusion pumps etc), long arm gloves for use by health care professionals and power pack with high endurance. Design requirements have been evolved and are based on the guidelines issued by Ministry of Health and Family Welfare (MoHFW), National Accreditation Board for Hospitals and Healthcare Providers (NABH) and Centre for Disease Control (CDC), USA.

https://indianexpress.com/article/india/iaf-unit-designs-isolation-pod-to-evacuate-patients-with-infectious-diseases-6449024/

hindustantimes

Tue, 09 June 2020

Cadets at Indian Military Academy to sport masks, keep distance at passing out parade

The decision has come barely days after the IMA administration had informed that as a precautionary step for the safety of the cadets and IMA staff, parents of cadets would not be allowed to attend the ceremony at the academy this year

By Kalyan Das

Dehradun: In a first, the Gentleman Cadets (GC) will be wearing masks as a precautionary measure while participating in the ceremonial parade during the upcoming Passing Out Parade (POP) event of the Indian Military Academy (IMA) on June 13, IMA officials said on Monday.

The development has come days after the IMA administration had informed that as a precautionary measure for the safety of the GCs and IMA staff, the parents of the cadets would not be allowed to attend the POP at the academy.

The POP which will be held on June 13, will see a total of 423 GCs passing out from the academy, including 333 from India and 90 from friendly foreign nations. (HT PHOTO.)

Lt Col Amit Dagar, public relations officer, IMA said, "Due to the Covid-19 pandemic, this time the IMA has introduced many changes in the POP as per the Centre's guidelines. Among that, one is wearing of facemasks by the GCs during the parade. They will also be maintaining more distance than usual from one another during the parade in full adherence to the guidelines."

Lt Col Dagar also informed that there would also be some changes in the Pipping Ceremony following the parade during which the GCs celebrate and get their stars put on their shoulders by their parents as a symbol of becoming an army officer.

"This time as their parents and dear ones won't be able to attend the event; their instructors at the academy along with their wives will be playing the role of their parents and putting the stars on their shoulders. However, they will not be able to celebrate by hugging each other and singing during the Pipping Ceremony due to social distancing," he said.

The IMA official also added, "This time as the parents won't be able to attend the ceremony, we have requested the media to cover it extensively so that the family members of the GCs could witness their wards passing out as Indian Army officers."

The POP which will be held on June 13, will see a total of 423 GCs passing out from the academy, including 333 from India and 90 from friendly foreign nations.

https://www.hindustantimes.com/india-news/cadets-at-indian-military-academy-to-sport-masks-keep-distance-at-passing-out-parade/story-l0viLbpKLwdcSdBjWIzHZL.html

DefenceNews

Tue, 09 June 2020

MHA holds discussions with 17 companies for making arms

The Union home ministry has held discussions with 17 private Indian companies including Larsen & Toubro and Godrej for local manufacturing of small arms for central armed police forces (CAPFs), in its attempt to promote self-reliance.

Some of these weapons currently being used were imported by security forces through the home ministry, said officials. The home ministry is looking at local production of these equipment following Prime Minister Narendra Modi's call on Atmanirbhar Bharat to make the country self-reliant.

"The private companies shortlisted by the MHA own licence to manufacture weapons," said a senior home ministry official.

Besides L&T and Godrej, these include Vem Technologies, Kalyani Strategic, Shyam Arms, Premier Explosives and HYT, he added.

The ministry is learnt to have held the first round of discussions with representatives of these companies and the director generals of the ITBP, BSF, CRPF, SSB, CISF, NSG and Assam Rifles.

"The security forces have been asked to provide their requirement and to cut down on import of arms and ammunitions which can be easily developed with the help of local manufacturers," said another home ministry official.

https://www.defencenews.in/article/MHA-holds-discussions-with-17-companies-for-making-arms-841000

pv magazine

Tue, 09 June 2020

New insights into lithium-ion battery structure

Scientists at Moscow's Skoltech Center for Energy Science and Technology have developed a method of visualizing the formation of layers on battery electrodes during their initial operation. The observations reveal various mechanisms that could be optimized to improve battery performance and operational lifetime

By Mark Hutchins

There are many processes at work during the charging and discharging of a lithium-ion battery, some of which are still not fully understood despite the technology's growing prevalence.

Observing such events could unlock ways of improving performance but is no easy task given the complex structure of lithium-ion batteries and the limitations of microscope technology.

Skoltech scientists have developed a method of better observing the formation of layers on a battery anode during operation.

Scientists at Moscow's Skoltech Center for Energy Science and Technology have developed a way to take a closer look at one such process – the formation of a solid-electrolyte interphase (SEI), which the researchers described as a "thin layer of electrolyte reduction products formed on the surface [of] a lithium-ion battery anode during several initial cycles."

The formation of such films, according to the Skoltech group, is vital to mitigate battery degradation. However, *in-situ* measurement of the formation of SEI has proven difficult, and replacing commercial battery materials with more uniform alternatives in the lab has been the only way to achieve results.

Cross-section

"Battery-grade materials are powders and visualizing dynamic processes on their surface by AFM [atomic force microscopy], especially in [a] liquid environment, is challenging," said Skoltech scientist Sergey Luchkin. "A standard battery electrode is too rough for such measurements and isolated particles tend to detach from [the] substrate during scanning. To overcome this issue, we embedded the particles into epoxy resin and made a cross-section so the particles were firmly fixed in the substrate."

In addition to highly-oriented pyrolytic graphite – one of the more uniform carbon materials previously used to study SEIs – the Skoltech group applied its cross-section process to electrodes of mesocarbon microbead graphite and non-graphitizable amorphous carbon, enabling the researchers to observe formation of the SEI layer and assess its electrical and mechanical properties.

The results, published in *Scientific Reports,* show the conditions for SEI formation differ significantly depending on electrode material. SEI adhesion was found to correlate with the surface roughness of an electrode. Rougher surfaces were found to prompt reduced degradation as the SEI is able to penetrate into the more porous surface and achieve better adhesion.

Differences

The cross-section approach was also applied to lithium-manganese-cobalt cathodes and these exhibited no sign of SEI layer formation. That result, according to the scientists, suggested future

research should acknowledge fundamental differences in stabilization mechanisms between anode and cathode in a Li-ion battery.

"Spatially-resolved investigations of battery interfaces and interphases, detailed in this work, provide significant new insights into the structure and evolution of the anode SEI," said Skoltech professor Keith Stevenson. "Therefore, they provide firm guidelines for rational electrolyte design to enable high-performance batteries with improved safety."

https://www.pv-magazine.com/2020/06/08/new-insights-into-lithium-ion-battery-structure/

EurekAlert!

Tue, 09 June 2020

New research shows how complex chemistry may be relevant to origins of life on Earth

A popular model suggests life on Earth began with RNA. A recent study reveals how RNA precursors can arise from complex chemical networks that evolve from simple chemicals, providing new directions for testing how RNA might form on primitive planets

Chemists have long sought to understand the origins of life, with one popular model suggesting life began when simple RNA molecules capable of copying themselves formed spontaneously in the primitive environment. How this happened exactly is fraught with difficulties. New research by a team of chemists led by Ruiqin Yi of the Earth-Life Science Institute (ELSI) at Tokyo Institute of Technology and Albert Fahrenbach, a lecturer at the University of New South Wales, suggests that mixtures of simple organic compounds in water exposed to high energy radiation react to form a variety of more complex organic compounds that could help make RNA. Researchers from the Institute for Advanced Study in Princeton, Tokyo Tech and the University of Arizona also assisted in the work.

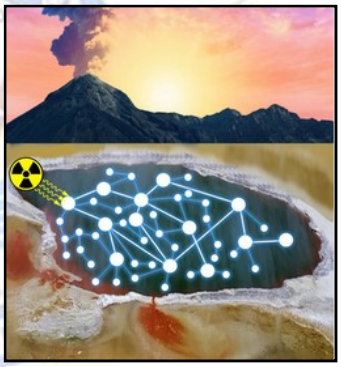


Image: Generation of target molecules relevant to the origins of life in a complex chemical network driven by radiation.

To conduct this work, the team took a mixture of very simple small molecules, common table salt, ammonia, phosphate and hydrogen cyanide, and exposed them to a high energy gamma radiation source at Tokyo Tech. These conditions simulate environments irradiated by naturally occurring radioactive minerals, which were likely much more prevalent on early Earth. They also allowed their reactions to intermittently dry down, simulating evaporation in shallow puddles and beaches. Their reactions surprisingly made a variety of compounds which might have been important for the origins of life, including precursors for amino acids and other small compounds known to be useful for making RNA.

They showed that this set of conditions creates what they call a 'continuous reaction network', in which a wide variety of compounds are constantly being formed and destroyed, and these react with each other to form new compounds. These continuous reaction networks make up a complex set of reactions, and because of the way they occur, they can make a whole set of important compounds at once. The team thinks this makes their study especially insightful, as prebiotic chemistry on the primitive Earth could not have been as selective and goal-directed as modern organic chemists working in the lab, who can add chemicals at precisely the right time and purify the exact compounds they want to make.

The team thinks models of this type can help explain what sorts of environments are most amenable to making RNA in primitive planetary settings. Indeed, since the surfaces of rocky planets are so variable (think cool mountain streams, bubbling hot springs and sunny beaches),

there are many places where such chemistry might happen, only under slightly different conditions. These studies in turn could help other scientists identify the best areas to look for life beyond Earth.

As lead author Ruiqin Yi says, 'While we haven't yet made RNA, this work raises new questions. Can we tweak these reactions to make all of the necessary building blocks for RNA from such mixtures in a continuous fashion? Can we generate other useful compounds such as more complex amino acids in this "messy" chemistry from complex chemical reaction networks?'

Reference

Ruiqin Yi[1], Quoc Phuong Tran[2], Sarfaraz Ali[2], Isao Yoda[3], Zachary R. Adam[4,5], H. James Cleaves II[1,5,6], and Albert C. Fahrenbach[2*], A Continuous Reaction Network that Produces RNA Precursors, *Proceedings of the National Academy of Sciences*, DOI:10.1073/pnas.1922139117

1. Earth-Life Science Institute, Tokyo Institute of Technology, Tokyo 152-8550, Japan
2. School of Chemistry, University of New South Wales, Sydney, NSW 2052, Australia
3. Co-60 Radiation Facility, Tokyo Institute of Technology, Tokyo 152-8550, Japan
4. Department of Planetary Sciences, University of Arizona, Tucson, AZ 85721
5. Blue Marble Space Institute of Science, Seattle, WA 98154
6. Program in Interdisciplinary Studies, Institute for Advanced Study, Princeton, NJ 08540

More information

Tokyo Institute of Technology (Tokyo Tech) stands at the forefront of research and higher education as the leading university for science and technology in Japan. Tokyo Tech researchers excel in fields ranging from materials science to biology, computer science, and physics. Founded in 1881, Tokyo Tech hosts over 10,000 undergraduate and graduate students per year, who develop into scientific leaders and some of the most sought-after engineers in industry. Embodying the Japanese philosophy of "monotsukuri," meaning "technical ingenuity and innovation," the Tokyo Tech community strives to contribute to society through high-impact research.

The Earth-Life Science Institute (ELSI) is one of Japan's ambitious World Premiere International research centers, whose aim is to achieve progress in broadly inter-disciplinary scientific areas by inspiring the world's greatest minds to come to Japan and collaborate on the most challenging scientific problems. ELSI's primary aim is to address the origin and co-evolution of the Earth and life.

The World Premier International Research Center Initiative (WPI) was launched in 2007 by the Ministry of Education, Culture, Sports, Science and Technology (MEXT) to help build globally visible research centers in Japan. These institutes promote high research standards and outstanding research environments that attract frontline researchers from around the world. These centers are highly autonomous, allowing them to revolutionize conventional modes of research operation and administration in Japan.

https://www.eurekalert.org/pub_releases/2020-06/tiot-nrs060220.php

ScienceDaily

Tue, 09 June 2020

Scientists iron out the physics of wrinkling

When we think of wrinkles, we usually envision the lines etched into our skin, for some an unwelcome reality and for others a proud sign of a life well-lived. In material science, wrinkles can also be either wanted or unwanted. But the physical factors that cause wrinkling to occur are not yet fully understood

Now, in a paper recently published in *Applied Physics Letters*, researchers from the Mathematics, Mechanics, and Materials (MMM) Unit at the Okinawa Institute of Science and Technology Graduate University (OIST) have shown how wrinkles can be increased or reduced by altering the curvature at the edge of a material.

"Historically, scientists and engineers have focused on preventing wrinkling, which can adversely affect the performance of pressure sensors, aircraft panels, and lightweight spacecraft structures including deployable space booms and telescopes," said Professor Eliot Fried, who leads the MMM unit. "But recent research has also shown that wrinkling can give materials useful properties. For example, it can be used to make a material super hydrophobic or to make coatings that reflect light in unique ways."

Diamond windows of opportunity

The unit first encountered the phenomenon of wrinkling while working with ultra-thin nanocrystalline diamond films, grown on a sheet of glass.

"I was removing the layer of glass underneath small areas of the nanocrystalline diamond film to create diamond windows," said Dr. Stoffel Janssens, first author of the study and postdoctoral researcher in the MMM unit. "Diamond windows are extremely difficult to make but they have really exciting potential applications, including being used as a transparent structure upon which a cell culture can be grown and easily visualized."

The scientists found that wrinkling was an unavoidable part of fabricating diamond windows. The process of growing the nanocrystalline diamond film on top of the glass sheet involves heating and cooling the substrate, which causes the two layers to expand and contract by different amounts, generating stress in the layers, Dr. Janssens explained. Then, when a hole in the glass substrate is made by lasers and acids to form a diamond window, the residual stress causes the now suspended portion of nanocrystalline diamond film, which is no longer bonded to the sheet of glass, to deform and wrinkle around the edge.

"We realized that diamond windows provided a great opportunity to understand some of the physical factors that affect wrinkling," said Prof. Fried. "Using circular diamond windows, we experimentally demonstrated the effect of diameter and boundary curvature on wrinkling, and then we also developed a simple theoretical model to explain what we observed."

Bridging experiment and theory

In the study, the researchers created different sized diamond windows, and then measured the wavelength and number of wrinkles that formed in the suspended film around the curved edge of each diamond window.

They found that as the size of the diamond windows increased, reducing the curvature at the boundary between the bonded and suspended nanocrystalline diamond film, the density of wrinkles decreased, and the wavelength of each wrinkle was longer.

The researchers also measured the level of strain -- the amount of deformation caused by the stress in the layers -- across the diamond windows.

"Measuring strain across a 2D material in a conventional way is very complicated and expensive, but we were able to devise a technique where we instead determined the surface profile of the diamond window -- how high each point is -- and then developed algorithms to retrieve the strain values," said Dr. Janssens.

The team then used the experimental results to develop a theoretical model, which they believe could be used to design devices with functional wrinkles or reduced wrinkling.

The model also expanded on the experiments, suggesting that devices containing a negative curvature would see further reductions in wrinkling.

Going forward, the unit are interested in creating diamond windows in the shape of rings, rather than circles. While more challenging to fabricate, these structures have two boundaries between the suspended and attached portions of nanocrystalline diamond films -- one with positive curvature and one with negative curvature -- allowing the scientists to use experiments to further explore the validity of their model.

"Overall, this study integrates theory, computation, experimentation, and analysis," said Prof. Fried. "The interdisciplinary environment fostered at OIST made this work possible and has ultimately allowed all the researchers of our unit to collaborate and expand their expertise."

Story Source:

Materials provided by **Okinawa Institute of Science and Technology (OIST) Graduate University**. Original written by Dani Ellenby. *Note: Content may be edited for style and length.*

Journal Reference:

1. Stoffel D. Janssens, Burhannudin Sutisna, Alessandro Giussani, James A. Kwiecinski, David Vázquez-Cortés, Eliot Fried. **Boundary curvature effect on the wrinkling of thin suspended films**. *Applied Physics Letters*, 2020; 116 (19): 193702 DOI: 10.1063/5.0006164

https://www.sciencedaily.com/releases/2020/06/200605105352.htm

Science Focus
THE HOME OF BBC SCIENCE FOCUS MAGAZINE

Tue, 09 June 2020

New method protects vaccines from heat degradation

Heat causes proteins in vaccines to unravel, rendering them ineffective, but scientists have found a way to keep vaccines at room temperature for up to three years

By Amy Barret

A new method that stops vaccines from degrading in warm temperatures could help children in low-income nations receive life-saving inoculations, scientists have said.

The researchers from the universities of Bath and Newcastle believe they have found a way to make transportation and storage of vaccines safer without the need for refrigeration.

Their new method, known as ensilication, involves encasing the protein molecules in a vaccine in a non-toxic silica shell.

Study author Dr Asel Sartbaeva, from the University of Bath, said their process "preserves not just the structure of the vaccine proteins but also the function", allowing the biological substance to work without temperature constraints.

"The aim is to eradicate vaccine-preventable diseases in low income countries by using thermally stable vaccines" Dr Asel Sartbaeva, University of Bath

At present, all vaccines follow a cold chain procedure which requires refrigeration at all times, from the manufacturing stage to the point of administration. This temperature-controlled supply chain ensures vaccines are always stored between 2°C and 8°C.

However, despite best efforts, around 50 per cent of vaccine doses are discarded before use due to logistical issues associated with temperature control, according to estimates from the World Health Organisation.

At higher temperatures, the proteins in vaccines can start to unravel making them ineffective. Encasing these protein molecules in a silica shell enables their structure to remain intact – allowing the vaccines to be stored at room temperature for up to three years, the researchers said.

Dr Sartbaeva said: "We build our shell in a way so that it is completely encases the protein and stops the protein from unfolding – because it is this physical unfolding which leads to the breaking of the proteins inside the vaccines and it leads to the denaturation or spoiling of these vaccines."

The researchers tested ensilicated and regular samples of the tetanus vaccine on mice and found the silica-coated vaccines triggered an immune response, while the regular samples did not.

The team plans to work on developing thermally-stable vaccines for diseases such as diphtheria and whooping cough.

Dr Sartbaeva said: "Ultimately, we want to make important medicines stable so they can be more widely available. The aim is to eradicate vaccine-preventable diseases in low income countries by using thermally stable vaccines and cutting out dependence on cold chain."

The findings are published in the journal *Scientific Reports*.

How do scientists develop vaccines for new viruses?

Vaccines work by fooling our bodies into thinking that we've been infected by a virus. Our body mounts an immune response, and builds a memory of that virus which will enable us to fight it in the future.

Viruses and the immune system interact in complex ways, so there are many different approaches to developing an effective vaccine. The two most common types are inactivated vaccines (which use harmless viruses that have been 'killed', but which still activate the immune system), and attenuated vaccines (which use live viruses that have been modified so that they trigger an immune response without causing us harm).

A more recent development is recombinant vaccines, which involve genetically engineering a less harmful virus so that it includes a small part of the target virus. Our body launches an immune response to the carrier virus, but also to the target virus.

Over the past few years, this approach has been used to develop a vaccine (called rVSV-ZEBOV) against the Ebola virus. It consists of a vesicular stomatitis animal virus (which causes flu-like symptoms in humans), engineered to have an outer protein of the Zaire strain of Ebola.

Vaccines go through a huge amount of testing to check that they are safe and effective, whether there are any side effects, and what dosage levels are suitable. It usually takes years before a vaccine is commercially available.

Sometimes this is too long, and the new Ebola vaccine is being administered under 'compassionate use' terms: it has yet to complete all its formal testing and paperwork, but has been shown to be safe and effective. Something similar may be possible if one of the many groups around the world working on a vaccine for the new strain of coronavirus (SARS-CoV-2) is successful.

https://www.sciencefocus.com/news/new-method-protects-vaccines-from-heat-degradation/

Business Standard

Tue, 09 June 2020

Coronavirus vaccine update: Covid drug, AstraZeneca vaccine current status

Coronavirus vaccine latest update: AstraZeneca has approached Gilead Sciences over a potential merger. It also says it is on track to roll out 2 billion doses of coronavirus vaccines in September

The total number of coronavirus cases across the world has now crossed the 7-million mark. A little more than five months have passed since the world first learnt of the deadly SARS-CoV-2 infection. Since then, researchers are scrambling to produce vaccine and also to repurpose existing treatments to help fight the uncontrollable virus. According to the World Health Organization (WHO), there are move than 115 teams speeding up efforts to produce a vaccine or an effective drug for Covid-19 treatment. Major pharmaceutical companies such as Gilead Sciences, AstraZeneca, Pfizer and Moderna are rushing to find a successful vaccine and some of them have succeeded in many ways.

Coronavirus treatment: Here are updates on coronavirus vaccine/drug development:

1. Coronavirus vaccine: AstraZeneca approaches Gilead over possible merger

AstraZeneca approached one of its US rivals, Gilead Sciences, last month over a potential merger, *Bloomberg* has reported.

A transatlantic tie-up would be the biggest healthcare merger yet, forging a company worth around 200 billion pounds, and bringing together firms leading the pharmaceutical industry's efforts to develop a vaccine and treatments for Covid-19.

2. Oxford University-AstraZeneca Covid-19 vaccine status

AstraZeneca, which is developing AZD1222 vaccine in partnership with Oxford University, has said it is "on track" to roll out up to two billion doses of coronavirus vaccine in September. Meanwhile, the US has also said that it has already produced two million vaccine doses that are "ready to go" if they "check out for safety".

3. CSL-University of Queensland coronavirus vaccine update

University of Queensland and CSL plan to produce up to 100 million doses of a Covid-19 vaccine, which uses an innovative 'molecular clamp technology', by the end of next year, according to an *ABC* news report. The home-grown vaccine has showed promising early results in the laboratory.

4. Moderna's mRNA vaccine update

Moderna's experimental coronavirus vaccine (mRNA-1273), like most other candidates that are in the works, attempts to train the immune system to recognise the SARS-CoV-2 virus' spike protein, which the virus uses to bind to and enter host cells. The mRNA-1273 vaccine, which is currently in crucial Phase-II trials, entered into human trials just 66 days after SARS-CoV-2 was first sequenced.

5. China coronavirus vaccine update

China may deploy coronavirus vaccines as early as September to at-risk groups even if clinical trials have yet to be completed.

Health officials are drafting guidelines for administering vaccines under testing to priority groups, such as medical personnel, the latest sign Beijing is ramping up competition against the US to produce a global cure.

China has five vaccines in Phase-II human trials – more than any other country. Chinese biopharmaceutical company Sinovac Biotech has said that it is 99 per cent sure that its Covid-19 vaccine will work.

6. Pfizer-BNTECH vaccine update

Pharmaceutical giant Pfizer, which is co-producing the vaccine with the help of German company BNTECH, has started the process of dosing patients. Four vaccine candidates devised out of messenger RNA (mRNA) format are being tested on volunteers to identify the most viable and suited vaccine of the four. The data is being shared with scientists in real time. The tests are currently going on in Germany and parts of the US.

Pfizer believes that a Covid-19 vaccine could be ready by the end of October 2020, according to *The Times of Israel*, which has cited Albert Bourla, the CEO of the firm.

7. Russia approves use of Covid-19 drug Avifavir

Russia has approved an anti-influenza drug, Aviifavir, to treat Covid-19 and will start delivering it to hospitals this month, according to Russia's sovereign wealth fund.

8. Maharashtra willing to procure remdesivir from Bangladesh

The Maharashtra government has said it will procure the repurposed Ebola drug remdesivir to treat critical Covid-19 patients in the state at a price of Rs 12,000 per vial. Since the Indian manufacturers of the drug are yet to get the marketing authorisation for the drug and its innovator Gilead is yet to launch in the market, the state government is open to procuring it from Bangladesh.

9. AstraZeneca's cancer drug

British-Swedish pharmaceuticals firm AstraZeneca's cancer drug, Calquence, has shown initial signs of helping hospitalised Covid-19 patients overcome the disease, as researchers scramble to repurpose existing treatments to help fight the deadly infection. Eleven patients had been on oxygen when they started the 10-14-day Calquence course and eight of them could afterwards be discharged, breathing independently, according to results of the preliminary study.

10. Serum Institute of India (SII) vaccine update

Pune-based Serum Institute of India (SII) is a leading contender for vaccine development. The company, which is known to produce over 10 million doses of vaccines in a year for treating other diseases, has partnered with the University of Oxford to speed up the development of a safe and affordable coronavirus vaccine. While the Oxford University vaccine shows good success rates (and has reached the human clinical trial stage), SII is speeding up efforts to produce the vaccine and making sure that vaccine doses are available as early as October 2020.

BioNTech, Novavax, Sinovac, CanSino Biologics and Inovio Pharmaceuticals are among those leading the fight against coornavirus.

Why is there an urgency to develop coronavirus vaccine?

Widespread community transmission of Covid-19 in India and other parts of the world will be extremely challenging. Safe and effective Covid vaccines are the best bet to interrupt, and eventually stop, community transmission of the contagion.

How soon can the world expect a coronavirus vaccine?

A vaccine would normally take years, if not decades, to develop. But in this case, researchers hope to achieve the same amount of work in just a few months. Most experts think a vaccine is likely to become available by mid-2021.

https://www.business-standard.com/article/health/coronavirus-vaccine-update-corona-drug-latest-news-vaccine-current-status-from-astrazeneca-gileads-us-china-india-more-120060800443_1.html

hindustantimes

Tue, 09 June 2020

Covid-19 cases top 7mn; China promises greater collaboration on vaccine

At least 6.9 million people have been infected across the world by the coronavirus, according to Johns Hopkins University

Beijing: Global cases of Covid-19 crossed seven million on Sunday, according to coronavirus data collected by Worldometer, as China promised to strengthen international cooperation in future clinical vaccine trials.

China said it will strengthen international cooperation in future Covid-19 clinical vaccine trials, building on earlier collaboration in vaccine development.(Reuters)

The confirmed global death toll from the pandemic reached at least 400,000. At least 6.9 million people have been infected across the world by the coronavirus, according to Johns Hopkins University.

Health experts, however, believe that the John Hopkins tally falls short of showing the true tragedy of the pandemic and Worldometer, an online source for world statistics, showed that the number of cases had already crossed the grim 7 million mark on Sunday.

China said it will strengthen international cooperation in future Covid-19 clinical vaccine trials, building on earlier collaboration in vaccine development.

China is expending great efforts in the global scramble to develop a vaccine for the new coronavirus epidemic that began in its central city of Wuhan, with Chinese researchers conducting five separate clinical trials on humans, or half of all such trials globally, according to the data compiled by the World Health Organization.

President Xi Jinping had vowed last month at the World Heath Assembly, the WHO's governing body, that vaccines China's develops will become a "global public good" once they are ready for use, and it will be China's contribution to ensuring vaccine accessibility and affordability in developing countries.

Developing "a vaccine is still the fundamental strategy in our effort to overcome the new coronavirus," Chinese science and technology minister Wang Zhigang said on Sunday.

But vaccine development is very difficult and takes time, he said, when asked how China would initially prioritise shots by country if and when a vaccine is found.

In a white paper released by the State Council Information Office at the news conference, the Chinese government urged global cooperation, saying the international community should resist finger-pointing and politicising the virus. It did not name any country.

US President Donald Trump's administration has been accusing China of cover-ups and lack of transparency regarding the pandemic. The head of the Chinese Center for Disease Control and Prevention briefed his US counterpart by phone on the then-unknown virus as early as January 4, according to the white paper.

Meanshile, Shanghai Junshi Biosciences has started an early-stage study in China to test a potential antibody treatment in uninfected people, official paper Liberation Daily said on its online channel on Sunday.

The experimental drug, JS016, is also expected to begin human study in the US in the second quarter of this year, through collaboration with Eli Lilly and Co.

Junshi is among a few biotech firms and research institutes backed by global pharmaceutical giants to work on antibody-based therapies to help those infected with Covid-19.

https://www.hindustantimes.com/world-news/covid-19-cases-top-7mn-china-promises-greater-collaboration-on-vaccine/story-8rikI1hgbxywSIPzIdgjJK.html