



*Lt Gen Subrata Saha, UYSM, YSM, VSM\*\*, DCOAS (P&S)*



*Lt Gen PR Shankar, AVSM, VSM, DG Artillery*



# Future Artillery & UAV India 2016



*Lt Gen Vinod Bhatia, PVSM, AVSM, SM (Retd), Director CENJOWS*



*Lt Gen AK Ahuja, PVSM, UYSM, AVSM, SM, VSM \*\*, DCIDS (PP&FD)*



*Lt Gen AS Lamba, PVSM, AVSM (Retd), former VCOAS*

**‘Artillery modernisation is not just about the acquisition of state of the art guns and precision munitions, but its operational employment in battle’,** said Lt Gen PR Shankar, AVSM, VSM, DG Artillery at the recently held Artillery seminar. Organised jointly by the Centre for Joint Warfare Studies and South Asia Defence & Strategic Review on 09-10 Mar in Delhi, the two day symposium witnessed some riveting presentations and animated discussion on a range of topics related to Artillery and UAVs. While Artillery enjoyed the centre stage on Day1, Incubating UAV Technologies was the theme on Day2, underscoring the importance of unmanned systems in the present times. As always, the symposium enjoyed patronage from the users, defence industry, think tanks and global military. All the sessions including the ‘Opening and Keynote’ were interactive and generated animated discussions about technologies, concepts of employment and acquisition policy.

Lt Gen Vinod Bhatia, PVSM, AVSM, SM (Retd), Director CENJOWS, introduced the Keynote session and the seminar with his Opening Address stating that the importance of modernising the Artillery is apparent from the number of pages on Google – 98,500 to be precise. He added that contrary to the common perception, Artillery modernisation has not really lagged behind. He highlighted the Artillery’s contribution and role during the Kargil conflict.

Lt Gen Subrata Saha, UYSM, SM, VSM\*\*, Deputy Chief of the Army Staff

(P&S) supported the sentiment and described broad categories under which the process of modernisation takes shape. Commending Artillery’s role in CI grid and surveillance, Gen Saha flagged ‘Force Protection’, ‘Synthetic Training’ and ‘All Weather Capability’ as some of the additional issues for Artillery’s modernisation. The Deputy Chief called for a fresh collaborative approach and relationship with the industry in determining solutions for the future.

Lt Gen AK Ahuja, PVSM, UYSM, AVSM, SM, VSM\*\*, DCIDS (PP&FD) recounted his days as a young gunner officer and the equipment (25 pdrs, to be precise) that he was trained on, and traced the journey to the present, putting in perspective the transformation that has occurred along the way both in terms of equipment and concepts. Gen Ahuja explained the huge spectrum that the Artillery occupies from the target end to the firing platform and the domain in between. He exhorted the industry to look at the entire system and provide cutting edge solutions in terms of technologies and products and emerge as lead system providers and integrators.

In his Keynote address, Lt Gen PR Shankar, AVSM, VSM, Director General, Artillery, stated that the process of modernisation of the Artillery is already set in motion. Adding that random pickings are no longer in vogue, the Director General emphasised that Artillery modernisation is a deliberate process as part of a well thought out vision to acquire capability. He then went on to provide a quick glimpse into various modernisation programmes related to Artillery which included efforts in indigenisation.



Dr Ajit Kalghatgi, Director R&D of Bharat Electronics Ltd, explained the contribution of industry to enable the armed forces to better manage the present day scenario of digitised battlefield. He was assertive about the need for 'information superiority' which can be achieved through information advantage in a networked system. 'Cyber security' and 'data overload' were certain areas of concern flagged by Dr Kalghatgi. Speaking about BEL's contribution in the digitised battles pace, Dr Kalghatgi emphasised the DPSU giant's resolve to continue to invest in R&D in realising new solutions to overcome the challenges.

Session 2 was devoted to 'Developing Artillery Capability that can Adapt to Future Conflicts' Chaired by Lt Gen AS Lamba, PVSM, AVSM (Retd), former Vice Chief of Army, the session included representatives from foreign armies, defence industry as well as R&D. Gen Lamba spoke of the need of holistic development of Artillery as part of Army's overall modernisation. Col Brent Parker of the US Army made a comprehensive presentation on the US Army's plans of Artillery modernisation. Interestingly, he mentioned that the US Army plans were no different from those of the Indian Army and that even the concepts and concerns of

the Corps too were similar in nature even though in entirely different geographical regions with different operational responsibilities. A while later Major Francis Denisart, speaking on the French Army's recent experiences echoed the same sentiment about Artillery Modernisation. Talking about the lessons learnt in Mali, Lebanon and Afghanistan, Denisart made a brief presentation on Caesar gun system and its fascinating attributes in terms of quick deployment, accuracy and lethality in battle.

Representing defence industry, two speakers from SAGEM Marc Trasleglise and Arnaud De Villermont made high impact technical presentations on 'Forward Observers' and 'Navigation Systems' respectively. Marc presented high technology solutions for effective enhancement of Forward Observation Observers. Arnaud, on the other hand, started with the description of causes of errors in targetting, an inaccurate navigation system being a major one. Thereafter, he presented an interesting comparison between 0.6 mil and 1.0 mil error in navigational system and its exponential effect in accuracy, thus advocating state of the art navigational systems for Artillery platforms, particularly during mobile combat. Col Amarjit Singh of Bharat Forge-Elbit combine and Col VK Bhatnagar of TATA Power SED presented the ATAGS, a modern indigenous gun system with a huge promise.

Post lunch session was on 'Delivering Terminal Effect in Future Ops; Generating an Effective Munitions Capability and Enhancing Operational Flexibility'. Lt Gen Arun Sahni,



**Col Brent Parker, US Army**



**Maj Gen Pankaj Srivastava, VSM, ADG Artillery**



**Lt Col Simon de Labillière, British Army**



**Arnaud De-Villermont, SAGEM**



**SAGEM displayed state-of-the-art equipment like CM3 LR, SIGMA 30 and STERNA**



**Gp Capt Sudhir Varma, Saab Technologies**

**Col Amarjit Singh Jr (Retd) BF-Elbit Advanced Systems**

PVSM, AVSM, SM, former C-in-C SW Command, moderated the proceedings and spoke of changing nature of warfare in his opening remarks. Speaking about contact and non-contact battles, Sahni made a case for adapting to the contours of future conflicts. Starting the session, Maj Gen Pankaj Srivastava, VSM, ADG Artillery, spoke eloquently on Artillery Targeting, an issue relatively new to the Indian Army. Listing out the six steps to targeting, Gen Srivastava explained how the various steps belong to different domains (ISR, Fires and GS domain) and how an ideal scenario would be to have all the six fall under one officer. He then went on to explain the effective engagement of targets once spotted. Dr SV Kannan of SOLAR Industries made a presentation listing out efforts on part of India's ammunition major to enter the fray in indigenising ammunition, which is considered a dire necessity towards making India self-reliant in defence. He spoke of the innumerable licenses to be acquired and the long process involved in making ammunition. The facilities that SOLAR has already created and its initiatives and future plans appear to be very promising. Given the company's impressive track record from modest beginnings in 1986, SOLAR truly holds promise for the future.

Col Simon de Labilliere, British Army, made a presentation on the 'Evolution of Gun Systems and Precision Capability' and spoke about 'next generation target acquisitions', surveillance and target acquisition patrols, tactically guided munitions, future VSHORADS, FLAADS and future indirect fire systems. Georg Koilpillai of Honeywell spoke about Navigation Systems and supported his counterpart from SAGEM in his analysis of navigational equipment's effects at the target end. Koilpillai showcased Honeywell's cutting edge technologies in this domain and asserted that days of FOG technology (and perhaps RLG) are over as optical systems take over the task. He hinted at indigenous solutions in the times to come as Honeywell and TATA Power SED join hands in this domain.

## Incubating UAV Technologies in India

In what was planned to be a two hour session as part of the Artillery symposium, UAVs assumed their rightful position as one full day was devoted to the subject with the explicit aim as suggested by the topic above. As the Deputy Chief, Gen Saha observed, the distinctly

visible younger age profile on 'Day 2' devoted to UAVs was a clear indication of the times to come. The Keynote session chaired dexterously by a former aviator, Lt Gen BS Pawar, VSM, was witness to an interesting presentation by Gen Shankar, DG Artillery. Painstakingly explaining the need for incubating UAV Technologies in India, Shankar kept the best slide for the best effect at the culmination. It was a rather busy slide listing all the technologies that go into making a modern mission ready UAV; it is indeed a complex technological marvel. In his Keynote Address Lt Gen Saha in his trademark candid style called for a pragmatic and informed approach on part of the user even as an exercise in capability discovery amongst the user, industry and R&D was the need of the hour. Explaining the dichotomy between apparently commonplace demands for application and handling of UAVs, Saha suggested that easy availability of UAVs was a bit of a myth. Expert handling of UAVs under diverse conditions is a challenge, and there's a need for added capabilities like foliage penetration, increased endurance and terrain specific QRs. Col Paramvir, Director at the Infantry Directorate, spoke about mini and micro UAVs. He dwelt at length about the capabilities that are desired and exist in this domain and said that the exploitation of UAVs is up to the user's imagination.

It was next the turn of the industry to present their technologies and capabilities of their products. More importantly it was left to them to identify and explain technologies that can be transferred/developed in India; thus laying down the roadmap for incubating UAV technologies in India. Sudhir Varma, VP, Saab Technologies took the lead in presenting Saab's Skeldar-a rotary wing UAV with immense potential and desirable characteristics like modular design, ease of operation, tethering facility and all weather capability. He expressed willingness to bring the product and the technology (including IP) to India and presented a 'Make in India' option. An enthusiastic QA session followed and paved the way for a highly interactive day to follow. Honeywell was next in line as Gp Capt Shiv Kumar (retd) made an equally impressive presentation of the company's

payloads that can provide an all-weather surveillance capability to a range of UAVs. Make in India was Honeywell's mantra too, and found favour with the user. Another presentation on payloads being made in India was made by TATA Power SED's Chief Technical Officer, Mr Muralidharan. The indigenous capability received an expected round of applause.

With a UAV being as good as the payloads it carries, another presentation was made by Dmitry Bernadiner of Defsys systems. The thrust of his presentation was to highlight the capability of STAMP family of payloads and other Electro Optical devices which offer numerous options for UAVs and precision munitions. Lt Gen VK Saxena, PVSM, AVSM, VSM, former DG AAD, spoke about the existing laws (and the lack of it!) governing employment of unmanned platforms and management of airspace and made a passionate call for bringing them in.

In the first of its kind, the symposium included active participation of the academia in the deliberations. Encouraged personally by the Director General, Artillery, a number of faculty members from IIT Kanpur, Madras and Bangalore participated and made presentations on their efforts and projects in the respective institutions. Imprint Initiative was represented by Ashwani Ratroo, Asst Prof at IIS Bangalore. He spoke about concepts of employment including the TREE. Prof AK Gosh and his team member from IIT Chennai, DrDipu Ghosh presented SWATI (Silent Watch Aircraft for Tac Int). Gosh made a fervent appeal for setting a template for assessment parameters of UAVs. IIT Kanpur was represented by Dr Abhishek and Dr C Venkatesh who presented rotary wing RPAs developed at IIT Kanpur. Prof C Venkatesan of IIT Kanpur presented the R&D activities to encourage development of RPAs at the Department of Aerospace Engineering.

## Takeaways

### Some of the major takeaways from the two day symposium:

**Artillery Modernisation.** Contrary to the common perception, modernization of Artillery has not lagged behind. It has evolved as a continuous process keeping pace with the overall vision of capability development and has morphed into a well-planned and systematic modernization plan.

**Inclusive Development.** Artillery spectrum is huge, extending from the target end to the firing platform and what lies in between. Add to that, ammunition, navigation and digitization etc and the list gets longer. A truly modernized force, thus, would imply inclusive growth of all segments from acquisition of target to its neutralization.

**Similarity in Global Concepts.** An interesting fact that



*Dmitry Bernadiner, DEFSYS*

emerged during the symposium was that of similarity in concerns, concepts and overall approach towards future capability development plans of the Indian Artillery and those of developed countries. In a way it was a validation of Indian Artillery's approach towards capability development.

**Collaborative Approach.** It is imperative to develop a collaborative approach and relationship amongst all the stakeholders including industry in order to develop lasting and cost effective solutions.

**Indigenous Capability Development.** There was unanimous approval of Indian programmes like the Dhanush and ATAGS. Indian defence industry majors like BEL, Bharat Forge and TATA Power SED received special appreciation. SOLAR Industries' initiative in manufacturing ammunitions in India also met with thumping applause. Encouragement to MSMEs to become part of the supply chain through systematic facilitation was advocated.

**Incubating UAV Technologies in India.** This was the objective as also the thrust area on Day2 of the symposium. During the deliberations the reason for choosing this topic became obvious. Animated discussions, numerous technologies and the expertise required in exploiting their potential were indicative of the fact that a well thought out, systematic approach is needed to incubate these technologies in India. A systematic approach will also help in bridging the yawning gap between futuristic requirements and availability.

**Synthetic Training.** Use of simulation in training OPs and rehearsing engagement drills will result in considerable cost cutting during training. Similar need exists in training UAV pilots which are in short supply.

**Contribution of the Academia.** Last, but not the least, this symposium perhaps marked the very first time that the academia was invited to interact with the stakeholders in defence. Following such practices on regular basis will certainly help the nation's cause in building a self-reliant India. 🇮🇳