



## Lead Feature Article

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# Rise, Rise and Rise for the Solar Industries: What Legacy SAMC and MOGI Companies can Learn from it (Part-2)

**SAM: Stand Alone Mining**

**MOGI: Mineral Oil Gas Integrated**

(Continued from part-1 published in the last issue)

### Abstract

*In the 1<sup>st</sup> part of the article, we learned about the progress of solar explosives from a medium quality explosive manufacturer to a major defense armaments manufacturer in India. We discussed: consolidation of the business with high value customer accrual, diversification of the business - from mass mine explosives to blasting accessories to ammunition, alignment with multiple foreign partners, sourcing cheap investments from various countries, understanding Indian defense imports were rising leading to currency issues and finally the early mover advantage in to the defense sector. The learning of the SAM and MOGI companies is that they have to seize with new opportunities and persist with them as vigorously as possible. In this conclusive part we discuss what Solar did differently: their achievements, the timing, the alignment, keeping the operations keyed to share market moves, the organizational moves and total productive maintenance to produce quality products.*

### What Solar did Differently

In the year 2019, Solar received orders to make propellants for the Akash missile, a medium-range surface-to-air missile, and the Pinaka, a multiple rocket launcher, used by the country's defense forces, as well as for pyrotechnics, which help initiate the explosion, and igniters, which provide the spark for the ammunition. It has also received a trial order for propellants for the BrahMos cruise missile, a medium-range missile that can be fired from submarines, ships, aircraft or land. Its current order book totals ₹4 billion<sup>1,2</sup>. In the latest financial year, defence-related sales accounted for about ₹1.7 billion, a four-fold increase from the previous year. Although still only about 7 percent of total revenues, the defence business is Solar's fastest-growing segment. Satyanarayan Nuwal has accomplished many things in his long career, among them creating India's largest maker of explosives (by revenue) and the first private supplier of explosives for warheads. He



**Figure 1.** The company also featured in Forbes Asia's list of 200 Best under a billion companies in 2019 and previously in 2010 (with Satyanarayan Nuwal).

has also hit another milestone, as the 73 percent stake that he and his family hold in Solar Industries India, the company he founded in 1983, rose to be worth \$1 billion.

## Remaining Ahead of the Pack

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Solar Industries took the initiative to start new defense verticals taking advantage of the following openings provided by the Indian government:

1. Starting from early 2022, the Government of India has taken several policy initiatives in the past few years under 'Make in India' program and brought in reforms to encourage indigenous design, development and manufacture of defence equipment in the country, including design and development. These initiatives, inter-alia, include according priority to procurement of capital items from domestic sources under Defence Acquisition Procedure (DAP)-2020.
2. Announcement of 18 major defence platforms for industry led design and development; Notification of two 'Positive Indigenisation Lists' of total 209 items of Services and one 'Positive Indigenisation List' of total 2851 items of Defence Public Sector Undertakings (DPSUs), for which there would be an embargo on the import beyond the timelines indicated against them.
3. Simplification of Industrial licensing process with longer validity period.
4. Liberalisation of Foreign Direct Investment (FDI) policy allowing 74% FDI under automatic route.
5. Simplification of Make Procedure; Launch of Innovations for Defence Excellence (iDEX) scheme involving startups & Micro, Small and Medium Enterprises (MSMEs).
6. Implementation of Public Procurement (Preference to Make in India) Order 2017; Launch of an indigenization portal namely SRIJAN to facilitate indigenisation by Indian Industry including MSMEs.
7. Reforms in Offset policy with thrust on attracting investment and Transfer of Technology for Defence manufacturing by assigning higher multipliers.
8. Establishment of two Defence Industrial Corridors, one each in Uttar Pradesh and Tamil Nadu<sup>2,3</sup>.

## Indian Defence Sector At a Glance

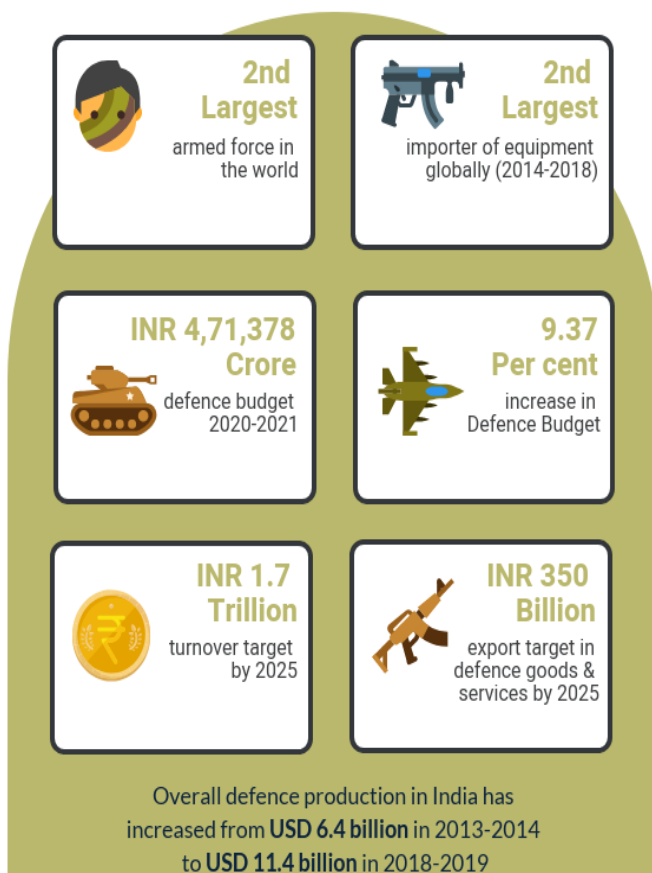


Figure 2. Indian defense sector.

## Foray into Military Explosive Development

Economic Explosives Ltd (EEL), a subsidiary of Solar Industries, Nagpur, on the basis of July 1<sup>st</sup>, 2024 report claims to have developed three new explosive formulations that can prove to be a game changer for the Indian armed forces due to the sheer enhancement of firepower and explosive effect. SEBEX 2 is a new explosive formulation that provides a



Figure 3. A poster of the explosive.

much more powerful blast effect than any currently available solid explosive. Conventional Explosives, like DENTEX/TORPEX, which are used in conventional warheads, aerial bombs and many other ammunitions worldwide have the TNT equivalence of 1.25-1.30, according to solar industries officials. Calling it another step towards achieving “Aatma Nirbharta (self sufficiency) in Defence,” the Navy said that the development was aimed at enhancing the potency and efficiency of weapons/ammunition”. Another step towards achieving #AatmaNirbharta in Defence. #IndianNavy has successfully conducted certification tests for the explosives, which are being indigenously developed by M/s Economic Explosives Limited, Nagpur. SEBEX 2, developed under the Make in India initiative, uses a composition based on high-melting explosive (HMX)<sup>4</sup>.

Meanwhile, the company is also reportedly developing another variant, which is expected to have an explosive power rated 2.3 times that of TNT.

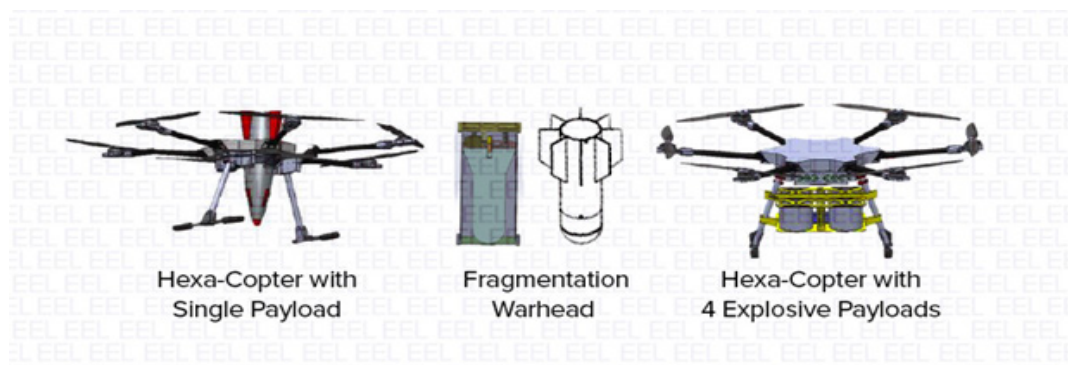
Touted to be among the world’s most powerful non-nuclear explosives, SEBEX 2 is aimed at revolutionising artillery shells and warheads by further enhancing their destructive power without adding extra weight to them, reports said. The new formulation of SEBEX 2 was rigorously tested under the Defence Export Promotion Scheme of the Navy, The Economic Times reported. According to other sources, the Indian Navy has also certified SITBEX 1 – the EEL’s first thermobaric explosive. SITBEX 1, which generates extended blast duration with intense heat, is suited to target enemy bunkers, tunnels, and other fortified positions. The Indian Navy has also certified SIMEX 4, a munition which is safer than standard explosives when it comes to its storage, transportation and handling. It is far more likely to accidentally go off, which makes it appropriate for weapons like torpedo warheads in submarines, where safety is of utmost importance.

## Foray into Drone Development

In a June, this year report, Economic Explosives Limited (EEL), have sent the first batch of domestically produced man-portable suicide drones, called Nagastra-1 having an indigenous content of over 75 per cent. This addition enhances the



**Figure 4.** A loitering munitions (also known as a suicide drone or kamikaze drone) is an aerial weapon system category in which the munitions can loiter (wait passively) around the target area for some time and attacks only once a target is located. The precision attack is dependent on its sensors. The kamikaze drone can be operated in silent mode and at an altitude of 1,200m, making it a difficult target to detect.



**Figure 5.** Different drone payloads developed/under development at solar industries.

army's capability to execute shallow strikes across the border when necessary. These drones are engineered to accurately strike enemy training camps, launch pads, and infiltrators, thus minimising risk to soldiers<sup>5,6</sup>.

The loitering system weighs 12 kg and carries a warhead of 4.5 kg. It has an endurance of 60 minutes and offers a range of around 40 km. Vehicle mounted tube / cassette launched Loiter Munition (LM-2) can carry 5-10 kg warheads to a range of 40-100. This will be a rugged and mobile system where in six LM2, launcher, generator, UPS, and other support equipment can be accommodated in a 1 T class of vehicle. This variant can be gainfully utilised by the Operational Commanders to shape the battlefield and can be a game changer. Under Project 'Zorawar', the Army's light tanks will be the first to be fitted with loitering munitions, that would be very efficient weapons against tanks and armoured vehicles. The Army plans to integrate these kamikaze drones as standard non line-of-sight strike loitering munitions into their Main Battle Tanks (MBTs) like the T-80 and Arjun Mk-1 to enhance their battle effectiveness. Following a thorough analyses of recent conflicts, like in Ukraine, the Indian Army has determined that loitering munitions are more effective than armed Unmanned Aerial Vehicles (UAVs) in taking out enemy MBTs. Therefore, Project 'Zorawar' is to incorporate these munitions after careful consideration of new advancements in technology and studying their effectiveness. According to an official in the know, Nagastra-1 has maximum range of 30 km in autonomous mode of operation and 15 km in man-in-the-loop mode. It can loiter over a target for a maximum of 60 minutes and has an accuracy of less than 2 metres.

Solar is currently developing fragmentation cum blast warheads weighing 01-10 kg that can be dropped from individual Drones or Swarms of Drones. These warheads can neutralise enemy or anti national personnel in open and also neutralise hostile soft skinned targets within a lethal radius of 8-30 m. The said warheads are being developed with electronic fuses to ensure effective air burst or detonation on impact. EEL is also developing hexa-copter drones with single or multiple explosive payloads that can be dropped from a height of 300-500 m with an accuracy of 3-5 m at the target end. EEL has developed the competency to develop other variants of warheads to neutralise armoured vehicles, civil or field fortifications employed against us or any other target specified by the users.

## Other Capabilities

### HMX and its Compounds

Solar provides a complete range of High Performance Explosives and its compositions from its "State-of-The Art" manufacturing plants. Solar has facilities to produce HMX and HMX Compounds with high purity and fineness. Solar also produces HMX compounds coated with high melting waxes and synthetic polymers such as Viton for pressing applications providing an enhanced phlegmatization effect resulting in less sensitivity. The modern production facility

has well defined and documented Quality Management System. Laboratory having latest comprehensive testing facilities with NABL accreditation ISO/IEC-17025-2017.

## Currently Under Development

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### Counter Drone System (CDS)

Countering the threat caused by disruptive drones is now an issue of concern for everyone as hostile countries and non-state actors will try to use drones for surveillance of vital installations and for targeting military assets. Even non-state actors are adept at use of Unmanned Aerial Systems (UAS) for malicious purpose such as for terrorism, violent extremism, espionage, sabotage, propoganda and smuggling of arms, ammunition, drugs, fake currency and other disruptive material. Keeping in view of the futuristic requirements of armed forces, EEL is developing a Micro-missile based Counter-Drone System (CDS) with both soft kill and hard kill capability.

### Drones Armed with Guided Missile

Drones carrying small missiles can be a game changer solution as it can neutralise adversary targets by firing short range air to ground missiles. The system under development at EEL is having a drone armed with missiles weighing 2-10 kg with a range of 2-3 km. These missiles will be guided precisely to the target and will carry warheads to neutralise tanks, bunkers, radar sites and other valuable military targets<sup>6</sup>.

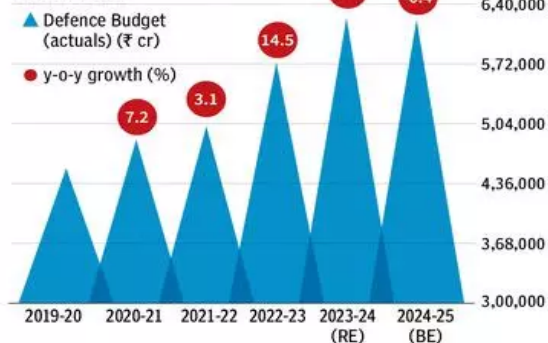
### The Takeaway from the Story so Far

- 1. Taking the risk:** By the mid-1990s, competition had picked up as several companies had come in as consignment agents of mining explosives in India. With margins getting squeezed, Solar decided it was time to go beyond trading and start manufacturing explosives. In 1996, he started modestly, first as an explosives trading business and a year later set up a small plant to manufacture explosives, selling them to clients in mining, construction and infrastructure. His single biggest client over the years has been India's state-controlled Coal India. By 2006, Nuwal was ready to IPO, and used the money for expansion, building 13 plants in India. In 2010, Solar was the first private company to get a licence from the Indian government to make explosives for warheads for India's defence forces. "The government had never thought that the private sector in India could produce ammunition," says Nuwal. "But I was very confident."
- 2. Leap of faith:** Solar set up new facilities and hire experts without any guarantee of winning a government contract. They started with an investment of about ₹600 million in the facilities before receiving the first order. "They've got excellent facilities and found the right skills in good people," says KV Kuber, director, aerospace and defence at EY in India. "They've created indigenous technology."
- 3. Investing in understanding the ecosystem:** With Solar paving the way, a handful of other private companies are now entering the sector. But Solar has first-mover advantage, says Santosh Yellapu, a defence analyst at Mumbai-based IndiaNivesh Securities. "They are well prepared to get all approvals. They know how the defence ecosystem works, how the files move from one table to the next," he says. When asked about the prospects for the defence business, Nuwal says simply: "There is no reason for us to be stopped."
- 4. Alignment:** The skillsets of explosives and detonator technologies helped them venture into defense technologies as the alignment matched.
- 5. The timing:** Atmanirbhar project brought in a lot of filip for defence production and obviously, the public sector was slow to respond. The defense budget of India was cutting away a lot of foreign currency reserves and the internal and external security situations are not improving- it is only natural that the government would look for Indian substitutes. Solar placed itself in the gap.

## Does defence Budget fall short?

**1.9%** Allocation to the Ministry of Defence in FY25  
of GDP *\*The global norm is 2-5 per cent*

### Growth in allocation flat in FY25



The Government of India has announced a significant increase in its defence budget for the financial year 2024-25, allocating ₹6.21 lakh crore (approximately US \$75 billion). This marks a notable rise from the previous year's budget of ₹5.94 lakh crore.

Figure 6. Budget allocation.

## The Market as it is Shaping Up

India's annual defense production reached a record high of approximately Rs 1.27 lakh crore for 2023-24, surpassing the previous year's Rs 1.09 lakh crore.

As per the data received from all DPSUs (Defence Public Sector Undertakings), other PSUs manufacturing defence items and private firms, the value of defence production in the country has gone up to a record-high figure, i.e., Rs 1,26,887 crore, reflecting a growth of 16.7% over the defense production of the previous financial year. Of the total Value of Production (VoP) in 2023-24, about 79.2% came from DPSUs and other PSUs, and 20.8% percent by the private sector, the Ministry said.

In terms of absolute value, both DPSUs/PSUs and the private sector recorded a steady growth in defense production. What contributed to the overall growth in the indigenous production, according to the Ministry, was the increasing defence exports. In FY 2023-24, defence exports worth Rs 21,083 crore were registered, up 32.5% over Rs 15,920 crore in the previous fiscal. Since 2019-20, when defence production stood at Rs 7,90,71 crore, the growth in value is over 60%.

## What More to Expect

To reiterate what Solar Explosives did differently are the following:

### 1. Production

- In 2023-24, India's defense production reached a record high of Rs 1,26,887 crore, which is 16.8% higher than the previous year. The government aims to increase annual production to Rs 3 lakh crore by 2028-29.
- In 2023-24, India's defense exports also reached an all-time high. The government aims to increase exports to Rs 50,000 crore by 2028-29, which is more than double the current level of Rs 21,083 crore.
- The private sector is also expanding rapidly, contributing 20.8% of the total production value in 2023-24.

Reading the above signals ahead of the pack and seeing the gap because of lethargic public sector and budding private sector, and the positioning to serve the global defense sector in the wake of warring worlds.

## 2. Preparation

To dream of something is one, to actually coming true to the dream is another. Solar put every move with a framework so that it can carry on with the existing business while developing the new businesses. Solar Industries, had a flat year in 2013. The company's stagnating performance reflected in its share price, which after having reached Rs 850 in November 2011, was still at the same level in March 2014. Instead of being bogged down, the company used this time to expand its capacities within India as well as abroad and expand into another lucrative field — defense. In 2013-14, even under the troubled times of the company, they spent Rs 160 crore to set up a propellant and warhead plant for defense, besides setting up cartridge plants in Zambia and enter Turkey<sup>7</sup>. The explosives used in the missile warheads were all imported in India then.

## 3. Playing the Share Market Note

Solar did what could be sweetener for the stock market. Over the last 3 years, Solar Industries India has consistently outperformed the BSE 500 index and has generated a return of 145.61%. With a market cap of Rs 84,166 crore, it is the largest company in the sector and accounts for 16.09% of the entire industry's market share. Its annual sales of Rs 6,069.52 crore make up 4.34% of the industry's total sales<sup>8</sup>.

## 4. Code of conduct

The Company has developed Code of Conduct and directors, management and employees at all levels will abide to ensure good governance, ethical practices, transparency and accountability in conducting affairs of the company and dealing with stakeholders across the value chain.

## 5. Total Productive Maintenance led cultural change

Solar adopted TPM to initiate the organizational changes. Some of what they achieved are;

- a. Workmen have started owning responsibility for operating and maintaining the equipment.
- b. Team working culture is inculcated by breaking down departmental barriers.
- c. Culture of waste elimination is getting inculcated. Reduction in breakeven point for off highway was achieved on the back of Kaizens implemented on the shop floor.
- d. Improvement in skill level of the operators in terms of multi skilling.
- e. Review mechanisms set up for tracking performance parameters.
- f. 5S activities improved shop floor. This gave a positive image about the company to visiting customers and has resulted in more business enquiries to our company.
- g. S-D-C-A cycle has started due to formulation of checklists. This has resulted in benchmarking of key indices for further improvement.
- h. Disciplined approach to problem solving is demonstrated by use of Why-Why analysis, 10 step methodology, etc.
- i. KMI-KPI-KAI connect enabled to harness the efforts of everyone to goal of Zero accidents, Zero defects and Zero break downs<sup>9</sup>.

## Conclusion

The article reports the phenomenal rise of Solar Industries Limited. While the progress in the last 10-15 years have shown incredible appreciation in the stock market ,it will be hard for the Solar Industries to match the market expectation. More challenges will come from organizational expansion, control, quality assurance and competition in imitable technologies. This is a story to watch.



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## References

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1. Available from: <https://www.forbesindia.com/article/cross-border/why-solar-industries-india-is-seeing-explosive-growth/57889/1>
2. Available from: <https://solargroup.com/defence/#apps>
3. Available from: <https://www.spslandforces.com/experts-speak/?id=1008&h=Indigenous-Nagastra-Kamikaze-Drone>
4. Available from: <https://www.indiatoday.in/india/story/india-develops-sebex-2-new-explosive-double-lethality-of-warheads-bombs-tnt-2560711-2024-07-01>
5. Available from: <https://indianexpress.com/article/india/defence-production-rs-1-27-lakh-crore-2023-24-9434778/>
6. Available from: [https://economictimes.indiatimes.com/news/defence/indias-defence-production-skyrockets-in-2023-24-make-in-india-hits-turbo-mode/articleshow/111504256.cms?utm\\_source=newsletter](https://economictimes.indiatimes.com/news/defence/indias-defence-production-skyrockets-in-2023-24-make-in-india-hits-turbo-mode/articleshow/111504256.cms?utm_source=newsletter)
7. Available from: <https://economictimes.indiatimes.com/markets/stocks/news/capacity-expansion-defence-foray-to-fire-up-solar-industries/articleshow/36851422.cms?from=mdr>
8. Available from: <https://www.marketsmojo.com/news/stock-recommendation/solar-industries-india-receives-buy-rating-from-marketsmojo-showcasing-strong-fundamentals-and-growth-potential-140773>
9. Total Productive Maintenance. Available from: <https://jipmglobal.com/tpm/wpcontent/uploads/d400b7ef24150d6526c244fff71b2436.pdf>