Forging India’s Defence Future: Advancing Artillery Shell Manufacturing for Strategic Self-Reliance

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India’s defence manufacturing sector is undergoing a pivotal transformation, and at the heart of this shift lies a capability that often goes unnoticed but is mission-critical — artillery shell manufacturing. These components, though rarely in the spotlight, form the very foundation of India’s ammunition strength. Their production is a matter of national security, industrial progress, and strategic autonomy.

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In FY 2023-24, India's defence production soared to approximately Rs. 1.27 lakh crore, showing the highest-ever rise in output, with PSUs contributing nearly 79% and the private sector about 21% Wikipedia. Further, in FY 2024-25, annual defence output jumped even higher to Rs. 1,50,590 crore, marking a new record The Times of India.

Forging Strength: Why Artillery Shells Matter

Artillery remains the backbone of conventional warfare. According to AP News, **Ukraine fires around 4,000-7,000 artillery shells daily**, while **Russia fires over 20,000**AP News. Bomb shells are not merely metal casings – they must withstand intense pressures during handling, firing, and detonation. A single flaw can compromise safety and effectiveness, making forging – whether cold, hot, or isothermal – indispensable for ensuring internal structural integrity. This process ensures the resulting shells offer maximum strength, fatigue resistance, and dimensional accuracy.

India's Modernization Journey in Shell Production

Despite the high stakes, India's artillery shell output remains comparatively modest – though exact production numbers are not publicly detailed, the escalation in defence output and renewed policy focus suggests a significant push is underway.

Traditionally, shell manufacturing in India relied on manual forging, semi automation, and labor-intensive machining. Now, a shift is underway – embracing **hydraulic forging presses, hot/die-forging systems, CNC machining, robotic handling, and digital inspection**. This transition is steering the sector toward precision, consistency, and the global quality benchmarks needed for modern warfare.

Global Comparisons & Strategic Gaps

Globally, shell production is being ramped up significantly:

- In March 2023, the **EU committed €2 billion (about $2.2 billion)** to procure **1 million 155mm shells for Ukraine within a year**Defense One.
- NATO also signed a **$1.2 billion contract for 220,000 rounds of 155mm shells**, acknowledging urgent needs, given Ukraine's and Russia's massive daily artillery usage AP News.
- Examples of accelerating production: Europe's artillery shell output is projected to hit **2 million rounds by end of 2025**YahooIr-Ia.
- Rheinmetall, backed by EU funding (€130 million), aims to scale up to **1.1 million shells annually by 2027**The Wall Street Journal.

By comparison, India must upscale production capabilities swiftly to meet both national demand and emerging export opportunities.

Policy Support & Export Potential

India's burgeoning defence output indicates growing capacity and confidence. According to Reuters, India produced **$14.8 billion worth of arms in FY 2023-24**, a 62% increase since 2020. Indian-made 155mm artillery shells have even appeared on the frontlines in Ukraine Reuters – highlighting both cost-effectiveness and export competitiveness (priced at just $300-400 per shell) Defence Blog.

These developments reflect India's potential to tap into global demand. With rising international orders and India's cost advantage, expanding production could position the country as a reliable global supplier.

Technology & Sustainability: The Next Frontier

Manufacturing innovation now goes beyond precision – it includes sustainability. European firms, for example, are investing in automation to boost output while cutting energy and waste. India should mirror this by incorporating **energy-efficient presses, optimized die processes, AI-based defect detection, digital twins**, and **real-time analytics**.

Building Human Capital

Behind every machine is a skilled workforce. India has launched **Make in India** and Liberalization initiatives – by October 2022, the MoD had issued over **6,000 industrial licences**, with ~20% for guns and cartridges KPMG. Coupled with schemes like PMKVY and institutional alliances (e.g., via AICTE), these efforts are building technical expertise in forging, CNC, and digital manufacturing.

A Strategic Asset for the Future

To ensure artillery shell production becomes both a strategic asset and economic opportunity, India must:

1. Develop a forging capacity that can meet both domestic defense needs and export demand.
2. Embrace Industry 4.0 technologies to move toward precision, sustainability, and zero-defect output.
3. Invest in public-private collaboration and production clusters to accelerate scaling.
4. Expand human capital through focused training and skill development.

Conclusion

Artillery shells are often invisible in the broader narrative of defence capability – yet they are essential. Forging them with precision, reliability, and sustainability through modern

technologies and skilled manpower is India's path toward strategic autonomy.

With defence output already setting records – and cost-competitive artillery shells reaching global theatres – India has both the mandate and momentum. The shells we forge today are not merely engineering products – they are symbols of India's resilience, strength, and self-reliance.

Sources

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- MoD licences for defence manufacturing (guns & cartridges ~20%) KPMGâ□□

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