Russia and Eurasia Studies programme

Russia's defence industry at war
Can it live up to expectations?

Tomas Malmlöf

> We provide ourselves with all types of weapons ourselves. And today, already in quantities exceeding the current needs of the Armed Forces. This is how our military-industrial complex operates now. Its conveyors work in three shifts. And it will produce armaments as much as is necessary for the effective defence of our Fatherland.
>
> ***Dmitrii Medvedev**, deputy Chairman of the Security Council of Russia, on Telegram, 28 Aug. 2023.*

Russia's failed attempt to conquer Ukraine in February 2022 highlighted the need for its defence industrial production capacity to withstand harsh working conditions and foreign sanctions. This analysis is a summary of the chapter on Russia's defence industry and procurement at war in the June 2023 FOI report, *Russia's War Against Ukraine and the West: The First Year*. The chapter focuses on Russia's production of main battle tanks, artillery shells and rockets, all crucial elements of military manoeuvre and fire support. Its conclusions are tentative, as the war has added to the uncertainty in forecasting and estimating Russia's equipment portfolio. This, in turn, has negatively affected the accuracy of any estimates of Russia's military production capacity and future military equipment holdings. Should we worry about the statement of Mr Dmitrii Medvedev above?

The economics of Russian arms production

Russia is one of only a few countries aiming to maintain a strong defence industry capable of producing the entire range of military systems and equipment for all branches of its military and security forces. As the second-largest arms exporter in the world, Russia's defence industry also plays a crucial role in bolstering Russia's political influence. Yet another important feature of the Russian defence industry is its rent dependence, as it relies on financial transfers from more profitable sectors such as oil and gas.

In 2019, the Russian defence-industrial complex had 1 353 organisations, employing around two million people. In an effort to increase the industry's efficiency, the state has successively strengthened its vertical control. Its expectations have not been met; the sector is plagued with high operational costs, corruption and nepotism, as well as with bureaucratic hurdles.

Russia's military infrastructure for research and development consists of over 250 research institutes, primarily focused on applied research, and 300 design bureaus that work on design and development of prototypes. The top-down, mostly state-driven, approach to research is poorly adapted to market needs. Other weaknesses include a shortage of human capital, lack of innovation, deterioration of higher scientific education, and a lack of innovation-led manufacturing. Western sanctions against Russia increase the likelihood that the existing technology gap will continue to grow.

The ten-year state armament programmes, SAP, spell out the procurement, refurbishment and development of military hardware to equip the Armed Forces. The latest SAP, SAP 2027, adopted in December 2017, covers 2018–2027 and amounts to over RUB 20 tn (approx. USD 330 bn). 19 tn are allocated to the Ministry of Defence procurement budget. The SAP 2027 envisages a shift in production from established designs, or modernised versions of them, to serial production of new systems and equipment developed in post-Soviet Russia.

Forecasting arms procurement

Based on assessment of open source data in the late 2010s, Russia's Armed Forces looked set to be relying on a mix of modern designs, legacy hardware and gap-filling modernised Soviet systems towards the end of the SAP

FOI Memo: 8231
Project No: A 12311
Approved by: Mike Winnerstig

RUFS Briefing No. 53
September, 2023

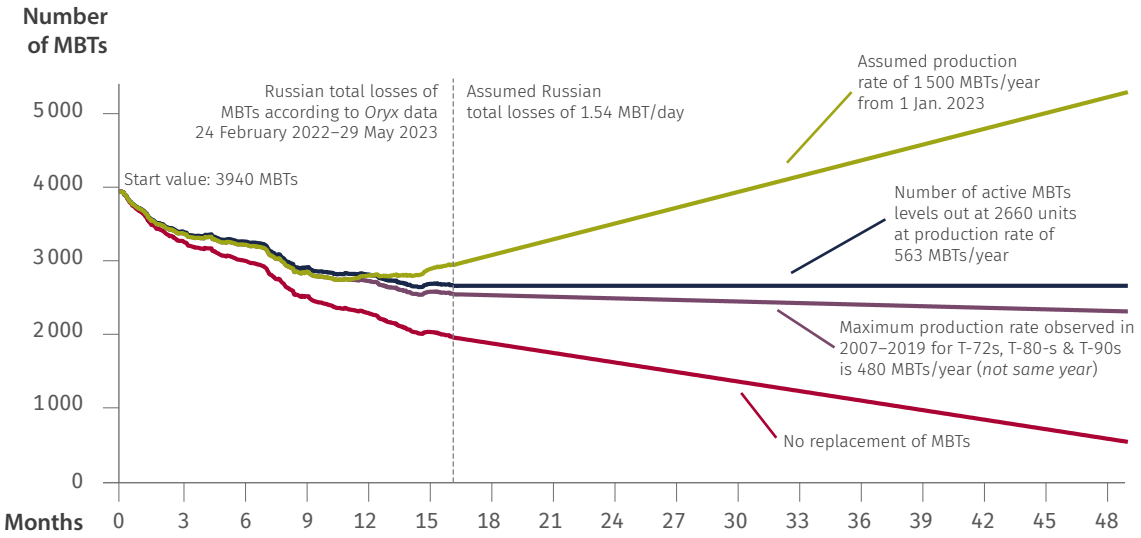

Figure 1. Assessment of Russia's stock of main battle tanks (MBT) in active use.

Sources: *Military Balance*, different years, Westerlund, Fredrik, and Oxenstierna, Susanne (eds.) *Russian Military Capability in a Ten-Year Perspective – 2019*, FOI-R--4758—SE, Stockholm, December, author's own calculations.

2027. FOI's forecasting report, *Russian Military Capability in a Ten-year Perspective–2019,* predicted that Russia would not only be able to consolidate its equipment recapitalisation, but also to increase the total equipment holdings of the Armed Forces. Provided there was sufficient political will, Russia could, in theory, increase its ground-force equipment by 30–70 percent, double its naval platforms, and enlarge its aerospace systems by 70–110 percent. Russia's enormous landmass and the importance that equipment quantity has for its defence means that a hypothetical, complete turnover of military platforms requires several decades.

Defence-industrial implications from the invasion

Russia's military capabilities have been significantly weakened by its invasion of Ukraine and its pre-invasion military stock is reduced. Its Armed Forces has lost or used up large amounts of military equipment and ammunition, especially for land warfare. Thus, in 2022, Russia had to focus on providing materiel to its military forces in Ukraine. Deliveries of urgently needed equipment planned for 2024–2025 had had to be advanced to 2023, according to Defence Minister Sergei Shoigu on 21 December 2022 at an extended session of the Ministry of Defence.

Russia was also subjected to additional Western sanctions relating to military and dual-use products, with the aim of maximizing the negative impact on the Russian economy and denying access to technologies needed for its aggressive military capabilities.

In sum, assumptions about the prerequisites for Russia's defence-industrial production capacity need to be revisited.

Land warfare equipment

To project the impact of Russia's invasion of Ukraine on the size of its active stock of battle tanks, released Russian data on yearly procurements of military systems up to 2021 were used, together with equipment inventories from *The Military Balance* and records of equipment losses from the *Oryx* website.

Figure 1 illustrates four different scenarios with which to explore Russia's ability to reconstitute its stock of main battle tanks during the on-going war. Before the invasion, Russia's Armed Forces listed approximately 3 940 main battle tanks in active use. The downward slope in all curves up to the dashed vertical line represents their total losses of tanks, as recorded by *Oryx*, from 24 February 2022 to 29 May 2023. From that time on, the assumption here is that the losses have stagnated around a linear trend of 1.54 main battle tanks a day, which corresponds to the trend in Russia's losses of tanks as of 29 May 2023.

Without repairs or replacements, the red curve illustrates that Russia would run out of main battle tanks 62 months into the invasion.

The dark violet curve assumes that Russia can add 480 units a year to its stock through new production or modernisation. This figure is based on the maximum numbers for each of the T-72, T-80, or T-90, tank

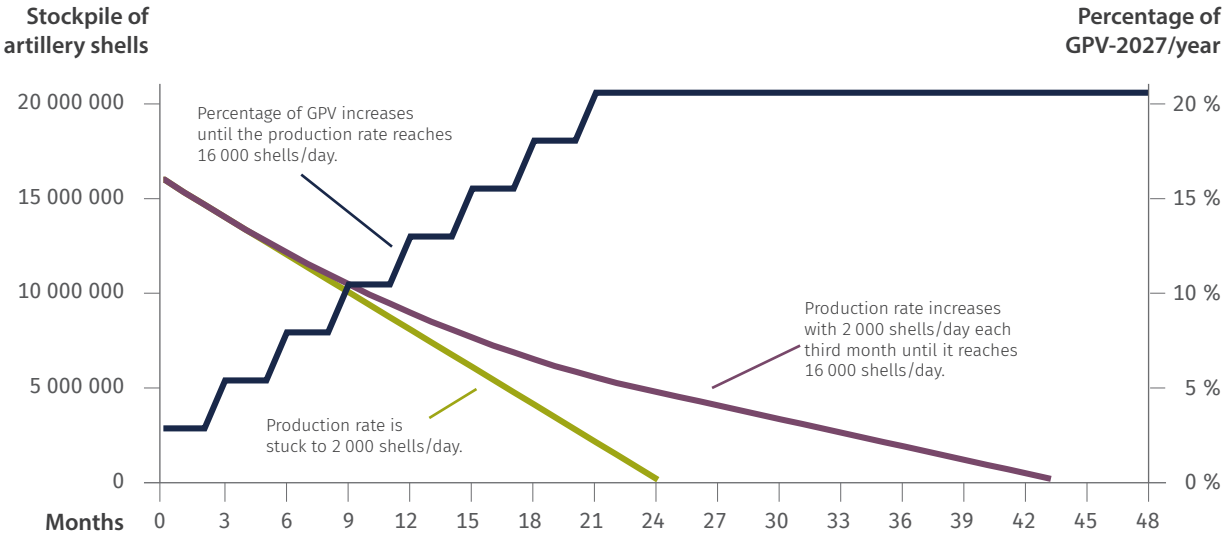

Figure 2. Impact of shelling on Russia's stockpile of artillery shells.
Source: Author's own calculations

models delivered in any single year occurring between 2009 and 2019. This figure may appear conservative or modest given other assumptions about Russia's increase in military production since the invasion.

The dark blue curve represents a scenario in which Russia's losses are levelled out by the replacement rate: 1.54 units per day, or 560 units per year. The green curve represents the statements by the Deputy Chairman of the Security Council, Dmitry Medvedev, claiming that in 2023 Russia would already be able to add another 1 500 units to its arsenal of battle tanks in active use. Considering that late Soviet production of main battle tanks amounted to some 2 000 units per year, at most, this scenario appears highly unrealistic.

In conclusion, Russia's ability to reconstitute its arsenal of battle tanks in active use is not seriously stymied, even if production output is modest. The constraining factors are whether Russia can afford to replace or repair destroyed and depleted units, and whether its stored units will last longer than the duration of the war.

Artillery shells

The first year of Russia's invasion of Ukraine was marked by high intensity, with ammunition supplies being consumed at a rate not experienced since the Second World War. This intensity placed significant logistical challenges on the warring parties, raising the question of how long supplies of ammunition could last on both sides.

In the early 1990s, Russia's Armed Forces had inherited about 15 mn metric tons of missiles and ammunition from the Soviet Army, stored at 180 arsenals, bases and warehouses, with 3 mn tons resulting from the removal of ammunition from Soviet bases abroad. Until the Soviet Union's collapse, its industry had annually produced 1.0 – 1.2 mn tons of missiles and ammunition.

Until January 2013, this stockpile had been brought down to 3.7 mn tons, of which 1.1 mn tons were unfit for use and destined for destruction through different targeted federal programmes. Until the end of the 2010s, the set target for the Armed Forces was to reduce its stockpile to 2 mn tons of artillery shells and rockets, with a yearly turnover of up to 100 000 tons, due to operations and combat training. Evidently, these figures were not dimensioned to take on a major, high-intensity and protracted war.

Despite these constraints, Russia did not economise its use of artillery shells and missiles during the first year of the war. In summer 2022, Russia's Armed Forces experienced an acute shortage of personnel in the Donbas fighting, which it tried to neutralise with heavy artillery fire – around 20 000 – 30 000 shells a day, according to some analysts. A source within the Ukrainian military command claimed that Russia used up to 60 000 artillery shells and rockets a day during the summer fighting in Donbas. During the winter of 2022 – 2023, Ukraine was on the receiving end of about 10 000 – 30 000 shells a day, according to different estimates.

Most sources nevertheless concur that in spring 2023, Russia's fire rate had been falling from late 2022 and onwards, a possible indication of the beginning of

Russian "shell hunger," or a critical shortage of ammunition. However, such assumptions have been consistently refuted by the Russian side. Defence Minister Sergei Shoigu asserts that the financial resources provided in 2022 had made it possible to increase production of ammunition for rocket and artillery weapons and aircraft by 69 to 109 percent, for certain types. Sergei Chemezov, the long-time General Director or CEO of the state-owned defence conglomerate, Rostec, claims that any talk that Russia is running out of ammunition or anything else, "is complete nonsense." Allegedly, Rostec has increased its production of ammunition several times and, in some cases, by several orders of magnitude.

Although it is likely that Russia has indeed increased its production of ammunition from at least 2022 onwards, it is neither possible to check the figures released by the Russian leadership, nor to use them to assess the actual production volumes. However, if the war continues with an intensity similar to that of the first year, shell hunger will remain a non-fictitious threat to Russia's warfare, as its stockpiles deplete further.

Figure 2 illustrates this case in point in a simple model with two scenarios. With regard to different estimations, the model postulates that Russia had stockpiled 16 mn artillery rounds and rockets at the outset of the invasion. Assuming that half of this stockpile was used up during the first year of fighting gives an average firing intensity of some 24 000 shells and rockets per day.

Based on an anticipated production rate of 2 000 artillery rounds per day, or around 60 000 shells per month, prior to the invasion, the green curve indicates that Russia would run out of artillery and rockets around 24 months, or two years, into the invasion.

The dark violet curve is based on the same assumptions of fire intensity and an initial output of 2 000 shells per day. However, in this scenario, Russia increases production by another 2 000 shells per day every third month, until the production has reached 16 000 shells per day, that is, half a million shells a month, or just over 5.8 mn shells a year. However unrealistic this production figure may seem, this curve demonstrates that, compared to the previous scenario, Russia would only gain another year and a half before it ran out of artillery shells and rockets.

Apart from the very practical and technical nature of the problems involved in multiplying the production output of artillery shells eightfold, the dark blue curve demonstrates that Russia would also be stymied by serious financial constraints. Assuming an average cost of RUB 68 400 per artillery shell, production costs of artillery shells would increase from the pre-invasion figure of some 2.6 percent to over a fifth of the entire yearly average budget for MoD acquisitions under the GPV 2027, or RUB 400 bn per year.

In conclusion, even dramatic increases in Russia's production capacity for artillery shells and rockets would have a minor impact on how long its shell stockpiles would last if Russia does not adapt its warfare, and it would come at a tremendous cost increase.

Conclusions

In the early 2020s, Russia's defence industry appeared to be in better shape than it had been for decades. Performance improved due to higher political priority and a more efficient organisational structure. Russia's full-scale invasion of Ukraine overturned these prospects. Forecasts regarding the industry's production have been narrowed down to its capacity to replace equipment losses in Ukraine and the amount of its used-up ammunition.

Russia's intensive use of ammunition is not tenable. The intensity has been maintained by reducing the stockpiles of stored ammunition. Even an eightfold production increase would only prolong the war, but it would be far from enough to stabilise and start rebuilding the stockpiles to their pre-war levels.

Denied a swift victory over Ukraine, it has been speculated that Russian President Putin now believes he can win the war through attrition. The figures presented here indicate that such a strategy would only lead to a Pyrrhic victory, at best, from which Russia would be left struggling to recover and restore its pre-war military capability for the next five to ten years – or longer. ■

Tomas Malmlöf is a senior analyst at the Swedish Defence Research Agency; his focus is on the Russian defence industrial complex and military procurement.

This text is a summary of the chapter, "*Russia's defence industry at war: Can it live up to expectations?*" in the FOI report, *Russia's war against Ukraine and the West: The First Year*. The entire report may be obtained from *www.foi.se* or via the following QR code: