



COMMENTARY

The Return of Industrial Warfare

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17 June 2022

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Can the West still provide the arsenal of democracy?

The war in Ukraine has proven that the age of industrial warfare is still here. The massive consumption of equipment, vehicles and ammunition requires a large-scale industrial base for resupply – quantity still has a quality of its own. The mass-scale combat has pitted 250,000 Ukrainian soldiers, together with 450,000 recently mobilized citizen soldiers against about 200,000 Russian and separatist troops. The effort to arm and supply these armies is a monumental task. Ammunition resupply is particularly onerous. For Ukraine, compounding this task are Russian deep fires capabilities that target Ukrainian military industry and transportation networks throughout the country. The Russian army has also suffered from Ukrainian cross-border attacks of sabotage, but at a smaller scale. The rate of ammunition and equipment consumption in Ukraine can only be sustained by a large-scale industrial base.

This reality should be a concrete warning to Western countries, who have scaled back their military industrial capacity and sacrificed scale and effectiveness for efficiency. The current strategy relies on flawed assumptions about the future of war, and has been influenced by both the bureaucratic culture in Western governments and the legacy of low-intensity conflicts. Currently, the West may not have the industrial capacity to fight a large-scale war. If the US government is planning to once again become the arsenal of democracy, then the existing capabilities of the US military-industrial base and the assumptions that have driven its development need to be re-examined.

Estimating Ammo Consumption

There is no exact ammunition consumption data available for the Russia–Ukraine conflict. Neither government publishes data, but an estimate of Russian ammunition consumption can be calculated using the official fire missions data provided by Russian Ministry of Defense during its daily briefing.

Number of Russian Daily Fire Missions, 19–31 May

Date	Fire Missions
31	710
30	710
29	717
28	542
27	499
26	526
25	490
24	684
23	688
22	700
21	735
20	251
19	356
Average	585.2308

Although these numbers mix tactical rockets with conventional, hard-shell artillery is not unreasonable to assume that a third of these missions were fired by rockets because they form a third of a motorised rifle brigade's artillery force, with two battalions being tube artillery. This suggests 390 daily missions fired by tube artillery. Each tube artillery strike is conducted by a battery of six guns total. However, combat and maintenance breakdowns are likely to reduce this number to four. With four

per battery and four rounds per gun, the tube artillery fires about 6,240 rounds. We can estimate an additional 15% wastage for rounds that were set on the ground and abandoned when the battery moved in a hurry, rounds destroyed by Ukrainian forces on ammunition dumps, or rounds fired but not reported to higher command levels. This number comes up to 7,176 artillery rounds a day. It should be noted that the Russian Ministry of Defense only reports fire missions by forces of the Russian Federation. These do not include formations from the Donetsk and Luhansk separatist republics, which are treated as different countries. The numbers are not perfect even if they are off by 50%, it still does not change the overall logistics challenge.

The Capacity of the West's Industrial Base

The winner in a prolonged war between two near-peer powers is still based on which side has the strongest industrial base. A country must either have the manufacturing capacity to build massive quantities of ammunition or have other manufacturing industries that can be rapidly converted to ammunition production. Unfortunately, the West no longer seems to have either.

Presently, the US is decreasing its artillery ammunition stockpiles. In 2020, artillery ammunition purchases decreased by 36% to \$425 million. In 2022, the plan is to reduce expenditure on 155mm artillery rounds to \$174 million. This is equivalent to 75,000 M795 basic 'dumb' rounds for regular artillery, 1,400 XM1113 rounds for the M777, 1,046 XM1113 rounds for Extended Round Artillery Cannons. Finally, there are \$100 million dedicated for Excalibur precision-guided munitions that costs \$176K per round, thus totaling 426 rounds. In short, US annual artillery production would at best last for 10 days to two weeks of combat in Ukraine. If the initial estimate of Russian shells fired is over by 50%, it would only extend the artillery supplied for three weeks.

The US is not the only country facing this challenge. In a recent war game involving UK and French forces, UK forces exhausted national stockpiles of critical ammunition in eight days.

Unfortunately, this is not only the case with artillery. Anti-tank Javelins and air-launched Stingers are in the same boat. The US shipped 7,000 Javelin missiles to Ukraine – roughly

one-third of its stockpile – with more shipments to come. Lockheed Martin produces about 2,100 missiles a year, though this number might ramp up to 4,000 in a few years. Ukraine claims to use 500 Javelin missiles every day.

The expenditure of cruise missiles and theatre ballistic missiles is just as massive. Russians have fired between 1,100 and 2,100 missiles. The US currently purchases PRISM, 500 JASSM and 60 Tomahawk cruise missiles annually, meaning that in 18 months of combat, Russia has burned through four times the US annual missile production. The Russian rate of production can only be estimated. Russia started missile production in 2015 in limited initial runs, and even in 2016 the production were estimated at 47 missiles. This means that it had only five to six years of full-scale production.

“ **If competition between autocracies and democracies has really entered a military phase, then the arsenal of democracy must radically improve its approach to the production of materiel in wartime**

The initial stockpile in February 2022 is unknown, but considering expenditure, the requirement to hold substantial stockpiles back in case of war with NATO, it is unlikely that the Russians are worried. In fact, they seem to have enough to export operational-level cruise missiles on tactical targets. The assumption that there are 4 cruise and ballistic missiles in the Russian inventory is not unreasonable. This production will probably increase despite Western sanctions. In April, ODK Saturn makes Kalibr missile motors, announced an additional 500 job openings. This suggests even in this field, the West only has parity with Russia.

Flawed Assumptions

The first key assumption about future of combat is that precision-guided weapons reduce overall ammunition consumption by requiring only one round to destroy a target. The war in Ukraine is challenging this assumption. Many 'dumb' indirect fire systems are achieving a great deal of precision without precision guidance, and overall ammunition consumption is massive. Part of the issue is that the digitisation of global maps, combined with a massive proliferation of drones, allows geolocation and targeting with increased precision, with video evidence demonstrating the ability to score first strike hits by indirect fires.

The second crucial assumption is that industry can be turned on and off at will. This mode of thinking was imported from the business sector and has spread throughout government culture. In the civilian sector, customers can increase or decrease their orders. The producer may be hurt by a drop in orders but rarely is that drop catastrophic because usually there are multiple consumers and losses can be spread among consumers. Unfortunately, this does not work for military purchases. There is only one customer in the US for artillery shells – the military. Once the orders drop, the manufacturer must close production lines to cut costs to stay in business. Some businesses may close entirely. Generating new capacity is very challenging, especially as there is so little manufacturing capacity left to draw skilled workers from. This is especially challenging because many older armament production systems are labour intensive to the point where they are practically built by hand, and it takes a long time to train a new workforce. The supply chain issues are also problematic because subcomponents may be produced by a subcontractor who either goes out of business with loss of orders or retools for other customers or who relies on parts from overseas, possibly from a hostile country.

China's near monopoly on rare earth materials is an obvious challenge here. Stimulating missile production will not be completed until 2026, in part due to component shortages. US reports on the defence industrial base have made it clear that ramping up production in war-time may be challenging, if not impossible, due to supply chain issues and a lack of trained personnel due to the degradation of the US manufacturing base.

Finally, there is an assumption about overall ammunition consumption rates. The government has always lowballed this number. From the Vietnam era to today, arms plants have shrunk from five to just one. This was glaring at the height of the war, when US started to run low on small arms ammunition, causing the US government to buy British and Israeli ammunition during the initial stage of the war. At one point, the US had to dip into Vietnam and even Second World War-era ammunition stockpiles of .50 calibre ammunition to feed the war effort. This was largely the result of incorrect assumptions about how effective US troops would be. Indeed, the Government Accountability Office estimated that it took 250,000 rounds to kill one insurgent. Luckily for the US, its gun culture ensured that small arms ammunition industry has a civilian component in the US. This is not the case with other types of ammunition, as shown earlier with Javelin and Stinger missiles. Without access to government methodology, it is impossible to understand why US government estimates were off, but there is a risk that the same errors were made with other types of munitions.

Conclusion

The war in Ukraine demonstrates that war between peer or near-peer adversaries demands the existence of a technically advanced, mass scale, industrial-age production capability. The Russian onslaught consumes ammunition at rates that massively exceed US forecasts and ammunition production. For the US to act as the arsenal of democracy in defence of Ukraine, there must be a major look at the manner and the scale at which the US organises its industrial base. This situation is especially critical because the Russian invasion stands the world's manufacturing capital – China. As the US begins to expend more and more of its stockpiles to keep Ukraine in the war, China is yet to provide any meaningful military assistance to Russia. The West must assume that China will not allow Russia to be defeated, especially due to a lack of ammunition. The competition between autocracies and democracies has really entered a military phase, then the arsenal of democracy must first radically improve its approach to the production of materiel in wartime.

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