

China's Latest Rare Earth Gambit: A Cold War on Technology

written by Jack Lifton | October 9, 2025

The Chinese have upped the ante in their trade war with Donald Trump. In a move that is as calculated as it is consequential, **Beijing has now banned the export of any and all processing equipment related to rare earths**—machinery used in refining, alloying, and fabricating end-use materials. This is not another symbolic tariff; it is a direct strike at the industrial heart of Western efforts to build independent rare earth supply chains.

To grasp its magnitude, consider that for the past two decades, virtually every piece of precision machinery used to convert rare earth oxides into metals, alloys, or magnets has come from China. Western firms have depended on Chinese engineers, Chinese instruction manuals, and Chinese spare parts. Until last week, Beijing tolerated this dependency under tight control—allowing equipment exports “out of a catalog,” as I put it, without manuals or technicians. Those days are over.

This decision may look bureaucratic, but it is geopolitical. China has not merely cornered the market on rare earth elements—it now controls the means of producing end user forms of them. The restriction targets every step with dual-use potential, meaning any process or product that could serve both civilian and military industries. Magnets, alloys, and high-purity metals all fall into that category. Xi Jinping understands exactly how to weaponize dependency: he is holding the cards, and he has just raised the stakes.

The West's Equipment Dilemma

The implications for Western projects are enormous. When I toured **Less Common Metals** in the U.K. last December, I was shown a critical component of their operation—a *spin caster*, the machine that transforms molten rare earth alloys into uniform slugs for magnet production. “The interior is Chinese, the exterior Japanese,” the engineers told me. “The Chinese make the best spin casters; the Japanese make the best furnaces.”

That firm has since been acquired by **USA Rare Earth, Inc. (Nasdaq: USAR)**, which intends to reproduce the technology in Oklahoma. But here's the problem: you can't replicate a process without the machines—and those machines are Chinese. The new export ban means **USA Rare Earth, Inc.** will need to design, build, and test its own hardware. That is not impossible, but it could add years to development timelines.

Why so long? Because the West no longer possesses a critical mass of engineers who know how to build rare earth process equipment. This is a generational gap. The few who still have the expertise—men and women who cut their teeth in the 1970s and '80s when the U.S. and Japan led in rare-earth metallurgy—are now mostly retired. Re-creating that ecosystem will require an infusion of both capital and knowledge, and neither can be purchased off the shelf.

Lessons from the Past

The danger of ignorance in this field is not theoretical. Over the last decade, I have personally witnessed **two large-scale solvent-extraction plants fail** because Western designers underestimated the corrosive nature of rare earth chemistry. “The piping was perforated and collapsed,” I recall, “because

the engineers didn't know what they were dealing with." Those errors cost hundreds of millions of dollars and years of lost production. The only reason those facilities eventually recovered was that **Chinese engineers were brought in**—men who had built similar plants dozens of times before and had already solved those problems.

Now, that safety valve is gone. Western companies cannot call in Chinese technicians anymore, nor can they import the precision equipment that forms the backbone of metallization and magnet manufacturing processes. Every alloy caster, every furnace, every extraction column will have to be designed anew.

In theory, American and European manufacturers could step in. Firms like **Thermo Fisher Scientific (NYSE: TMO)** or **Alfa Laval AB (STO: ALFA)** know how to make high-grade chemical process systems. But designing rare-earth-enabled product manufacturing equipment is not like building stainless-steel tanks for pharmaceuticals. These systems operate at corrosive extremes of acidity and temperature, and the materials of construction—corrosion-resistant metals and alloys, fluoropolymer-lined alloys, ceramic crucibles, graphite reaction chambers—must be matched to specific rare earth chemistries. Getting those specifications wrong is not a minor error; it is catastrophic.

The Market's Misreading

Wall Street, as usual, has drawn the wrong conclusion. When the news broke, the share prices of Western rare earth firms surged. "My God, the Chinese are going to cut us off," traders exclaimed. "These companies will be the solution." But they are not the solution—they are the problem. **Without Chinese technology, they cannot scale.** Their value proposition collapses unless they find or build new equipment sources.

Xi Jinping knows this perfectly well. His government has studied Western vulnerabilities for decades. In the 1990s, China imported Western plants wholesale, learned from them, and replicated them domestically. Now the process is reversed: the West is the student without the textbook.

Donald Trump's response will define whether this becomes a temporary disruption or a structural crisis. The Trump administration's earlier tariffs on Chinese magnets and critical materials were designed to incentivize domestic production, but they never tackled the deeper issue—**technological dependency**. We do not merely import Chinese metals; we import the means to make them. Tariffs do nothing to change that equation.

A Call for Real Industrial Policy

To build a genuinely independent rare earth supply chain, the United States and its allies must think beyond mining. They need to fund **equipment innovation**—the engineering of new spin casters, solvent-extraction trains, reduction furnaces, and sintering systems. This is not glamorous work. It is slow, iterative, and expensive. Experience can no longer be purchased; it must be created by trial and error. But without it, the so-called “critical minerals strategy” is hollow.

The U.S. Department of War and the Department of Energy have both issued grants for magnet projects, but few of those funds target process equipment design. We need a “**DARPA for metallurgical engineering**”—a place where mechanical, chemical, and materials engineers can rebuild the lost art of rare-earth manufacturing. Until that happens, every Western project remains hostage to Chinese machinery.

Xi Jinping is playing a long game, and he's winning. He doesn't need to embargo rare earths themselves; cutting off the **tools to**

process them achieves the same effect with less diplomatic fallout. For Washington, the message could not be clearer: industrial sovereignty cannot be bought on the open market. It must be built.

I have said it before, and I will say it again: **we are not in a trade war over metals—we are in a technology war over how to make them.** And at this moment, China still holds the machines, the manuals, and the men who know how to run them.