



Testimony

U.S.-China Competition in Global Supply Chains, Panel IV: Safeguarding U.S. Defense-Critical Supply Chains

James (JB) Brown

CEO

BCI Solutions - Bremen, Indiana

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Good afternoon, Commissioners Borochoff and Goodwin, other members of the Commission, and staff. Thank you for the invitation and opportunity to speak with you today. I apologize for not being able to testify in person. My testimony will focus on the importance of the U.S. metalcasting industry in providing key castings for our nation's national defense, and the challenges, vulnerabilities, and implications of our continued reliance on China as part of our critical supply chain.

I am JB Brown, CEO of BCI Solutions, Inc. in Bremen, Indiana. I am proud to be a fourth-generation Indiana metalcaster and small business owner. Our foundry was founded by my great-grandfather in 1939 and has been in continuous operation for over 80 years. My daughter, Jordan Brown, and my son, Ryan Topper, are part of our team and represent the 5th generation.

BCI is a ferrous foundry producing gray and ductile iron castings. We also operate our own machine shop and assembly division. Our team of over 200 associates manufactures an array of castings for heavy duty trucks, agricultural and healthcare equipment, valves and pipe fittings, pump components, compressors, lawn and garden equipment, as well as a variety of key parts for the U.S. Department of Defense found in military equipment.

U.S. Metalcasting Industry

The U.S. metalcasting industry remains critical to the U.S. economy, as 90 percent of all manufactured goods incorporate engineered castings. All major metals can be cast. The most common are iron, steel, aluminum, magnesium, zinc, titanium, and copper-based alloys. There are currently 1,725 metalcasting facilities operating in 49 states,¹ down from 2,620 plants in 2003.²

Castings have thousands of applications. They are found in cars, trucks, planes, rail, transit, ships, all types of machinery, air conditioners, refrigerators, lawn mowers, power generation, medical devices, water infrastructure, home appliances, wind turbines, military equipment, oil and gas, mining equipment, and tractors – just to name a few. In short, castings represent a vital, yet basic, aspect of our everyday lives.

According to the American Foundry Society, our industry's trade association, the U.S. metalcasting industry contributes over 490,000 jobs and generates \$110.52 billion in economic output when considering the direct and indirect induced impacts, and provides \$10.59 billion in federal, state, and local taxes annually. It is comprised primarily of

¹ Industry Outlook: Strong Sales Expected, Casting Source, Jan/Feb 2022, pg. 35.

² Steady Growth in Global Output, Metal Casting Design & Purchasing, Jan. 2015, pg. 26.

small businesses, with nearly 80% of domestic metalcasters employing fewer than 100 workers. Many foundries are still family owned, such as my own.

Growth of Chinese Manufacturing and Chinese Foundries

Over 90,000 American manufacturing facilities have closed their doors since the late 1990s, according to the Economic Policy Institute³, eliminating millions of good-paying, middle-class jobs. China surpassed the United States as the world's largest manufacturing nation in 2010, and in 2019 held nearly 29 percent of global factory output, while the U.S. share had shrunk to 17 percent.⁴ Imports have replaced domestic production throughout our supply chains, often from adversarial countries like China and Russia.

Since 2000, China has become the largest producer of metal castings. There are over 25,000 metalcasting facilities in China.⁵ The China Foundry Association maintains that there are 14,000 iron foundries, 4,000 steel foundries, and 8,000 nonferrous foundries operating in China.

The world volume of casting production has fallen steadily by 6.4 percent since 2018, with a recorded production volume of 105.5 million metric tons in 2020. Despite this global decline, China's production has increased, maintaining the lead in 2020 with 51.95 million metric tons – nearly 49.2 percent of the world's production. India and the United States followed with a casting production of 11.31 and 9.75 million metric tons, respectively, that same year, with the U.S. showing a year-on-year decrease of 13.8 percent.⁶

The Chinese government continues to heavily subsidize its metals-related sectors through cash grants, preferential loans and directed credit, land use subsidies, subsidies for utilities, raw material price controls, and tax policies.

Chinese castings have continued to be priced 30 percent lower than U.S.-produced castings, despite the Section 301 tariffs being put in place on dozens and dozens of ferrous castings for past several years, and the increase in overall operating costs due to the pandemic. For years, U.S.-based companies have purchased from low-cost producers, primarily castings from China and broader Asia.

The pandemic has exposed a dangerous reliance on global suppliers for many consumer

³ “Free Trade is Killing American Manufacturing,” Michael Collins. Industry Week, Nov. 23, 2020. See Appendix A - Volume of global casting production from 2018 to 2020.

⁴ “China Is the World's Manufacturing Superpower,” Felix Richter. Statista. May 4, 2021. Link: <https://www.statista.com/chart/20858/top-10-countries-by-share-of-global-manufacturing-output/>

⁵ China Foundry Association, Nov. 2021 – provided to the American Foundry Society.

⁶ Published by Statista, April 26, 2022 - <https://www.statista.com/statistics/237526/casting-production-worldwide-by-country/>.

and commercial products – revealing that the United States is ill-equipped to produce enough medicine, medical equipment, personal protective equipment, semiconductors, automobiles and parts, building materials, and consumer goods, let alone the quantities needed to address a future emergency. Decades of offshoring have contributed to the ongoing supply chain shortages and risks that continue to hinder the U.S. economy, especially for manufacturers and metalcasters.

Defense & National Security

Metal castings play an integral role in our national defense. All branches of the U.S. military are reliant on castings found in jet fighters, helicopters, ships, tanks, trucks, submarines, laser-guided missile systems, weapon systems, as well as other vital systems and equipment. Many of the castings we supply are contained in weapons being sent to Ukraine, including Javelin antitank weapons. Our company, BCI Solutions, supplies over 23 different types of machined complete ductile iron castings to AM General for the military Humvee brand vehicles as a Tier 2 supplier.

In February 2022, the U.S. Department of Defense (DoD) issued its report in response to last year's Executive Order 14017, Securing America's Supply Chains, which called for a comprehensive review of supply chains in critical sectors, including the defense industrial base (DIB). The DoD report, titled "Securing Defense-Critical Supply Chains," assesses supply chains in the DIB and sets out DoD's plan to align its priorities and capabilities to strengthen the industrial base and to establish a network of domestic and allied supply chains to meet national security needs.⁷

The DOD identified four types of technology and goods about which it is particularly concerned, including castings and forgings; kinetic capabilities such as missiles, hypersonic and directed-energy weapons; high-capacity batteries, especially those using lithium; and microelectronics.

Regarding castings and forgings, the Report attributes capability challenges in part "to the impacts of offshoring and waves of industry consolidation since the mid-20th century."

It highlights concerns about how there is only one foundry that can produce the large titanium castings required for certain key defense systems, while China produces four times as much as the United States in terms of casting tonnage. The resulting erosion of the domestic market share and increased reliance on foreign sources could introduce national security vulnerabilities in addition to the general diminishment of U.S. technological innovation.

⁷ "State of Competition within the Defense Industrial Base," Office of the Under Secretary of Defense for Acquisition and Sustainment (Feb. 2022), [available here](#).

DoD recommendations to address these offshoring and consolidation issues include:

- Development of a cast and forged (C&F) strategy to “inform policy and investment decisions over the coming years,” which would include, in part, expanding use of additive manufacturing and digital production capabilities.
- Investment in the C&F industrial base. This investment will leverage DoD’s overall C&F strategy to revitalize sub-tier supplier and workforce development and address procurements that optimize DIB synergies.
- Identifying and developing allied and partner C&F capabilities. Through international coordination, DoD aims “to scope, develop, and implement plans to develop and coordinate C&F capabilities.”

Our industry looks forward to working with the DoD and other key federal agencies on these recommendations to strengthen the U.S. metalcasting industry.

Disconcerting is the fact that the number of small businesses in the U.S. defense industrial base shrank by more than 40% over the past decade. In fact, the DoD warned that if the trend continues, the country could lose an additional 15,000 suppliers over the next 10 years.⁸

One of the challenges as a Tier 2 supplier for the defense sector is that most foundries are small businesses. Reading through government procurement requirements for the manufacture of castings or components is more extensive than other customer relationships. These extra requirements to meet government contracts takes additional staff time, more documentation, and more effort to fulfill. Foundries that sell to the U.S. military also need to comply with a cybersecurity certification process. Some foundries are overwhelmed with the risk management expertise required and financial resources to achieve the levels of the cybersecurity compliance. These stringent requirements are not something that some small foundries would be willing to undertake.

Critical Materials and Rare Earth Elements

One of the questions that was asked is about dependency on China for materials and chemicals that go into the casting process. To me, this is one of the most critical questions that manufacturers need to know the answer.

Unfortunately, we remain more dependent than ever in the manufacturing sector in securing strategic and critical materials and components from China. In 2019, China was responsible for 80 percent of rare earths imports into the U.S., according to the U.S.

⁸ “Hicks says DOD will take ‘meaningful action’ to remove barriers for small contractors,” John Hewitt Jones. FedScoop, Sept 21, 2021.

Geological Survey. The U.S. went from a position of global dominance in rare earth element (REE) supplies in the 1990s to a heavy dependency on China within 10 years. They are essential for electric motors, military hardware, smartphones, and many other products and industrial processes — and demand for them is expected to increase dramatically in the next 20 years.

Extracting, processing, and refining the rare earths elements pose a range of technical and environmental issues. Domestic efforts to extract rare earths are taking place in states including Wyoming, Texas and California, but the recent past provides cautionary tales. In 2002, after the only major U.S. REE supplier, California's Mountain Pass mining company, went bankrupt, the federal government and U.S. manufacturers began sourcing REEs from foreign countries. Molycorp, which reopened the Mountain Pass mine in the early 2000s, only to go bankrupt in 2015. MP Materials bought the mine and restarted production in 2017. It is our understanding that the company is expanding its facilities, including a restoration of domestic refining capability at Mountain Pass by next year.

On March 31, President Biden ordered the U.S. secretary of defense to “create, maintain, protect, expand, or restore” domestic production of critical minerals such as lithium, nickel, cobalt, graphite, and manganese. The IEA recently estimated that demand for these five minerals and rare earth elements will grow ten times by 2040 in a baseline scenario based on current government policies — and by 30 times in a scenario with more aggressive policies.

Ferrous foundries require REEs in the metalcasting process. The foundry industry uses rare earths and minerals, scrap metal, and pig iron to produce castings. **If we are unable to obtain these materials in the quantities needed, BCI would not be able to meet that demand, especially if an increase were to be requested at this moment.** For certain materials, we are limited to the amounts that we ordered last year due to ongoing supply chain issues which I describe below.

Currently, magnesium silicon prices are at an all-time high and world supplies are very tight. The sole-source U.S. supplier, US Magnesium, put in place a force majeure since October due to equipment failure, which is still in effect. Prior to the Russian invasion of Ukraine, we were using Ukraine as our silicon supplier. We have had excellent material with good pricing from India, but the logistics have been the issue. We used to get magnesium silicon shipped within 5-6 weeks. Now it is taking five months at a minimum for delivery. A number of foundries are purchasing their magnesium silicon from China and Brazil.

Pig iron continues to be a major sourcing issue for gray and ductile iron foundries since Russia and Ukraine were top suppliers of pig iron. Most American gray and ductile iron

foundries utilizing pig iron were sourcing it from Ukraine. Effectively 50% of the global supply of pig iron, both basic and nodular, has been affected.

Supplies are now coming from Brazil, Turkey, and Canada. Mills in China, Japan, and the United Arab Emirates have started offering pig iron. China remains the largest producer of pig iron – until recently they were domestic consumers and were not exporting pig iron in large quantities.

Meanwhile, prices for pig iron have increased from \$400 net ton (NT) to now \$1,200/NT. I don't believe there are any domestic sources of nodular grade pig iron. If iron ore were mined domestically and desulphurized further, the U.S. would have a potential for domestic supply. American steel companies using blast furnaces typically use their molten iron to make finished steel, rather than sell pig iron to their competitors or U.S. foundries.

Cost increases across the board are staggering for other materials as well. Nickel that was \$7.00/lb is now \$15/lb. Silicon carbide that was \$800/NT is now \$1,500/NT.

Additionally, here is an overview of additional metals and minerals used by ferrous foundries, as well as their sourcing (China is a critical source of several of these commodities):

Commodity	Major Import Sources
▪ Chromium	Russia is the primary source , along with South Africa, Mexico, Kazakhstan
▪ Fluorspar	Mexico, Vietnam, South Africa, Canada
▪ Graphite	China is the primary source of the material . Also, Mexico, Canada, and India.
▪ Magnesium (metal compounds)	China is the primary source of the material . Other countries include Russia , Israel, Kazakhstan, Ukraine , Brazil, Turkey.
▪ Manganese	Gabon, South Africa, Australia, and Georgia.
▪ Rare earth elements group	China is the primary source of the material . Other countries include Estonia, Malaysia, and Japan.
▪ Strontium	Mexico, Germany, and China .
▪ Tin	Indonesia, Peru, Malaysia, and Bolivia.

Energy Security

Three months into the war in Ukraine, the outlook for oil supply and demand remains uncertain. The timing of the resolution of the conflict is unclear and both consumers and investors are being buffeted by price volatility. Metalcasting is among the most energy-intensive industries in the United States. The heating and melting of metals consume large amounts of energy, accounting for about 55% of the total energy used. Mold-making, core-making, heat treatment and post-cast operations use significant energy as

well.

Compared to other foundry sectors, energy costs are typically higher for iron foundries such as BCI. Most iron casting work is done at temperatures up to 2850° F, with subsequent heat treating done at up to 1900°F. The melt temperature is much higher for gray and ductile iron compared to non-ferrous metals.

Today, energy costs are again at the forefront of U.S. metalcasters' concerns, with oil prices at a record high, dwindling domestic natural gas supplies pushing up the cost of a major energy component for many plants, and the once-reliable electricity network in increasing jeopardy.

The IEA warned in its latest monthly oil market report released June 15 that the market may loosen up later this year, but producers could face fresh challenges to keep up with rising consumer use in 2023 as sanctions squeeze Russian supply, Chinese demand returns from pandemic restrictions, and oil-producing nations face limits on output increases.⁹

Furthermore, there is less U.S. and Canadian refining capacity today than there was before the pandemic, as some refineries have closed permanently, and others are being converted to refine renewable fuels rather than crude oil.

As temperatures rise ahead of what forecasters say will be a hotter-than-normal summer, electricity experts and officials are warning that states may not have enough power to meet demand in the coming months. This is problematic for foundries given furnaces require a constant power supply to maintain the standard temperatures necessary to melt iron in large quantities. A power failure would result in production being stalled, materials wasted, and equipment damaged.

Metalcasters risk losing their global energy advantage if prices continue to rise and exacerbate supply chain constraints. Increasing energy production and mining critical minerals here at home is the way we can drive down energy costs, lower inflation, support our allies, and make manufacturers in America more competitive in the global marketplace.

Recommendations

Our reliance on China as a supplier remains high. The time to address the supply chain threat and risk to our nation's national security and military readiness is now, not after a major incident. I would now like to address recommendations to this Commission with suggestions from myself and some of my peers.

⁹ The International Energy Agency, Oil Market Report – June 15, 2022 - <https://www.iea.org/reports/oil-market-report-june-2022>

- **Production and Processing of Critical Minerals and Materials in the U.S.** – The U.S. faces a shortage of minerals, materials, and processing capacity to support key sectors of the economy and the clean energy transition. It can take at least a decade to get a new American mine operation permitted. Materials such as copper, cobalt, nickel, lithium, graphite and zinc are essential for renewable technologies and metalcasters. However, the mining and processing are dominated by China and other nations. In 2021, the United States produced just 6 percent of the global copper supply, 0.4 percent of global cobalt supplies, 0.67 percent of the world’s nickel, 0 percent of global graphite supply, and about 5.7 percent of the world’s zinc.
- **Institute More Efficient Permitting Processes** – Project delays related to both infrastructure and the energy transition hurt our nation. America’s system for permitting the development of projects is broken. Projects of all kinds — renewables, electricity transmission, critical mineral mining, oil and natural gas, and pipelines — face extensive delays and can even be halted due to unnecessarily lengthy reviews and associated litigation. There is no reason that permitting a mine in the United States should take five times longer than it does in Canada or Australia.
- **Implement Tax Credits & Changes to Tax Code to Promote Automation and Energy Efficiency** – Urge Congress to provide additional incentives to bolster the integration of additive manufacturing technologies in metalcasting, automation, and energy efficiency. That could be in the form of grants or tax credits. Our industry has significant opportunities to be more energy efficient, such as increasing yield or reducing machine idle time. It takes extra staff time and possibly new equipment to make those gains, but the payback will be fast.
- **Promote Reliable Domestic Energy Production and Infrastructure Development to Enhance Energy Security** – Urge Congress and the Administration to reverse obstacles to domestic oil and natural gas leasing and work to build a reliable power grid. That starts with approving responsible exploration and production, supporting sustainable permitting, and quickly building out more energy infrastructure, including electric vehicle charging and pipelines. Foundries produce crucial castings for the oil, gas and renewable energy sectors, as well as for the electric grid and hydroelectric dams.
- **Trade Enforcement** – Strengthen and aggressively enforce U.S. antidumping and countervailing duty laws, ensure adequate resources for the agencies responsible for enforcing these trade laws, and work to address transshipment, circumvention, and evasion of trade remedy orders. BCI Solutions supports strengthening trade enforcement tools to ensure that our efforts to secure critical supply chains are not undermined by unfair trade practices from China, Russia, and other countries. Specifically, we urge Congress to pass the Eliminating Global Market Distortions to Protect American Jobs Act (H.R. 6121/S. 1187) which would update and modernize

U.S. trade laws to ensure that domestic industries are able to pursue and rely upon remedies to address new and evolving unfair trade practice.

- **Maintain Section 301 Tariffs** – For decades, the Chinese government has led an effort to dominate global industries through predatory trade practices, from using subsidies, intellectual property theft and forced technology transfers, to lax environmental and labor practices. The tariffs aimed to level the playing field for American manufacturers and workers. I urge the Administration to maintain the Section 301 tariffs on metal castings.

It was disappointed to see the Administration’s recent decision to allow solar components from Cambodia, Malaysia, Thailand, and Vietnam to be imported into the U.S. duty-free for two years, regardless of whether they contain Chinese-produced parts that are subject to U.S. tariffs. This sends a clear message to our foreign adversaries that our trade enforcement laws will not be upheld.

- **Strengthening U.S. Investments in Critical Industries** – Congress should prioritize funding to strengthen domestic semiconductor manufacturing and other federal assistance as outlined in the CHIPS Act. Metalcasters supply key castings to a wide range of sectors where semiconductor chips play a central role including in their products, including military equipment, cars, buses, trains, planes, appliances, tractors, motorcycles, and machinery. Forecasts for North American automotive production dropped in June as semiconductor shortages continue to drag on the industry, meaning fewer casting orders for foundries in 2022.

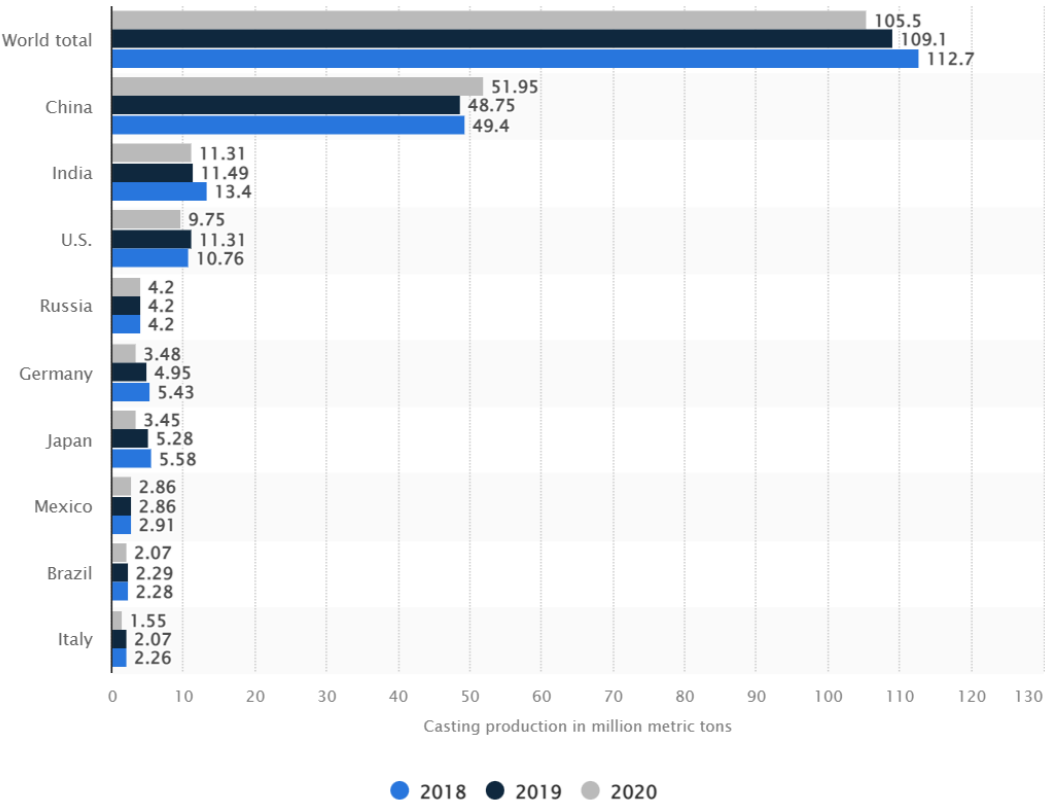
Conclusion

Thank you for the opportunity to express the concerns of U.S. foundries and small businesses regarding the threat that China continues to pose to our industry and the U.S. supply chain. I welcome your questions.

Appendix A

Global Casting Production Worldwide, 2018 to 2020

Volume of global casting production from 2018 to 2020, by country (in million metric tons)



Published by [Statista Research Department](#), Apr 26, 2022