



**PA MEP**  
PENNSYLVANIA MANUFACTURING  
EXTENSION PARTNERSHIP

# Fabricated Metal Industries Industry Landscape Report

Fabricated Metal Product Manufacturing: NAICS 332



Helping Manufacturers Grow Profitably Since 1988

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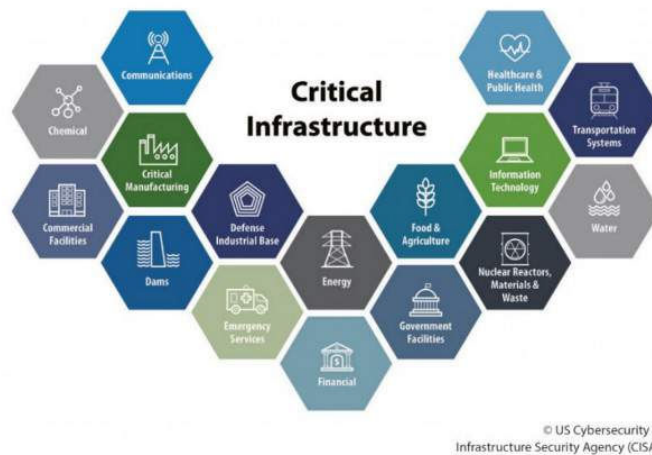
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# Fabricated Metals

The Fabricated Metal Products industry involves the manufacturing of metal products from raw metal materials like steel, aluminum, copper, and brass. This includes cutting, bending, welding, machining, forming, and assembling metal components into finished products or parts.

The Fabricated Metal Products industry is one of the Department of Homeland Security's Critical Manufacturing Sectors and is closely integrated with several other critical infrastructure sectors nationally, depicted in the graphic below.<sup>1</sup> The intermediate and final products from the Fabricated Metals industry are essential inputs for metal fabrication products, contributing to an interdependence between both defense and commercial applications. Fabricated metals are also closely linked to the lifeline functions: Energy, Water, and Communications.<sup>2</sup> Metal fabrication can be energy intensive and requires an industrial water supply for cooling, lubricating, and removing debris. The coordination of supply chain movements and control system processes is supported by communications networks, within the Communications sector serving as a crucial resource for telecommunications access in operations, logistics, emergency notification, and response for the fabricated metals industry.

Additionally, metal fabrication is interdependent with supply chain functions, including transportation systems, information technology (IT), and chemicals.<sup>3</sup> Transportation modes such as aviation, rail, highway, and maritime are crucial to enable the global movement of large and specialized materials and products. The Fabricated Metal Products industry depends on IT for manufacturing operations, transit, quality control, critical processes, and facility security. Finally, lubricants, coolants, coatings, and other chemicals are used in the metal fabrication process, with a delay in the chemical supply impacting production in critical manufacturing.



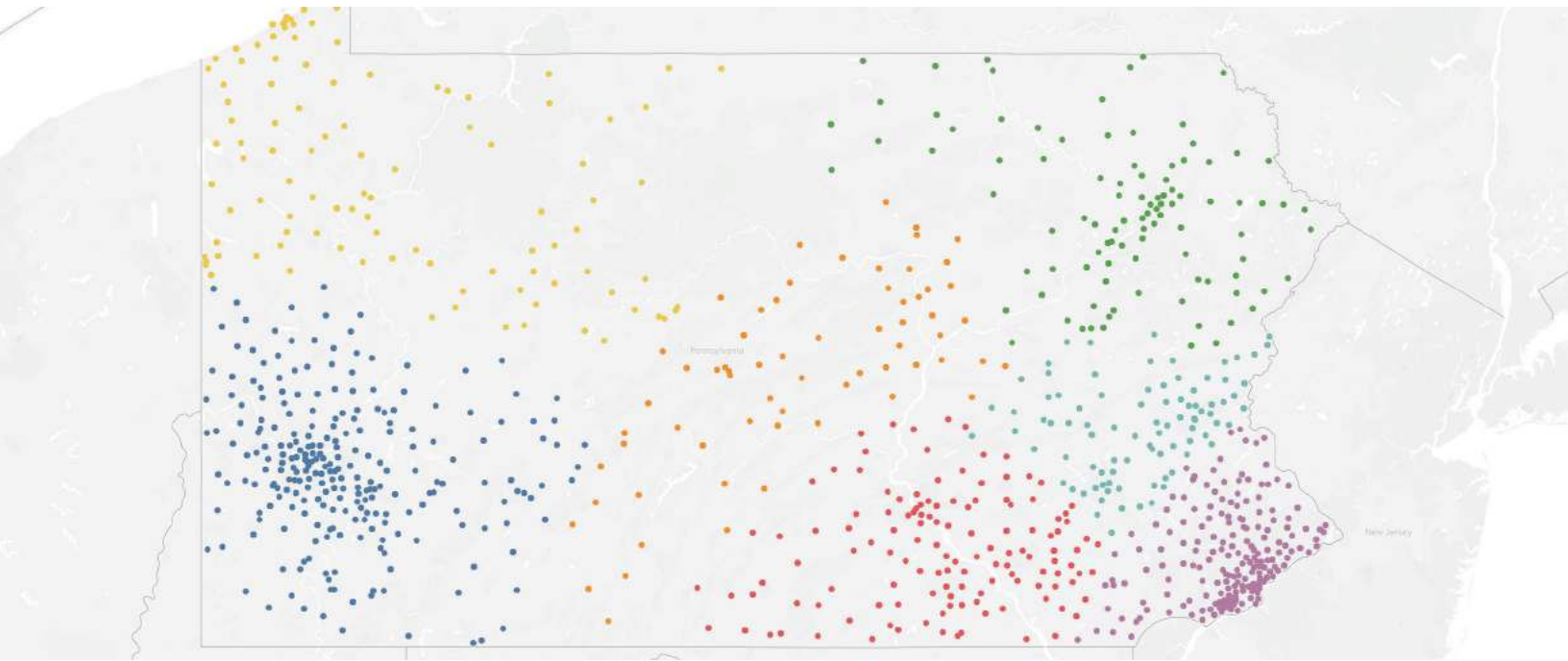
The North American Industry Classification (NAICS) for Fabricated Metal Products is listed under Code Section 332. Pennsylvania has a robust manufacturing base that produces a variety of fabricated metal products. This report will cover fabricated metals activity throughout the state, segmented into the seven Industrial Resource Centers' (IRC's) geographical territories.

The Industrial Resource Centers (IRCs) are a network of seven private, nonprofit organizations located strategically throughout the state that work with manufacturers to respond to changing market conditions, to adopt new technology, and to create strategies to remain competitive in today's global economy. IRCs play a crucial role in supporting the U.S. Defense sector by providing expertise and assistance to enhance the security, resilience, and functioning of critical infrastructure sectors in Pennsylvania. PA MEP is comprised of the seven IRCs represented in the list below.

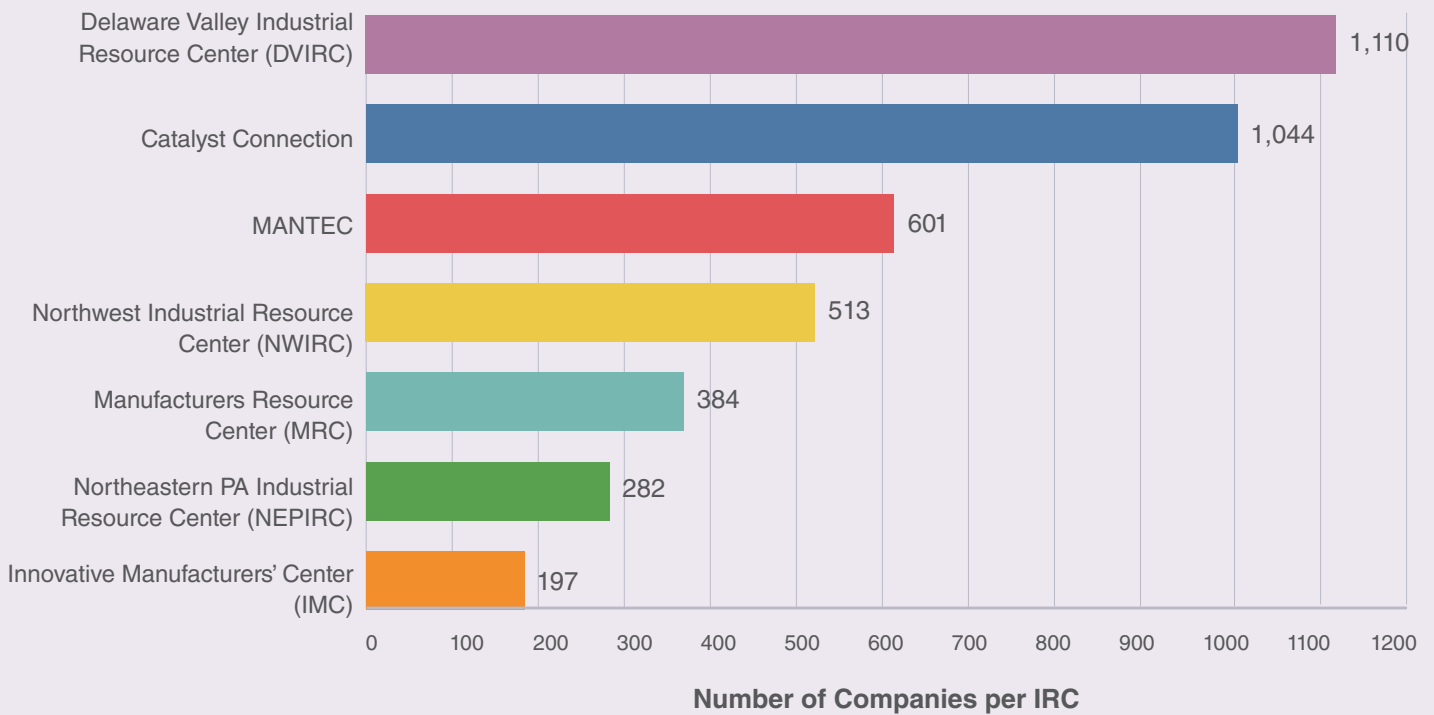
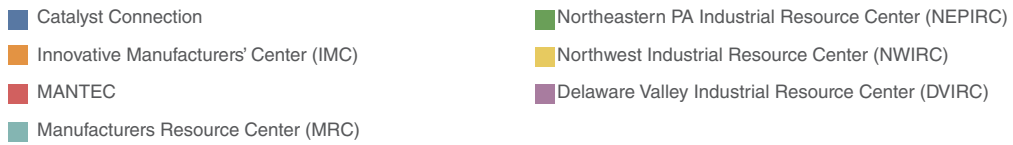
- **Catalyst Connection:** Serving Lawrence, Beaver, Washington, Greene, Fayette, Somerset, Cambria, Indiana, Armstrong, Butler, Allegheny, and Westmoreland counties.
- **Delaware Valley Industrial Resource Center (DVIRC):** Serving Chester, Montgomery, Delaware, Philadelphia, and Bucks counties.
- **Innovative Manufacturers' Center (IMC):** Serving Lycoming, Montour, Northumberland, Union, Snyder, Clinton, Centre, Mifflin, Juniata, Huntingdon, Blair, and Bedford counties.
- **MANTEC:** Serving Adams, Cumberland, Dauphin, Franklin, Fulton, Lancaster, Lebanon, Perry and York counties.
- **Manufacturers Resource Center (MRC):** Serving Lehigh, Berks, Carbon, Schuylkill, and Northampton counties.
- **Northeastern PA Industrial Resource Center (NEPIRC):** Serving Tioga, Bradford, Sullivan, Columbia, Luzerne, Wyoming, Susquehanna, Lackawanna, Wayne, Pike, and Monroe counties.
- **Northwest Industrial Resource Center (NWIRC):** Serving Erie, Crawford, Mercer, Venango, Warren, Forest, Clarion, McKean, Elk, Jefferson, Clearfield, Cameron, and Potter counties.

# Fabricated Metals (continued)

## PA Fabricated Metal Segmented by IRC



PA IRC Center



# Fabricated Metal Product Manufacturing (NAICS 332) Landscape

## Industry Summary

Metal fabrication is one of the largest manufacturing sectors in Pennsylvania, representing **over 4,000 total establishments**.

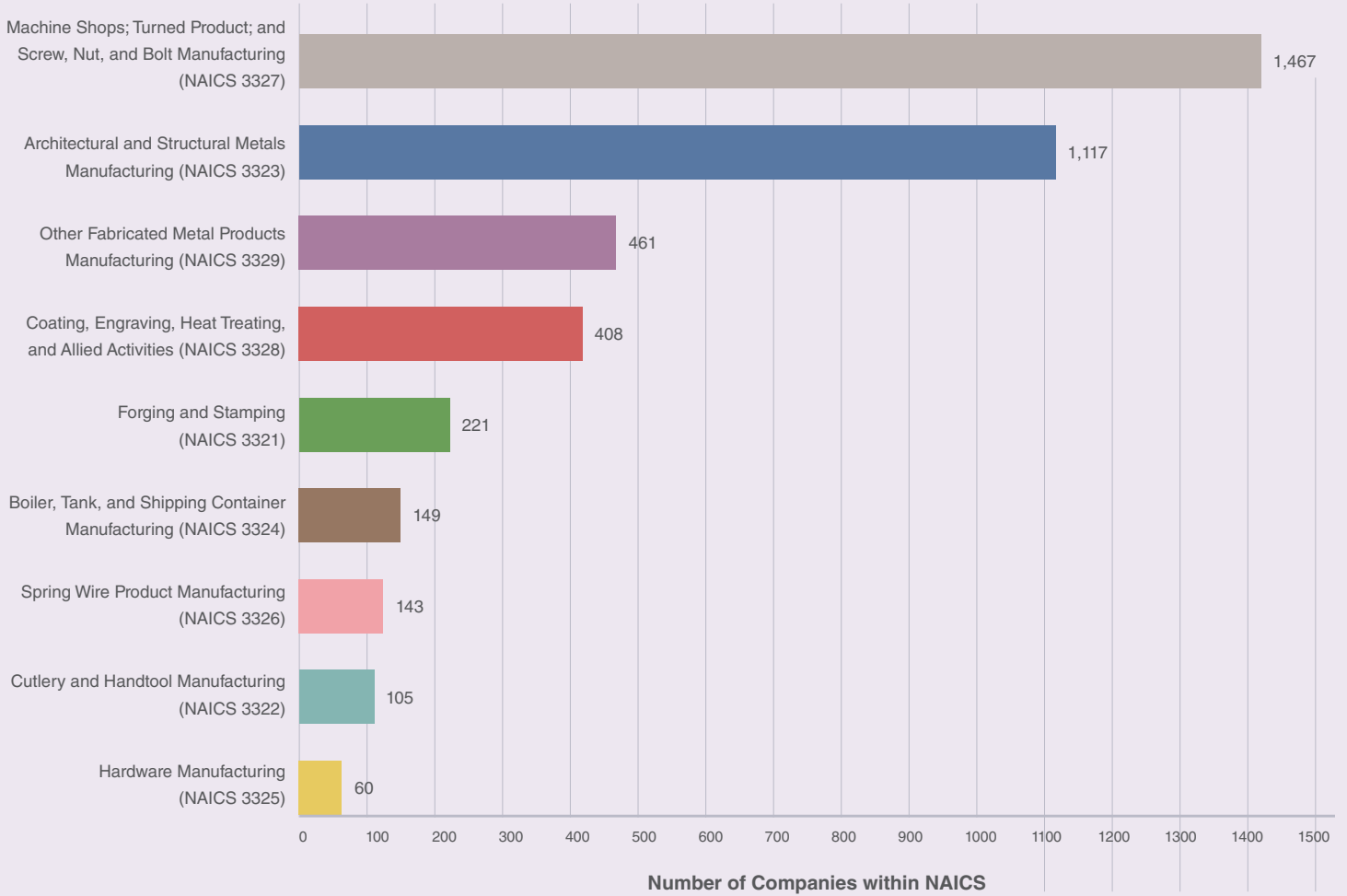
- **Pennsylvania exported approximately \$1.8 billion worth of fabricated metal products in 2022**, comprising 3.4% of exports in this sector nationally and ranking seventh overall.<sup>4</sup>
- In Pennsylvania, the industry had a **Gross State Product (GSP) of over \$8 billion in 2022**, roughly 5% of the U.S. industry Gross Domestic Product (GDP) of almost \$165 billion.<sup>5</sup>
- **Pennsylvania is the sixth-highest grossing state**, behind Ohio, Texas, California, Illinois, and Michigan; these six states alone comprise roughly a third of the industry's revenue nationally.<sup>6</sup>

Metal fabrication is represented by 14 subsectors, listed in the Extended NAICS Codes: 332 table below.

## Extended NAICS Codes: 332

<b>33211</b>	Forging and Stamping
<b>33221</b>	Cutlery and Handtool Manufacturing
<b>33231</b>	Plate Work and Fabricated Structural Product Manufacturing
<b>33232</b>	Ornamental and Architectural Metal Products Manufacturing
<b>33241</b>	Power Boiler and Heat Exchanger Manufacturing
<b>33242</b>	Metal Tank (Heavy Gauge) Manufacturing
<b>33243</b>	Metal Can, Box, and Other Metal Container (Light Gauge) Manufacturing
<b>33251</b>	Hardware Manufacturing
<b>33261</b>	Spring and Wire Product Manufacturing
<b>33271</b>	Machine Shops
<b>33272</b>	Turned Product and Screw, Nut, and Bolt Manufacturing
<b>33281</b>	Coating, Engraving, Heat Treating, and Allied Activities
<b>33291</b>	Metal Valve Manufacturing
<b>33299</b>	All Other Fabricated Metal Product Manufacturing

# PA NAICS 332 Segmented by Description



# Industry Demographics

This section provides an overview of the Fabricated Metal Product Manufacturing sector, including takeaways such as the market size, revenue distribution across segments, establishment statistics, and the critical market trends shaping the landscape. The exploration extends to industry profits, drivers, and the influence of external factors, providing a holistic perspective on the current state and future trajectory of the industry.

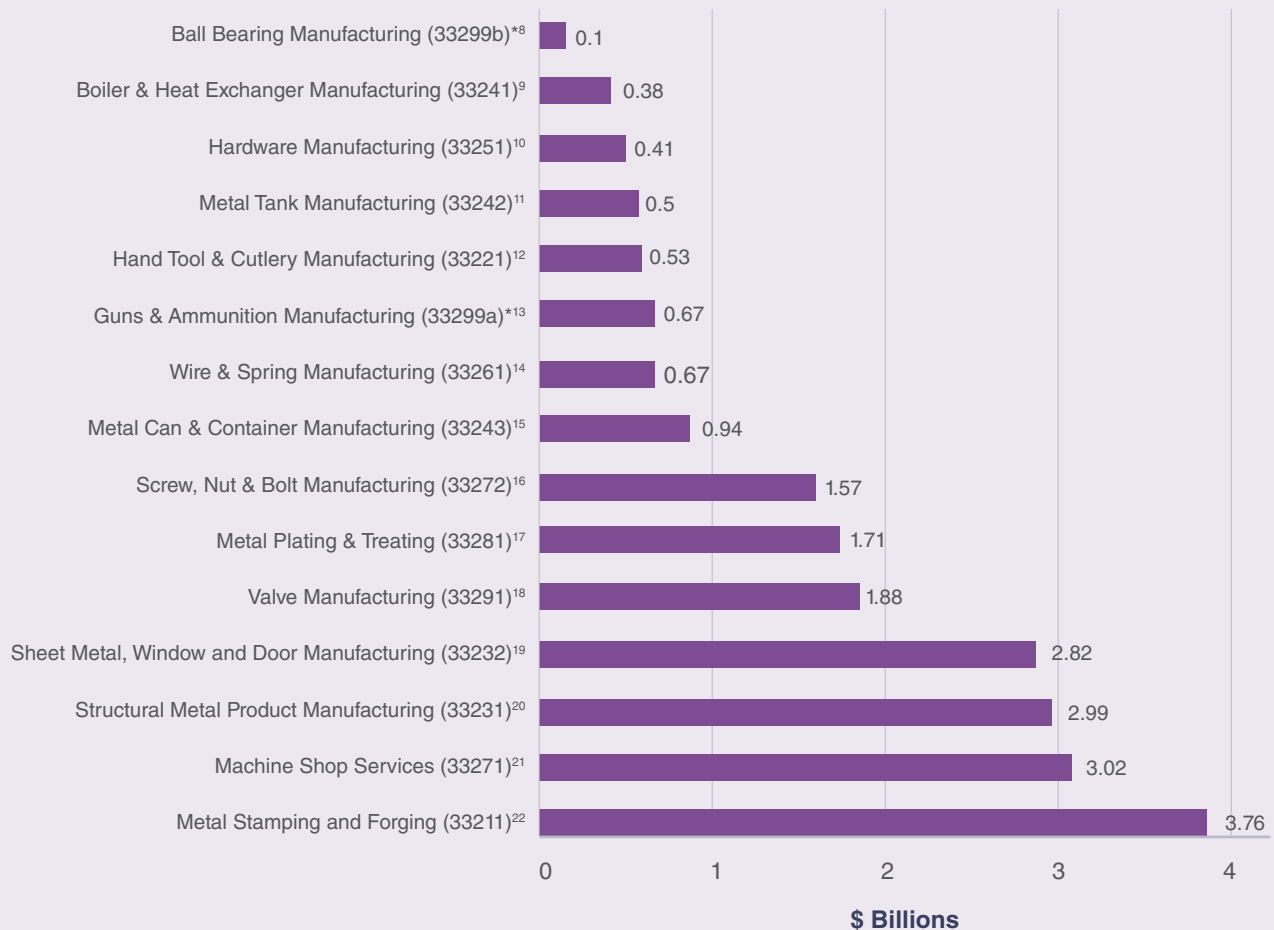
**Pennsylvania GSP for Fabricated Metal Product Manufacturing:** \$8.14 billion (2022)

**U.S. GDP for Fabricated Metal Product Manufacturing:** \$164.89 billion

**U.S. Industry Growth of Fabricated Metal Product Manufacturing:** NAICS 332 is projected to grow at a Compound Annual Growth Rate (CAGR)\* of 5% from 2023 to 2031.<sup>7</sup>

\*Compound Annual Growth Rate (CAGR) provides a smoothed estimate of growth over a specific period of time, accounting for year-by-year fluctuations and compounding effects, to provide a longer-term outlook for an industry.

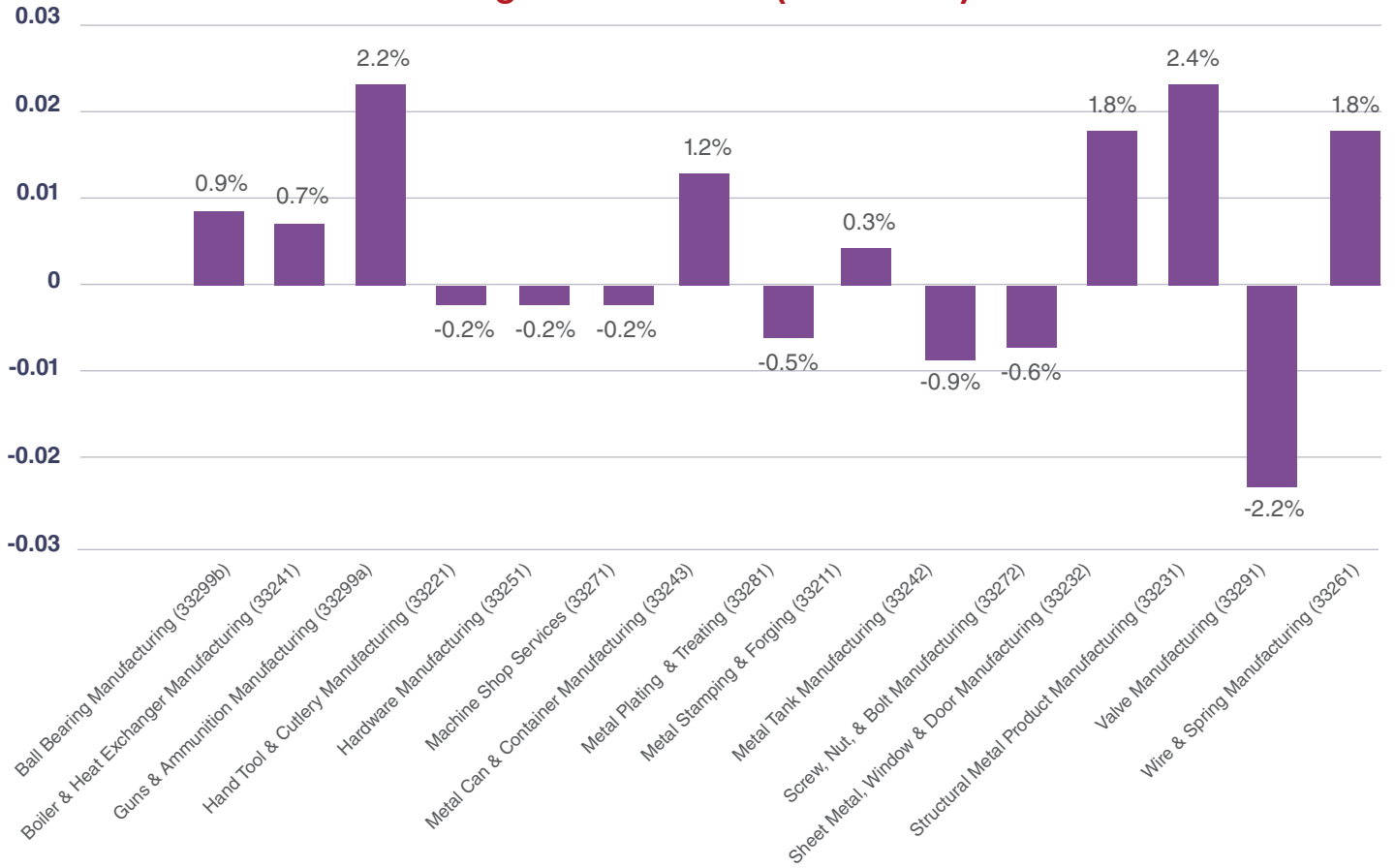
## Pennsylvania Industry Revenue by Segment



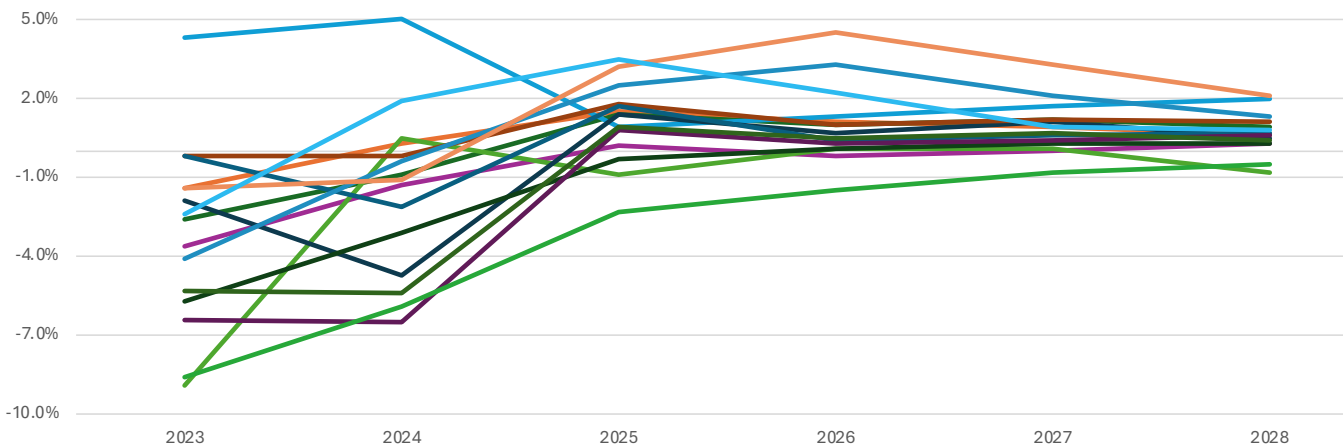
\* Included within All Other Miscellaneous Fabricated Metal Product Manufacturing (33299)

# Industry Demographics (continued)

## Average Growth Rate (2023-2028)



## Revenue Growth (2023-2028)



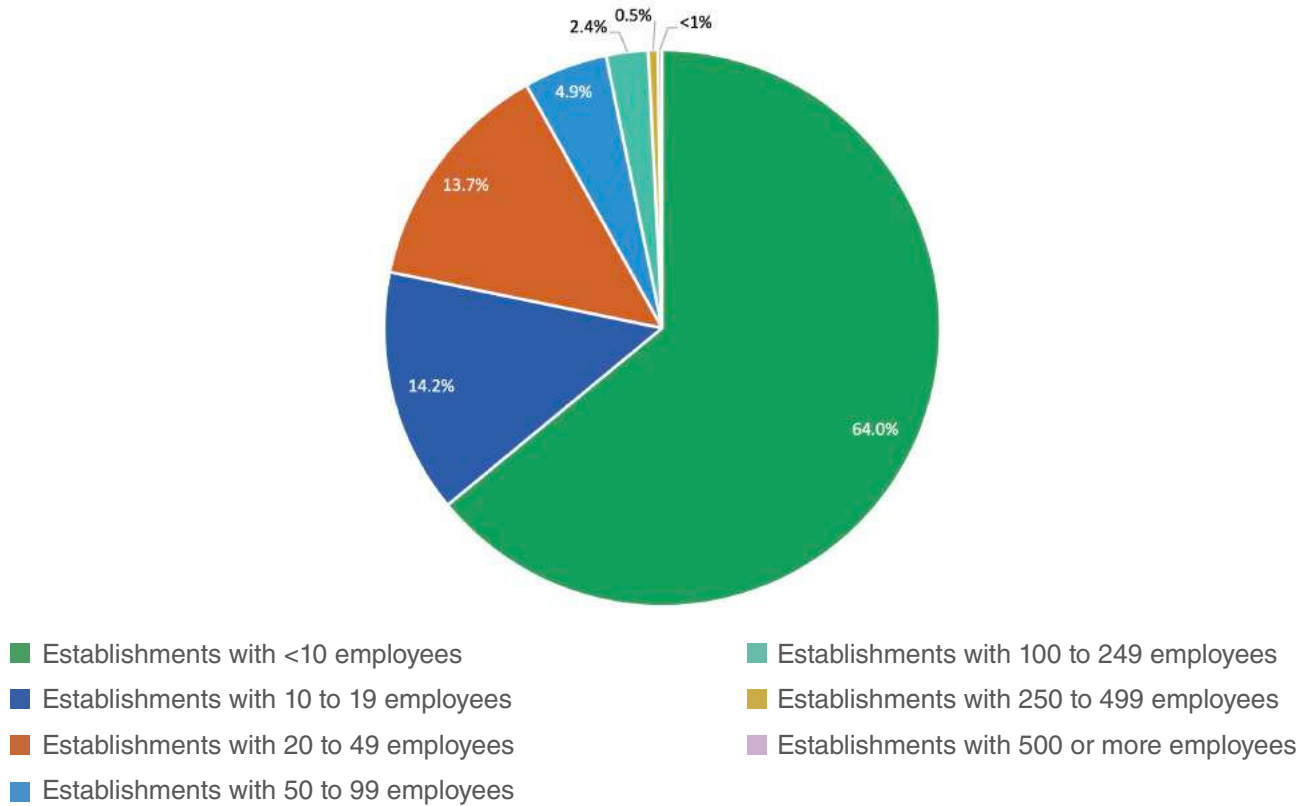
- Fabricated Metal (332)
- Boiler & Heat Exchanger Manufacturing (33241)
- Hand Tool & Cutlery Manufacturing (33221)
- Machine Shop Services (33271)
- Metal Plating & Treating (33281)
- Metal Tank Manufacturing (33242)
- Sheet Metal, Window & Door Manufacturing (33232)
- Valve Manufacturing (33291)
- Ball Bearing Manufacturing (33299b)
- Guns & Ammunition Manufacturing (33299a)
- Hardware Manufacturing (33251)
- Metal Can & Container Manufacturing (33243)
- Metal Stamping & Forging (33211)
- Screw, Nut, & Bolt Manufacturing (33272)
- Structural Metal Product Manufacturing (33231)
- Wire & Spring Manufacturing (33261)



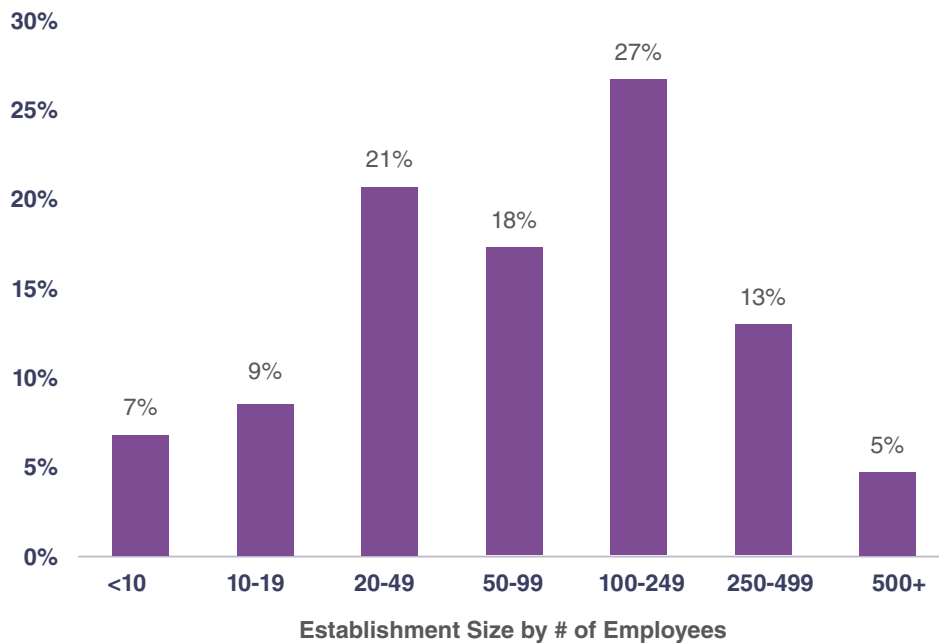
# Industry Demographics (continued)

## Pennsylvania Establishment Size Distribution in NAICS 332

This figure illustrates the percentage breakdown of the total number of establishments in the NAICS 332 industry, segmented by size.



## Pennsylvania Employee Distribution by Establishment Size



# Industry Demographics (continued)

## Key Industry Trends

### External Market Forces:

- The reluctance of end-market buyers to invest in industrial machinery, driven by increasing borrowing costs associated with high inflation and interest rates, hinders both immediate procurement and long-term growth prospects for manufacturers, particularly those with limited cash reserves.<sup>27</sup>
- Barriers to entry are very high: high initial capital investments are required for establishing or upgrading metal stamping, forging, or casting. This limits the entry of new players, consolidating the market share among established companies.

### Technology Integration and Innovation:

- Factory of the Future: Industry 4.0 seamlessly integrates Internet of Things (IoT), cloud computing, artificial intelligence (AI) and machine learning, and additive manufacturing (AM) to improve production efficiency and cost containment through predictive maintenance, and it helps promote a more transparent, sustainable supply chain.<sup>28</sup>
- Additive Manufacturing (AM) or 3D printing, increasingly adopted by metal fabricators, shortens the value chain, reduces waste compared to conventional production processes, offers greater design freedom and rapid prototyping, and can be cost effective for manufacturing small batches of highly customized parts.<sup>29</sup>
- AM enables the production of complex geometries while consolidating parts, eliminating process steps like core assembly for castings, or CNC machining setup for subtractive metal production.<sup>30</sup>
- Leveraging AI in supply chain management will automate time-consuming tasks, improve accuracy, efficiency and sustainability, and achieve greener warehouse processes.<sup>31</sup>
- AI can be used for forecasting, inspection, and optimization of existing processes.<sup>32</sup>
- Robotics and human collaborative-environments: Robots can perform dangerous processes with high labor churn faster than humans (e.g. surface finishing). Robots can also be collaborative and work alongside team members.
- Cybersecurity: U.S. Department of Defense (DoD) vendors must demonstrate proper cyber hygiene by obtaining the Cybersecurity Maturity Model Certification (CMMC).<sup>33</sup>

### Workforce Challenges and Skill Gaps:

- Due to growing demand and anticipated attrition (more than 155,000 workers approaching retirement), the American Welding Society estimates a shortage of 360,000 welding workers by 2027.<sup>34</sup>
- Anticipated workforce demand in the Philadelphia, Berks County, and Lancaster County metropolitan statistical areas (MSAs) is projected to reach 35,000 workers annually, driven by defense manufacturing needs.<sup>35</sup>
- Workforce shortages force implementation of automation to bridge the skilled labor gap for CNC machinists, tool and die makers, and welders.
- Augmented reality (AR) and virtual reality (VR) are empowering manufacturers by facilitating the generational workforce transition.
- To attract the younger generation and help make up for the experience lost with the retirement of a more seasoned workforce, AR/VR technology can simulate training environments and close the skills gap through 3D modeling.<sup>36</sup>
- Wages as a percentage of total revenue in 2023:
  - Ball Bearing Manufacturing: 18.4%
  - Boiler & Heat Exchanger Manufacturing: 17.5%
  - Guns & Ammunition Manufacturing: 24.2%
  - Metal Plating & Treating: 19.8%
  - Valve Manufacturing: 15.3%
  - Hardware Manufacturing: 14.4%
  - Machine Shop Services: 30.7%
  - Metal Tank Manufacturing: 26.9%
  - Screw, Nut & Bolt Manufacturing: 27.8%
  - Wire & Spring Manufacturing: 19.6%

# Industry Demographics (continued)

## Renewable Energy:

- As green energy policies prioritize renewable energy sources, U.S. wind turbine manufacturing is projected to grow at a CAGR of 2.1% over the next 5 years, with PA representing 1.61% of the total energy production.<sup>37</sup> This increases the demand for turbine metal base and anchor plates made by metal fabricators.
- As the automobile industry further transitions to electronic vehicles (EVs), the revenues for internal combustion engines (ICEs), as well as fuel and exhaust systems, are expected to decline 44% through 2027; this is problematic for metal fabricators as EV powertrain parts are predominately composite materials.<sup>38</sup>
- The EV battery market has a projected CAGR of 19.8% from 2022-2032.<sup>39</sup>
- Alongside traditional EVs, the hydrogen fuel cell market is expected to expand rapidly in the coming years, with a CAGR of approximately 47% between 2023 and 2035.<sup>40</sup>

## Supply Constraints:

- The industry is heavily reliant on steel and has been negatively impacted by significant price volatility in recent years. To absorb costs, metal fabricators will attempt to pass input price increases on to consumers.<sup>41</sup>

## Fabricated Metal Cost Trends:

- Hefty purchase costs for raw materials that are affected by the metal used, its thickness, and availability – volatility in the supply chain exacerbates sourcing and purchasing costs for operators.
- Administrative, sales, and communication expenses have increased, particularly for machine shops.<sup>42</sup>
- Wages for skilled labor and workforce training costs have outpaced revenue growth in some sectors.

## Revenue Trends

- Boiler & Heat Exchanger Manufacturing revenue in the U.S. is expected to slow down over the next five years, growing at a CAGR of 0.7% to \$10.3 billion.<sup>43</sup>
- Guns & Ammunition Manufacturing profit, measured as earnings before interest and taxes, accounted for 6.8% of Guns & Ammunition Manufacturing revenue in 2023, down from 9.1% in 2018.<sup>44</sup>
- Cutting- and precision-measuring tools comprised 17.9% of Hand Tool & Cutlery Manufacturing revenue in 2023. Edge tools, saw blades, and handsaws accounted for 20.9% in 2023.<sup>45</sup>
- The Metal Tank Manufacturing industry was forecast to decrease at a CAGR of 1.3% to \$9.6 billion over the five years to 2023, including a decline of 6.4% in 2023 alone.<sup>46</sup>
- Sheet Metal, Window & Door Manufacturing revenue is forecast to climb at a CAGR of 1.8% to \$61.5 billion over the five years to 2028.<sup>47</sup>
- Structural metal product manufacturing revenue has contracted by 1.4% in 2023.<sup>48</sup>
- Valve manufacturing revenue is on track to realize a CAGR of 2.2% to \$41.5 billion in 2028.<sup>49</sup>

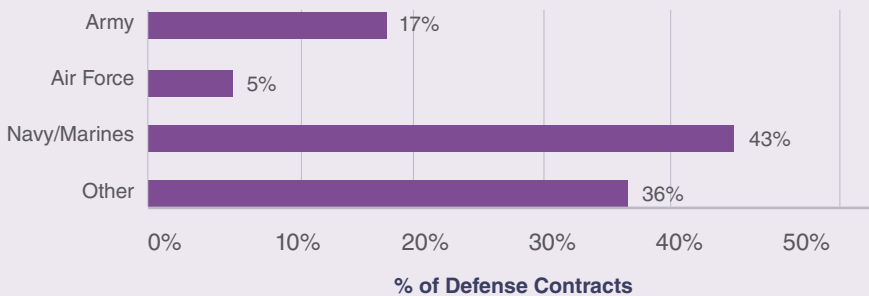
# Key National Defense Trends

## Key National Defense Trends Affecting Fabricated Metals

### Defense and Aerospace:

- Pennsylvania received \$17.9 billion in state defense contracts in 2023.<sup>50</sup>
- Defense contracts comprised 1.9% of state GDP in 2023.<sup>51</sup>
- Pennsylvania made up 3.2% of total U.S. defense spending.<sup>52</sup>

### % of Pennsylvania Defense Contracts



### Top Defense Contractors in Pennsylvania

- Bechtel Group: \$2.1 billion
- AmerisourceBergen: \$2.0 billion
- Fluor Corp: \$1.7 billion
- BAE Systems: \$1.1 billion
- Boeing: \$781.5 million
- Siemens AG: \$651.3 million
- Highmark, Inc.: \$504.9 million
- OraSure Technologies, Inc.: \$400.5 million
- Lockheed Martin: \$361.6 million
- Pennsylvania State University: \$251.4 million

### Top Defense Contracting Spending Locations within Pennsylvania are listed below.

- Allegheny: \$4.2 billion
- Montgomery: \$2.4 billion
- York: \$1.2 billion
- Franklin: \$1.1 billion
- Delaware: \$908.8 million
- Philadelphia: \$726.7 million
- Bucks: \$537.3 million
- Dauphin: \$524.4 million
- Northampton: \$428.2 million
- Cumberland: \$406.4 million

- Rising global tensions such as ongoing wars, conflicts, and potential threats will bolster defense spending and create opportunities for machine shops and forgers.
- The growing commercial space launch sector generates research and development revenue due to booming demand for highly durable and complex parts for rocket structures.
- More than 50% of supply contracts must come from domestic suppliers, limiting demand for imported metals.<sup>53</sup>
- Increase in demand for missiles, hypersonics, autonomous underwater vehicles (AUVs), advanced air mobility (AAM), and aerospace with long-term growth projections.
- Hypersonic growth projections: CAGR of 11.4% from 2023 to 2030.<sup>54</sup>
- AUV growth projections: CAGR of ~19.3% from 2023 to 2030.<sup>55</sup>
- AAM growth projections: CAGR of ~27.6% from 2023 and 2032.<sup>56</sup>
- U.S. Navy's Naval Nuclear Propulsion Program is overseeing the design and building of 12 nuclear submarines, with a projected completion of the first vehicle by 2027.<sup>57</sup>
- The components used in naval reactors require as much as eight years of CNC machining, welding, grinding, heat treatment, and nondestructive testing of large specialty metal forgings.<sup>58</sup>

# Fabricated Metal Buyer and Supplier Relationships

## SUPPLIERS

Aluminum Manufacturing  
**Chemical Product Manufacturing**  
Coal & Ore Wholesaling  
Copper Rolling, Drawing & Extruding  
**Electric Power Transmission**  
Ferrous Metal Foundry Products  
**Industrial Machinery & Equipment Wholesaling**  
Iron & Steel Manufacturing  
Iron Ore Mining  
Land Leasing  
Metal Plating & Treating  
Metal Stamping & Forging  
Metal Wholesaling  
Metalworking Machinery Manufacturing  
Mining  
Molybdenum & Metal Ore Mining  
Nonferrous Metal Rolling & Alloying  
Paint Manufacturing  
**Petrochemical Manufacturing**  
Screw, Nut, & Bolt Manufacturing  
Steel Rolling & Drawing  
**Structural Metal Product Manufacturing**  
Tool & Hardware Wholesaling  
**Utilities**  
Wire & Spring Manufacturing

## FABRICATED METAL







## BUYERS

**Agriculture, Forestry, Fishing and Hunting**  
Apartment & Condominium Construction  
**Automechanics**  
**Automobile Engine & Parts Manufacturing**  
**Automotive Steering & Suspension Manufacturing**  
Boiler & Heat Exchanger Manufacturing  
**Bridge & Elevated Highway Construction**  
**Canned Fruit & Vegetable Processing**  
**Car & Automotive Manufacturing**  
**Commercial Building Construction**  
**Concrete Contractors**  
**Construction Machinery Manufacturing**  
**Electric Power Transmission**  
Electricians  
Engine & Turbine Manufacturing  
**Farm Product Storage & Warehousing**  
Forklift & Conveyor Manufacturing  
Hardware Manufacturing  
Hardware Stores  
Heavy Engineering Construction  
Home Builders  
Home Improvement Stores  
Household Furniture Manufacturing  
**Industrial Building Construction**  
**Industrial Machinery & Equipment Wholesaling**  
**Industrial Supplies Wholesaling**  
Iron & Steel Manufacturing  
**Juice Production**  
Major Household Appliance Manufacturing  
Manufacturing  
Metal Can & Container Manufacturing  
Metal Pipe & Tube Manufacturing  
Metal Stamping & Forging  
Metal Tank Manufacturing  
Mining  
**Mining, Oil & Gas Machinery**  
**Municipal Building Construction**  
Nursery & Garden Stores  
Oxygen & Hydrogen Gas Manufacturing  
Paint Manufacturing  
**Petroleum Refining**  
**Power Tools & General Purpose Machinery Manufacturing**  
Remodeling  
Retail Trade  
**Seafood Preparation**  
Sheet Metal, Window & Door Manufacturing  
**Ship Building**  
**Soda Production**  
**Space Vehicle & Missile Manufacturing**  
Specialized Storage & Warehousing  
**Steel Framing**  
**Structural Metal Product Manufacturing**  
**SUV & Light Truck Manufacturing**  
**Tractors & Agricultural Machinery Manufacturing**  
**Train, Subway & Transit Car Manufacturing**  
**Truck & Bus Manufacturing**  
Warehouse Clubs & Supercenters  
**Water & Sewer Line Construction**  
**Water Supply & Irrigation Systems**  
Wholesale Trade  
**Wind Turbine Manufacturing**

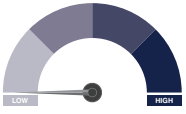

# Fabricated Metals Impact on Critical Industries

Critical Industry Sector as defined by Cybersecurity & Infrastructure Security Agency (CISA)	What Fabricated Metal Provides to Critical Industry	Impact of Fabricated Metal on Critical Industry	U.S. Growth Rate (2022)
<p>Communications - interconnected industry using terrestrial, satellite, and wireless transmission system</p>	<ul style="list-style-type: none"> <li>• Antennas</li> <li>• Enclosures</li> <li>• Connectors</li> <li>• Brackets</li> </ul>		3.6%
<p>Chemical - manufactures, stores, uses, and transports potentially dangerous chemicals</p>	<ul style="list-style-type: none"> <li>• Chemical plant structure</li> <li>• Chemical process systems:               <ul style="list-style-type: none"> <li>- Reaction</li> <li>- Distillation</li> <li>- Filtration</li> <li>- Extraction</li> <li>- Drying</li> <li>- Fluid systems</li> <li>- Pipes</li> <li>- Pumps</li> <li>- Compressors</li> </ul> </li> </ul>		4.3%
<p>Commercial Facilities - diverse range of sites that draw large crowds of people for shopping, business, entertainment, or lodging</p>	<ul style="list-style-type: none"> <li>• End products for roofing, fencing, plumbing, and building enclosures, staircases, and interior design features</li> <li>• Steel panels for fire escapes, decking, catwalks, and other metal structures</li> <li>• Structural steel beams used in commercial applications, such as buildings, metal structures, bridges, stadiums, skids, warehouses, and general fabrication</li> </ul>		1.4%
<p>Critical Manufacturing - significant manufacturing industries that may be susceptible to manmade and natural disasters</p>	<ul style="list-style-type: none"> <li>• Armored vehicles and sophisticated defense aircraft               <ul style="list-style-type: none"> <li>- From tanks and armored personnel carriers to helicopters and fighter jets—all require high-quality components from durable metals.</li> </ul> </li> <li>• Building structures for barracks, field hospitals, and other essential buildings</li> <li>• Components for weaponry               <ul style="list-style-type: none"> <li>- Everything from small parts like triggers and firing pins to larger components like barrels or even entire weapons systems themselves</li> </ul> </li> </ul>		12.9%
<p>Dams - delivers critical water retention and control services</p>	<ul style="list-style-type: none"> <li>• Steel reinforcement</li> </ul>		12%
<p>Defense Industrial Base - research and development, design, production, delivery, and maintenance of military weapons systems, subsystems, and components or parts, to meet U.S. military requirements</p>	<ul style="list-style-type: none"> <li>• Armored vehicles, tanks, submarines, aircraft carriers, and various weapons systems               <ul style="list-style-type: none"> <li>- Armor plating</li> <li>- Helicopter rotor systems</li> <li>- Jet engine parts</li> <li>- Landing gears and engine parts</li> </ul> </li> <li>• Firearms and ammunition</li> <li>• Military-grade electronics</li> <li>• Specialized parts for use on submarines</li> <li>• Custom metal components for the Combat Information Center</li> </ul>		8%

# Fabricated Metals Impact on Critical Industries (Continued)

Critical Industry Sector as defined by Cybersecurity & Infrastructure Security Agency (CISA)	What Fabricated Metal Provides to Critical Industry	Impact of Fabricated Metal on Critical Industry	U.S. Growth Rate (2022)
Emergency Services - community highly-skilled, trained personnel, along with the physical and cyber resources, that provide a wide range of prevention, preparedness, response, and recovery services	<ul style="list-style-type: none"> <li>• Police, fire and emergency vehicle manufacturing</li> <li>• Industrial fire equipment</li> <li>• Fire hydrants</li> <li>• Rescue tools: cutters, spreaders, etc.</li> </ul>		9.5%
Energy - protects a multifaceted web of electricity, oil, and natural gas resources and assets to maintain steady energy supplies	<ul style="list-style-type: none"> <li>• Building power plants and power-generation equipment</li> <li>• Extracting fuels via durable, high-quality metal pipelines, sites, and turbines</li> <li>• Refining requires stainless steel and its alloys.</li> <li>• Gas and oil applications that involve extraction, storage, and transportation require wear-resistant metal components of high quality.</li> <li>• Distribution of energy requires robust metal pipelines.</li> </ul>		6.4%
Financial Services - depository institutions, providers of investment products, insurance companies, other credit and financing organizations, and the providers of the critical financial utilities and services that support these functions	<ul style="list-style-type: none"> <li>• Financial institution construction</li> <li>• Bank vaults</li> <li>• Equipment for coin production</li> </ul>		7.5%
Food and Agriculture - composed of farms, restaurants, and registered food manufacturing, processing, and storage facilities	<ul style="list-style-type: none"> <li>• Customized metal items for food safe food storage</li> <li>• Fabrication of food machinery</li> <li>• Equipment efficient delivery of end products</li> </ul>		1.3%
Government Facilities - a wide variety of buildings, located in the United States and overseas, that are owned or leased by federal, state, local, and tribal governments	<ul style="list-style-type: none"> <li>• Building construction</li> </ul>		2.5%
Healthcare and Public Health - protects all sectors of the economy from hazards such as terrorism, infectious disease outbreaks, and natural disasters	<ul style="list-style-type: none"> <li>• Medical equipment               <ul style="list-style-type: none"> <li>- Implants</li> <li>- Prosthetics</li> <li>- Surgical equipment</li> <li>- Diagnostic equipment</li> <li>- Laboratory equipment</li> <li>- Medical supply drones</li> <li>- Surgical robots</li> <li>- Exoskeletons</li> <li>- Wearable tech</li> </ul> </li> <li>• Hospital examination rooms and furniture</li> </ul>		7%

# Fabricated Metals Impact on Critical Industries (Continued)

Critical Industry Sector as defined by Cybersecurity & Infrastructure Security Agency (CISA)	What Fabricated Metal Provides to Critical Industry	Impact of Fabricated Metal on Critical Industry	U.S. Growth Rate (2022)
Information Technology - produce and provide hardware, software, and information technology systems and services	<ul style="list-style-type: none"> <li>• Server racks and cabinets</li> <li>• PC and laptop casings</li> <li>• Networking hardware</li> <li>• Data storage equipment</li> <li>• Telecommunication equipment</li> <li>• Computer server chassis</li> <li>• Rack-mount equipment</li> <li>• Kiosks and enclosures</li> <li>• Consumer electronics</li> <li>• Cooling systems</li> <li>• Data center infrastructure</li> <li>• Rack rails and mounting hardware</li> </ul>		4.0%
Nuclear Reactors, Materials and Waste - America's civilian nuclear infrastructure	<ul style="list-style-type: none"> <li>• Pressure vessels</li> <li>• Tanks</li> <li>• Containment parts</li> <li>• Shell and tube heat exchangers</li> <li>• Radioactive material containers</li> </ul>		9.0%
Transportation Systems - Aviation, Highway and Motor Carrier, Maritime Transportation System, Mass Transit and Passenger Rail, Freight Rail, and Postal and Shipping	<ul style="list-style-type: none"> <li>• Aircraft manufacturing                             <ul style="list-style-type: none"> <li>- From the fuselage to the wings and tail sections</li> </ul> </li> <li>• Automotive manufacturing                             <ul style="list-style-type: none"> <li>- Body panels</li> <li>- Frames</li> <li>- Suspension systems</li> <li>- Engine parts</li> <li>- Exhaust systems</li> </ul> </li> <li>• Bridges</li> </ul>		3.8%
Water - public drinking water systems and wastewater treatment systems	<ul style="list-style-type: none"> <li>• ASME pressure vessels</li> <li>• Heat exchangers</li> <li>• Mix tanks</li> <li>• Reactors</li> <li>• Other specialized fabricated equipment</li> </ul>		6.8%



# Supply Chain Partners

The Fabricated Metal Product industry supply chain encompasses a complex network of activities, from the extraction of raw materials to the production of finished metal products. Typical end customers reside in the automotive, residential, and commercial construction, mining, energy, aerospace, general industrial and other sectors. Below is an overview of the major input supplier and end-use industries, in alphabetical order.

## Major Supply Industries

- **Aluminum Manufacturing (NAICS 33131):** Aluminum is a lightweight and corrosion-resistant metal used extensively in fabricated metal products, contributing to their durability and versatility.
- **Copper Rolling, Drawing and Extruding (NAICS 33142):** Copper manufacturing processes include rolling, drawing, and extruding to produce various forms of copper. Copper is valued for its excellent conductivity and malleability, making it essential in electrical components and various fabricated metal products.
- **Ferrous Metal Foundry Products (NAICS 33151):** Ferrous metal foundries specialize in casting iron and steel components. These foundry products contribute to the diversity of metal components used in fabricated products, ranging from intricate parts to structural elements.
- **Industrial Machinery and Equipment Wholesaling (NAICS 42383):** Wholesalers in this category supply a wide range of industrial machinery and equipment used in metal fabrication, including machinery for welding, cutting, and shaping metal components.
- **Iron and Steel Manufacturing (NAICS 33111):** This industry encompasses the production of iron and steel from iron ore, with subsequent processes like smelting and refining. Iron and steel are fundamental materials in fabricated metal products due to their strength and widespread use across numerous industries.
- **Metal Wholesaling (NAICS 42531):** Metal wholesalers act as intermediaries, procuring metal products from manufacturers and distributing them to various industries.
- **Metalworking Machinery Manufacturing (v33351):** This industry focuses on manufacturing machinery used in metalworking processes, such as CNC machines, presses, and cutting tools. The equipment produced enhances the efficiency and precision of metal fabrication processes.
- **Nonferrous Metal Rolling and Alloying (NAICS 33152):** This industry involves rolling and alloying processes for nonferrous metals like copper, aluminum, and zinc. The output serves as essential raw material for fabricated metal products, offering specific properties such as corrosion resistance or enhanced strength.
- **Tool and Hardware Wholesaling (NAICS 42371):** Wholesalers in this sector provide essential tools and hardware used in metal fabrication processes. These include cutting tools, fasteners, and other equipment necessary for shaping and assembling metal components.

# Supply Chain Partners (continued)

**Major Demand Industries:** Fabricated metal products are key inputs to critical infrastructure industries, particularly as components used by the Defense Industrial Base (DIB) to mobilize, deploy, and sustain military operations. This also includes the transportation sector — for subsectors such as aviation, highway, and pipeline systems — or energy, including activity related to the production and extraction of both electricity and natural gases.

- **Aircraft, Engine and Parts Manufacturing:** Aerospace applications require a wide range of fabricated metal products, from structural components to specialized parts used in aircraft and engine construction.
- **Automobile Metal Stamping:** The automotive industry relies on metal stamping to produce various components, including body panels, chassis- and other metal parts used in vehicle manufacturing.
- **Construction:** The construction industry relies on fabricated metal products for structural elements, building frameworks, and various components used in construction projects.
- **Construction Machinery Manufacturing:** Fabricated metal components are crucial in the construction machinery sector, contributing to the robustness and functionality of heavy equipment used in construction projects.
- **Engine and Turbine Manufacturing:** This sector demands fabricated metal components for the construction of engines and turbines, where precision engineering and durability are essential.
- **Mining, Oil and Gas Machinery Manufacturing:** This sector demands fabricated metal products for machinery used in resource extraction, including drilling equipment, structural components, and other specialized parts.
- **Space Vehicle and Missile Manufacturing:** Precision metal components are vital in aerospace applications, including the construction of space vehicles and missiles, where reliability and durability are paramount.
- **Structural Metal Product Manufacturing:** Fabricated metal products are essential in the construction of structural components, including beams, columns, and other elements used in building and infrastructure projects.
- **Tool and Hardware Wholesaling:** The demand for fabricated metal products in this sector involves the distribution of metal tools and hardware used in various applications, from construction to manufacturing.
- **Truck and Bus Manufacturing:** This sector requires fabricated metal products for vehicle construction, including chassis components, frames, and other structural elements.
- **Wind Turbine Manufacturing:** Fabricated metal components are integral to the construction of wind turbines, including tower structures, frames, and other components that withstand environmental forces.

# Leading Pennsylvania Manufacturers within NAICS 332

This section documents the leading manufacturers with operations in Pennsylvania that fall under the NAICS 332 industry code, segmented by geographic region and sorted alphabetically. Leading companies were selected based on revenue estimates.

Sources: Dunn & Bradstreet;<sup>59</sup> ZoomInfo<sup>60</sup>

## **Southeastern PA Region**

### **Delaware Valley Industrial Resource Center (DVIRC)**

- Carpenter Technology Corporation (Philadelphia, PA)
- Crown Holdings, Inc. (Yardley, PA)
- Curtiss-Wright EST Group (Hatfield, PA)
- Enviri Corporation (Philadelphia, PA)
- LaFrance (Concordville, PA)
- PennEngineering (Philadelphia, PA)
- SPS Technologies, LLC (Jenkintown, PA)
- Southco, Inc. (Philadelphia, PA)

## **Southwestern PA Region**

### **Catalyst Connection**

- Alstom Transport USA Inc. (Pittsburgh, PA)
- Centria, Inc. (Moon Township, PA)
- ERIKS North America (Pittsburgh, PA)
- Fenner Dunlop Americas, LLC (Corapolis, PA)
- Hörmann Flexon (Burgettstown, PA)
- North American Höganäs Holdings, Inc. (Hollsopple, PA)
- Oberg Industries, LLC (Freeport, PA)
- Riggs Industries, Inc. (Stoystown, PA)

## **South Central PA Region**

### **MANTEC**

- High Steel Structures (Lancaster, PA)
- Kratos' Gichner Systems Group, Inc. (Dallastown, PA)
- MI Windows and Doors, LLC (Gratz, PA)
- New Standard Corporation (York, PA)
- Pennsylvania Precision Casted Parts (Lebanon, PA)

## **Lehigh Valley PA Region**

### **Manufacturers Resource Center (MRC)**

- Chart, Inc. (Allentown, PA)
- HYDAC Technology Corp. (Bethlehem, PA)
- Reading Truck Body, LLC (Reading, PA)
- Victaulic Company (Easton, PA)

## **Northeast PA Region**

### **Northeastern PA Industrial Resource Center (NEPIRC)**

- Diamond Manufacturing Company (Wyoming, PA)
- General Dynamics OTS, LLC (Wilkes Barre, PA)
- Zippo Manufacturing (Bradford, PA)

## **Central PA Region**

### **Innovative Manufacturers' Center (IMC)**

- Bonney Forge Corporation (Mount Union, PA)
- Standard Steel (Burnham, PA)

## **Northwest PA Region**

### **Northwest Industrial Resource Center (NWIRC)**

- The Electric Materials Company (North East, PA)
- Eriez (Erie, PA)
- Meadville Forging Company, L.P. (Meadville, PA)
- Metaldyne Sintered Ridgway, LLC (Ridgway, PA)

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