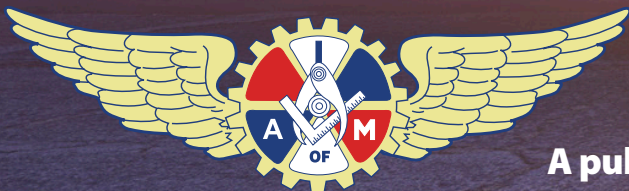
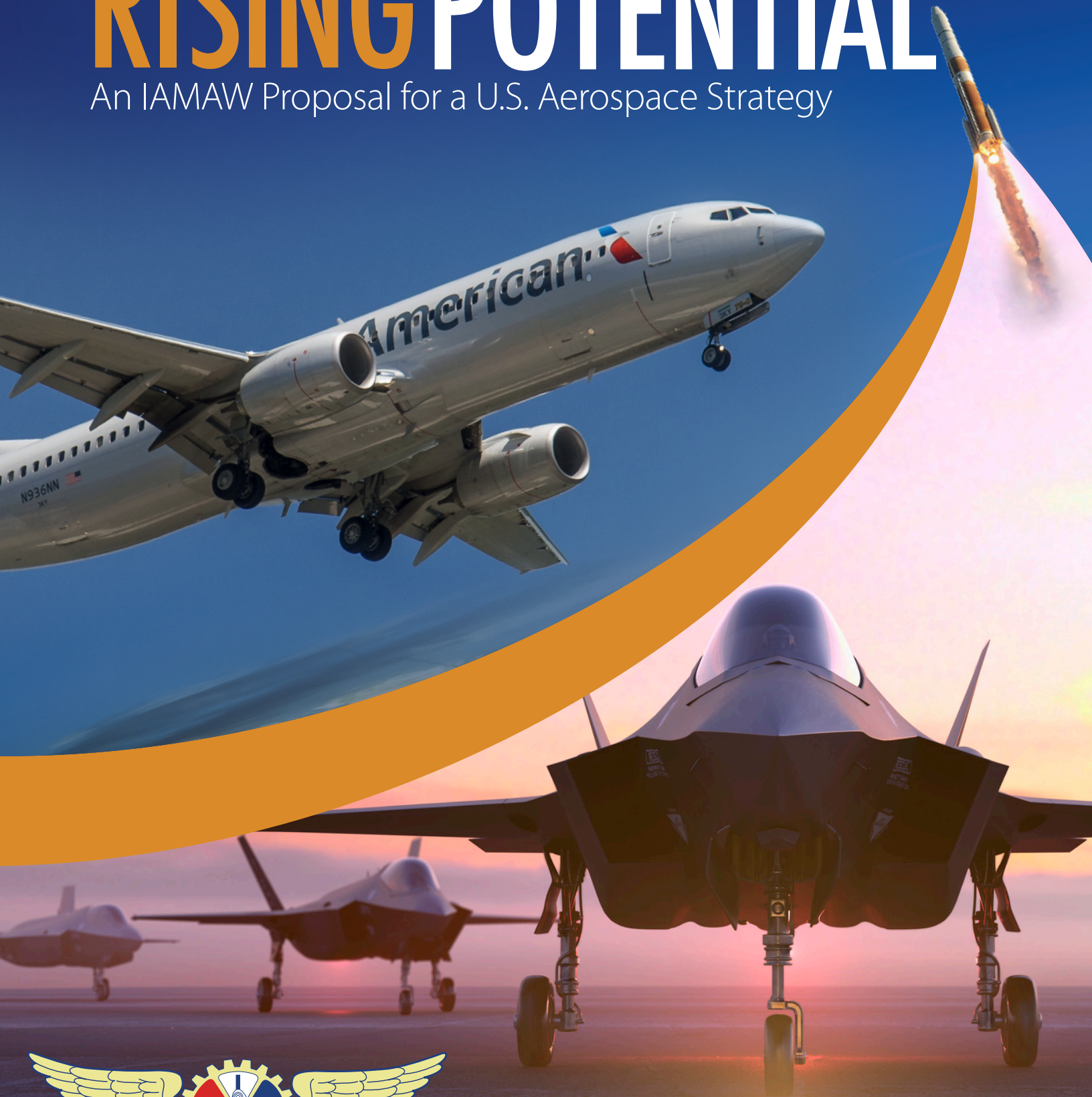


# RISING POTENTIAL

An IAMAW Proposal for a U.S. Aerospace Strategy

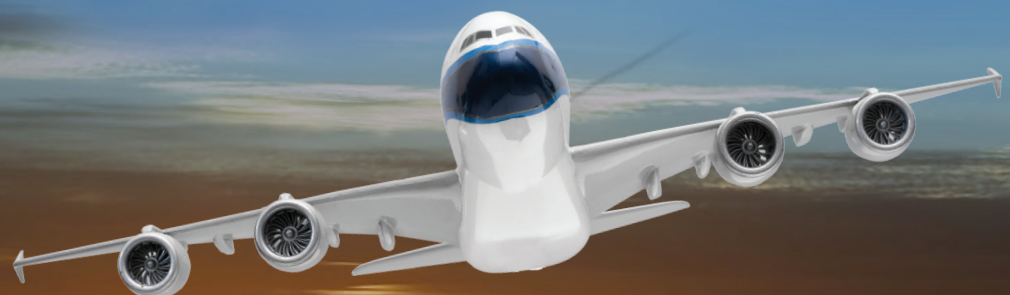


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## LETTER FROM IP MARTINEZ AND GVP BLONDIN

The International Association of Machinists and Aerospace Workers (IAMAW) represents aerospace workers in every sector and subsector of this global industry. With 600 collective bargaining agreements at more than 750 locations, it covers 150,000 bargaining unit members in the industry and hundreds of thousands of more outside of it. In addition to representing workers at the nation's largest aerospace companies and their suppliers, IAMAW also represents thousands of members working under the Service Contract Act (SCA) at military locations across the U.S.

As the representative of its highly skilled workforce, IAMAW recognizes a strong aerospace industry depends on collaboration between government, companies, universities and labor unions. The industry contributes billions of dollars annually to the economy, so it is imperative that U.S. aerospace maintains its standing as a world leader in this high-tech and high-skilled industry.

**A national aerospace strategy created by government, private industry and labor unions is necessary to ensure that happens.**

One major challenge: narrowing the skill gap caused by new technology. The aerospace industry will suffer without an adequately trained workforce. This will cause a ripple effect that will impact everyday lives and national security.

Ensuring the jobs created by the industry remain in the U.S. by enforcing "Buy American" provisions in procurement and trade laws is vital, as is creating stricter regulations around offsets that transfer technology to global competitors.

The solutions to the problems facing the aerospace industry are achievable. Unifying the industry to include workers through labor unions, companies, universities and the government will lead to success. This comprehensive report provides an overview of the industry and its key challenges, and offers solutions to protect the U.S. aerospace Industry well into the future.

Robert Martinez Jr.  
International President

Mark Blondin  
Aerospace General Vice President



## EXECUTIVE SUMMARY

As the leading net exporting manufacturing industry in the country, the U.S. aerospace and defense industry plays a vital role in the economy. From space and defense to commercial and private air travel, the U.S. aerospace industry is a global leader. Many well-paying jobs and highly skilled workers drive innovation forward. Advancements across industries better communities every day.

The future looks promising for U.S. aerospace research and manufacturing. Industry experts predict potential job growth for decades to come due to rising demand for supersonic travel, space exploration, the rise of widespread freight air to deliver goods to consumers and other new technologies.

NASA, for example, is reaching new heights with its plans to partner with private industry to launch missions to Mars and return man to the moon. Such ambitions require re-training the current workforce and adding more employees.

In Washington state, the world's largest aerospace hub, the local economy depends on the production of commercial aircraft. The aerospace and defense industry created 260,627 jobs and supported tens of billions in economic activity in Washington alone in 2019, according to the Aerospace Industries Association.

Maintenance, repair and overhaul (MRO) is another important aspect of civilian and military aerospace sectors. In 2018, the industry spent \$77 billion on MRO, and is expected to grow to become a \$116 billion industry by the end of the decade.

In the defense sector, aircraft annually contributes billions of dollars in economic impact across the U.S. According to Lockheed Martin, the F-35 adds \$14 billion to 453 different suppliers in the state of California alone. The significance of economic ripple effects cannot be understated.

The IAMAW recognizes it can't take its standing with the aerospace industry for granted. The U.S.

is no longer a world manufacturing powerhouse; it is falling behind in nearly every manufacturing industry, including steel and automotive. Aerospace remains one of the exceptions.

That's why it is important to include a robust worker-focused trade policy that protects workers' rights and prevents outsourcing of jobs overseas.

For the aerospace industry, economic projections say military spending will continue to grow and demand for commercial air travel will increase in coming years. U.S. manufacturers must keep pace with demand or lose business to overseas competition.

This overview of the aerospace industry in the U.S. and its global competitiveness highlights common issues in the industry that threaten to erode its strength. Its policy solutions will help preserve the sector.

**Of most concern is the imminent skill gap that will cause a shortage of trained workers necessary to service the industry in the coming years. Quality registered apprentice and training programs are necessary to save these essential jobs. Investment into these programs is crucial.**

Other solutions include further regulation and enforcement of offsets—arrangements in international trade deals that hand manufacturing and technology to global competitors. Additionally, rules of origin, trade laws and "Buy American" provisions in procurement ensure the creation of good domestic jobs at home.

Without a comprehensive aerospace sector plan going forward, the industry will lose jobs and its foothold as world leaders, even as other countries prioritize their own aerospace industries.

Ultimately, IAMAW calls for a coordinated effort between government, private business, universities and labor unions to move the industry forward. The path must be forged together. The future of the aerospace industry depends on it.



## KEY FINDINGS

- The U.S. aerospace and defense industry is the leading net exporting manufacturing industry in the country.
- The aerospace industry contributed \$147 billion in exports to the U.S. economy and generated \$909 billion in total industry revenue in 2019 and employs over 700,000 people directly and 2.2 million or more indirectly.
- Aerospace is a source of highly paying, unionized jobs that offered \$104,577 in wages and benefits on average in 2020.
- The U.S. is a leader in research and development, but global competition must be monitored to maintain its standing.
- American industry and the federal government must invest in maintaining a workforce with the necessary skills and technology to fill future projected expert worker shortages.
- Lack of training opportunities and certified apprenticeship programs add to this skill gap.
- Global competition that offshores American jobs and shares our technology with competitor foreign industries costs the U.S. hundreds of thousands of jobs.
- Well-paid, stable and rewarding jobs are integral to recruiting workers, best achieved through a unionized workforce and by prioritizing union workplaces in federal contracting, especially through the Service Contract Act.
- Failed trade policies that tolerate intolerable labor conditions and the offshoring of our supply chains undermine the resilience of the industry to external shocks and cost thousands of jobs

## CORE RECOMMENDATIONS

- Strengthen “Buy American” Requirements to meaningfully ensure American tax dollars contribute to the American economy and preference union workers in the federal procurement process
- Invest in training and registered apprenticeship programs
- Regulate offsets to protect our technological advantage, and prevent companies from agreeing to short-sighted deals with competitor nations
- Strengthen Rules of Origin to level the playing field and reduce use of low-wage workers overseas, which undercut American workers
- Strengthen a fully functioning Ex-IM Bank to support domestic exporters
- End the interstate race to the bottom that pits states and struggling localities against each other in an effort to offer ever-larger corporate subsidy packages
- Increase federal funding for FAA Inspectors to promote the safety of the flying public
- Encourage manufactures to require FAA’s Aviation Safety Action Program (ASAP)
- Draft worker-focused trade policies that dissuade offshoring of U.S. aerospace jobs
- Bolster public and private investment in Aerospace research and development

## INTRODUCTION

Aerospace is one of America's last great manufacturing industries. Its achievements include civilian aircraft that connect the world, military innovations that provide security, space exploration missions that expand understanding of the universe, and powerful new fuel efficient jet engines that shorten travel times. Looking at the nation's rich history in aerospace is crucial in maintaining dominance today and into the future. Working together to address challenges, from lackluster trade agreements to potential skilled workforce shortages, has never been more vital.

The nation is reaching a critical point: the aerospace industry needs a national manufacturing strategy to maintain its dominance. If problems are not addressed, the challenges will become insurmountable and our leadership to other nations will suffer. The U.S. economy and millions of workers from coast-to-coast depend on the strength of the aerospace industry.

Domestically, the aerospace industry is worth more than \$874 billion to the U.S. economy. It employed 2.09 million people in 2021 with good jobs worth an average of \$104,577 in total wages and benefits. The aerospace and defense industry are the U.S.' top exporters of finished goods in the country.<sup>1</sup> Our American aerospace industry is a global leader, exporting more than the seven next largest countries combined (See Figure 1).<sup>2</sup>

According to the Economic Policy Institute, these exports create economic ripple effects through both backward and forward linkages across the supply chain. This creates a multiplier effect that expands the impact of the aerospace and defense industries beyond just its manufacturers.

Despite its scale, the industry suffers from a growing skill gap created by new technology that threatens the availability of experienced workers. And while other nations are investing

**FIGURE 1** 2019 Aerospace Exports by Country

United States*	\$148,000,000,000
France	\$53,533,821,363
Germany	\$43,217,503,828
United Kingdom	\$18,448,108,939
Canada	\$11,271,089,953
Singapore	\$7,961,352,601
Spain	\$6,786,692,102
Italy	\$4,805,391,908
Ireland	\$5,025,416,667
Japan	\$4,536,626,126

Data calculated using percentage changes from 2019 to 2020

\*Source: Aerospace Industries Association 2020 Facts and Figures Report

in and protecting their high-tech industry, imbalanced and unenforced trade agreements encourage offshoring of these vital American middle-class jobs. Unless policymakers and industry commit to keeping this industry thriving in the U.S., it will slowly be stripped for parts to China and Europe, to the detriment of workers, national security, and our economy.

For decades, IAMAW has been the largest union in the aerospace industry. Members in all sectors assemble civilian and military aircraft, build missiles and rockets, manufacture parts and components, and provide maintenance, repair and overhaul (MRO) services.

Some economic projections predict military spending will grow and demand for commercial air travel will increase in coming years. Such scenarios add pressure on U.S. manufacturers to keep pace with demand or lose business to overseas competition.

In 2020, the aerospace and defense industry still represented 2% of the U.S.' total Gross Domestic Product, despite major setbacks delivered by the onset of the COVID-19 pandemic and the decline in air travel.<sup>3</sup>

1. US Census Bureau, Aerospace Industries Association 2021 Aerospace and Defense Report

2. International Trade Centre

3. Aerospace Industries Association 2021 Aerospace and Defense Report





In the last half-century, the U.S. has gone from world manufacturing powerhouse to underdog in nearly every manufacturing industry, including steel and automotive.

American manufacturers lost the lead by prioritizing profits over resiliency, shifting manufacturing overseas and stretching once-domestic supply chains around the world, leaving us vulnerable to a shock like COVID-19. But large global corporations that put their profits and priorities over national interests are still crafting our trade and economic policies.

Aerospace, however, is one of the bright spots—it has maintained dominance.

Policies need to preserve its leadership by rewriting trade pacts with the U.S. workforce in mind. Additional and broader use of registered apprenticeships and training are required to arm the nation's workforce with skills needed to meet rising demand for aerospace business.

Legislative relief includes stronger laws to ensure high-paying aerospace jobs remain in the U.S. This allows workers to keep earning high wages and provides job protections necessary for recruitment. Federal investment in job training, including more funding for the Labor Department's registered apprenticeship programs, is sorely needed.

The industry needs stronger collaboration between unions and industries to continually recruit and upskill workers to meet the indus-

try's demands for today and tomorrow.

However, challenges present an opportunity for private industry to collaborate with government, universities and labor unions. This strategy has worked in the past.

Partnerships between the federal government and private industry led to commercial jets, and placed a man on the moon. Generations of workers in all kinds of skilled trades provided the labor and institutional knowledge that made the nation the indisputable world leader in this area.

Government-funded research for both military and civilian aerospace spurred the science and technological advances which moved the country from early aviation to the moon in a few short decades, revolutionized manufacturing processes, and pushed forward innovations in materials, aeronautic designs, computers, and other vital technologies.

This report provides an overview of the aerospace industry in the U.S., including international comparisons with some main competitors.

It also outlines a series of recommendations to address challenges and improve the nation's foothold in the aerospace industry.

There's a lot at stake. Now is the time to act to maintain U.S. dominance in the aerospace industry.

## A SNAPSHOT OF AEROSPACE IN UNITED STATES

The U.S. aerospace industry comprises four sub-industries: commercial aviation, defense, space and general aviation. According to the U.S. Census Bureau, approximately 42 percent of U.S. aerospace shipments came from civil aircrafts, 20 percent from military aircraft and 17 percent from space and missiles.<sup>4</sup> Across these sub-industries, two distinct activities take place: manufacturing and maintenance, and repair and overhaul (MRO).

### COMMERCIAL AVIATION

Commercial aviation includes civil transportation, such as passenger and cargo aircraft that operate on regularly scheduled routes. Large commercial jets comprise 60 percent of total industry output by value from supply chain to final delivery.<sup>5</sup> The largest company in commercial aviation is Boeing, which is also the largest aircraft manufacturer in the world.

Although Boeing is by far the largest company in commercial aviation, its subcontractors play an essential role in almost all aspects of production. Boeing buys many products and services each year that fall into numerous categories including avionics components, hydraulic systems, engine and propulsion systems, interior carpeting and lighting, and more.<sup>6</sup> The sheer number of inputs that go into making a single commercial aircraft speaks to the breadth of its impact across the supply chain.

Some of Boeing's major subcontractors cumulatively employ tens of thousands of people. Some of them include: Spirit AeroSystems, UTC Aerospace Systems, Pratt & Whitney, General Electric, Triumph Aerostructures, Leonardo and Kawasaki Heavy Industries, Pratt & Whitney and GE produce engines. Spirit AeroSystems has built several important components for Boeing including the fuselage for the 737 models and portions of the 787s. UTC Aerospace Systems

provides nacelle systems, the aerodynamic structure that surrounds a jet engine, and aftermarket support for Boeing 787 Dreamliner, among others.

### DEFENSE

Defense in aerospace, for the purposes of this report, includes military aircraft and missiles. The largest companies in this sector include Lockheed Martin, Northrop, General Dynamics, Boeing and Raytheon.

Heightened defense spending means more demand for highly trained personnel and more workers. President Joe Biden's proposed Fiscal Year 2023 defense spending budget, which fortifies our military and industry, understands the value of this further investment.<sup>7</sup>

Two examples of aircraft that add to the sector and the American economy are the F-35 and the C-130. These aircraft have billions of dollars in economic impact across the U.S. According to Lockheed Martin, the F-35 has \$11 billion in total economic impact in the state of Texas alone.



### F-35

Lockheed Martin's F-35 fighter jet completed its first flight in December 2006. Since then, the F-35 has logged more than 470,000 cumulative flight hours, trained over 1200 pilots and 10,000 maintainers and, through its suppliers, has supported more than 250,000 advanced manufacturing jobs.<sup>8</sup> (See Figure 2)

4. American Survey of Manufacturers, Census Bureau

5. Teal Group, Aerospace Competitive Economics Study, 2019

6. Boeing Suppliers. <http://www.boeingsuppliers.com/become.html>

7. Reuters, "EXCLUSIVE Biden to seek more than \$770 billion in 2023 defense budget, sources say," February 2022

8. Lockheed Martin Annual Report 2021



Lockheed assembles the F-35 at its Fort Worth, Texas, facility. It takes more than 300,000 parts to assemble a single F-35. This is a huge financial boost to suppliers in the U.S. and creates thousands of well-paying jobs.

In 2021, Lockheed produced its 753rd F-35, exceeding its contractual obligations despite major production delays due to COVID-19. Not only do Lockheed workers continue to meet their delivery goals, they continue to improve efficiencies and reduce costs.



### C-130

According to Lockheed Martin, the C-130 “Hercules” is the “most modern military tactical transport in service today.”<sup>9</sup> Additionally, the C-130 is celebrated for its lower operations costs, increased performance improvements and operational capabilities that make it especially effective.

More than 400 Hercules have been produced and delivered to 18 nations on five continents by Lockheed’s Marietta, GA facility. They have seen 2 million flight hours and counting. This aircraft has many capabilities ranging from air drops to arctic support, from search and rescue to gunship.<sup>10</sup>

Aircraft produced in the U.S. are integral to the nation’s economy and defense.

FIGURE 2

State	F35 Supplier Locations	F35 Direct & Indirect Jobs	F35 Economic Impact (\$Millions)
Texas	111	55,450	10,596
California	453	53,130	14,046
Florida	134	20,600	4,876
Connecticut	92	16,540	1,675
New York	119	11,160	1,155
Arizona	38	8,790	1,060
Georgia	28	6,610	705
Michigan	49	5,810	559
Kansas	42	5,290	617
Ohio	49	5,270	546

Source: Lockheed Martin <https://www.f35.com/about/economic-impact-map>



### F/A-18

Boeing and Northrop’s F/A-18 family of aircraft includes the United States Navy’s F/A-18E/F Block III Super Hornet and the EA-18G Growler. The F/A-18 is a tactical strike fighter used by both the U.S. Navy and the Marine Corps, as well as the air forces of many other allied nations.

9. Lockheed Martin C-130 Page  
 10. Lockheed Mart C-130J Fast Facts



The F/A-18 Hornet was the first tactical aircraft designed to carry out both air-to-air and air-to-ground missions.<sup>11</sup> Hornets were used for active duty in 1983, then used in both the Persian Gulf war in 1991 and in Afghanistan in 2001.

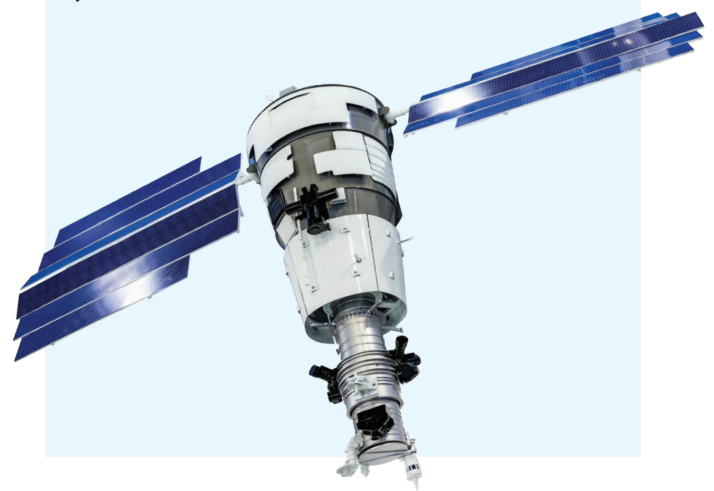
With 24 planes funded in the fiscal year 2021 budget, the F/A-18 program alone would support nearly 60,000 jobs across the country, 800 suppliers, and account for \$3 billion in economic impact.

## SPACE

In the last half of the 20th century, space exploration became a reality with the development of rockets able to overcome gravity and reach orbital speeds.<sup>12</sup> Since then, Americans have been leaders investing in space exploration and satellite launches.

NASA, Boeing, the United Launch Alliance, and SpaceX are currently the biggest participants in space. NASA has long been one of the nation's largest users of new technologies, products, and related manufacturing jobs. It employs thousands of IAMAW workers and contractors. The IAMAW is proud to have long played a part in the history of space exploration, building custom-made space suits for astronauts, and conducting research and development projects for NASA's Apollo 11 mission.

One of the most important aspects of the space industry are satellites, especially those used for national security. Space-Based Infrared System (SBIRS) satellites are designed to help with missile warnings, missile defense, technical intelligence and battlespace awareness. Advanced Extremely High Frequency (AEHF) satellites allow for various forms of tactical military communications.



The future of U.S. space travel looks rosy. NASA is partnering with private firms to continue working toward resuming flights to Mars and returning to the moon. This would fuel thousands of jobs in Florida's Space Coast region, as well as NASA's space facilities in Mississippi, Ohio, California and Texas.

11. Boeing F/A-18 Hornet Fighter Page

12. Aerospace Corporation, A Brief History of Space Exploration





## GENERAL AVIATION

General aviation encompasses both personal and corporate aircraft and is defined as all aviation other than military and scheduled commercial airlines. This includes more than 446,000 general aviation aircraft flying worldwide, 211,000 of which are aircraft based in the U.S. General aviation's total economic output in 2018 was \$128.3 billion, which supported 1.2 million total jobs in the U.S.<sup>13</sup>

The main manufacturers of personal and corporate jets in the U.S. include Bombardier, the third largest civil aircraft manufacturer in the world, Cessna, owned by Textron, and Gulfstream owned by General Dynamics.<sup>14</sup> General aviation is an important part of the aerospace industry that provides travel efficiency and flexibility that customers and companies demand.

## MAINTENANCE, REPAIR AND OVERHAUL

Maintenance, repair and overhaul (MRO) is important for both the civilian and military aerospace sectors. There are stringent requirements for quality certification. Billions of dollars are spent each year to ensure the safety of passen-

gers and crew.<sup>15</sup> In 2020, \$50.3 billion was spent on MRO, remaining a major industry despite pandemic-induced declines.<sup>16</sup> MRO demand is expected to recover quickly, however, forecasted to grow 50% between 2021 and 2023 and to grow to be a \$116 billion industry by the end of the decade.

MRO services are divided into four segments: airframe, line, engine and components.<sup>17</sup> Airframe MRO includes heavy maintenance and repair to the airframe, and the cabin interior and subsequent system upgrades. Line MRO is light airframe and engine maintenance when the aircraft does not have to be taken out of service. Engine MRO typically requires the aircraft be grounded then sent to an overhaul facility. Finally, components MRO handles the repair of major components, such as landing gear, that can be taken off and repaired or replaced, often at the same facility.<sup>18</sup>

## SERVICE CONTRACT ACT

The U.S. government spends hundreds of billions of dollars annually contracting out goods and services.<sup>19</sup> The McNamara-O'Hara Service Contract Act (SCA) is labor law established in

13. General Aviation Manufacturers Association, "Contribution of General Aviation to the US Economy"

14. Preparing for Takeoff: Commercial Aerospace Primer. Epstein, Ronald. Liwag, Kristine. Fornaro, Celine. Equity | Americas | Aerospace. May 8, 2014. p. 55

15. Darli Rodrigues Vieira. Maintenance, Repair and Overhaul (MRO) Fundamentals and Strategies: An Aeronautical Industry Overview. International Journal of Computer Applications. Volume 135 – No. 12, February 2016

16. Oliver Wyman Global Fleet and MRO Market Forecast, 2021-2031

17. Preparing for Takeoff: Commercial Aerospace Primer

18. Ibid

19. USASpending.gov

1965 that requires the government ensure fair wages, benefits, safety and health standards for workers when contracting or subcontracting out these goods and services to private entities.<sup>20</sup> IAMAW is the nation's leading union for employees working under the Service Contract Act. In recent years, the IAMAW has secured numerous organizing wins in the Service Contract field. This translates to bargaining power at the negotiating table and the creation of avenues to work alongside employers to ensure improved training and lower turnover.

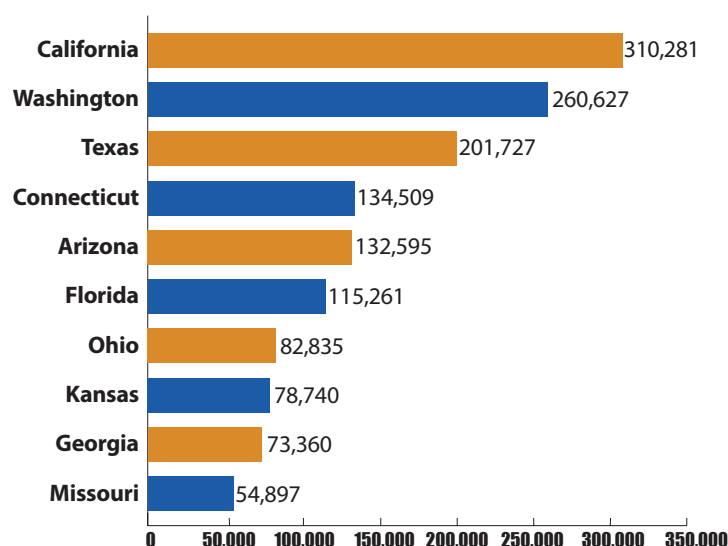
For example, Lockheed Martin F-35 pilot instructors now enjoy industry-leading wages, thanks to their IAMAW membership. The standards set by the SCA, and those bargained by unions like IAMAW, ensure compensation for work done on behalf of the government is fair and equitable.

## ROLE OF CLUSTERS

Geographic clusters include the original equipment manufacturer (OEM), suppliers and service companies, and other people who depend on the sector. The aerospace industry spans the U.S. The top 10 states based on aerospace employment are California, Washington, Texas, Connecticut, Arizona, Florida, Ohio, Kansas, Georgia and Missouri. (See Figure 3) Each cluster specializes in different sub-industries.

The largest aerospace and defense hub in the United States is in Washington state, which contributed \$63 billion to Washington's GDP in 2019.<sup>21</sup> The state produces nearly 90 percent of all commercial aircraft in the U.S.<sup>22</sup> Boeing's factory in Everett, Washington, produces its wide-body Boeing 747, 767, 777 and 787 model aircraft. Boeing is also the second largest private employer in the state, behind only Amazon, though the average Boeing worker makes significantly more than any Amazon warehouse worker.<sup>23</sup>

**FIGURE 3** 10 Highest Ranking States by Total Employment



Source: Bureau of Labor Statistics, NAICS Code 3364 and 4881

A 2019 hiring forecast predicted the Pacific West would hire 39 percent of the aerospace and defense workforce in the U.S., meaning 21,651 new jobs in the area.

Other noteworthy locations: Lockheed with facilities in Fort Worth, TX, Pratt & Whitney and UTC Aerosystems near Hartford, CT, Boeing and GKN in St. Louis, MO, Spirit and Textron in Wichita, KS, and General Electric near Cincinnati, OH.

The aviation industry's exports of at least \$147 billion in 2019 contribute significantly to combatting America's trade deficit. In 2020, even with the industry at its lowest pandemic nadir, it generated \$874 billion in revenue and \$90.6 billion in exports, and is only expected to grow.<sup>24</sup> (See Figure 4)

## ORGANIZED LABOR

Some of the nation's most coveted careers can be found in the aerospace industry. This is aided in part by robust salaries and benefits negotiated by unions such as the IAMAW, which, in

20. US Department of Labor

21. Aerospace & Defense Industry, "The Facts About Aerospace And Defense In Washington"

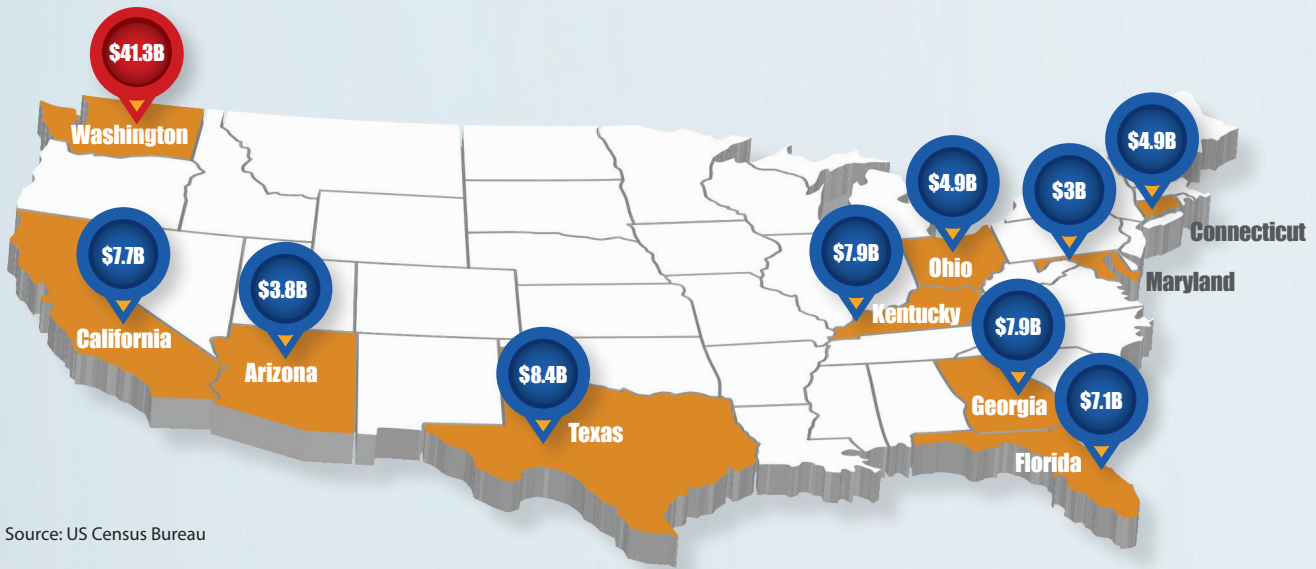
22. Pricewaterhouse Coopers (PWC) "2019 Aerospace Manufacturing Attractiveness Ranking"

23. *Seattle Times*, "Amazon surpasses Boeing as Washington's biggest employer," Jan. 2021

24. Aerospace Industries Association 2021 Aerospace and Defense Report



**FIGURE 4** Top 10 Aerospace Exporting States in 2021 (\$US billions)



1936, signed the nation's first labor agreement in the aerospace industry with Boeing Co.

Today, IAMAW remains a strong part of the aerospace industry. It represents tens of thousands of workers at aerospace manufacturers across the country, including Boeing, Lockheed Martin, Pratt & Whitney and Spirit AeroSystems.

IAMAW also represents aerospace defense workers across the nation, including those at military installations in Texas, Florida and California.

Labor unions play an important part in ensuring coveted aerospace jobs are safe, productive and benefit the nation's economy.

Labor unions like IAMAW champion for its members to have a voice on the job, and offer the means for them to upskill as they keep pace with changing market demands.

A national aerospace strategy must include protections ensuring workers have collective bargaining rights.

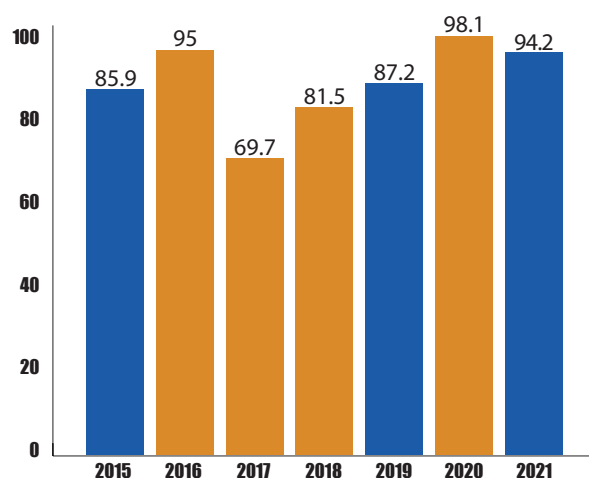
## RESEARCH AND DEVELOPMENT

Research and development (R&D) is necessary for the Aerospace industry to develop and innovate technology, both at private companies and at universities with huge support from the federal government.

The U.S. is a world leader in R&D. But the nation's investment in defense R&D has worsened in the last decade due to the 2011 Budget Control Act (BCA), which cratered R&D spending for years. These major cuts were significantly in place until 2019. According to the National Science Foundation, federal research funding on defense and space flight has just hit over \$115 billion (see Figure 5). This comes as China continues to increase its investments in R&D as a proportion of its GDP, according to the World Bank, highlighting the need for consistent investment.

Robust public research spending has become more crucial in the wake of the COVID-19 pandemic, which caused many aerospace companies to reduce private R&D costs. For example, Boeing's R&D spending has fallen from \$3.2 billion in 2019 to \$2.2 billion in 2021, signal-

**FIGURE 5** Federal R&D Spending On Defense & Space Flight (\$US billions)



Source: US National Science Foundation

ing an alarming drop.<sup>25</sup> If the US is to remain an aerospace competitor, it must continue to invest in the innovative future of the sector.

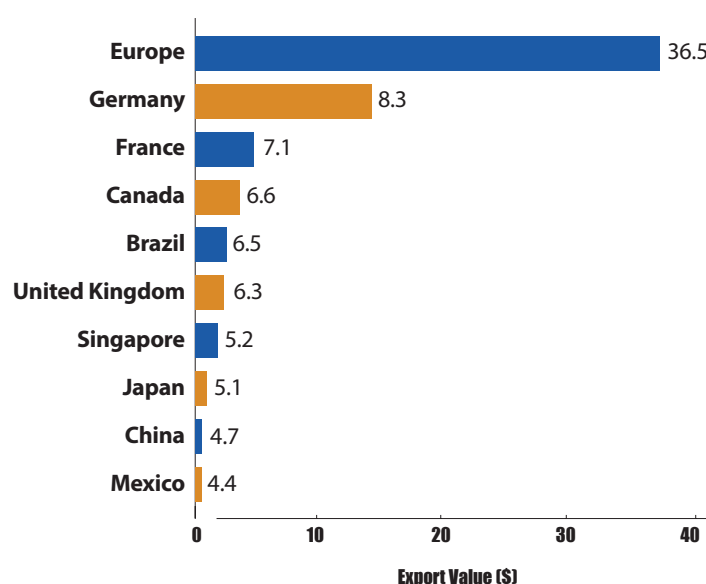
According to the Aerospace Technology Institute, there is a major social return on aerospace research and development that spills over to the non-aerospace economy.<sup>26</sup> Composite materials and 3-D printing are two examples of technology researched and developed through aerospace funding, and then used throughout many different industries.

To develop the technology necessary to remain a world leader in innovation, investment by the government and the aerospace industry must continue.

### GLOBAL COMPETITION

Globally, in 2018 and 2019, the aerospace industry grew along with commercial flight demand and military spending, and is predicted to recover relatively quickly from pandemic declines.<sup>27</sup> Even now, the backlog for commercial aerospace is at an all-time high. In defense, continued global tensions and a newly revitalized U.S. defense budget has spurred growth. On the other hand, China's defense spending rose by 1.9% over 2019 and over 76%

**FIGURE 6** Top 10 Importers of US Aerospace Products in 2021 (\$US billions)



Source: U.S. Census Bureau, NAICS 3364 Aerospace Product and Parts Manufacturing

over the last decade. This could pose a threat to the domestic industry if major American companies continue to transfer technology and production to our competitors. Increased global competition, unfair trade offsets and unenforced "Buy American" provisions have already cost the U.S. hundreds of thousands of jobs to countries like China.

China is among the most capable and focused countries building their own aerospace industry. It is developing its own large commercial aircraft to compete with Boeing and Airbus. But China has relied on Western aerospace companies to develop its industry through transfer of production and technology. And profit-seeking corporations are more than happy sacrificing long-term viability for short-term gains when they accede to Chinese demands to shift production abroad in return for temporarily lucrative contracts. As U.S. aerospace companies outsource work in return for market access and cheap labor—working conditions suffer.<sup>28</sup>

This poses a threat to the U.S. in four different ways, says Export-Import Bank Director nominee, Owen E. Herrnsstadt. "First, jobs that may

25. Boeing's Annual Report 2021

26. Aerospace Technology Institute, Spillovers: Revealing the broader economic benefits of Aerospace R&D. October 2019.

27. Deloitte, 2022 Aerospace & Defense Industry Outlook

28. Herrnsstadt, Owen. Offsets and the lack of a comprehensive U.S. Policy EPI Briefing Paper.

be associated with the transfer of technology and production are lost; second, the skills that accompany the transfers are lost, leading to further decline in the industrial base; third, additional jobs could be lost in the future as China uses transfers from the U.S. to create and strengthen its own aerospace companies that compete directly with U.S. companies; and fourth, the technology and production that would have led to more U.S. jobs through development of innovative products is lost.”<sup>29</sup>

On their website, Airbus proclaims the A320 partly assembled in China as, “representing the most successful and versatile jetliner family ever.”<sup>30</sup> They do not mention the many good jobs lost to offshoring and or calculate the long-term cost of losing their technical prowess to foreign competitors.

## TRADE

A balanced trade policy is crucial for sustaining and growing the U.S. aerospace industry (See Figure 6). This includes strong and enforceable labor protections that make it viable for companies to conduct aerospace research and development, and manufacture within the U.S.

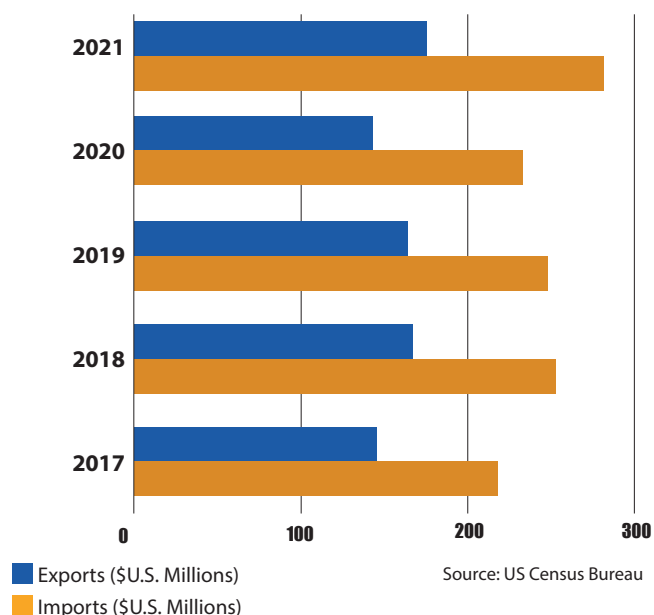
The projected uptick in demand for commercial and defense aviation calls for a U.S. aerospace strategy with a trade policy that benefits U.S. workers.

This includes drafting policy to respond to competition with Mexico and China, two countries with ambitions to compete with U.S. aerospace manufacturing.

IAMAW supports a comprehensive manufacturing strategy that disincentivizes outsourcing and ensures U.S. competitiveness with China.<sup>31</sup> Without this, our current aerospace export lead will disintegrate (see Figure 7).

The failures of past policies, including the North American Free Trade Agreement (NAFTA) which helped speed up the outsourcing of jobs overseas and across the southern border, are instructive.

**FIGURE 7** US Trade Balance



The renegotiated NAFTA trade deal, the USM-CA, stopped short of fixing the problems pinpointed by groups like IAMAW. Fair union elections were not guaranteed; just labor standards were not enforced; and violators of human and labor rights were rarely punished.<sup>32</sup>

Instead, our trade policy functionally ignores basic labor rights and privileges the needs of the wealthiest and most powerful business interests across North America.

## EMPLOYMENT

The aerospace industry is made up of two main categories: 1) Aerospace Product and Parts Manufacturing and 2) Support Activities of Air Transportation. (See Figure 8).

The Bureau of Labor Statistics (BLS) projects that aerospace employment will grow by 6% over the next decade to over 750,000 people, not including workers supported indirectly by the industry (See Figure 9). Most of the growth will come from aerospace support activities, which refer to workers who inspect and service

29. U.S.-China Economic and Security Review Commission.

30. Airbus Website

31. Testimony of Owen Herrstadt before the House Ways and Means Committee, “U.S., China and Trade Competition”

32. Testimony of Owen Herrstadt before the House Ways and Means Committee, “Enforcement in the New NAFTA”



**FIGURE 8**

INDUSTRY	EMPLOYEES
<b>Aerospace products &amp; parts</b>	<b>510,680</b>
Aircraft	231,848
Engines & Other Parts	82,564
Other Aircraft Parts	106,812
Missiles & Space	89,456
<b>Support activities for air transportation</b>	<b>245,685</b>
Air Traffic/Airport Operations	126,349
Misc Airport Operations	115,034
<b>Total</b>	<b>752,063</b>

Source: BLS Employment Surveys For NAICS Code 336411, 336412, Other Aircraft Parts, Space & missile, Airport Operations, and Other Airport Operations

aircrafts, airport service workers and security screeners.<sup>33</sup> (See Figure 10)

Despite overall growth, the BLS projects that production occupations involved with direct manufacturing are forecasted to decline by a staggering 9.1% by 2030. This will disproportionately impact black and minority workers who have long relied on these often unionized manufacturing positions to join the middle class. Black union workers have “higher wages and better access to health insurance and retirement benefits than their non-union peers.”<sup>34</sup> If these manufacturing jobs are allowed to continually offshored and strategically transferred to anti-union states in the US South, workers of color especially will be left behind.

On the other hand, the BLS projects that the industry will need 23% more industrial machinery mechanics, 21% more CNC programmers, and 13% more maintenance workers and millwrights. The growing demand for these skilled positions highlights the need to invest in future worker education. Otherwise these positions may go unfilled as the “skill gap” between the existing workforce and those just entering the workforce grows.

## TRAINING AND REGISTERED APPRENTICESHIP

For many years, the aerospace industry has expected mass retirement of experienced workers, otherwise known as the “gray tsunami.” Retirement data shows that the aerospace workforce is relatively old, with 15 percent of the workforce over 60 in 2018 and 30 percent were over 55.<sup>35</sup>

But instead of a mass exit, fewer than 20 percent of workers over 60 have retired in a process known as “managed maturation.”<sup>36</sup>

Industry experts have concluded the mass exodus has not occurred because workers are weighing the impact of past recessions and the impact of COVID-19 on their retirement savings. Plus, fewer people have pre-65 retiree healthcare, meaning many have chosen to delay retirement until they qualify for Medicare.<sup>37</sup> And inadequate 401(k)s prevent many workers from retiring with dignity and make it difficult for companies to attract new employees.

Although retirements are a concern, the more pressing issue for the industry now is increasing technology and maintaining a workforce with the necessary skills to fill its needs. This is especially important in industries like aerospace. The industry’s technology is constantly evolving, so it is essential for the workforce to adapt and meet the new challenges of a global economy through reskilling.

To prepare the industry for imminent change, a much more aggressive approach to training the workforce of today and tomorrow is needed to get the most of a maturing workforce while ensuring expertise is passed on to younger workers.

One of the oldest and most successful methods of on-the-job training for the IAMAW is registered apprenticeship programs. In a survey of industry leaders from across the world, 63 percent said their top concern in the aerospace and defense industry is closing the “talent gap.”<sup>38</sup>

33. Bureau of Labor Statistics, Employment Projections for NAICS Code 3364 and 48819

34. Center for Economic & Policy Research, Cherrie Bucknor, “Black Workers, Unions, and Inequality”

35. Hedde, Carole Rickard, 2019 Workforce Data Pinpoints Need for Tailored Recruiting as Job Requirements Boom

36. Ibid.

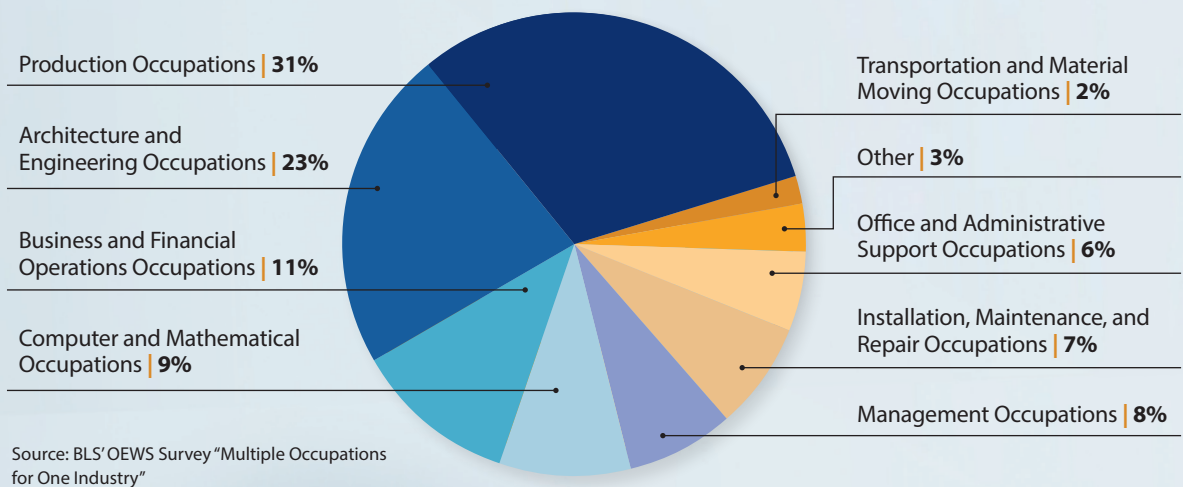
37. Ibid.

38. Ibid.

**FIGURE 9** Projected Aerospace & Support Activities Employment

2020 Employment	Projected 2030 Employment	Employment Change	% Change
717,900	761,000	43,100	6.0%

**FIGURE 10** Employment by Occupation



Although a top concern, only 34 percent of employees in the industry said they participated in learning and development programs.<sup>39</sup>

IAMAW has resolved to establish a uniform registered apprenticeship and training system. The adoption of IAMAW registered apprenticeship standards protects the future of industries, the union and the apprentice, and offers a comprehensive apprenticeship system in which future apprentices are carefully selected and properly trained in all of the mechanical and theoretical aspects of the industry.<sup>40</sup>

The IAMAW-Boeing Joint Apprenticeship Program in the Puget Sound area of Washington is an example of an effective training program proven to develop a highly skilled workforce. Boeing offers 10 apprenticeship programs, either four or five years in duration. Both require 160 unpaid classroom hours per year.<sup>41</sup> Qualified journeyman workers teach students through a combination of real-world and on-the-job training that meets the Standards of Apprenticeship approved by IAMAW, Boeing and the Washington State Apprenticeship and Training Council.<sup>42</sup>

Aviation High Schools, which focus the curriculum heavily on aerospace learning, are another example of successful workforce education programs. Aviation High School in New York City offer a high quality program that prepares students to meet the challenges of the 21st century and a career in aerospace.<sup>43</sup> Similarly, Raisbeck Aviation High School, one of the top high schools in Washington, prepares students with a

39. Ibid.

40. IAMAW/Boeing Apprenticeship Program

41. Ibid.

42. Ibid.

43. Aviation High School New York City, Mission

## IAM District 751-Member Mylo Lang



IAMAW District 751-member Mylo Lang came to Boeing as an Aircraft Structures Mechanic just months after graduating high school. The bridge from graduation to full-time work was seamless for Mylo, who strategically built his manufacturing, advanced composites, precision machining and workplace skills throughout high school in Capital High School's Core Plus Aerospace program.

Immediately after joining Boeing, Mylo used the IAMAW's rich, contractual education benefits to gain additional skills to secure an upgrade. He completed South Seattle College's CNC Machining Program while working full time as a structure mechanic. A little over a year after hiring into Boeing, Mylo secured an NC Multiple Tool and Milling Machine Operator position—a significant upgrade. However, this motivated Machinist aims even higher and is using his contractual education benefits to pursue a degree in engineering.

## CASE STUDY

### IAM District 70 and Spirit Aerosystems

In 2017, Spirit AeroSystems management approached the union about skills training. With support from the IAMAW Apprenticeships Department, both labor and management worked on determining required skills. A simple demographic analysis showed the primary skill loss would be in the maintenance sector. Both parties agreed to work to establish an apprenticeship program. They began working on a Joint Apprenticeship Training Committee outline; met with state representatives to register the program; developed a selection process and enrolled 10 apprentices.

Since that initial enrollment, other trades and skills have been added. Apprentices attend Wichita State University Tech and Wichita Technical College for related instruction and then work at the facility to "earn and learn" their skills. As new demographic data demonstrate needs, the parties will work together to increase skills training.





learning experience facilitated in the context of aviation and aerospace.<sup>44</sup>

Airframe and/or Powerplant (A&P) certificates are for workers seeking to become aircraft maintenance technicians. Technicians inspect aircraft and perform, supervise and conduct preventive maintenance. A&P certifications, issued by the Federal Aviation Administration (FAA), have rules and regulations that can be learned through registered apprenticeship programs.

IAMAW has dozens of state and federally registered trades (see Appendix I) that impact the aerospace industry. Registered apprenticeship programs are the preferred choice of IAMAW. It is incumbent on employers, unions and government to ensure the skills needed to provide state-of-the-art aircraft and equipment are available.

Employers will no longer be able to acquire skilled workers for their needs as Baby Boomers retire and Generation X follows. It is important to draw employers' attention to these coming skills challenges. Conducting a demographic analysis of the skilled positions at each facility and determining how many workers may retire in the next five years is one way of accomplishing this.

A 2019 survey of large IAMAW-represented aerospace locations indicate that, of the 75 respondents, only 10 have robust apprenticeship programs. Of the remainder, six have apprenticeship programs but lack participation. Twenty-seven of the remaining 59 employers see a need for apprenticeship programs but lack resources. If investment into the educational future of the workforce isn't made now, major aerospace employers will face significant skills and training shortages.

Further demographic analysis would highlight the skills gaps and how to address them by developing a consortium to address the current and future skill needs of workers.

**The IAMAW is ready to assist in addressing employers' needs. IAMAW supports partnerships to develop skills and training programs, by establishing Joint Training Committees.**

These and other documents are available through the IAMAW Apprenticeships Department. Many of the trades of trades listed in the appendix are not directly related to Aerospace, but to facility maintenance applicable to the industry. Many trades have cross-over or transferable skills that can support the industry.

The Aerospace Machinists Institute (AMI), a 501(c)(3) nonprofit, was created by IAMAW District 751 in 2019 to fill a vital role for Machinists members and employers and the broader community. With the visionary leadership of the Union, AMI will provide world-class training to current and future aerospace and manufacturing workers.

The Institute will focus on providing living-wage career opportunities through education and training across Washington. A highly skilled and diverse workforce, aligned with industry demand, is critical for the state to remain a global aerospace and manufacturing leader. Union partnership allows collective bargaining to bring meaningful and sustainable educational opportunities to Washington workers.

Initial programs offered by AMI include pre-employment training, skills upgrade training, school-to-work training, and registered apprenticeships. In addition to career curriculum, AMI will ensure all students understand what the union means to aerospace workers and their rights on the job.

Core Plus Aerospace is a two-year high school manufacturing curriculum that prepares students for high-demand jobs through hands-on learning. Students gain real-world skills that open doors to good-paying manufacturing jobs. This gives them an advantage when applying for apprenticeships, post-high school certificates, and college degrees. Currently, 40 schools and skill centers in Washington state offer the Core Plus Aerospace curriculum. In 2018, Boeing hired more than 150 high school graduates who participated in Core Plus Aerospace as IAMAW 751 members.

To maintain its leadership and remain innovative, action must be taken.

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44. Raisbeck Aviation High School, Mission

## CASE STUDY

### Aerospace Machinists Joint Training Council (AMJTC) Aerospace Joint Apprenticeship Committee (AJAC)

The Aerospace Machinists Joint Training Council (AMJTC), a nonprofit corporation established in 2008, funds the Aerospace Joint Apprenticeship Committee (AJAC). AJAC provides “21<sup>st</sup> Century” Washington with state-wide apprenticeship programs for the aerospace and advanced-manufacturing industries. State and federal funding for the proven apprenticeship training model, as an addition to the State’s workforce development strategy, is rooted in labor. With funding allocated by the Washington State legislature, the AJAC addresses attrition, increasing demand for products, rapidly changing technologies leading to increasing skills gaps for entry, and middle-skilled careers.

#### OUTCOMES

- 10,000+ participants served
- 31,000+ college credits earned
- \$5 Million+ revenue to colleges through the FTE’s
- 15 school Districts and skills centers engaged
- 500+ advanced manufacturing employers engaged annually representing approx. 60,000 workers.
- 12 Community and Technical college partners
- 9 regional Workforce Development Councils
- 125% growth in Youth Apprenticeships (Juniors and Seniors in High School) since 2017

#### STUDENT CHARACTERISTICS



**\$26/HOUR**  
Average Journeyman Wage



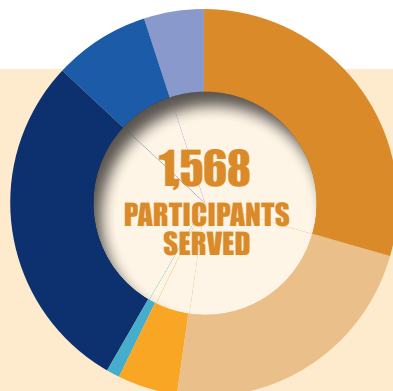
**\$20 MILLION**  
In Total Wages Earned



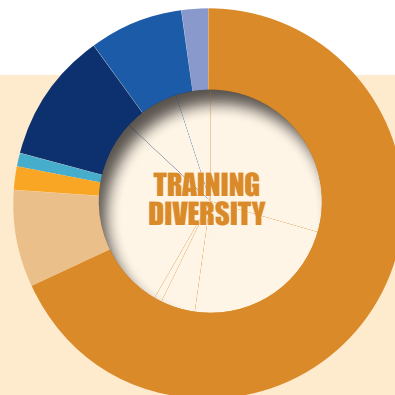
**28 YEARS OLD**  
Average Participant Age



**91.7% Male**  
**8.3% Female**



- 30% Mentors
- 23% Job Seekers
- 5% Youth Apprentices
- 1% Pre-Apprentice Incarcerated Youth
- 29% Adult Apprentices
- 8% Adult Pre-Apprentices
- 5% Instructors



- 69% White
- 8% Hispanic
- 2% Native American
- 1% Other
- 11% Black
- 8% Asian
- 2% Native Hawaiian

## LEGISLATIVE PRIORITIES

### MAINTAIN INVESTMENT IN AEROSPACE & DEFENSE DOMINANCE

When developing federal budget and procurement priorities, legislators must continue their investment in aerospace defense. Robust aerospace defense spending ensures men and women in uniform have the most advanced and efficient tools at their disposal to promote our national security and stability across the globe. Additionally, a commitment to investment in aerospace defense creates high-quality jobs, stokes scientific and technological innovation, bolsters domestic supply chains, and strengthens the nation's economic health overall. Shortsighted policies—sequestration, across-the-board spending cuts, and other policies that put downward pressure on federal defense spending—are ill-conceived policies and an inefficient way to curb government spending.

### DEVELOP COMPREHENSIVE AEROSPACE MANUFACTURING STRATEGY AND ENHANCE SUPPLY CHAIN SECURITY

A robust and secure aerospace industry supply chain which allows for consistent and efficient access to inputs and component is essential to US national defense and economic security. While recognizing that manufacturing of advanced aerospace platforms requires a strong global network of allies and partners, we must strive to enact policy which works to bolster and expand domestic production of aerospace inputs, components and products.

The COVID-19 pandemic and the supply chain disruptions which followed have shown that robust domestic supply chains, especially in strategically important industries such as healthcare and aerospace, are key to our national security and prosperity. The pandemic has shown that we simply cannot rely on sole-source foreign production of key components and inputs in industries as important as aerospace and defense.

Congress must work strategically to enact and implement a comprehensive manufacturing policy

which aims to dramatically strengthen the domestic aerospace and defense supply chain and ensure domestic production of key aerospace components and inputs. A strategic, comprehensive aerospace manufacturing policy is sorely needed to strengthen our national security, bolster the U.S. economy, create thousands upon thousands of high-skilled jobs and maintain our position as a global leader in advanced technology development.

### STRENGTHEN BUY AMERICAN REQUIREMENTS TO SUPPORT DOMESTIC, UNION WORKERS

Federal procurement policy falls far short of its potential to encourage and support a strong domestic aerospace manufacturing industry and the high-quality jobs that come with it. “Buy American” domestic content requirements target U.S. tax dollars for the purchase of American-made products and services, thereby employing U.S. workers and putting federal tax receipts to work here at home.

Currently, “Buy American” requirements are still far too weak.<sup>45</sup> Lawmakers neglect to properly consider the impact of defense procurement policy on America's defense industrial base and the U.S. economy as a whole. Effective legislation is needed to increase U.S. content requirements for government aerospace and defense procurement and eliminates loopholes which undermine these requirements. Strengthening “Buy American” requirements will help ensure tax dollars are used to provide our men and women in uniform with the best possible U.S.-made equipment available, support the U.S. workforce and the U.S. firms who employ them, and solidify the future of the domestic aerospace industry.

Additionally, simply buying “American,” is not enough if we want our tax dollars to support middle-class jobs. Instead, our procurement policy should systematically favor union-made products. Federal contracts should “prioritize workplaces with collective-bargaining agreements,” using the massive scale of federal spending to promote union organizing.<sup>46</sup>

45. Owen Herrstadt, “When will ‘Buy American’ really mean buy American,” Economic Policy Institute

46. *The American Prospect*, “\$15 an Hour for Federal Contractors Is Great. A Union Is Better.” May 2021



## **STRENGTHEN RULES OF ORIGIN**

To make the nation's trade agreements work here, the aerospace product rules of origin provisions in these agreements must be strengthened. Rules of origin determine the percentage of a product and its components which must be sourced from inside the U.S. (and Canada) to enter the United States duty free. Stronger rules of origin will incentivize the sourcing of aerospace goods and materials from the United States (and Canada). Closing loopholes, often used to undermine the rules of origin and reduce domestic content, is a priority. Strengthening these rules will level the playing field and reduce the impact of low-road companies using low-wage workers overseas to undercut domestic production.

## **OFFSETS = TECH TRANSFER**

Before granting U.S. aerospace companies access to foreign markets, a growing number of trading partners insist the company produce a portion of the product in their country.

These arrangements, called "offsets," are detrimental to national industry for several reasons. First, they reduce jobs and economic activity in the U.S. as a portion of the production is moved overseas. Second, these offsets allow for the free transfer of technology and manufacturing processes to our trading partners. Aerospace technology and know-how is the main reason the U.S. has a distinct advantage over all other nations in the aerospace industry. The U.S. should aim to protect that advantage, not give it away for free in the name of short-sighted profit. Legislative and regulatory solutions must protect this technological advantage before it is too late.

## **STRENGTHEN A FULLY FUNCTIONING EX-IM BANK**

The Export-Import Bank (Ex-Im Bank) is one of the few U.S. institutions that supports U.S. exports and jobs. It provides vital loan guarantees for the sale of U.S. goods and services to international markets.

American aerospace jobs depend upon a fully functioning Ex-Im Bank to provide vital financing for the export of U.S.-made products. International competitors support their companies through comprehensive industrial policies and robust export financing agencies. China has three export credit agencies that dwarf what the U.S. Ex-Im Bank provides. To keep pace with these competitors, it is imperative the U.S. supports the Ex-Im bank; allows the bank to expand

its portfolio of projects, increase U.S. exports, create additional U.S. jobs, and drive economic growth.

## **INTERSTATE COMPETITION—DOMESTIC OFFSHORING**

In recent years, it has become increasingly common for companies to pit workers against workers by threatening to close longstanding worksites and move production to other parts of the country in search of cheaper labor and more generous tax incentives. Plant closures are extremely inefficient and wreak havoc on workers, families, and communities. The quality of jobs usually suffers as unionized workplaces are shuttered and reopened at lower pay rates and without similar health or retirement benefits in anti-union states, a type of "domestic offshoring." They are also extremely detrimental to state and local budgets, as tax revenues decrease and public safety nets are stretched to the brink. To alleviate this problem, we must end the zero-sum game of so-called "economic development" subsidies that pit states against one another to attract the latest corporate headquarters or manufacturing plant. States stealing jobs from each other and disrupting communities does not help the national economy. Instead, it leads to a corporate race to the bottom as businesses make inflated promises about future job creation in an attempt to fleece the best deal out of often struggling, deindustrialized municipal and state governments.

## **ADDITIONAL FUNDING FOR FAA INSPECTORS**

It is imperative the federal budget has adequate funding for the FAA. Deep cuts in funding and the headcount of FAA inspectors have plagued the nation for many years. This has led to lower staffing levels at the FAA and higher reliance on companies to self-regulate the enforcement of FAA requirements in the manufacturing process, using Organization Designation Authorization (ODA's).

The FAA must have the proper resources and funding to ensure aircraft are certified and delivered to customers without any delay due to limited FAA inspectors. If FAA staffing is too low, it could severely hamper the manufacturing process.

IAMAW is asking for additional funding and/or investments in FAA staff to include:

- training and workforce development
- additional FAA inspectors
- rebalancing of ODA's to ensure proper FAA oversight

## **SAFE AIRCRAFT MAINTENANCE STANDARDS**

In the U.S., Federal Aviation Administration (FAA) employees must undergo rigorous screenings. Employees train for months or even years before inspecting and repairing aircraft. This is not true for foreign repair stations.

To ensure equally high standards when airline maintenance is outsourced to other countries, legislation is needed to close the significant regulatory loopholes that could lead to casualties from an aircraft inadequately inspected or repaired.

## **FUNDING FOR REGISTERED APPRENTICESHIPS & SKILL ENHANCEMENTS**

The aerospace industry maintains a highly skilled workforce. Training and registered apprenticeship programs are essential to fill the skill gap left from retiring workers and technological advances. Private industry, labor unions and universities must ensure federal funding is available for training and apprenticeship programs for aerospace. In this way, the skill gap will narrow and one of America's greatest workforces will grow stronger.

A well-trained, highly skilled workforce is pivotal to the success of the U.S. Aerospace Industry. Unfortunately, industry experts forecast an ongoing and increasing shortage of skilled workers. This includes some vital posts such as airframe and power plant mechanics; the Aeronautical Repair Station Association predicts a 10 percent shortage of workers by 2028.

Training and registered apprenticeship programs are essential to fill the skill gap left from retiring workers and technological advances. Funding for registered apprenticeship should be directed to joint labor/management/academia consortia.

Federal funding should be directed toward the Department of Labor's registered training and registered apprenticeship programs. These programs teach a wide array of skills and abilities, useful immediately in the workplace. Often, companies offer training under the guise of 'apprenticeship programs.' These are not bona fide apprenticeship programs, but merely short-term job training programs intended to give an individual just enough skill to do one particular job. Fortunately, many labor unions, in conjunction with the Department of Labor, developed a model for registered apprentice-

ship programs, leaving the worker with a full set of skills to benefit the industry into the future.

Additionally, IAMAW supports legislation to shape government contracting in the Service Contract Act and Walsh Healy sphere, to include provisions mandating a certain level of worker training and registered apprenticeships for all eligible contracts. This legislation preferably will include a mandated commitment to on-the-job training and registered apprenticeship opportunities, calculated as a percentage of the employer's overall workforce under the government contract.

Expanding funding for registered apprenticeships and training programs, and ensuring labor unions and other worker advocates are at the table, will help close the skill gap and strengthen one of America's greatest workforces.

## **FAA'S AVIATION SAFETY ACTION PROGRAM (ASAP)**

It is in manufacturers' best interest to enter into the tri-party FAA's Aviation Safety Action Program (ASAP) with the IAMAW.

ASAP works to enhance aviation safety through the prevention of accidents and incidents. It encourages voluntary reporting of safety issues and other events that come to the attention of employees and internal watchdogs.

Boeing and Alaska Airlines are in ASAP programs with the IAMAW and the FAA.

IAMAW is pushing for an ASAP with all manufacturers that would:

- Protect the flying public by allowing members and all employees to bring safety issues directly to the FAA.
- Give the FAA more oversight into manufacturers' activities.
- Protect manufacturers from fines if they self-report.
- Protect manufacturers from Freedom of Information Act (FOIA) requests so issues brought to the FAA are not reported in the media.



## CONCLUSIONS

The U.S. aerospace industry is the largest in the world. Its workforce is skilled and educated, and drives innovation forward. Aerospace research subsidizes innovation across industries, brings about new forms of production, creates massive manufacturing hubs and supports regional economies. It powers the economy of swathes of the country with good jobs in places like Washington state.

The commercial, defense, and space industries are a national achievement. The benefits of the aerospace spans many other industries, including communications, defense, technology, travel and tourism, playing a critical role in the domestic economy. In 2019 before the pandemic, the aerospace industry shored up our trade deficit by exporting more than \$148 billion and employed directly and indirectly more than 2.19 million workers.

Funding of aerospace Research and Development (R&D) is vitally important to the long term health of the industry. The U.S. role as world leader in R&D will evaporate if funding is not supported, along with the many valuable ancillary benefits of aerospace and defense research.

Registered apprenticeships and training are central to this report for good reason. A highly

skilled workforce is essential to the nation's economy and security. Failure to address the defining workforce challenge in aerospace—the widening skill gap and the shortage of qualified workers will become insurmountable over the next decade. Programs, policies and investments are key.

Another risk facing the industry: shipment of jobs and technology overseas through unregulated offsets and weak “Buy American” provisions. The American manufacturing industry has suffered greatly over the last half-century.<sup>47</sup> The aerospace industry is one of the last manufacturing industries to outperform competitors. Legislative and regulatory solutions must protect this advantage before it is too late.

Looking ahead, how people move, communicate and work will change over the next few decades. In 30 years, or sooner, expanded freight and cargo planes, national security concerns, accelerated travel and cutting-edge space exploration await.<sup>48</sup> The American aerospace industry will remain at the center of it all.

Together, all the issues facing the industry can be overcome, allowing it to thrive well into the future.

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# APPENDIX 1

## Registered Trades

1. Airframe Mechanic
2. Airframe and Power Plant Mechanic
3. Auto Body & Fender Repairer
4. Auto Painter
5. Automobile Machinist
6. Automobile Mechanic
7. Automotive Master Mechanic
8. Avionics Technician
9. Body Repair Mechanic
10. Braze Mill Operator
11. Cellular Manufacturing Machinist
12. Composite and Plastics Fabricator
13. Composite Manufacturing Machinist
14. Crane Operator
15. Diesel Locomotive Technician
16. Diesel Mechanic Machinist
17. Diesel Technician
18. Electrical Equipment Repairer Journeyman
19. Electrician
20. Electronic Mechanic
21. Fabric Worker
22. Heavy Duty Mechanic
23. Heavy Duty Truck Mechanic
24. Heavy Equipment Mechanic
25. Industrial Electronic Maintenance Technician
26. Industrial Equipment Mechanic
27. Industrial Manufacturing Technician
28. Industrial Pipe Fitter
29. Inside Machinists
30. Instrument Technician
31. Instrumentation
32. Insulator
33. Journeyman Machinist
34. Journeyman Technician
35. Locomotive Machinist
36. Machine Repair Maintenance
37. Machine Trades
38. Machinist
39. Machinist/Foreman
40. Maintenance Electrician
41. Maintenance Machinist
42. Maintenance Mechanic
43. Maintenance Technician
44. Manufacturing Machinist
45. Marine Machinery Mechanic
46. Master Machinist
47. Mechanical Machinist
48. Model Maker
49. NC Spar Mill Operator
50. Non Destructive Testing Inspector
51. Painter
52. Patternmaker
53. Pipefitter
54. Precision Machine Tool Mechanic
55. Precision Maintenance Mechanic
56. Production Machinery Mechanic
57. Railway Machinist
58. Refrigeration Mechanic
59. Senior Parts Technician
60. Service Advisor
61. Sheet Metal Experimental Mechanic
62. Shipfitter
63. Shipwright
64. Tool & Die maker
65. Truck Mechanic
66. Truck Trailer Mechanic
67. Turbine Maintenance Machinist
68. Weld Mill Operator
69. Welder

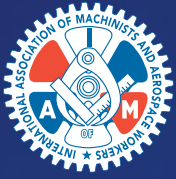
## APPENDIX II

State	Total Exports Value (\$US)	Total Employment
California	\$8,702,023,917	117,108
Washington	\$41,965,568,324	92,124
Texas	\$9,630,743,254	78,854
Florida	\$7,408,225,610	53,396
Arizona	\$3,320,283,452	36,503
Kansas	\$2,389,278,060	32,878
Connecticut*	\$7,443,531,138	31,764
Georgia*	\$7,976,419,134	30,199
Ohio	\$5,568,342,941	25,844
Missouri	\$998,929,514	20,133
New York	\$1,832,585,441	19,580
Oklahoma	\$785,477,815	17,389
Alabama	\$2,380,514,004	16,073
Pennsylvania	\$1,145,476,190	15,913
Massachusetts*	\$832,679,667	14,326
North Carolina*	\$2,962,244,704	13,303
Colorado	\$279,277,363	12,835
Virginia	\$1,088,748,861	11,697
Illinois	\$1,238,516,588	10,994
Indiana	\$2,065,368,164	9,988
Michigan*	\$1,155,152,566	9,966
Utah	\$428,839,081	9,493
South Carolina	\$7,950,122,711	9,320
New Jersey	\$1,334,112,508	7,677
Kentucky	\$12,557,947,073	7,397
Maryland	\$1,488,618,320	6,156

State	Total Exports Value (\$US)	Total Employment
Nevada*	\$184,469,848	6,139
Oregon	\$759,133,750	5,908
Tennessee*	\$1,464,792,334	5,702
Arkansas	\$1,432,670,329	4,295
Minnesota	\$486,734,816	3,513
Wisconsin	\$739,993,808	3,440
Louisiana*	\$234,153,631	3,290
West Virginia*	\$244,802,759	3,049
New Mexico	\$130,756,954	2,954
Nebraska*	\$58,147,605	2,924
Mississippi	\$110,196,490	2,612
Hawaii	\$49,608,970	2,467
Puerto Rico*	\$47,803,179	2,049
New Hampshire*	\$915,422,387	1,788
Alaska	\$60,176,859	1,667
Vermont*	\$59,064,941	1,538
Idaho	\$49,048,141	1,331
Delaware	\$84,467,638	1,202
Iowa	\$321,220,268	1,046
Montana*	\$37,516,761	1,033
Maine*	\$256,958,761	723
North Dakota*	\$19,699,868	663
South Dakota	\$4,271,470	409
Rhode Island*	\$12,828,334	379
Wyoming	\$2,517,462	187
District of Columbia	\$729,930,764	54

\* Employment values are absent of non-disclosable data  
Source: U.S. Census Bureau and Bureau of Labor Statistics





**INTERNATIONAL ASSOCIATION OF  
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