



Aerospace and Defense: Second to None

*Aerospace and defense is a powerful economic engine. It is **Second to None**.*

As the U.S. economy continues to move through uncertain times and the nation grapples with a growing debt, America's aerospace industry remains a powerful, reliable engine of employment, innovation and export income. Aerospace contributed \$77.5 billion in export sales to America's economy last year.¹ Conservatively, U.S. aerospace sales alone account for three to five percent of our country's gross domestic product, and every aerospace dollar yields an extra \$1.50 to \$3 in further economic activity.² Aerospace products and services are the bedrock of our nation's security and competitiveness.

We strongly believe that keeping this economic workhorse on track is in America's best interest. To accomplish this, government policies must support robust funding of defense priorities, research and development, a 21st century air traffic control system, a level playing field abroad and a robust industrial base. Additionally policies that promote science, technology engineering and mathematics (STEM) will help reenergize an aging aerospace workforce with an infusion of younger employees.

This paper explains what's at stake and how to ensure that the economic and national security benefits of our industry are bolstered and broadened. It's particularly important this year. With sixty percent of aerospace sales dependent on federal contracts, ill-considered budget cuts could jeopardize our national security, civil and space transportation infrastructure and economy.

A High-Skilled People Business

The aerospace and defense industry directly employs approximately 800,000 Americans, located in every state of the union — and supports more than two million jobs in related fields.³ Our people bring a diverse set of skills and capabilities to their jobs: engineers on the cutting edge of advanced materials, structures and information

¹ U.S. Department of Commerce.

² Aerospace Industries Association estimate.

³ U.S. Bureau of Labor Statistics, *Quarterly Census of Employees and Wages*, 2009 annual edition.

technology; machinists fabricating complex shapes and structures; and technicians from almost every degree field, testing, applying and integrating the latest technologies. Most of these positions are high-skill, quality jobs, paying above average wages. Production workers average \$34.11 an hour;⁴ entry-level engineers average more than \$50,000⁵ a year, with more senior engineers well into six figures.

Many of these jobs are unique and require skills that take time to develop. It takes 10 years for a degreed aerospace engineer to master the intricacies of aerospace vehicle design. Technicians skilled in applying stealth coatings, programmers fluent in satellite-control algorithms, metallurgists expert in high-temperature jet engine design — these skills and many more are very hard to replace.

Because many of our programs involve national security, America's aerospace and defense industry must rely on home-grown talent. Of the positions open in the industry in 2008, 66.5 percent required U.S. citizenship.⁶ These jobs can't be sent overseas.

However, the American workforce is in trouble. Recent student assessments show that American youth ranked 21st out of 30 in science literacy and 25th out of 30 in math literacy. Developing the science, technology, engineering and math — the so-called STEM skillset — is a priority for our industry. And, because the stakes are so high — the average aerospace worker is 45 years old — the aerospace and defense industry has been a leader in investing in STEM. We're increasingly working with educators at federal, state and local levels in many ways — adopting schools, sponsoring competitions, providing internships and scholarships and other measures. The challenges extend beyond attracting young people to our industry. We need to better incorporate flexible work styles into our workplace to reduce the voluntary attrition rate of young professionals and increase the representation of women and minorities among our numbers.

A Good Trade

Government policies that advance free and fair trade in global markets are vital to our industry and our country. Aerospace brings in the largest foreign trade surplus of any manufacturing sector — that is American economic growth funded by demand for U.S. aerospace products.⁷ The industry's \$51 billion surplus in 2010 came from exporting 50 percent of all aerospace production and 74 percent of civil aircraft and component production.⁸ Aerospace exports of \$77.5 billion accounted for 6 percent of total U.S. exports and supported 50 percent, or 324,033, of U.S. aerospace jobs. From the smallest supplier to the largest prime, U.S. aerospace manufacturers are world leaders in the global marketplace.

⁴ Bureau of Labor Statistics, June 2010.

⁵ National Association of Colleges and Employers, July 2009.

⁶ Aviation Week 2009 Workforce Study.

⁷ U.S. Department of Commerce.

⁸ U.S. Department of Commerce.

Preserving and enhancing our ability to export is an administration priority. President Obama announced the establishment of the National Export Initiative in 2010 that commits the government to “doubling exports over the next five years by working to remove trade barriers abroad, by helping firms — especially small businesses — overcome the hurdles to entering new export markets, by assisting with financing and in general by pursuing a government-wide approach to export advocacy abroad.” The National Export Initiative is guided in part by the President’s Export Council chaired by Boeing Chief Executive Officer James McNerney. The National Export Initiative is an important step forward for our industry in particular and our nation as a whole as we commit to taking the right steps to become an even more competitive exporting country.

We are also encouraged by steps to modernize our export control system to make it more efficient, transparent and predictable. The Obama administration has formed an interagency review team to undertake a comprehensive review of the export control system. AIA supports the rationalization of the technology control lists, as well as a program licensing regime that dramatically reduces the number of licenses required for U.S. government defense and security programs. This in conjunction with the implementation of the U.S.–UK and Australian Defense Trade Treaties are important steps to enhancing our national security while promoting our economic competitiveness through exports.

Securing the Nation

The beginning of a new decade presents the defense industry with challenges that aren’t new, but are becoming more urgent. Developing a national strategy to ensure a robust industrial base and modernizing our military hardware must become front-burner priorities.

The health of the industrial base is at the heart of our ability to supply our nation with the weapons systems it requires. As the Aerospace Industries Association wrote in a landmark study on the industrial base in 2009: “Military technologies used to be much more closely related to civilian technologies. They even used common production processes. But because DOD is today the sole customer for industry’s most advanced capabilities, the defense industrial base is increasingly specialized and separate from the general manufacturing and technology sectors. That means even a healthy general economy will not necessarily help underwrite the industrial capabilities DOD most needs.”

A huge step forward was made in 2010 when the industrial base was included in the Quadrennial Defense Review as a factor to be considered in its long-term planning. We’re optimistic that the next step — inclusion of industrial base considerations in program plans and policy — will be executed as directed by the QDR — ensuring that it becomes incorporated into long-range defense plans.

However, we remain concerned about the fragility of the supplier base. With another round of acquisitions and consolidations imminent along with a projected decline in defense spending, the supplier base remains particularly vulnerable. These small businesses are critical to the primes and to the government. They face multiple challenges overcoming barriers to federal contracting and once they leave the contracting base, they and their unique skills cannot be recovered.

Along with our concern about the industrial base is the long-term issue of modernizing our military hardware. The 1980s defense build-up is now 25 years old, and systems acquired then are in need of replacement. The decade of 2010-2019 is the crucial time to reset, recapitalize and modernize our military forces. Not only are many of our systems reaching the end of their designed lives, but America's military forces are using their equipment at many times the programmed rates in the harsh conditions of combat, wearing out equipment prematurely. Delaying modernization will make it even harder to identify and effectively address global threats in the future.

The Aerospace Industries Association released a report in May 2011 that takes a historical look at spending in the investment accounts and the ebb and flow of spending since the 1970s. It concludes that our nation and its military members pay a large price when we decrease spending on procurement and research and development. The report, [*Defense Investment: Finding the Right Balance*](#), also recommends 35 percent of the budget be devoted to modernization as a prudent and affordable level for supporting the force of today and the future.

The requirements identified in the 2010 QDR — for the United States to overmatch potential adversaries and to execute long-duration campaigns in coming years against increasingly capable potential opponents — will require complex and expensive aerospace capabilities. This is a concern that the Defense Department recognizes.

Since the end of the Cold War, the Pentagon has reduced the number of weapons systems it has bought and there are fewer new-start programs further and further apart. In 2010, for the first time in 100 years, the United States had no manned military aircraft in design. Forty-nine military aircraft programs were underway in the 1950s, seven in the 1980s, and three in the 1990s. Today, looking beyond the F-35, there are none—with the possible exception of a long-range bomber that is not yet approved for development.

Defense modernization is not optional. While the fiscal 2012 budget request is a reasonable target that takes into account funding needed to fight two wars, the pressure on the procurement and research and development budget is sure to increase in the future.

At the same time, America must adapt its defenses to new kinds of threats. A large-scale attack on information networks could pose a serious economic threat, impeding or preventing commerce conducted electronically. This would affect not only

ATM transactions, but commercial and governmental fund transfers and the just-in-time orders on which the manufacturing sector depends. It could even pose threats to American lives, interrupting the transfer of medical data, disrupting power grids, even disabling emergency communications links. In partnership with the government, our industry is on the forefront of securing these networks and combating cyber attack.

The American people also demand better security for the U.S. homeland, from gaining control of our borders to more effective law enforcement and disaster response. The aerospace industry provides the tools that help different forces and jurisdictions communicate with each other; monitor critical facilities and unpatrolled borders, and give advance warning of natural disasters, among other capabilities. In many cases, government is the only market for these technologies. Therefore, sound government policy is essential not only to maintain current capabilities, but to ensure that a technology and manufacturing base exists to develop new ones.

Civil Aviation: Transforming the Future of Flying

Civil aviation is an economic engine directly and indirectly contributing more than \$1.3 trillion — or 5.6 percent of gross domestic product — to the U.S. economy. It supports nearly 11 million jobs with a payroll of \$369 billion.⁹ Civil aviation contributes positively to the U.S. trade balance, creates high paying jobs, keeps just-in-time business models viable and connects all Americans to friends, family and business opportunities.

All of that economic activity passes through the nation's air traffic system. As long as the system can accommodate the rising demand for air travel and just-in-time express delivery, the growth of jobs and economic activity associated with civil aviation will continue. Our current system is safe, but antiquated and highly inefficient. We need to replace our 1960s-era air traffic control technology with a much more accurate and efficient 21st century satellite-based Next Generation Air Transportation System (NextGen).

NextGen is essential to helping airlines return to profitability. It is critical for reducing fuel consumption and airplane emissions. Without NextGen, our national airspace will remain cluttered and inefficient and undermine the economic benefits of America's commercial aviation industry.

Excluding the costs of delays due to system inefficiency, failure to institute NextGen could cost the U.S. about \$35 billion in annual economic loss by 2014 and as much as \$52 billion in annual economic loss by 2024 — and that's only in unmet demand and lost productivity. Businesses related to or dependent on aviation risk losing as many as two million jobs every five years if the nation doesn't implement NextGen.

⁹ The Economic Impact of Civil Aviation on the U.S. Economy, FAA, Dec. 2009.

The entire U.S. fleet of civil aircraft can be NextGen equipped in less than three years for less funding than has been committed to surface transportation infrastructure projects. Experts say with an equipped fleet and a commitment to accelerate supporting ground infrastructure, NextGen could be in place in five to eight years instead of 10 to 15.

Full NextGen deployment requires the production and installation of hundreds of thousands of high-tech avionic products assembled by skilled workers in U.S. factories and maintenance stations in every state. Without these products, our National Airspace System cannot upgrade to satellite-based navigation and will lag behind systems in other countries.

Building and deploying NextGen equipment, procedures and infrastructure could create approximately 153,600 jobs.¹⁰ A viable aviation sector enhances economic activity in a wide number of industries outside aviation, including travel, tourism and industries that rely on just-in-time global inventories and shipping capability.

Implications on the trade front are also important. Our strong competitive position in aerospace is being challenged by the European Union, Australia, Canada and other countries. China and India, which will witness the greatest growth in aviation travel for years to come, will look to either the United States or Europe for leadership as they develop their respective air traffic control systems. If the United States does not promptly deploy these technologies, opportunities for U.S. manufacturers and workers could be lost.

Greening of Aerospace

The aerospace industry knows it has an obligation to grow responsibly and it understands that environmentally sustainable growth is not only good for the planet, but also good for the economic health of the industry and the nation. Aviation is working diligently to develop better aircraft, technology and operating procedures to conserve fuel and reduce emissions.

NextGen is a key enabler of environmental stewardship. Delays in today's air traffic control system result in millions of gallons of fuel wasted annually — more than 4.3 million hours of delays in 2007¹¹ consumed an additional 740 million gallons of jet fuel, costing carriers more than \$1.6 billion.¹² The delays produced approximately 7.1 million metric tons of carbon dioxide.

NextGen operational procedures and implementing technology can help reduce emissions by enhancing engine and airframe technologies. NextGen will build on

¹⁰ Aerospace Industries Association estimate.

¹¹ Based on actual flight times, (57% more than reported by carriers using scheduled block times; *Your Flight Has Been Delayed Again*, p.3.

¹² 2007 average wholesale price of \$2.17 per gallon, *Your Flight Has Been Delayed Again*, p. 4.

aviation's progress in reducing CO₂, which is particularly challenging given projected traffic growth and global concern about aviation's effect on the environment.

Innovative engine design, airframes, avionics and materials together have resulted in 90 percent fewer Americans exposed to significant aircraft noise and a 70 percent improvement in civil aviation fuel efficiency since the late 1960s. Innovation is driven by necessity, as fuel costs are the largest single expenditure for the airlines. Moreover, the industry is leading the way in research on sustainable alternative fuels. Besides the positive impact on the bottom line, there are obvious positive environmental impacts from these efforts.

Space Technology is an Investment in U.S. Global Leadership, Competitiveness and Innovation

Space systems drive our nation's competitiveness, economic growth and innovation. U.S. soldiers in the mountains of Afghanistan, farmers, bankers and emergency responders here at home all have a common reliance on a space infrastructure in orbit above the Earth. Everyday activities, taken for granted by many Americans, are supported or even driven by space systems. These systems are hidden to us and rarely noticed unless the services they provide are interrupted. However, the lack of visibility of space systems doesn't diminish their importance — both our nation's economy and national security are tied directly to this critical infrastructure.

Communications drive today's commerce, and space systems are a chief global conduit of our nation's commercial and national security communications. The Internet, e-mail and wireless devices have all become the standard for businesses and recreation. Direct-to-home television and satellite radio have become standard in many American homes and automobiles. These all depend on our satellite communications systems. Similarly, the Global Positioning System, originally designed for military use, is now relied on for banking transactions, ATMs, improved agriculture, air traffic and ground transportation systems and by emergency responders.

All of these applications add up to substantial economic activity. Of \$214 billion in aerospace industry sales in 2009, direct space system industry sales topped \$40 billion.¹³ Total direct and indirect global space activity for 2008 was \$257 billion.¹⁴ Even harder to quantify — but no less valuable — is the impact that technology spin-offs from space activities bring to our economy. In 2009 alone, NASA entered into more than 250 agreements with private and other external entities for development of dual-use technologies.¹⁵

Space is certainly becoming more contested, congested and competitive. More than 60 nations are engaged in space efforts and tens of thousands of man-made objects

¹⁴ AIA figures based on The Budget of the United States Government for the Fiscal Year 2008 and data from NASA.

¹⁴ The Space Foundation, *The Space Report 2009*.

¹⁵ The Space Foundation.

orbit the Earth. In January 2007, the Chinese used a ballistic missile to destroy an aging weather satellite. This anti-satellite test demonstrated the very real ability of a foreign power to attack and destroy space assets and resulted in a dangerous debris cloud. In addition, the February 2009 collision of a commercial U.S. satellite and Russian satellite showed that space systems not only face disruption from intentional attack, but are also at risk from unintentional events in an increasingly crowded environment.

Using systems developed by America's aerospace industry, the Defense Department currently tracks more than 21,000 man-made objects in the Earth's orbit — many of which could threaten civil and national security space systems, as well as our nation's efforts to increase the commercial use of space.¹⁶ In such an environment, investments in rapid reconstitution, sensors, tracking, threat assessment and other space protection and situational awareness capabilities are needed to mitigate the impacts of an unexpected catastrophic space system failure. The cost and difficulty involved in developing and deploying space systems as well as the severe consequences of their loss necessitates that our nation's space infrastructure be adequately protected.

Part of ensuring robust space capabilities means that America must routinely replace and update its space infrastructure. It is highly problematic — if not infeasible — to perform maintenance or even refuel them. Space systems have limited life spans and, at today's pace of technology, can quickly become obsolete. Critical space systems that provide missile warning, global communications, positioning, navigation and timing and weather are in need of upgrade at a time when other nations are rapidly modernizing their own space infrastructure.

The United States must remain a leader in human and robotic space — a position that is perishable if not properly supported. Research aboard the International Space Station and human and robotic exploration beyond low Earth orbit must remain national priorities. These activities demonstrate global leadership, sharpen our expertise for future long-range space travel, add to our scientific knowledge and inspire our youth to pursue engineering and science disciplines.

Space systems often go unnoticed in our daily lives, but their impact is very real. It is imperative that we as a nation have the right plans, strategies and budgets in place to keep our space industry competitive and our space systems, and their supporting Earth-based infrastructure, operating when we need them. It is increasingly important that the United States develop and maintain a cohesive national approach to our efforts in space — one that crosses civil agencies, the Defense Department and the intelligence community.

Business Practices Underpin our Technology and Competitiveness

The United States has always relied on technology as a competitiveness multiplier. However, there must be a business environment that supports innovation

¹⁶ U.S. Strategic Command: www.stratcom.mil/posture.

underlying that superior technology. Without this environment, we will lag in the global marketplace no matter how advanced our products.

Adopting a tax code that adheres to the principles of efficiency, innovation, competitiveness and simplicity will pay dividends across the board. U.S. companies will have more business, there will be more jobs for Americans and the nation will experience more economic growth. Congressional action on repealing the three percent withholding tax, making the research and development tax credit permanent and lowering corporate tax rates are all an excellent first step forward.

Supplying the systems and services that support America's men and women in uniform is one of the most important functions of the aerospace and defense industry. The defense acquisition system — when properly used — is a powerful tool for ensuring that systems, supplies and services are provided at fair and reasonable prices in compliance with the cost, schedule and technical parameters of government contracts.

The ability of the defense acquisition process to produce the best military equipment at the best value for taxpayers is dependent on several important factors — a strong industrial base, a rational and flexible acquisition process, well-defined requirements, budget realism, stable procurement plans, a well-trained and experienced acquisition workforce and support from Congress. All are interdependent and all operate in a dynamic environment that faces continuing challenges.

When President Obama and his team came in to office, one of the first areas of emphasis for the new administration was acquisition reform.. Over the last several years, the government has proposed a number of rules to reduce fraud, waste and abuse in government contracting. We support this objective, but are committed to achieving a streamlined and efficient acquisition process that does not impose unnecessary administrative burdens on contractors or government contracting officers. We need the kinds of reforms that promote competitiveness and efficiency in the aerospace and defense industry while providing reasonable returns for good performance.

Second to None

Every dollar invested in the aerospace industry has a triple effect. It helps retain good jobs in the United States; creates the products that bring significant revenues from other countries and provides security and economic benefits that flow uniquely from America's civil aviation, defense and space defense leadership. The aerospace and defense industry takes great pride in contributing to our nation's success, and, with the appropriate policies and resources will remain a source of economic strength for generations to come. After all, this industry in Second to None.