

AIR WAR COLLEGE

AIR UNIVERSITY

IS THE UNITED STATES AIR FORCE  
RESPONSIBLE FOR PRESERVING  
THE US AEROSPACE INDUSTRIAL BASE?

by

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## **Biography**

Lt Col Christopher Kinne was commissioned through the Reserve Officer Training Corps, University of Virginia, in 1988. He has served in a variety of acquisition corps assignments, including munitions development, directed energy development, electronic systems development, and aircraft sustainment. He has served on the staff of the Assistant Secretary of the Air Force (Acquisition) and has commanded two squadrons—the 631<sup>st</sup> Electronic Systems Squadron at Hanscom AFB MA and the 546<sup>th</sup> Aircraft Sustainment Squadron at Tinker AFB OK. He earned a Bachelor of Science degree in systems engineering from the University of Virginia and a Master's of Engineering degree in industrial and systems engineering from the University of Florida. He is a 2002 graduate of the Air Command and Staff College at Maxwell AFB AL.

## Introduction

The United States Air Force (USAF) should not attempt to proactively manage the US aerospace industrial base for the purpose of preserving a domestic development and manufacturing capability to produce future generations of US military aircraft weapon systems. It is the mission of the USAF to *fly, fight, and win in air, space, and cyberspace*.<sup>1</sup> It is not the mission of the USAF to sustain the US aerospace industry. Preservation of the US aerospace industry is a national policy issue that should be addressed by the president of the United States in partnership with the US Congress. They are the only entities that can appropriately balance the military needs of the Department of Defense (DoD) and the USAF against the other competing requirements within the United States.

The current USAF mission—and those that preceded it—are often interpreted by Airmen as implying that aircraft and their associated weapon systems are fundamentally required. This perception by Airmen reflects a culture of aeronautical innovation that has its roots in the earliest days of the Army Air Corps and the infancy of the USAF. (Then) Major Dik Daso observed, in his 1997 work *Architects of American Air Supremacy: General Hap Arnold and Dr. Theodore von Karman*, “both Arnold and Karman developed a similar vision for military aviation: the United States needed a cooperative aeronautics establishment which coupled civilian scientific and industrial expertise with the practical needs of the Army Air Corps.”<sup>2</sup> Dr. von Karman articulated this vision in his December 1945 report to General Arnold entitled *Toward New Horizons*, which was the first report of the then newly formed Army Air Force Scientific Advisory Group. In his cover letter to General Arnold, Dr. von Karman says, “The men in charge of the future Air Forces should always remember that problems never have final or universal

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<sup>1</sup> Donley and Schwartz, *Mission Statement and Priorities*.

<sup>2</sup> Daso, *Architects of American Air Supremacy*, 48.

solutions, and only a constant inquisitive attitude toward science and a ceaseless and swift adaptation to new developments can maintain the security of this nation through world air supremacy.”<sup>3</sup>

The technological push of the USAF served it well throughout the Cold War. The service successfully developed and operated many weapon systems, including advanced aircraft that were designed, tested, and manufactured in the United States. However, in 2009, the USAF is faced with the challenge of continuing to pursue technology advances within the limitation of reduced budget authority and increasing unit costs for each new weapon system. In addition, a myriad of laws, policies, and procedures have evolved to control and regulate the efforts that lead to the fielding of new weapon systems. The defense segment of the US aerospace industry is caught in the middle and has suffered as a result.

The US aerospace industrial base has changed dramatically since the end of the Cold War and the military procurement boom of the 1980s. As Pierre Chao, an analyst with the Center for Strategic and International Studies observes, “the 1990s were the perfect storm of events, which led to defense industry consolidation (70 industry firms became 5 between 1984 and 2004).”<sup>4</sup> While the US defense industry was consolidating, the global marketplace was expanding and aerospace emerged as a major point of international economic competition between the United States and its largest market competitor, the European Union (EU). The fact that “Washington and Brussels currently are working to resolve a number of issues, including a dispute between

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<sup>3</sup> See Dr. Theodore Von Karman’s memorandum to General Hap Arnold, 15 December 1945. This memorandum and the associated report are included as appendix C in Major Dik A. Daso’s, *Architects of American Air Supremacy: General Hap Arnold and Dr. Theodore von Karman*. Maxwell AFB Alabama: Air University Press, 1997.

<sup>4</sup> Chao, “Structure and Dynamics of the Defense Industry,” (see charts 15 and 16).

the aerospace manufacturers, Airbus and Boeing,”<sup>5</sup> demonstrates the importance of the issue to both the United States and the European Union. “The transatlantic economy dominates the world economy by its sheer size and prosperity. The combined population of the United States and EU now approaches 800 million people who generate a combined gross domestic product (GDP) of \$26.8 trillion (\$13.6 trillion in the EU and \$13.2 trillion in the US). This sum was equivalent to 56% of world production or GDP in 2006.”<sup>6</sup>

The commercial market place moves on. It does not wait for defense funding if it is not forthcoming. The surviving aircraft companies now look for opportunities to share costs and manage opportunities within the worldwide economy. For example, Boeing has greatly expanded its use of non-US subcontractors and nontraditional funding. “A Japanese group will provide approximately 35% of the funding for the B-787 design project (\$1.6 billion). In return this group will produce a large portion of the aircraft’s structure and the wings (this will be the first time that a Boeing commercial product will use a non-US built wing). Alenia of Italy is expected to provide \$600 million and produce the rear fuselage of the aircraft.”<sup>7</sup>

But where does the aerospace defense industry go? The USAF had very few aircraft in development and production in 2008 and the manufacturing lines are dwindling—a situation that seems out of place for a nation that had a robust aerospace industry throughout much of the 20<sup>th</sup> century. In this research paper, I examine the perceived relationship between the DoD, the USAF, and the US aerospace industry; and, I answer the question “should the USAF be involved in preserving the US aerospace industrial base?” In answering “no,” I assert the future of the US aerospace industry is a national issue, not a USAF-unique issue. I also suggest that any action by

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<sup>5</sup> Ahearn et al., *European Union-US Trade and Investment Relations*, 1.

<sup>6</sup> *Ibid.*, 2.

<sup>7</sup> *Ibid.*, 12.



the USAF to proactively preserve the US aerospace industrial base would be contrary to the current strategic direction of the Secretary of Defense and established DoD policy.

## **Background**

There is no shortage of interest in the US aerospace industry. By one recent count, there are more than 400 different US-based websites that represent elements of the US aerospace industry.<sup>8</sup> The scope of these websites range from colleges and universities to national academies, from aerospace workers' associations to airline carriers and airports, and from state and national government agencies to corporate industry. Each individual website serves a group that has a vested interest in the future of the aerospace industry. The purpose of this background section is to present perspectives from five US defense-related constituencies that represent a broad spectrum of ideas, with a particular focus on the issues that are most related to US national security and the question of the USAF's role in preserving the aerospace industry. The five constituencies considered are: the Office of the President of the United States; the United States Congress; the Department of Defense (DoD); the DoD acquisition community; and the US defense and aerospace industry.

### **Perspectives from a Recent Presidential Commission**

Early in his first term, President George W. Bush established a bipartisan presidential commission to examine the future of the US aerospace industry.<sup>9</sup> To ensure a broad, bipartisan effort, the president only appointed six of the 12-member commission. The other six were appointed by the leadership of the US House of Representatives and the US Senate. The commission was chartered on July 19, 2001, to “study the issues associated with the future of the United States aerospace industry in the global economy, particularly in relationship to United

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<sup>8</sup> See appendix J of the *Final Report of the Commission on the Future of the United States Aerospace Industry*.

<sup>9</sup> President Bush established the presidential commission before the tragic events of September 11, 2001. There does not appear to have been much follow-up. The Commission's final report seems to have been lost in the noise of the Global War on Terrorism, including Operations Enduring Freedom and Iraqi Freedom.

States national security; and *assess the future importance of the domestic aerospace industry for the economic and national security of the United States.*”<sup>10</sup> (emphasis added) The

commission was asked to study a broad spectrum of topics:

- the budget process of the US government;
- the acquisition process of the government;
- the financing and payment of government contracts;
- international trade and the export of technology;
- taxation;
- the national space launch infrastructure;
- science and engineering education.<sup>11</sup>

The commission had a great deal to say about these topics. After months of meetings and discussions covering the broad spectrum of topics, the commission published its final 300-plus-page report in November 2002. The commission report begins with a positive statement about the US aerospace industry and claims in its opening sentences “the role of aerospace in establishing America’s global leadership was incontrovertibly proved in the last century . . . [and] aerospace will be at the core of America’s leadership and strength in the 21st century.”<sup>12</sup> However, the report also includes nine recommendations that address many concerns of the aerospace industry and the panel members themselves. The commission identified with great concern several trends it believes must be corrected to both preserve the US aerospace industry and to improve US national security. Most importantly, the commission observed, “The contributions of aerospace to our global leadership have been so successful that it is assumed US

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<sup>10</sup> Lindsey, *Commission on the Future of the United States Aerospace Industry Charter*.

<sup>11</sup> *Ibid.*

<sup>12</sup> *Final Report of the Commission on the Future of the United States Aerospace Industry*, v.

preeminence in aerospace remains assured. Yet the evidence would indicate this to be far from the case.”<sup>13</sup>

In highlighting its concern about the future preeminence of the US aerospace industry, the commission observed, “The US aerospace industry has consolidated to a handful of players—from what was once over 70 suppliers in 1980 down to 5 prime contractors today. Only one US commercial prime aircraft manufacturer remains. Not all of these surviving companies are in strong business health.”<sup>14</sup> The commission also noted, “New entrants to the industry have dropped precipitously to historical lows . . . [and] the industry is confronted with a graying workforce in science, engineering and manufacturing . . . [and] the US K-12 education system [is failing] to properly equip US students with the math, science, and technological skills needed to advance the US aerospace industry.”<sup>15</sup>

Addressing part of the national security issue, the commission noted “Other countries [specifically in Europe and Asia] that aspire for a great global role are directing intense attention and resources to foster an indigenous aerospace industry. This is in contrast to the attitude present here in the United States. We stand dangerously close to *squandering the advantage* bequeathed to us by prior generations of aerospace leaders. . . . *A healthy aerospace industry is a national imperative*. The administration and the Congress must heed our warning call and act promptly to implement the recommendations in this report.”<sup>16</sup> (emphasis added)

Among the nine recommendations of the commission, one stands out as particularly relevant to the question of the USAF role in preserving the US aerospace industrial base. The commission recommended “the nation adopt a policy that invigorates and sustains the US

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<sup>13</sup> Ibid.

<sup>14</sup> Ibid.

<sup>15</sup> Ibid.

<sup>16</sup> Ibid.

aerospace industrial base.”<sup>17</sup> The panel essentially recommends the US government take a much more direct and overt role in the future of the aerospace industry. The recommendation includes such steps as

- tasking the Defense Science Board to develop a national policy that will invigorate and sustain the US aerospace industrial base;
- continuously developing new experimental systems, with or without a requirement for production;
- maintaining and enhancing critical national infrastructure when it is in the nation’s interest;
- revising procurement policies to include prototyping, spiral development, and other techniques, which allow the continuous exercise of design and production skills.<sup>18</sup>

## **Perspectives from the US Congress**

Members of the US Congress use both the General Accounting Office (GAO) and the Congressional Research Service (CRS) to help themselves understand issues while fulfilling their Constitutional obligations. When issues suddenly become current events, it can be useful to examine the history of the issue—where the issue came from and who cared about it when. As a case in point, the status of the US aerospace industry became an issue during the July 22, 2008 Senate confirmation hearings for the secretary of Air Force and USAF chief of staff nominees. During a line of questioning about the KC-X tanker source selection activity, Secretary of the Air Force nominee Michael Donley asserted “aerospace is an international business.”<sup>19</sup> In response, Senator Hillary Clinton responded, “I’m very well aware that we live in an international

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<sup>17</sup> For a complete discussion of the recommendation, please see chapter 4 of the *Final Report of the Commission on the Future of the United States Aerospace Industry*.

<sup>18</sup> Ibid.

<sup>19</sup> US Senate. *Senate Armed Services Committee Hearing on Air Force Nominations*.

economy, but I'm also extremely conscious of the impact of decisions made by our government with taxpayer dollars that undermine our competitiveness for the long run and eliminate jobs and thereby undermine technical skill acquisition in a way that I think will come back to haunt us. So this is something that I take very seriously.”<sup>20</sup>

Senator Clinton did not reveal the motivation for her expression of concern, but it is likely that her thoughts and opinions had been informed by the GAO and the CRS. In an April 2008 Congressional Research Service report titled *Air Force Air Refueling: The KC-X Aircraft Acquisition Program*, William Knight and Christopher Bolkcom reported that “the commercial aircraft industry, like the personal computer and automobile industries, has globalized, drawing on the relative strengths of specialized suppliers of components and expertise from around the world. As a result, the two primary manufacturers, Boeing and Airbus, have both outsourced key parts of their production processes to overseas firms”<sup>21</sup>

Senator Clinton’s expression of concern was not new or unique. As early as 1993, national security risks related to the US aerospace industry were being identified by the GAO in reports to congressional requestors concerned with the trend of defense industry mergers and acquisitions. In a report titled *Defense Industrial Base: An Overview of an Emerging Issue*, the GAO reported

DoD has taken the position that free market forces generally will guide the restructuring of the defense industrial base. We believe that this is ***not a realistic strategy*** for ensuring that government decisions and industry adjustments will result in the industrial and technological capabilities needed to meet ***future national security requirements***. A key reason for this is that ***defense company officials*** are understandably concerned with maximizing the returns for investors and ***are not specifically accountable for how***

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<sup>20</sup> Ibid.

<sup>21</sup> Knight and Bolkcom. *Air Force Air Refueling*, 25.

*the long-term changes in the defense industrial base affect national security.*<sup>22</sup> (emphasis added)

The same GAO report also states “DoD has not taken a strong proactive role in assessing US reliance on foreign sources and foreign investment relating to the defense industrial base. . . . [and] consequently, DoD generally does not know whether and to what extent it relies on foreign technology and products to meet its critical needs. *Such information is necessary to assess national security risks.*”<sup>23</sup> (emphasis added)

By 1997 the focus of the GAO regarding defense industry consolidation seemed to be evolving from the issue of national security to the risks to competition potentially caused by fewer vendors in the marketplace. In a report titled *Defense Industry: Trends in DoD Spending, Industrial Productivity, and Competition*, the GAO shifted the discussion from a concern about national security and implied that consolidation in the defense industry is an acceptable outcome resulting from a natural cycle of events. The 1997 report states

The business environment for defense industry has also changed over the years. Since the end of World War II the number of aircraft contractors dropped from 26 to 7 in 1994. . . . The size and nature of the defense industrial base is critically shaped by the amount and emphasis of US defense outlays. *Recent debate has centered on the effect of the post-Cold War reduction in defense spending and its effect on the viability of the industrial base.* Although this downward trend in budget outlays and particularly in procurement spending is sizable, *it is one of four times in post-World War II history that the industrial base has had to adjust to changes in national security requirements.* In historical perspective, *defense funding draw downs are not unique.*<sup>24</sup> (emphasis added)

In 1998 GAO did not address national security concerns at all. In a report titled *Defense Industry: Consolidation and Options for Preserving Competition*, the entire discussion had

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<sup>22</sup> GAO Report, *Defense Industrial Base*, 2.

<sup>23</sup> Ibid.

<sup>24</sup> Ibid., 4.

moved to concerns about the potential risk to competition between contractors. For instance, the report states

The sharp decline in spending by DoD since 1985 has resulted in a dramatic consolidation of the defense industry, which is now more concentrated than at any time in more than half a century. As the single customer for many products of the defense industry, DoD must have the ability to identify and address potential harmful effects of mergers and acquisitions. *Questions have been raised about whether the consolidation has gone too far—adversely affecting competition in the industry.* Many defense industry mergers and acquisitions are recent, so there is little evidence that the increased consolidation has adversely affected current DoD programs. Antitrust reviews have identified some problems, and remedies have been implemented. However, *the consolidation could pose future problems unless DoD improves its ability to identify problem areas and devises alternative ways to maintain competition* in defense acquisition programs.<sup>25</sup> (emphasis added)

Clearly, the tone of the GAO reporting suggests the interest in the US Congress trended toward the state of competition in the US aerospace industry. Perhaps the statement from (then) Senator Clinton indicates national security issues are part of the discussion again. If so, the national security issues might be partly addressed by Secretary Clinton in her new role as the US Secretary of State in the Obama administration.

## **Perspectives from the Department of Defense**

### **Secretary of Defense**

Secretary of Defense Robert Gates, who served in the Bush administration and continues to serve in the Obama administration, recently published an article in *Foreign Affairs* outlining his strategy for the DoD and his philosophy and intent for the department. Secretary Gates asserted “The defining principle of the Pentagon’s new National Defense Strategy is *balance*.”<sup>26</sup> (emphasis added) In Secretary Gates’ vision, “balance” means striking equilibrium between the

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<sup>25</sup> GAO Report, *Defense Industry*, 1.

<sup>26</sup> Gates, “A Balanced Strategy: Reprogramming the Pentagon for a New Age.”



urgent need to recapitalize the DoD weapon system inventory and the immediate need to support current conflicts in the global war on terrorism. Secretary Gates proposed “It would be irresponsible not to think about and prepare for the future, and the overwhelming majority of people in the Pentagon, the services, and the defense industry do just that. But we must not be so preoccupied with preparing for future conventional and strategic conflicts that we neglect to provide all the capabilities necessary to fight and win conflicts such as those the United States is in today.”<sup>27</sup>

Secretary Gates recognized that “balance” means some modernization efforts will have to be slowed down or stopped outright. He suggested “that although US predominance in conventional warfare is not unchallenged, it is sustainable for the medium term given current trends . . . [and acknowledged the] current strategy knowingly assumes some additional risk . . . [that] is prudent and manageable.”<sup>28</sup> Secretary Gates also recognized that implementation of the National Defense Strategy will require a partnership between the DoD, Congress, and the president. He asserted, “The country’s national security capabilities are still coping with the consequences of the 1990s, when, with the complicity of both ends of Pennsylvania Avenue, key instruments of U.S. power abroad were reduced or allowed to wither on the bureaucratic vine. The National Defense Strategy offers a slow, steady, balanced approach to recovery.”<sup>29</sup>

## **DoD Policy**

In accordance with Section 2504 of Title 10, United States Code, the DoD submits an annual report on US industrial capability to the Committees on Armed Services of the Senate and the House of Representatives. Among other things, the annual report includes statements of DoD

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<sup>27</sup> Ibid.

<sup>28</sup> Ibid.

<sup>29</sup> Ibid.

policy and “a description of the methods and analyses being undertaken by the Department of Defense alone or in cooperation with other Federal agencies, to identify and address concerns regarding technological and industrial capabilities of the national technology and industrial base. . . [and] a description of the assessments”<sup>30</sup> conducted by the DoD.

The March 2008 report, submitted by the Office of the Under Secretary of Defense for Acquisition, Technology & Logistics (Industrial Policy), defines DoD national security industrial policy as based on *ideal* industry characteristics. An infinitely robust industrial base is not the ultimate objective of the Department.<sup>31</sup> (emphasis in the original) The *ideal* industry characteristics define an industry that is *reliable*, *cost-effective*, and *sufficient* to meet strategic objectives. The annual report is a carefully worded policy statement. The definitions of *reliable*, *cost-effective*, and *sufficient* never explicitly suggest that DoD is responsible for sustainability of the US defense industry.<sup>32</sup> However, the March 2008 report does recognize that “DoD research, development, acquisition, and logistics policies, analyses, and decisions guide and influence industry in four fundamental ways.”<sup>33</sup> The report makes special note of the fact that the Department incorporates industrial base-related policies into its acquisition regulations to protect

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<sup>30</sup> DoD Report, *Annual Industrial Capabilities Report to Congress*, February 2008, v.

<sup>31</sup> The statements of DoD policy are derived and quoted from United States, Department of Defense Report, *Annual Industrial Capabilities Report to Congress*, February 2008.

<sup>32</sup> The DoD definitions of *reliable*, *cost-effective*, and *sufficient* are included in the appendix of this paper.

<sup>33</sup> The four ways DoD influences industry are reported in Department of Defense Report, *Annual Industrial Capabilities Report to Congress*, February 2008 as “first, DoD evaluations and assessments of industry segments or specific industry-related issues help identify future budgetary and programmatic issues and inform policy-making and requirements generation. Second, DoD defense system acquisition strategies and decisions shape the technological and programmatic focus of industry. Third, the Department incorporates industrial base-related policies into its acquisition regulations to protect national security, promote competition and innovation, and, in certain specific cases, preserve critical defense industrial and technological capabilities. Finally, decisions made on mergers and acquisitions involving defense firms directly shape the structure of the industry.”

national security [and to] preserve critical defense industrial and technological capabilities”<sup>34</sup> when necessary. The Department acknowledges that it can use a “variety of means including funding innovation in science and technology and encouraging competition through acquisition strategies and contract provisions to preserve industrial capability. And, the Department asserts that adequate regulations exist to preserve industrial capabilities vital to national security on a case-by-case basis, but that the standard for intervention into the industrial base is high in order to ensure that limited DoD resources are not expended unnecessarily.”<sup>35</sup>

On the specific topic of globalization and international competition, the stated DoD objective is to “leverage globalization benefits and commercial markets while minimizing risks.”<sup>36</sup> Furthermore, the DoD states “even if the Department could afford to rely only on domestic sources, it would not want to. The United States does not own all the good ideas, nor make all the best products. Many of them come to us from our allies and trading partners. . . . The Department does not, and cannot, drive global commercial markets. Instead of hoping that global commercial markets will adapt to the Department, the Department must adapt its practices to be more of a conventional customer wherever possible.”<sup>37</sup> With respect to the risk of foreign sources of supply, the 2008 report asserts the following:

Foreign dependence usually does not equate to foreign vulnerability. The Department is not vulnerable if it is dependent on reliable foreign suppliers, just as it is not vulnerable when it is dependent on reliable domestic suppliers. Foreign vulnerability would occur only if the Department was dependent upon suppliers from a single or small group of countries that had the capability and political will to halt shipments to DoD in time of need, and

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<sup>34</sup> The definitions are taken from United States, Department of Defense Report, *Annual Industrial Capabilities Report to Congress*, February 2008.

<sup>35</sup> *Ibid.*, 10.

<sup>36</sup> *Ibid.*, 11.

<sup>37</sup> *Ibid.*, 12.

when such delivery denial would cause direct and unacceptable impact to operations.<sup>38</sup>

To demonstrate the minimal risk of this vulnerability, the report offers the fact that “the Department procures very few defense items and components from foreign suppliers. In Fiscal Year 2006, the Department awarded contracts to foreign suppliers for defense items and components totaling approximately \$1.9 billion, less than 1 percent of all DoD contracts; and only about 2.4% of all DoD contracts for defense items and components. This report concludes that the Department employs foreign contractors and subcontractors judiciously, and in a manner consistent with national security requirements.”<sup>39</sup>

On the subject of domestic source restrictions, the report states, “the Department generally opposes statutory domestic preference proposals that preclude or impede its ability to procure world class products and capabilities on a ‘best value’ basis or when it impairs effective Defense cooperation with friends and allies.”<sup>40</sup> At the same time, the Department recognizes “the availability of domestic production capabilities for critical defense technologies is an essential element of national security [and asserts] that in calendar year 2007, the DoD had twenty-three projects underway specifically designed to establish, expand, maintain, or modernize industrial capabilities required for national defense.”<sup>41</sup>

Commenting on the effect of mergers and consolidation, the same 2008 report states

the DoD’s decisions take a long view on competition. In the case of potential last-of-type platforms such as Joint Strike Fighter, for example, DoD selected from one industry team in order to minimize costs and maximize program efficiency. Its winner-take-all acquisition strategy decision was not anticompetitive. Rather, it reaffirmed DoD’s recognition of the need to focus the resources of

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<sup>38</sup> DoD Report, *Foreign Sources of Supply FY2006 Report*, 4.

<sup>39</sup> *Ibid.*, ii.

<sup>40</sup> DoD Report, *Annual Industrial Capabilities Report to Congress*, February 2008, 14.

<sup>41</sup> *Ibid.*, 73.

the tactical fighter industry on unmanned and other futuristic systems. While market forces and a strong budget normally sustain credible competitive sources, for some critical defense products the number of suppliers may be limited.<sup>42</sup>

A final interesting perspective comes from the DoD input to a Department of Homeland Security report in May 2007 titled *Defense Industrial Base: Critical Infrastructure and Key Resources Sector-Specific Plan as Input to the National Infrastructure Protection Plan*. This report presumes that the US defense industrial base exists and does not focus on preserving the economic enterprise itself as a matter of national security. Rather it is focused on the infrastructure that supports the industry. The report strives to “identify those assets, systems, networks, and functions that, if damaged, would result in unacceptable consequences to the DoD mission, national economic security, public health and safety, or public confidence.”<sup>43</sup>

### **Formal DoD Assessments**

DoD assessments of the US defense industrial base evolved and became more sophisticated and nuanced during the George W. Bush administration. Perhaps this increasing level of sophistication reflects a greater level of attention to the subject out of concern for national security, or perhaps it mostly reflects recognition of the subject’s political sensitivity. The changes in reporting between 2005 and 2008 illuminate the apparent political sensitivity.

In 2005, a broad statement of the defense industrial environment asserted, “The Department does not concur with concerns raised by some that the US defense industrial base is in crisis.”<sup>44</sup> The 2005 report also asserted “The overall economic outlook for the US

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<sup>42</sup> Ibid., 4.

<sup>43</sup> DoD and DHS, *Defense Industrial Base*, 1.

<sup>44</sup> DoD Report, *Annual Industrial Capabilities Report to Congress*, February 2005, 3.

aerospace/defense industry is positive [because] aerospace sales ... increased 8 percent [in the last year].<sup>45</sup> The report concludes as follows:

The Department of Defense is a relatively small player in the overall US economy (about 3.75 percent of the gross domestic product) and Department leverage within the overall US manufacturing sector is limited. Many US industries once dominated by DoD demand now are focused on, and dependent on, commercial markets. . . . Nevertheless, it is desirable—and absolutely necessary—that the Department take whatever steps are necessary to ensure the industrial base on which it depends remains sufficiently reliable, innovative, and cost-effective to meet the nation’s national defense requirements. The Department is doing so and will continue to do so.<sup>46</sup>

The 2006 and 2007 reports included assessments of the aerospace sector that are similar to those included in the 2005 report. In addition, the 2006 and 2007 reports started to shift the focus of discussion toward second and third tier suppliers and raw material rather than prime contractors. As one example, the 2006 report discusses aircraft structures design and manufacturing capabilities and the castings/forgings market. As another example, the 2007 report highlighted titanium availability as a significant issue within the aerospace industrial base.

The 2008 report continued the themes from 2007, with a particular emphasis on the titanium issue within the aerospace industry. However, the tone of the reporting seemed to change. The previous years’ reports generally presented only facts and information. The assessments did not make specific changes or even recommendations based on the circumstances. Rather than simply stating facts or providing facts, the 2008 report was written in such a way that the reader is left with unanswered questions. The 2008 report discussed the status of a variety of aircraft production lines as well as research and development funding streams, but never actually advocated for any change. It is left to the reader to reach a positive or

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<sup>45</sup> Ibid., 4.

<sup>46</sup> Ibid., 6-7.

negative conclusion. The same report referred to an internal USAF report titled *Annual 2007 Air Force Industrial Base Assessment* (December 2007), which asserted “The overall outlook for the industry is positive primarily due to increased commercial aircraft orders and increases in US defense spending. . . . [but] over the next 10 years multiple military aircraft production lines will go cold precipitating the need for a new round of consolidation in order to reduce infrastructure costs.”<sup>47</sup> Rather than make specific assessments or recommendations, the report included open-ended statements, such as “many of the issues faced by the military aircraft sector involve budgetary and re-capitalization trade-offs. Examples of these trade-offs include: continuing C-17 production or upgrading the C-5 fleet; maintaining two development teams for fighter engines; competing domestic and foreign aircraft designs; and determining the mix of manned versus unmanned systems.”<sup>48</sup>

## **Perspectives from the Acquisition Community**

In June 2005, Acting Deputy Secretary of Defense Gordon England established an *Acquisition Action Plan* to respond to the “growing and deep concern within the Congress and within the Department of Defense (DoD) Leadership Team about the DoD acquisition processes.”<sup>49</sup> The resulting *Defense Acquisition Performance Assessment*—published in January 2006—included assessments and recommended performance improvements. Among these assessments was the following commentary about the defense industry:

Successful acquisition requires a stable environment of trust and confidence between government and an industrial base that is responsive and healthy. This fosters competition for ideas and solutions to efficiently and effectively provide required capabilities and guaranteed best value for the government. Our assessment is that the consolidation of the industrial base, caused by unstable

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<sup>47</sup> DoD Report, *Annual Industrial Capabilities Report to Congress*, February 2008, 42-43.

<sup>48</sup> Ibid.

<sup>49</sup> England, Memorandum to Secretaries of the Military Departments, et al.

defense demand, has reduced the benefits of competition, introduced industrial organizational conflict of interest issues, and made every defense contract a “must win” situation for the prime contractors. The net result is that *the US industrial base is fragile*. It will re-learn very expensive lessons with every program and *will require the rebuilding of infrastructure*, tailored to each new program.<sup>50</sup>

Despite this assessment of a fragile industrial base, acquisition policy has not changed. Defense acquisition programs continue to have to deal with the issue, sometimes as an intentional element of the procurement strategy. For instance, Assistant Secretary of the Air Force, Ms. Sue Payton, stated “during testimony to Congress [about the KC-X tanker source selection effort], ‘job creation, location of assembly and manufacturing were not part of this evaluation criteria, according to the law’ and that ‘industrial capacity was not part of the evaluation criteria.’”<sup>51</sup>

An additional factor the acquisition community struggles with is the *Buy American Act*. In 1999, Colonel Joe Smythe suggested “the Buy American Act and its subsequent modifications represent one of the most visible and egregious remnants of US protectionism. Its very existence refutes the US desire to only ‘level the playing field’ in international trade. It has been used in the past to justify congressional protection of specific industries with an associated burden to DoD.”<sup>52</sup>

## **Perspective from the Defense and Aerospace Industry**

The National Defense Industrial Association (NDIA) publishes an annual white paper titled *Top Issues*. The top issues evolve annually as trends in the industry evolve. The 2004 version of the white paper labeled sustainment of the US industrial base a top issue. In that paper NDIA asserted “the adequacy of a viable U.S. defense industry to provide the equipment needed

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<sup>50</sup> Defense Acquisition Performance Assessment Panel. *Defense Acquisition Performance Assessment Panel Report*, 52.

<sup>51</sup> Knight and Bolcom, 25.

<sup>52</sup> Smythe, “The Impact of the Buy American Act on Program Managers,” 270-271.



by warfighters in performance of their national security responsibilities is critical for the ultimate success of the transformational programs of the DOD. . . . It is NDIA's position that the U.S. defense industrial base needs to review and reassess its ability to domestically produce critical items necessary for the timely support of the armed forces."<sup>53</sup> This position began to evolve in 2005 with the association's assertion that "broad based protectionism does not benefit the U.S. defense industrial base."<sup>54</sup> In 2006, the report suggested that globalization was good for the US industrial base,<sup>55</sup> and by 2008 there was no discussion of the US aerospace industrial base at all.

Two white papers produced by the Aerospace Industries Association of America, Inc., in late 2008 suggested that the US aerospace industry is healthy and doing well "following four years of remarkable expansion... [and] continued growth in 2008."<sup>56</sup> The same analysis also stated "as the global financial crisis continues to bring many industries to their knees, aerospace is largely flying above the storm."<sup>57</sup> Although much of this success is attributable to civil aircraft sales, defense sales are also doing well. But much of the defense spending is attributable to "supplemental spending to support troops in Iraq and Afghanistan. . . .[which has] led to large increases in procurement for additional equipment, spares, and maintenance."<sup>58</sup>

The supplemental funding has not helped with the growing modernization requirements. The 2008 Aerospace Industries Association white paper asserted "defense modernization is not optional. . . . America has deferred defense and aerospace modernization to the point that

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<sup>53</sup> National Defense Industrial Association, *2004 Top Issues*.

<sup>54</sup> National Defense Industrial Association, *2005 Top Issues*.

<sup>55</sup> National Defense Industrial Association, *2006 Top Issues*.

<sup>56</sup> Aerospace Industries Association of America Inc. "2008 Year End Review and 2009 Forecast – An Analysis."

<sup>57</sup> Aerospace Industries Association of America Inc. "2008 Year End Review and 2009 Forecast – An Analysis."

<sup>58</sup> Aerospace Industries Association of America Inc. "2008 Year End Review and 2009 Forecast – An Analysis."

modernization and recapitalization are increasingly lengthy and expensive. The bill is now due.”<sup>59</sup>

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<sup>59</sup> Aerospace Industries Association of America Inc. “Aerospace and Defense: The Strength to Lift America.”

## Analysis

The fate of the US aerospace industry is a national security issue that should be determined by the president of the United States in partnership with the US Congress. Working together, the president and Congress should decide whether the US government will proactively engage in preservation of the industry or whether free-market forces will be allowed to decide the outcome of this historically critical element of the US economy and defense establishment. The president and Congress have sufficient information with which to make the necessary national security decisions. The *Final Report of the Commission on the Future of the United States Aerospace Industry* lays out nine detailed recommendations for consideration. The recommendations cover a wide range of aerospace issues, including education reform, military research and development, commercial aviation, and space systems and launch. Well-considered and bipartisan, the commission report and its recommendations should form the basis for decisions made by the president and the Congress about the future of the US aerospace industry.

The USAF is not responsible for the future of the US aerospace industry. The USAF is responsible for organizing, training, and equipping a force capable of accomplishing the missions assigned by the president and the secretary of defense. There is no legislative or policy basis for the USAF to attempt to proactively manage the US aerospace industrial base for the purpose of preserving a domestic capability for producing future generations of US military aircraft weapon systems. In the absence of any specific national security policy regarding the defense industrial base, the DoD has decided to allow free-market forces to determine the general fate of the defense industry while preserving the possibility of acting when necessary to protect certain segments of the critical technology infrastructure. In general, these segments are

second and third-tier suppliers of subcomponents and raw materials. The DoD has generally decided not to act to preserve domestic US prime contractors.

There is no requirement for additional information about the state of the US aerospace industry and the associated risks of a dwindling industrial infrastructure. These issues have been well documented by many groups—public and private. The important issue is for the senior leadership of the United States—the president of the United States and the US Congress—to deal with the risk assessment and make some critical decisions about how the United States will develop and manufacture aerospace systems while also assuring national security. The DoD is responsible for providing the military instrument of power to the country. It is the responsibility of the president of the United States and the US Congress to determine how best to acquire and sustain the military instrument of power.

Pierre Chao observed in 2008 that the US industrial policy debate is usually focused on the spectrum of sourcing options ranging between global and national markets with the key issue being how to get technology to the US warfighter while preserving US jobs and assuring a source of supply.<sup>60</sup> Unfortunately, this policy dilemma is not well served by the current state of the US military acquisition system because, as Chao also noted that the military is primarily in a sustainment mode now, where costs are increasing to maintain the same capability; but that the heart of the defense industry is earlier in the acquisition cycle during system development where there is more opportunity for competition, new ideas, and profit.<sup>61</sup> So, the defense industry which is considered a candidate for government intervention is not necessarily interested in the current business being offered by DoD anyway. Again, a national security policy decision needs to be

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<sup>60</sup> Chao, 3.

<sup>61</sup> Chao, 5-10.

made—sustain the old systems with whatever industrial base wants to do the work, or develop new systems and encourage innovation across the defense and aerospace industries.

Unfortunately, the national security establishment often fails to make this kind of key national security decision. Members of Congress and the president, recognizing that the defense and aerospace industry represents a significant number of jobs in the US as well as a significant portion of the gross domestic product, continue to focus on competition when competition is not the issue. With a few notable exceptions—most recently, the Darleen Druyun scandal comes to mind—the DoD and the USAF play by the rules and procure military systems through robust competitive processes. In 1998, David Cooper of the General Accounting Office submitted testimony before the Senate Subcommittee on Acquisition and Technology, Committee on Armed Services asserting, “there is little evidence that the increased consolidation has adversely affected current DoD programs.”<sup>62</sup> Mr. Cooper’s testimony included a table that showed the number of contractors providing fixed-wing aircraft reduced from eight to two between 1990 and 1998<sup>63</sup> (only Boeing and Lockheed Martin remained).

Two of the six contractors identified in Mr. Cooper’s testimony who left the fixed wing aircraft market in the reported period (Northrop and Grumman) later merged and attempted to reenter the aerospace market with a European partner as a global competitor for the KC-X tanker program. In 2007, Senator John McCain’s staff asked the DoD Inspector General (DoDIG) to independently review [the KC-X program] and advise him on whether the Air Force request for proposal for the Air Force KC-X Aerial Refueling Tanker Aircraft Program contained

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<sup>62</sup> Cooper, “Competitive Effects of Mergers and Acquisitions,” 1.

<sup>63</sup> *Ibid.*, 6.

impediments to competition.”<sup>64</sup> The DoDIG concluded that with minor modifications to acquisition strategy (non-material findings), the USAF effort was sufficient in assuring competition and fair prices.<sup>65</sup> This was a positive finding for the DoD and the USAF, but it ignored the larger issue. What was the right decision for US national security? Are there risks associated with international participation in the tanker program?

The DoD appears to have concluded that it is an acceptable national security risk for the defense industry to continue to consolidate when driven by free-market forces. The DoD industrial policy 2008 report to Congress stated “the DoD’s decisions take a long view on competition. In the case of potential last-of-type platforms such as Joint Strike Fighter, for example, DoD selected from one industry team in order to minimize costs and maximize program efficiency. Its winner-take-all acquisition strategy decision was not anticompetitive. Rather, it reaffirmed DoD’s recognition of the need to focus the resources of the tactical fighter industry on unmanned and other futuristic systems.”<sup>66</sup> In other words, the DoD is focused on new ideas (read transformation). The DoD does not want to be stuck preserving an industry base that may no longer be relevant to the military instrument of power we wish to procure.

The DoD position also appears unconcerned with issues such as the limited supply of some materials, even when the competition for those materials is international and other nations are considered in a risk assessment. In the case of titanium, the DoD analysis is primarily focused on price impacts of global demand concluding

specialty metals as a percentage of the unit recurring flyaway cost represent a small portion of military aircraft prices. Although additional steel and aluminum price increases appear unlikely, the potential for future titanium price increases remain. Significant

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<sup>64</sup> DoDIG Report, *Air Force KC-X Aerial Refueling Tanker Aircraft Program*, 1.

<sup>65</sup> *Ibid.*

<sup>66</sup> DoD Report, *Business Combinations Desk Book*, 4-5.

future titanium price increases could lead to aircraft price increases for which the Department would have to plan. For example, a 50 percent titanium price increase would increase the unit price of an F-22A by \$1,274,000 and the FY05-11 buy (104 aircraft) by \$132,454,000.<sup>67</sup>

This price analysis, although interesting, only blithely addresses the real national security issue that price is irrelevant if you cannot get any of the material in the first place. The same DoD report states

global titanium demand also is increasing. However, there is limited information available on projected worldwide titanium production or production capacity. It is not clear whether titanium prices are likely to increase, stabilize, or decline. DoD weapons systems primarily use specialty metals which are produced by the same US suppliers that produce metals for the commercial markets. The Department is a very small consumer of commercial grade metals. However, tight commercial markets could negatively impact the viability of US metals suppliers, and ultimately DoD weapon system programs.<sup>68</sup>

However, “The Department’s smaller share of the market for raw materials lessens its ability to influence the market . . . in a global marketplace it is more difficult to separate defense and commercial needs and trends.”<sup>69</sup>

Perhaps industry consolidation and reduced access to materials are issues, but DoD doesn’t know how to deal with them—or, is unwilling to. Anthony Cordesman, of the Center for Strategic and International Studies, has suggested a lack of leadership is the fundamental issue. He says the senior leadership of the national security establishment should be asking the critical national security questions, but isn’t. According to Cordesman, “The problem does not lie in defense industry, program managers, mid-level officers and officials, or in the procurement process. It lies in a fundamental failure to take hard decisions and force the overall defense

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<sup>67</sup> DoD Report, *China’s Impact on Metals Prices in Defense Aerospace*, 39-40.

<sup>68</sup> Ibid.

<sup>69</sup> Ibid.

procurement process to become realistic in making easily foreseeable judgments about risk and feasibility, to contain costs, and to create a mix of program objective memorandum and PPB goals that the nation can actually afford.”<sup>70</sup>

If some fundamental national security policy decisions were made, the acquisition system could respond accordingly. As the 2006 Defense Acquisition Performance Assessment observed, “the current acquisition system delivered the foundation of our military power; [it] is, and must remain, our strategic advantage”<sup>71</sup> The question is how to get to those decisions. Cordesman, citing Loren Thompson from the Lexington Institute, noted that the “Pentagon doesn’t have a coherent plan for how it will sustain global air dominance over the next 30 years without a sufficient number of F-22s, because it has convinced itself that unconventional warfare is the wave of the future. Making decisions by default is not leadership; it is an abdication of responsibility.”<sup>72</sup> Cordesman goes on to say “recent statements in Congress have failed to address any of the real issues affecting national security and the future of the Air Force, but they have defended the program [F-22] on the narrow ground of constituent interest.”<sup>73</sup>

Existing DoD acquisition policies covering the development and production of weapon systems are sufficient to implement the current DoD policy and the de facto national security decision that has been made; and, the government acquisition community can work with whatever elements of the worldwide industrial base choose to participate in the procurement process. Consistent with existing policy, the USAF will provide annual assessments of the status of domestic and foreign sources of supply, which will support a risk assessment that will be

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<sup>70</sup> Cordesman, *America’s Self-Destroying Airpower*, 1.

<sup>71</sup> Defense Acquisition Performance Assessment Panel. *Defense Acquisition Performance Assessment Report Summary Briefing*, 4.

<sup>72</sup> Cordesman, 15.

<sup>73</sup> Cordesman, 15.



integrated into an overall defense capability risk assessment and reported to Congress. When, or if, the president and Congress chose to react to these risk assessments, the USAF will be ready.

## Conclusion

The USAF is dependent upon, but is not responsible for—and should not presume responsibility for—the aerospace industrial base that supports it. The USAF should not attempt to proactively manage the US aerospace industrial base for the purpose of preserving a domestic capability of producing future generations of US military aircraft weapon systems. There are well-established policies and procedures for informing the DoD, the US Congress, and the president of the United States when the USAF is concerned that limitations in the aerospace industry might threaten the USAF’s ability to execute its mission and thus threaten US national security. The USAF should use these policies and procedures to report the health of the aerospace industrial base when necessary, but it should not make decisions about how to react to the status unilaterally.

The USAF needs to concentrate on executing its mission today—to *fly, fight, and win in air, space, and cyberspace*. This mission fulfills the objective of balance established by the secretary of defense who has determined that significant focus needs to be placed on the current war on terrorism and not modernization. If the Secretary of Defense’s strategy has a detrimental effect on the US aerospace industry then that is a national issue that needs to be addressed by the president of the United States in partnership with the US Congress. These two national security institutions are the only entities with the responsibility of balancing the military needs of the DoD and the USAF against other competing requirements in the United States.

Unless otherwise directed, the way ahead for the USAF is clear. The USAF should stick to the basics. The USAF should inform the DoD and national leadership what capabilities it requires in order to execute the missions assigned to it; and the USAF should inform the DoD and national leadership about the risks associated with the global aerospace marketplace.

The USAF should do nothing more, nothing less.

A way ahead for the United States is less clear. In the wake of the 2008-2009 economic crises, the two most recent US presidential administrations, in partnership with the US Congress, have provided significant financial bailouts to two very different, but fundamental elements of the US economy—the banking community and the auto manufacturing industry. Clearly, President Bush and President Obama as well as their partners in the US Congress concluded that these bailouts were necessary to support the economic well-being of the country and therefore the national security of the United States. Perhaps it is time for the aerospace industry to be considered part of the conversation also. The nine recommendations included in *Final Report of the Commission on the Future of the United States Aerospace Industry* would be a good place to start.

## Appendix

The 2008 Department of Defense Report, *Annual Industrial Capabilities Report to Congress*, defines a reliable, cost-efficient, and sufficient industrial base as follows:

“A *reliable* industrial base is one in which suppliers ship contracted products and services on time. Additionally, reliable firms are viable for the long-term. These firms have a stable or expanding business base, earn fair operating margins for owners, and invest in internal research and development, capital equipment, and their workforce such that long-term viability, innovation, and competitiveness is likely. Reliable firms deliver products with integrity that satisfy Department expectations in every respect (free of device tampering, counterfeiting, etc). Finally, a reliable industrial base is one that facilitates innovation by both larger and smaller subsystem providers; allows smaller, subsystem firms to meaningfully compete against larger, vertically-integrated firms; and encourages new firms, commercial competitors, and reliable global suppliers to enter the defense marketplace and compete for defense-related business.

A *cost-effective* industrial base is one in which suppliers deliver contracted products and services at or below cost targets. A cost-effective industrial base is a competitive industrial base with at least two viable innovative suppliers with strong design teams in mature market areas and a greater number in areas where demand is high and innovation is critical to meet future warfighting, stability operations, and/or humanitarian assistance needs. In addition to the absolute number of suppliers in a given product area, another characteristic of a competitive and cost-effective industrial base is the extent to which suppliers participate in non-defense (dual-use) US markets and export products overseas.

A *sufficient* industrial base is one in which suppliers deliver contracted products and services that meet Department performance requirements. Suppliers with sufficient industrial capabilities are flexible and react positively and quickly to changing DoD requirements and priorities, particularly during times of conflict—indicative of the adaptability of both production lines and technology. They effectively manage their way through requirements peaks and valleys while maintaining the ability to hire, train, and retain the specialized skills required to meet these dynamic requirements. They also have technology or technology development programs planned and/or in place to meet current and projected DoD needs.”<sup>74</sup>

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<sup>74</sup> The definitions are taken from the Department of Defense Report, *Annual Industrial Capabilities Report to Congress*, February 2008.

## Bibliography

- Acquisition Performance Assessment Panel. *Defense Acquisition Performance Assessment Panel Report*, January, 2006.
- Aerospace Industries Association of America Inc. “2008 Year End Review and 2009 Forecast – An Analysis.” Available on-line at: [www.aia-aerospace.org/pdf/yearender08-analysis.pdf](http://www.aia-aerospace.org/pdf/yearender08-analysis.pdf) (accessed December 16, 2008).
- Aerospace Industries Association of America Inc. “Aerospace and Defense: The Strength to Lift America.” Available on-line at: [www.aia-aerospace.org/pdf/wp-strength-nov08.pdf](http://www.aia-aerospace.org/pdf/wp-strength-nov08.pdf) (accessed December 16, 2008)
- Ahearn, Raymond, J., John W. Fischer, Charles B. Goldfarb, Charles E. Hanrahan, Walter W. Eubanks, and Janice E. Rubin. *European Union-US Trade and Investment Relations: Key Issues*. Congressional Research Service Report for Congress, April 8, 2008.
- Air Force KC-X Aerial Refueling Tanker Aircraft Program*. United States Department of Defense Inspector General Report D-2007-103, May 30, 2007.
- Annual Industrial Capabilities Report to Congress*. United States, Department of Defense Report, Deputy Under Secretary of Defense (Industrial Policy), February 2005. Available at: <http://www.acq.osd.mil/ip>
- Annual Industrial Capabilities Report to Congress*. United States, Department of Defense Report, Deputy Under Secretary of Defense (Industrial Policy), February 2006. Available at: <http://www.acq.osd.mil/ip>
- Annual Industrial Capabilities Report to Congress*. United States, Department of Defense Report, Deputy Under Secretary of Defense (Industrial Policy), February 2007. Available at: <http://www.acq.osd.mil/ip>
- Annual Industrial Capabilities Report to Congress*. United States, Department of Defense Report, Deputy Under Secretary of Defense (Industrial Policy), February 2008. Available at: <http://www.acq.osd.mil/ip>
- Business Combinations Desk Book*. United States, Department of Defense Report, Deputy Under Secretary of Defense (Industrial Policy) and Deputy General Counsel (Acquisition & Logistics), September 2003. Available at: <http://www.acq.osd.mil/ip>
- Chao, Pierre, A. “Structure and Dynamics of the Defense Industry.” Briefing to the Defense Acquisition University Program Management Course (PMT 401), May 13, 2008.
- China’s Impact on Metals Prices in Defense Aerospace*. United States, Department of Defense Report, Deputy Under Secretary of Defense (Industrial Policy), December 2005. Available at: <http://www.acq.osd.mil/ip>

- Cooper, David E. "Competitive Effects of Mergers and Acquisitions." Testimony before the Subcommittee on Acquisition and Technology, Committee on Armed Services, US Senate, GAO/T-NSIAD-98-112, March 4, 1998.
- Cordesman, Anthony, H. and Hans Ulrich Kaesar. *America's Self-Destroying Airpower: Becoming Your Own Peer Threat*. Center for Strategic & International Studies Report. Working Draft, 1 October 2008 (used with permission).
- Daso, Major Dik A. *Architects of American Air Supremacy: General Hap Arnold and Dr. Theodore von Karman*. Maxwell AFB Alabama: Air University Press, 1997.
- Defense Acquisition Performance Assessment Panel. *Defense Acquisition Performance Assessment Report Summary Briefing*, January, 2006.
- Defense Critical Technologies. Joint Task Force Report of US Defense Science Board and UK Defence Scientific Advisory Council, March 2006.
- Defense Industrial Base: An Overview of an Emerging Issue*. United States General Accounting Office Report to Congressional Requesters, GAO/NSIAD-93-68, March 1993.
- Defense Industrial Base Capabilities Study: Protection*. United States, Department of Defense Report, Deputy Under Secretary of Defense (Industrial Policy), December 2004. Available at: <http://www.acq.osd.mil/ip>
- Defense Industry: Consolidation and Options for Preserving Competition*. United States General Accounting Office Report to Congressional Committees, GAO/NSIAD-98-141, April 1998.
- Defense Industry: Trends in DoD Spending, Industrial Productivity, and Competition*. United States General Accounting Office Report to Congressional Requesters, GAO/PEMD-97-3, January 1997.
- Department of Homeland Security and Department of Defense. *Defense Industrial Base: Critical Infrastructure and Key Resources Sector-Specific Plan as Input to the National Infrastructure Protection Plan*, May 2007.
- Donley, Michael B. and Norton A. Schwartz. *Mission Statement and Priorities*. Secretary of the Air Force and Chief of Staff, United States Air Force Memo to Airmen, September 2008.
- Emeigh, Geoffrey. "Norm Augustine's (Lockheed Martin) Comments at the DAPA Panel." The Bureau of National Affairs, Inc. October 27, 2005. Available at: <https://acc.dau.mil/CommunityBrowser.aspx?id=24495>
- Final Report of the Commission on the Future of the United States Aerospace Industry*. Commission on the Future of the United States Aerospace Industry, November 2002.

*Foreign Sources of Supply FY2006 Report: Annual Report of United States Defense Industrial Base Capabilities and Acquisition of Defense Items and Components Outside the United States.* United States, Department of Defense Report, Deputy Under Secretary of Defense (Acquisition, Technology & Logistics) Deputy Under Secretary of Defense (Industrial Policy), November 2007. Available at: <http://www.acq.osd.mil/ip>

Ingersoll, Bob. "President's Commission on the Future of the United States Aerospace Industry." Briefing to the National Contract Management Association, November 29, 2001.

Gates, Robert M. "A Balanced Strategy: Reprogramming the Pentagon for a New Age." *Foreign Affairs* (January-February 2009). Available on-line at: [www.foreignaffairs.org/20090101faessay88103/robert-m-gates/a-balanced-strategy.html](http://www.foreignaffairs.org/20090101faessay88103/robert-m-gates/a-balanced-strategy.html)

Gill, Bates, and Melissa Murphy. "China-Europe Relations: Implications and Policy Responses for the United States." Center for Strategic and International Studies, May 2008.

*JSF International Industrial Participation: A Study of Country Approaches and Financial Impacts on Foreign Suppliers.* United States, Department of Defense Report, Deputy Under Secretary of Defense (Industrial Policy), June 2003. Available at: <http://www.acq.osd.mil/ip>

Khana, Parag. *The Second World: Empires and Influence in the New Global Order.* As reviewed in "Goodbye US Hegemony, Welcome China, Europe" by Manish Chand, April 23, 2008.

Knight, William, and Christopher Bolkcom. *Air Force Air Refueling: The KC-X Aircraft Acquisition Program.* Congressional Research Service Report for Congress, April 4, 2008.

McKenna, Joseph F. "An Aerospace Council-Roger That." *Tooling & Production*, March 2001. Available at: <http://www.toolingandproduction.com>.

*Media Backgrounder: Final Report of the Commission on the Future of the United States Aerospace Industry.* Commission on the Future of the United States Aerospace Industry, November 18, 2002.

*National Aerospace Initiative Brochure.* Department of Defense and NASA Brochure. Available at <http://www.DoD.mil/ddre/nai>.

Smyth, Lt Col Joseph S. "The Impact of the Buy American Act on Program Managers." *Acquisition Review Quarterly*, Summer 1999, 263-272.

*Special Report: An In-Depth Look at the KC-X Competition.* Leeham Company, LLC. Report. September 4, 2007.

*Transforming the Defense Industrial Base: A Roadmap*. United States, Department of Defense Report, Deputy Under Secretary of Defense (Industrial Policy), February 2003. Available at: <http://www.acq.osd.mil/ip>

Ullrich, George W. OSD Perspective. Briefing to the 2003 Munitions Executive Summit, February 12, 2003.

*US Aerospace and Aviation Industry: A State-by-State Analysis*. Commission on the Future of the United States Aerospace Industry, October 2002.

US Senate. *Senate Armed Services Committee Hearing on Air Force Nominations*. July 22, 2008.

Wright, Major Stephen E. *Aerospace Strategy of the Aerospace Nation*. Masters Thesis, School of Advanced Airpower Studies, Air University, Maxwell AFB, AL, August 1994.

*2004 Top Issues*. National Defense Industrial Association White Paper, 2004. Available at: <http://www.acq.osd.mil/ip>

*2005 Top Issues*. National Defense Industrial Association White Paper, 2005. Available at: <http://www.acq.osd.mil/ip>

*2006 Top Issues*. National Defense Industrial Association White Paper, 2006. Available at: <http://www.acq.osd.mil/ip>

*2007 Top Issues*. National Defense Industrial Association White Paper, 2007. Available at: <http://www.acq.osd.mil/ip>

*2008 Top Issues*. National Defense Industrial Association White Paper, 2008. Available at: <http://www.acq.osd.mil/ip>