



August 27, 2009

Officers

Chris Hoeber, Chair
Space Systems/Loral
Julie Sattler, Vice-Chair North
Lockheed Martin Space Systems Company
Jim McGlothlin, Vice-Chair Central
Quintron Systems, Inc.
Gwynne Shotwell, Vice-Chair South
Space Exploration Technologies
Michael Gallo, CFO
Kelly Space & Technology, Inc.
Laurel Shockley, Secretary
Southern California Edison
Celeste Ford, Past Chair
Stellar Solutions

Board Members

Peter Banks, PhD
Universities Space Research Association (USRA)
James Boyle
United Launch Alliance
Greg Burner
Wyle
Corby Clark
United Paradyne Corporation
John Daegele
Northrop Grumman Aerospace Systems
Engineering, Integration & Test
Trevor Foster
Empirical Systems Aerospace, LLC
Randall Garber
A.T. Kearney
Hany Girgis
SGIS
Allen Hoffman
The Boeing Company
Prof. Scott Hubbard
Stanford University
Alan Jones
ATK Space
Wayne Kauffman
Raytheon Corporate Business Development
James Long
Aerofuel/GenCorp
Diane Murphy
Federal City Communications
Mohammad Noori, PhD
California Polytechnic State University
Stephen O'Neill
The Boeing Company
Michael Sarver
Cisco Systems, Inc.
Mark Sirangelo
Sierra Nevada Corporation
Thomas Taverney
SAIC Space Operation
Dan White
Com Dev USA

Liaisons to the Board

Col. David Buck
Commander, 30th Space Wing, U.S. Air Force
Col. Jerry L. Gandy
Commander, 95th Air Base Wing U.S. Air Force
J. Campbell Martin
NASA Dryden Flight Research Center
Gary Martin
NASA Ames Research Center
Brian McGowan
Business, Transportation & Housing Agency
Bryan Scurry
Space and Naval Warfare Systems Command
Lt. Gen. John T. Sheridan
Commander, Space & Missile Systems Center
Lt. Gen. Eugene Tattini, USAF (Ret.)
Jet Propulsion Laboratory

Mr. Daniel W. Hancock
Chairman, Little Hoover Commission
925 L Street, 805
Sacramento, CA 95814

RE: Examination of the State's Economic Development Activities

Dear Chairman Hancock:

On October 4, 1957, the Soviet Union launched Sputnik and jolted the United States into an awareness of the need to compete in a new technological era. Innovators, researchers, engineers and technicians responded to President John F. Kennedy's call to action with an expansion of economic development activities that thrust the US economy, in large part lead by California's aerospace leadership, into the stratosphere.

For decades California's aerospace industry has led the way for American innovation and economic prosperity. Even in a downward turning economy, aerospace represents upwards of 5 percent of the US gross domestic product, supports more than 10 million high wage jobs nationwide and leads the US economy in net exports. The space enterprise community alone, when extracted from the greater aerospace industry, impacts California's economy with \$31 billion in revenues generated by 71,000 direct jobs – a 21 percent share of the \$146 billion global space marketplace. And, remember, the average aerospace worker receives a salary of approximately \$60,000 per year (some studies calculate it as high as \$70,000). However, this formidable preeminence in the world economy is waning. Global dominance is threatened by increased international competition.

The California Space Authority (CSA), representing the state's diverse space enterprise community, believes that workforce training entities, economic development leaders and the educational system must coordinate resources and efforts as one if we are to regain our edge in economic leadership. CSA has been addressing this concern through the California Innovation Corridor (Corridor), funded by the Workforce Innovation in Regional Economic Development (WIRED) initiative and

Mr. Daniel W. Hancock
August 27, 2009
Page Number Two

advanced by the US Department of Labor and the California Labor and Workforce Development Agency, and has incorporated many of our findings and recommendations into the enclosed report recently presented to the Commission on Economic Development.

As the Little Hoover Commission begins its study of the state's economic development activities, please call upon CSA to offer you more in-depth review of our activities and our recommendations. We believe the greater aerospace industry can once again lead California out of its current economic doldrums with the appropriate levels of state encouragement.

Sincerely,



Eric A. Daniels
Director, State and Local Government Relations

Enclosure

ENERGIZING CALIFORNIA AEROSPACE

Aerospace
Advisory
Committee
November 2008

Recommendations to Retain, Expand & Grow 21st Century Aerospace in California*

California Aerospace Benefits to California¹

California is a global aerospace leader. The Golden State enjoys the largest concentration of aerospace in the United States, with significant benefits to the state's export ratio. Twenty-seven percent of the nation's aerospace and thirty-one percent of the U.S. space industry is in California. **The annual economic impact of California aerospace is \$53 billion.**

California's largest employer is an aerospace company and over 250,000 family-wage jobs averaging over \$60,000/year can be attributed to air, space and space services in California. Aerospace Advisory Committee members alone provide 90,000 jobs. Major aerospace prime contractors report between 5,500 and 7,500 California suppliers each, so despite the recognized overlap of suppliers across companies, California is home to more aerospace suppliers than any other U.S. state. A State-commissioned study found that 80% of statewide companies claiming aerospace business fell outside of aerospace industry codes, meaning that the value of these companies attributable to aerospace is not adequately recognized.

State residents benefit not only from the economic value of aerospace, but also from the breadth of space services available. **Space technology supports all California industries of critical importance and space provides state-of-the-art solutions for key California concerns.**

Global broadcasting, satellite television and satellite radio, as well as satellite-enabled cinema are ways in which California's **entertainment** community is supported by space technology. California **tourism** is enhanced by California's emerging space tourism sector and venues showcasing air and space.

California Aerospace Legacy

California was the birthplace of the aircraft industry at the start of the 20th Century and at the forefront of the space industry in the 1950s. Early aerospace entrepreneurs and founders of many of today's well-known air and space companies recognized that the California climate and "can-do" business environment could help jumpstart or expand their enterprises. Aerospace companies which started in California included those of Jack Northrop, Glenn Martin, Allan and Malcolm Loughhead (later Lockheed), Donald Douglas and Howard Hughes, Simon Ramo and Dean Woolridge (founders of TRW), all legacy companies of today's Northrop Grumman, Lockheed Martin and The Boeing Company.

Agriculture benefits from increased yields forged by precision farming and remote sensing, which supports more environmentally conscious irrigation strategies. **Biotech** can benefit from space-based pharmaceutical manufacturing and accelerated space-based pharmaceutical research. Container/fleet management, plane, ship tracking are all **global goods movement** benefits of space applications. Online communications, web-based services and e-commerce are supported by satellite internet, benefiting California's vast information technology industry and online community.

Satellite remote sensing offers advanced environmental management capabilities, insight regarding climate change, flood and fire control, ocean and water quality monitoring. Energy development and management are supported by remote sensing of potential resource beds, pipeline monitoring and satellite meter reading. Emergency satellite-linked communications and satellite-enabled border and port security enhance public safety and homeland security. Satellite-enabled geographical information systems (GIS) are used for urban planning; other space technologies track passenger buses and emergency vehicles, also helping to design efficient routing to reduce traffic congestion. Space technology supports robotics, and telemedicine, assuring Californians 21st Century medical care. Space-based e-learning expands educational opportunities to rural and disabled students, as well as incumbent workers for whom regular classes are not feasible.

The Golden State's largest aerospace firms also annually contribute millions of dollars to support education. At least one large aerospace firm contributes \$6 million a year for education support

* Report to the Lt. Governor and the California Commission on Economic Development

California Aerospace Legacy (cont.)

California aerospace infrastructure assets outstrip not only those of all other U.S. states, but of most countries. Every major U.S. aerospace corporation – The Boeing Company, Lockheed Martin, Northrop Grumman, Raytheon - maintains a significant California presence, with Northrop Grumman Corporation headquartered in southern California. Federal infrastructure assets include three of the nation's ten premier NASA sites, the largest concentration of federal labs (40) in the U.S. and 62 military installations, including several one-of-a-kind U.S. military research, development, test and evaluation sites. Seven of the nation's top 25 research universities are located in California, all receiving significant support from public and private aerospace entities.

Key California aerospace military infrastructure assets include Los Angeles Air Force Base/Space & Missile Systems Center, which develops and acquires critical space technology for military and national security organizations; the Space and Naval Warfare Systems Command, responsible for U.S. Navy command and control system acquisition; Edwards Air Force Base, site of aircraft and rocket testing since nearly the start of air

and space activity and Vandenberg Air Force Base, site of one of only two ground-based missile defense interceptor sites in the U.S. and now the venue for management of all U.S. military space operations. The Mojave Air and Space Port is the nation's first inland spaceport and the site of SpaceShipOne's first commercial spaceflight.

California's supply network represents manufacturers producing everything from fasteners to rocket engines and fully assembled space systems, to software and other information technology companies, engineering firms, composites and materials developers, as well as chemical, research, and test facilities. California's innovative aerospace entrepreneurial firms are engaged in a diversity of pursuits, from producing tires for the Mars rovers to developing armed unmanned vehicles, to developing next-generation space vehicles. California space services companies, also part of the supply network, are continually finding new applications for space technology, ensuring a better quality of life for all Californians.

The Aerospace Workforce Crisis²

The aerospace workforce crisis is part of the overall U.S. crisis in science and technology workers now unfolding. The average age of today's aerospace worker is 54 years old, so the industry is actively competing for an ever-shrinking number of qualified scientists, engineers and technicians. Estimates indicate that two million science and engineering workers have retired from 1998-2008 and that the U.S. will need 500,000 technical workers by 2010. In addition, 1.9 million new jobs in science and engineering have been created over those same ten years, so the impending shortage of science, engineering and technical workers is staggering. Several factors compound the problem.

Many aerospace workers need security clearances, which eliminates hiring of many non-U.S. citizens now attending U.S. universities. Another issue is that, while workforce development is a problem nationwide, California's educational system challenges and the state of its science, technology, engineering and math (STEM) preparation are more serious than in other states. California employs 18 percent of the U.S. science and engineering workforce but it produces only 9 percent of the technical graduates. Only four percent of California ninth graders go on to complete science or engineering degrees. In addition, California has an elevated high school drop-out rate, with approximately 25 percent of California high school students never completing a high school. In some metropolitan areas, drop-out rates are over 50 percent. This contributes to the aerospace industry's drastic shortage of technicians to fill positions often needing only career technical education or skills certification. Some estimates put the number of technician jobs to every engineering position at 6:1, with technician jobs, as well as professional positions, are going begging in many aerospace firms.

In 1970, the U.S. produced 50 percent of the world's science and engineering PhDs. By 2010, the U.S. rate is expected to be only about 15 percent. Traditionally, the five percent of the workforce employed in science and technical careers accounts for 50 percent of the economic impact of U.S. productivity. Today, the U.S. is having trouble preparing that five percent.

To remain competitive on the global 21st Century stage, California and the U.S. must better prepare students for high-wage technician, science and engineering jobs. A strategic statewide effort to increase the number of science, technology and engineering and math graduates, as well as trained, work-ready technicians, is what is needed. STEM enhancement for both academic and career technical education is required. Industry and informal science stand ready to assist California's educational systems and become part of the solution. Industry and military retirees can potentially be resources to address California's STEM instructor shortage. California educators and government can benefit from industry and informal science partnerships to ensure workforce relevancy, student and classroom support – for both college-bound and career technical education students.

The STEM Collaborative Action Plan developed with U.S. Department of Labor funding through the California Labor and Workforce Agency and the California Space Authority can be the starting point for a true statewide public/private STEM partnership and strategy. Created collectively by 500 statewide senior level STEM stakeholders from education, academia, industry and informal science, the Plan provides guiding principles, and STEM recommendations to support California education in developing a statewide strategy and effective regional solutions to ensure California a competitive 21st Century workforce.

Challenges to Industry Competitiveness¹

Like other industries today, California aerospace is part of a global market. As such, it must be competitive not only with national aerospace competitors, but with those on the international stage. Global practices, U.S. and state policies and practices all determine whether or not aerospace stays, grows and prospers in California.

The availability and affordability of a qualified technical workforce for the aerospace industry, while outlined above, cannot be overestimated. California is desperate for STEM professionals and qualified technicians. California's challenge is to resolve this issue before it creates an even greater incentive for aerospace companies to relocate offshore or to other states more effectively addressing the issue.

On the national front, California aerospace has suffered from the impact of cumbersome export licensing regulations. As an unintended consequence of these regulations, California aerospace firms, especially small to mid-sized firms without in-house licensing expertise, are facing increasing competitive pressure from foreign firms using the perceived difficulty of partnering with U.S. firms as a competitive advantage.

California's cost of doing business is of great concern to both small and large aerospace firms. Previous California state business incentives such as the Manufacturing Investment Credit have been eliminated and the State's permitting, environmental regulation and litigation costs are all barriers to industry expansion.

California companies are under increasing pressure from aerospace enterprises overseas. Foreign firms that have matured technologically now invent or duplicate what they used to buy from U.S. aerospace companies. Because of lower labor costs and a robust technical workforce, foreign firms can often undercut U.S. aerospace corporation pricing. Locating manufacturing operations abroad is sometimes seen as the only way to compete with these challenges. Countries hoping to enhance their 21st Century economies recognize U.S. aerospace firms as desirable recruitment targets for creating a robust technology culture. Using low labor costs, relocation incentives and the availability of an extremely qualified technical workforce as inducements, many foreign countries present an attractive alternative to California aerospace companies struggling with the cost of living and doing business in the Golden State.

When technical workers are in short supply and labor costs are high compared to global rates, the impetus for foreign relocation is even stronger.

National pressures also include the fact that individual states nationwide seek to enhance their positions as 21st Century innovation and technology centers by attracting California aerospace firms. Most large aerospace firms and even many mid-sized firms now receive ongoing, periodic recruitment calls from numerous other states. While California's climate, aerospace infrastructure and legacy of aerospace talent are retention assets, the pull to consider alternative locations is strong. The higher cost of doing business in California compared to other states has been researched by aerospace firms and the average differential is 30%. Officials from other states are often more educated, eager and vocal than California policymakers about the benefits of a robust aerospace industry. The industry's high-tech, high-wage profile, positive trade balance, billions of dollars in government and commercial aerospace investment, as well as the industry's appeal as a poster-child for 21st Century technology and innovation create a strong rationale for development by other states of attractive economic and workforce incentives.

In contrast, the aerospace industry in California lacks recognition as a key statewide economic driver. The Aerospace Advisory Committee opportunity is one of few to enable aerospace input into development of California economic policy. The industry sees scarcely any true aerospace champions within the legislature, while policymakers in other states join together to support their aerospace partners. Retention of aerospace in California does not appear to the industry to be a high State priority, as communities with potential aerospace losses seldom receive State support for regional retention efforts and companies receive virtually no recognition of their positive contributions to the California economy.

Nonetheless, the California aerospace industry appreciates the value of a potential partnership with the State and welcomes the Aerospace Advisory Committee opportunity to suggest strategies to ensure industry success in California.

Aerospace Advisory Committee Members

Chairperson: The Honorable Andrea Seastrand, Executive Director, California Space Authority
John F. Daegele, Sector Vice President, Systems Engineering, Integration & Test, Northrop Grumman Space Technology
Celeste Ford, CEO, Stellar Solutions
Kellie Johnson, President/CEO, Ace Clearwater Enterprises
Len Kwiatkowski, Vice President/General Manager, Global Communications, Lockheed Martin Space Systems
Mark Sirangelo, CEO and Chairman, SpaceDev, Inc.
Susan Sloan, Vice President, Mission Assurance, Raytheon Company
Gary S. Toyama, Vice President Southern California Region, Integrated Defense Systems, The Boeing Company

¹ May 7, 2008 Briefing to the Lt. Governor and the California Commission on Economic Development

² *Workforce of the Future* (The Boeing Company); *Raytheon Space & Airborne Systems presentation to Lt. Governor John Garamendi, April 24, 2008*; *STEM Collaborative Action Plan*; *STEM Report* (U.S. Department of Labor/Employment Training Administration)

Recommendations in Support of the California Aerospace Industry

Recognize and Celebrate California Aerospace Industry, Companies and Infrastructure

- Highlight California air and space in Governor/Lt. Governor/legislator speeches, reports, hearings.
- Celebrate corporate and entrepreneurial aerospace “firsts” and key accomplishments in California.
- Showcase national aerospace infrastructure located in California, periodically touring California aerospace government, corporate and entrepreneurial sites.
- Champion nationally and internally the value of California as premier U.S. center of aerospace suppliers supporting commercial, civil and national security aerospace.
- Celebrate high-visibility achievements of three premier NASA sites located in California.
- Seek ongoing State understanding of California air and space impact on California economy and state’s other key industries.

Support Air and Space Companies, Infrastructure Stakeholders

- Establish executive level linkage with key aerospace corporations and high visibility entrepreneurs, providing for at least annual status meetings.
- Establish executive level linkage with California’s military base commanders.
- When budget allows, re-establish Office of Military and Aerospace Support (OMAS) to ensure linkage with military base communities, adopting recommendations in OMAS report.
- Provide executive office linkage and support for key aerospace company and mission attraction, retention, providing executive office response for aerospace retention efforts critical to maintaining California aerospace capabilities, infrastructure.
- Build and support California aerospace champions within California State Legislature and Congressional Delegation.
- Assist companies doing aerospace site comparisons, site searches, providing comparison data for alternate California sites in less costly areas of the state when appropriate.

Leverage Statewide Air/Space Technologies to Address California Priorities

- Explore utility of satellite services, small sats, satellite networks to address State/regional challenges
- Assist key California industries in reducing costs, improving performance through introduction to aerospace solutions for industry challenges
- Provide leadership on key national challenges such as climate change, environmental management, agricultural yield, energy independence, etc. by exploring capabilities of California aerospace to address these issues

Ensure Global Innovation Edge through California Aerospace Retention/Growth

- Provide State leadership to focus statewide economic development strategy on creation of a globally competitive entrepreneurial, knowledge-based economy, garnering input of Commission’s advisory committees, leveraging the Innovation-Driven Economic Development Model created for the State with U.S. Department of Labor funding.
- Ensure a statewide economic development innovation infrastructure by linking California’s diverse corporate R&D, entrepreneurial, academic and federal assets.
- Align science, technology, engineering and math (STEM) education at all educational levels and with industry needs for a high-tech professional workforce. Initiate a statewide STEM strategy in partnership with industry, building on the foundation of the STEM Collaborative Action Plan.
- Ensure multiple student choices in reaching the high-tech workforce, including Career Technical Education (CTE) options that provide certifications and/or community college technical degrees enabling high school graduates and others to earn a good family wage.
- Measure economic development success by the number of high-tech, family-wage jobs created rather than the low pay/low skill jobs generated. Consider use of the Pollack Model as statewide standard to measure positive economic impact of California firms and prove value of manufacturing, high-tech sectors to California residents.
- Explore ways to reduce business and aerospace operating costs in California, prioritizing re-institution of California R&D and production tax incentives, and introducing permit process refinements.
- Provide incentives for California companies seeking expansion opportunities to consider California’s economically distressed areas instead of other states.
- Create center for air and space technology and entrepreneurship, ensuring linkage with education.
- Consider developing aero and space technology grant programs for innovators.
- Support development and leverage of institutes featuring aerospace technology development.
- Support Mojave Air and Space Port, the first U.S. inland spaceport, for next generation spaceflight.
- Continue to provide State leadership on reform of U.S. export licensing regulations.