

“Keeping America’s Lead in Aerospace”

Remarks by
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Thank you, Carol. This afternoon I want to talk about the importance of aerospace, the state of the industry today, and some of the threats our industry faces, and what we can do about them.

Aerospace at a Crossroads

I believe we’re at a crossroads. No one is ahead of America in aerospace, at least not yet. The U.S. is the undisputed leader. We build the most efficient and capable commercial airplanes in the world. The weapons systems we produce are unmatched, Our commercial and military satellites are phenomenal in what they can do, And our orbital manned space program – a program the United States will walk away from this year – is second to none.

But our leadership is being threatened by other countries intent on replacing the U.S. as the world’s leader in aerospace. Today, we’re not trying to reclaim our lead. We’re trying to keep it. The question is: Will we take the steps required to maintain our leadership? Or will we allow aerospace and aviation to join the list of industries that America used to lead?

Aerospace Makes America Strong

To understand why that’s so important, we have to look at what aerospace has done for our country. I was fortunate enough to join this industry in the final quarter of a remarkable century.

To me, American aerospace defined the 20th Century. It helped win World War II. It brought the world closer together with commercial air travel. It changed the way we communicate with commercial satellites. And, of course, it changed forever how we look at the world around us when man first walked on the Moon.

I am also convinced that aerospace will define the 21st century. The question is, will it be U.S. aerospace that does it? That’s a critical question because what we do helps keep America strong.

No industry has a bigger impact on exports. It tips the balance of trade in our favor by about \$53 billion. President Obama has set the goal of doubling U.S. exports in five years. Aerospace will be essential to help us reach that goal. When you look at direct

and secondary impacts, it's been estimated that U.S. civil aviation alone is responsible for 12 million jobs and contributes to more than 5 1/2 percent of the US GDP.

The State of Aerospace

So what does our commercial marketplace look like today? It's vibrant, growing, challenging and rapidly changing.

A Recovering Market

The commercial aviation market has been roaring back the last 15 months, despite the impact of the worst recession since the Great Depression. At Boeing, we have a 7-year, \$263 billion commercial airplane backlog. With air traffic increasing at a rate 1.5 times world GDP, the future looks good. Looking forward, we expect world GDP to grow at about 4 percent between 2011 and 2015. While not discounting events in Northern Africa, and the potential impact on the price of oil, the future looks good from a macro standpoint. Over the next 20 years, we see a need for 31,000 new airplanes. That's a \$3.6 trillion dollar market. It's a market many countries and companies covet.

That outlook is being shaped by many factors. I'd like to talk about a few of them: globalization, competition, and shifting demographics.

Globalization

Let's talk first about globalization. The world is more interconnected, yet more complicated because of that interconnection. What happens in other areas of the world matters everywhere. We saw that with the earthquake in Japan. Despite the fact that our factories in Washington state are more than 4,000 miles from the epicenter, we felt the impact of that disaster. Tom Friedman was right; the world is flat.

Globalization means our partners and customers are not just in the U.S.; they are around the world. And of course, globalization drives air traffic. In 1990, 72 percent of passenger traffic was in Europe and the Americas. By 2030, that number will be only 45 percent. Soon, over half of the world's GDP will be coming from emerging countries.

Increased Competition

We're also seeing increased competition. The traditional duopoly between Boeing and Airbus is over. Other countries and companies are attracted by the \$3.6 trillion market I mentioned earlier... countries like China with Comac, Russia with Sukhoi, Canada with Bombardier and Brazil with Embraer.

Not all the new entrants will be successful, but some of them will. We've got to assume our competitors will do what they say they're going to do. They have the financial and intellectual resources necessary.

Let me give you an example. The Chinese have made commercial aviation a national priority. They spent \$5 billion on a regional jet. It didn't meet market expectations. They are now developing the C-919, a narrow-body airplane to compete with the 737. It will be competitive in China. Eventually, Chinese airplanes will compete around the world.

China is investing \$30 billion in this industry. They're one of only three countries to put a man into space and once they make something a national priority, they make it happen.

At the same time, China is the largest market outside the United States for many companies – including Boeing. And the desire for market access has convinced many American executives to share technologies that may one day help Chinese companies compete around the world for the same business. We have to be very mindful in balancing those risks and potential rewards, not only in China, but around the globe. It's interesting that China has moved from customer/supplier to customer/competitor in four short decades representing both opportunity and challenge. This should not scare us. It should focus us.

Changing Military Threats

Meanwhile, military threats have also evolved. During the Cold War, we knew who our enemies were, and we trusted them not to use weapons of mass destruction. Today we often don't know who they are, but we know that if given the chance to use deadly weapons they will. As a result of this shifting dynamic, the needs of our military have evolved. Our armed forces must prepare for nontraditional threats, and that's changing the mix of platforms and priorities the DoD is seeking.

Shifting Demographics

A final issue influencing the future of aerospace today is our demographics. About half of Boeing's engineers will be able to retire by 2015. The same is true for all the aerospace companies. We simply are not producing enough engineers in this country, with the right skill sets, to meet this demand. It's contributing to what I call the "intellectual disarmament" of our country. Along with reduced R&D spending, I believe this puts us at risk. If we continue along this path: America will lose its lead in aerospace. We also risk breaking a long-standing continuum of capability in our industry. Our economy will lose an important engine of growth, and our country will be more vulnerable and less secure. Companies like Boeing will survive, but it may be outside the U.S. We will go to where the engineers and capabilities are.

Threats to America's Aerospace Leadership

In my view, we face threats in five areas:

1. The industrial base
2. Innovation and technology
3. The environment
4. A level playing field
5. And education

I believe our future -- as an industry and as a country -- will be determined by how we respond to these threats.

1. A WEAKENING INDUSTRIAL BASE

Today we take America's industrial base for granted, but we do so at our own peril. Think about what a strong industrial base has meant for our country.

It was the "arsenal of democracy" that equipped us to win World War II and the Cold War. It put a man on the moon. It made America the worldwide leader in space, commercial aviation, and defense.

But a strong industrial base is not a given. It's a product of the right policies, investments and priorities – and of time. We don't have to look far to see how an industrial base can quickly wither away. The UK was once renowned for its aerospace and defense manufacturing. Now that country is buying F-35s, C-17s, Apaches, and Chinooks from us, and of course, commercial airplanes. UK leaders realized a few years ago that they needed an industrial policy and have put one in place. But it won't be easy for the UK to rebuild its capabilities, and that should serve as a warning to us.

When we don't invest in new development programs and when policymakers don't consider how procurement decisions impact the industrial base, we risk losing talent and expertise that's taken us decades to build.

Our engineering talent is not a fixed asset. It's made up of people who need challenging new projects. And if they don't have them, they move into other industries or retire. Once lost, reconstituting it is very difficult and will take decades. With the F-35 in test flight, we are now at a point where there are no new military airplanes or helicopters in development by the DoD. I think that's the first time we've been in that situation in probably a hundred years. We risk following the UK in dismantling our industrial base if we don't do something about that.

You might think, "We are building aircraft for the military, so what's the problem?"

To be a viable contractor and an integrator of very complex systems, you have to understand how to do R&D. You have to take R&D into detailed design. You have to transition detailed design into production. You have to run your production systems, and you have to have a very healthy supply chain. What we're seeing right now with no new start in the Department of Defense is we are losing our ability to do detailed design. We are losing our capability to transition design into manufacturing. Once that's gone, it will take a long time to reconstitute. I know this is an issue. That was one of the problems we had on the 787 program. We had not done a new development program since the 777, and we paid the price as a result.

On the space side, tens of thousands of very experienced engineers will lose their jobs in the gap between the Space Shuttle's last mission and the start of the next program. Earlier this month, the United Space Alliance, the NASA contractor responsible for operating the space shuttles, announced it will lay off up to 50 percent of its work force

or about 2,800 workers. NASA astronauts who have trained for years are wondering what they will do next.

Without clear direction and investments, we're going to lose the intellectual capital it's taken us 50 years to develop. Once we park the shuttle this summer, I predict that the Chinese will walk on the moon before we once again put an American into low-earth orbit in a U.S. launch vehicle. To me, that's unconscionable.

Policy Needed

But there are steps we can take. Most every nation that is serious about sustaining and strengthening its industry has an industrial policy. Ours is one of market forces. In my mind, it is not clear, coherent or comprehensive enough. I'm not saying we need a policy that defines specific outputs and production, or that we should build things that aren't needed. But we do need to start the dialogue about an industrial strategy to ensure the long-term viability of our defense and industrial base. It's critical to our long-term economic and national security.

We can't wake up some morning and decide we want a certain capability and find there are no contractors with the required technologies or the experience and wherewithal to do a complex development program. This is an area where we all can encourage dialogue.

To some people in commercial aviation, the defense industrial base might not seem essential, but think about commercial aviation without it...

- without GPS ...
- without heads-up display...
- without satellite communications...
- without radar...
- I could go on and on.

When you realize that the defense industrial base affects all of us in this room, I think you can begin to see the value in all of us speaking out on it.

I find it curious that the Industrial Base wasn't considered during the tanker competition. If it was, that wasn't clear to me. The U.S. government didn't seem worried by the possibility of shipping up to 50,000 jobs overseas to a subsidized competitor. Fortunately that work will be staying in the U.S.

But no one should think that this one project alone will sustain America's defense industrial base. It will not.

2. INNOVATION AND TECHNOLOGY

The second threat to America's leadership in aerospace concerns innovation and technology. We're seeing increased competition on both the commercial and defense markets. In commercial aviation, we have the new entrants I mentioned -- China,

Russia, Canada and Brazil. And we have new defense entrants such as China. Many saw the J-20 – China's new stealth fighter -- as a military threat. I saw it as another competitor in the global defense market.

The way to win in the face of increasing competition – even heavily subsidized competition – is through better innovation and technology. At Boeing, we always want to be building tomorrow's airplane while the other guys are building today's. The 787 Dreamliner will be the first new airplane of the 21st century. Some say that distinction belongs to the Airbus A380, but in my mind, that's the last airplane of the 20th century because it was based on the last century's technology. The 787 is based on 21st century composites and innovations.

Some companies build an airplane and see if they can sell it. At Boeing, we sell the airplane and then we try to build it. While that may put more pressure on our engineers, it ensures we're delivering what our customers want -- the best, most capable airplanes in the world.

Ingredients for Innovation

From my perspective, there are ingredients to innovation that you won't be successful without:

- A vision that seeks to create the best products in the world by any measure; you have to want to be the best;
- A commitment to invest resources in people and technology;
- A culture of openness where people are willing to share ideas and best practices;
- A skilled, adaptable workforce and a leadership culture that encourages innovation as a competitive imperative in the global marketplace;
- And an awareness that the best ideas are not always inside a single company... or inside the U.S.

Innovation is important for my company, but it's also vital to our country's future. Studies have shown that more than half the growth of America's GDP is due to technological innovation.

Looking ahead, innovation will determine the strength of our economy for decades to come. Just imagine some of the innovations we might see...

- Imagine advanced composite materials that are light, strong, and "smart" too. A material that will morph in flight to be optimal... wings that imitate nature.
- Imagine most fuel for aircraft being made from plants. It will be cleaner and higher performing than today's petroleum-based fuel – and with less CO₂.
- Imagine a hypersonic aircraft that skims over the top of the atmosphere.

All these things, and more, are possible. But it will take investment and innovation. If we don't do it, someone else will.

Policies Needed

There are a number of policies that encourage innovation in America. We need to renew the U.S. R&D tax credit. Wherever R&D goes, innovation and economic growth follow. The tax credit will expire, once again, at the end of this year. We need to renew it as a “permanent, stable and predictable incentive” for research in the U.S. It's an effort that I know all of you support. The credit helps more than 18,000 companies of all sizes. Last year, President Obama set the goal of making R&D spending 3% of U.S. GDP. A stronger, permanent tax credit will help us get there.

3. ENVIRONMENT

The third major threat to American aviation concerns the environment. When I look ahead at the factors that could limit our growth, I see restrictions on CO2 and noise, traffic density, and infrastructure.

CO2

Commercial airplanes now account for 2 percent of man-made global carbon emissions. But with air traffic expected to grow in the coming decades, we've got to do more to reduce our impact ... and we are making progress.

We're focusing on getting ahead of new regulations.

- Making each generation of airplane more aerodynamic...
- Using lightweight materials like composites...
- Engines that are more efficient and produce less noise...
- We're also looking at biofuels and ATM.

At Boeing, 75% of our R&D directly impacts the environment. Over the past 50 years, we've achieved more than a 70 percent reduction in fuel consumption and the resulting CO2 emissions. That progress continues today. The 747-8 is 16 percent more fuel efficient than the 747-400. The 787 is 20 percent more fuel efficient than the plane it will replace. The 737 and the 777 are the most efficient in their class and getting better all the time.

Noise

In terms of noise, over the past 50 years, we've achieved a 90-percent reduction in the noise footprint when compared with original commercial jets.

Infrastructure

Infrastructure is another limiting factor. In the U.S., it can take 20 years to construct a new runway. Meanwhile, other countries are building out their infrastructure aggressively.

China plans to construct 45-55 new commercial airports over the next five years and make numerous improvements to existing airports. To the best of my knowledge, there aren't plans to build any new airports in the US during that time period.

Air Traffic Control

Air Traffic Control is an area with huge opportunity. We have to make better use of the airspace we have. We believe we can get a 10 to 20 percent improvement in airplane efficiency for all existing airplane models just by modernizing our antiquated Air Traffic Management System. Look at the money we're spending on the 787, which will reduce the carbon footprint dramatically from the airplanes it replaces. But a similar investment for Next Generation ATM will reduce the carbon footprint by 10 to 20 percent for every airplane flying today. It's an investment we need to make. With the next generation ATM system, we can get improvements through: continuous, low power approaches; more direct routing; closer spacing between planes; and arrivals tailored to an airport's geography, shortening the approach.

We're also investing in sustainable biofuels. The recent rise in oil prices reminds us of one reason why biofuels are so important. Biofuels are not only the right answer for the environment, but also for our customers and our country. Billy Glover from Boeing is going to be up here later to share more about our progress.

Policies Needed

In terms of federal policy, we're going to need a sound approach to the environment that achieves real results but does not disadvantage U.S. industries relative to our international competitors.

4. LEVEL PLAYING FIELD

The fourth threat to American aerospace is a marketplace where competitors don't play by the rules. We need a level playing field where everyone in aerospace operates within a rules-based trading system.

WTO - Subsidies

The recent ruling by the World Trade Organization is an important one. The WTO confirmed that Airbus has enjoyed billions of dollars in illegal government subsidies to fund their commercial airplane development for more than 40 years, particularly in the form of launch aid. Those illegal government subsidies harmed the U.S. aerospace industry and resulted in the loss of billions in exports and tens of thousands of U.S. jobs. Vigorous enforcement of the WTO findings will send a message not only to Europe, but to all competitors. It will remind them that rules matter and will be enforced.

Export-Import Bank

In addition to a rules-based system, we also need to reauthorize the Export-Import Bank. Now I recognize that these days asking for help for any entity that has the word "Bank" in its name is a tough sell. But here are a few facts:

Last year (FY2010), financial guarantees from the Ex-Im Bank supported more than \$34 billion in U.S. exports. That helped create or sustain 227,000 jobs. Eighty-five percent of the Ex-Im bank's transactions directly benefited small business. And an often-misunderstood fact: rather than cost taxpayers money, the Ex-Im Bank is the bank that actually returns money to taxpayers. Since 1992, the Bank has returned more than \$5 billion to the Treasury and taxpayers.

I might add that Ex-Im is one bank that did not need a bailout. Reauthorizing the Bank is vital to meeting the President's goal of doubling U.S. exports over five years and creating 2 million new jobs, goals that all of us share.

5. EDUCATION

Now, we can get all the things I've talked about right. But without a quality education system, America's leadership in aerospace is at stake. Earlier, I mentioned my concern about the "intellectual disarmament" of our country. It used to be the best and brightest came to this country to study and then stayed. Today, they go home and compete with us.

Demographics

Boeing employs about 36,000 engineers. Half will be able to retire by 2015. We hope they don't because we don't have new engineers to take their places. You have to wonder why American students are not embracing engineering as enthusiastically as they are in other parts of the world. My view is that engineers are not celebrated in this country as they should be.

On a recent visit to Russia, I toured the Novodevichy Cemetery in Moscow. And what stood out, beyond its tranquility and beauty, was the honor it bestowed upon its scientists, mathematicians and engineers. Their gravesites were among those of noted writers, artists and heads of state. There was Andrei Tupolev, Sergey Ilyushin and Pavel Sukhoi. All famous airplane designers

It made me wonder—when was the last time I saw a mathematician, scientist or engineer gracing the cover of a national magazine or the front page of a metropolitan newspaper in America? It's also interesting to note that China's current leader and his heir apparent are both engineers.

Inspiration

I think another reason why too few of today's students are pursuing careers in math, science and technology is because we haven't inspired them with exciting goals.

Young people around the world are looking for the same thing – a career that challenges them, allows them to grow and reach their potential, and connects them to something greater than themselves. We can attract tomorrow's engineers by capturing their imagination and letting them be part of an exciting mission that will shape the

future ... just as my generation was drawn into aerospace by President Kennedy's call to land a man on the moon.

I think there are very compelling missions for this generation. They will rebuild and save the Spaceship we are all on together, our planet Earth. This generation will find the solutions to global warming, energy independence and health care. They will rebuild this country's and the world's infrastructure ...and will change aerospace in untold ways.

Solutions

Inspiring young people with those missions is important. And when we attract them to STEM careers, we need to make sure our educational system can equip them to succeed.

On education, the answers are never easy. We spend more on education than other countries, but we're not getting the results. At the same time, I know that many states are struggling with their budgets and looking for areas to cut. If there is one area we should put a fence around... it is public education.

All of us have a role to play, including industry. Boeing, like many of your companies, is supporting education programs in high schools and colleges around the country. I think these public-private partnerships have a lot of potential. But in the end, education must remain a public responsibility. If there is one thing our country should stand for and guarantee, it's a quality public education for every young person.

Conclusion

In closing, I realize that I may have painted a challenging picture of our future – and it is challenging. But we can overcome the threats I mentioned if we take the right steps. We still have the lead, and we can keep it.

In December 1903, Orville Wright soared above the beach at Kitty Hawk for 12 remarkable seconds – 12 seconds that changed a century. I might note that the flight of 120 feet could have taken place within the fuselage of a 747-8 airplane.

Decades later, Neil Armstrong carried on the legacy that began that December day. In the 1960's, each Apollo astronaut was given something called a "Personal Preference Kit" to take with him into space. It wasn't big (five pounds total), but the contents were theirs alone to choose. Some astronauts brought family mementos.

Armstrong made arrangements with the National U.S. Air Force Museum to bring with him two very special items: a piece of wood from the propeller of the 1903 Wright Flyer and a piece of fabric from its wing.

The thread that started with the Wright Brothers and soared with Apollo continues today as we reach for new frontiers.

No one can do what America can do today in aviation and aerospace. And no nation has benefited more from the great advances of our industry than the United States.

The lead that we enjoy today is ours to keep ... or to lose. The advantages that aviation gives America are ours to keep ... or to squander.

By every measure, aviation helps answer the toughest questions about America's future – a future that we have the power to shape. We are the stewards of a proud and vital legacy. Together, we can keep America the world's leader in aerospace.

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