WHAT BOEING HAS MEANT FOR AMERICA

A Centennial Assessment

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FINDINGS IN BRIEF

An Enterprise Unlike Any Other. The Boeing Company was founded on July 15, 1916. Over the following century, Boeing became the biggest aerospace enterprise in the world, famous for its jetliners, fighters, rotorcraft and space systems. With annual revenues approaching $100 billion and an order backlog of nearly half a trillion dollars, Boeing is America's biggest exporter and the world's number-two military supplier.

Why Boeing Survived While Others Died. Boeing managed to outlive competitors by developing a culture that was not dependent on the guidance of its visionary founder, and investing continuously in technology rivals could not match. Rather than specializing in a handful of products, it continuously adapted and acquired as market conditions changed, applying its skills across a broad array of aerospace markets. Focused diversification within aerospace gave the company expanded opportunities and resilience.

A History Of Fearless, Disruptive Innovation. Boeing has inherited a rich tradition of innovation from many sources. The National Academy of Engineering lists half a dozen Boeing aircraft among the greatest engineering achievements of the 20th Century, and the company continues to disrupt markets today with offerings like the 787 Dreamliner. Keeping ahead has sometimes required Boeing to take big risks, but its success is grounded in developing novel products that change the direction of global commerce and culture.

Signature Products That Changed The World. Boeing's 737 jetliner is the most heavily used commercial transport in history. Its 777 is the world's most popular widebody, offering greater range than any other commercial transport. Boeing's military products have been similarly impressive, with planes like the iconic B-52 bomber and F-15 fighter defining the meaning of air dominance. The B-52 remains the most common heavy bomber in the U.S. fleet today, and the F-15 has never been defeated in aerial combat.

Boeing's Impact On U.S. Economic Performance. Boeing employs 160,000 workers, and has 20,000 suppliers -- the vast majority in the U.S. Over 70% of its commercial revenues and over 30% of its military revenues are generated abroad, making it America's biggest exporter. Unlike other manufacturing companies, Boeing has not moved offshore in pursuit of cheap labor or lower taxes. Instead it continues to innovate in America, sustaining a vast "ecosystem" of suppliers in virtually every state.

Boeing's Contribution To U.S. National Security. From its ground-breaking B-17 bomber in World War Two to the carrier-based F/A-18 Super Hornet fighter today, Boeing has played a central role in helping America's military keep the peace. Most of the bombers and missiles in the U.S. strategic nuclear force were built by Boeing, as were many of the fighters, tankers, airlifters, radar planes and military rotorcraft developed in recent decades. Its launch systems, satellites and munitions are vital to U.S. military power.

What Boeing's Brand Says About America. Boeing is one of the world's most valuable brands, attesting to its achievements as a purveyor of human progress. Boeing's success reflects the virtues of the American free-enterprise system, demonstrating the U.S. remains a technology leader that can compete effectively in exporting manufactured goods. Boeing has prevailed by working with both commercial and government customers, proving that excellence in one market segment need not preclude success in the other.

The Promise Of A Second Century. Boeing will continue dominating the commercial-transport market over the next generation with disruptive product offerings competitors cannot equal. Its large-aircraft skills will be applied to building military tankers and sensor aircraft, while services -- already a sizable part of its business portfolio -- continue growing. The company's space business will grow too, and its rotorcraft business will remain a global leader. The company will pursue new opportunities in manned and unmanned systems for diverse customers.

INTRODUCTION: AN ENTERPRISE UNLIKE ANY OTHER

On July 4, 1915 a Seattle lumberman and aviation enthusiast named Bill Boeing took his first plane ride with a barnstormer who was touring the country. Boeing was exhilarated by the experience, but after a few flights he was convinced he could build a better plane than the daredevil was operating. A year later, on July 15, 1916, he started a company to do just that.

The company to which he soon lent his name still exists today. In fact, the Boeing Company has grown to become the biggest aerospace enterprise in the world, famous for its jetliners, fighters, rotorcraft and satellites. It is the dominant global supplier of commercial transports and the second biggest supplier of military systems. It is also America's biggest exporter, owing to the fact that most of its revenues are generated overseas even though more than 80% of its suppliers are in the U.S.

Everything about Boeing is big. It employs 160,000 workers. It has over 20,000 subcontractors and suppliers. It holds 16,000 patents, including over a thousand for its recently introduced 787 Dreamliner -- the world's first commercial transport made mainly from lightweight composites rather than metal. The plant where the Dreamliner is assembled along with Boeing's other widebodies is the largest enclosed space ever built.

But these metrics merely describe the Boeing Company as it exists today. In previous incarnations, its legacy cultures provided much of the technology that enabled America to win the Second World War, and the 40-year Cold War that followed. Those legacy cultures, now gathered into the Boeing fold, included the Douglas Aircraft Corporation that dominated the first generation of commercial transports; the McDonnell Aircraft Corporation that produced the greatest Cold War fighters; the North American Aviation enterprise that built the B-1 bomber and the Space Shuttle; and the Hughes Space & Communications business that developed the world's first geosynchronous communications and weather satellites.

In other words, today's Boeing Company subsumes much of U.S. aerospace history, and at nearly $100 billion in sales annually is a preeminent example of how successful America's free-enterprise system has been. The purpose of this study is to provide a concise centennial assessment of what Boeing has meant for America -- to describe how Boeing has contributed to America's rise as a nation during the greatest era of economic and technological progress mankind has ever seen.

The study begins by trying to explain why Boeing survived while dozens of competitors did not, and then focuses on its century-long history of introducing disruptive technologies into the marketplace. That is followed by a description of some of the company's most famous products, and how they changed the course of civilization. The discussion then turns to an assessment of how Boeing's legacy cultures collectively have impacted U.S. economic progress and military power. An interpretation of what the Boeing brand says about America leads to some concluding observations concerning where the company's second century may take it.

This is not an exhaustive treatment of the Boeing story. Whole books have been written about Boeing products such as the 747 jumbo jet and B-52 bomber. The goal here is to capture the spirit and significance of one of the greatest enterprises American civilization has ever produced, an enterprise unlike any other.

Boeing's iconic B-52 Stratofortress bomber is listed by the National Academy of Engineering as one of the greatest engineering achievements of the 20th Century. With a top speed of 650 miles per hour and an unrefueled range in excess of 8,000 miles, the B-52 remains the most common heavy bomber in the Air Force fleet today.

WHY BOEING SURVIVED WHILE OTHERS DIED

The aviation business that Bill Boeing embarked on in 1916 was part of what economists now call an "infant industry." Dozens of upstart producers were jockeying for contracts and customers in a sector that hadn't even existed at the turn of the century. Many of them disappeared in the Great Depression, and many more were absorbed into a few mega-companies at the end of the Cold War. The odds were slim that Boeing would survive as an independent company during a century marked by economic and technological upheaval.

And yet it did. In fact, it thrived while dozens of competitors disappeared. Several of the most famous -- McDonnell Douglas, North American, Hughes and Vertol -- were assimilated into the Boeing family, enhancing its ability to compete. But to understand how Bill Boeing's fledgling enterprise managed to become the biggest aerospace company in history, it is necessary to look beyond the engineering excellence, financial discipline, and economies of scale for which it is now well known. In retrospect, there were other features of the Boeing enterprise making it unique. Here are five of them.

First of all, the Boeing Company managed to fashion a culture of excellence that transcended its founder. Bill Boeing was a visionary, but he left the company in 1934 -- less than 20 years after he created it. Other companies begun by aviation pioneers such as Douglas, Martin and McDonnell never managed to pass on the magic of founders to their successors, and so they gradually lost ground after the creators died. In part because Bill Boeing left so early in the organization's history, the company developed a culture that did not depend on one visionary for guidance.

Second, the Boeing culture was dominated by engineers who invested continuously in new technology. As a result, it frequently disrupted civil and military markets with innovative products no competitor could match. When the Army called for a "multi-engine" bomber in the 1930s, Boeing was the only company that offered a plane with four engines rather than two -- the iconic B-17. When the Air Force wanted a highly maneuverable fighter that could defeat any enemy in the 1960s, Boeing antecedent McDonnell Douglas offered the revolutionary F-15. When Marines sought a rotorcraft in the 1990s that could land like a helicopter but match the speed and range of a plane, Boeing partnered with Bell Helicopter to offer the unique V-22. Its track record on the commercial side, from jumbo jets to Dreamliners, has been equally disruptive.

Third, Boeing adapted as the market changed rather than specializing in a few signature products. When the War Department sought heavy bombers in World War Two, Boeing switched from making small planes to big ones. When the civil aviation sector grew rapidly after the war, it adapted its large-plane technology to making airliners. When piston engines gave way to turbojets, it produced the first successful jetliner -- the 707 -- and then developed the first jumbo jet as competitors were trying to match the success of the 707. When worries about a bomber gap with Russia gave way to concern about a missile gap, it turned to making the Minuteman ICBM -- and then became a leading player in the space race. No matter how demand shifted, Boeing kept up.

Fourth, the Boeing Company grasped early in its history how to generate synergies from selling to both commercial customers and the government. Its earliest successes were military and mail-carrying contracts, but as it expanded in commercial markets it learned to leverage investment in products for one type of customer to address the other. For instance, its first-generation 707 jetliner was based on the same design -- the Dash-80 -- as the planes it developed as aerial-refueling tankers and airborne radars for the Air Force. The fungibility of Boeing technology and skills across both market segments enabled it to successfully navigate divergent demand cycles in each segment.

Finally, Boeing used focused diversification to increase its resilience and cope with ups and downs in the demand cycle. It did not acquire business lines far removed from aerospace, but beginning with the Vertol helicopter transaction in 1961, it developed the broadest range of aerospace products in the world, from jetliners to fighters to rotorcraft to rockets to missiles to satellites. It thus avoided the fate of McDonnell Douglas, which was the leading fighter house for two generations, but lacked sufficient breadth to deal with setbacks in its primary market. By becoming an industry leader in virtually every segment of the aerospace business, Boeing was able to overcome reverses in any one segment.

Boeing's widebody 787 Dreamliner is the latest addition to its commercial transport line, and is built largely from lightweight composite materials rather than metal. The Dreamliner is 20% more fuel-efficient than the plane it replaces and delivers superior passenger comfort.

A HISTORY OF FEARLESS, DISRUPTIVE INNOVATION

When Bill Boeing decided after a few plane rides at the dawn of the aviation age that he could build a better aircraft, he was setting a standard for the company that would bear his name. From its inception, the Boeing Company was known for introducing novel, disruptive aircraft designs that changed the way customers and competitors thought about their business. The National Academy of Engineering lists half a dozen Boeing aircraft among the greatest engineering achievements of the 20th Century.

But this legacy belongs as much to the former competitors that eventually were gathered into the Boeing fold as it does to the company that Bill Boeing shepherded through its first 18 years. The Douglas Aircraft Company dominated civil aviation with its DC series of piston-powered transports during the interwar period. North American Aviation produced the most admired U.S. fighter of World War Two, the P-51 Mustang (about 15,000 were built), and then went on to develop the best U.S. fighter jet used in the Korean War, the F-86 Sabre.

McDonnell Aircraft Corporation barely existed when World War Two began, yet won the Navy's first contract for a carrier-based jet fighter in 1943 (North American won a second fighter contract from the Navy in 1945). McDonnell went on to become the world leader in fighter design during the Cold War, first with its F-4 Phantom and then later with the revolutionary F-15. And Hughes Aircraft evolved into a space enterprise that developed the first geosynchronous communications and weather satellites -- transforming global commerce and culture.

So although only the Boeing name remains today, the company has inherited a rich tradition of innovation from many sources. A striking example of its early innovative spirit was the Boeing 247, patented in 1932, which historians now consider the first modern airliner. Commercial airliners, to the extent they existed at all in the early 1930s, tended to be evolved versions of the wood-and-fabric biplanes common during aviation's earlier days. But the 247 was different -- a streamlined, all-metal monoplane with retractable landing gear and de-icing systems on wings and tail.

The 247 did not dominate the marketplace -- it was eclipsed by the even more advanced Douglas DC-3 -- but it changed the way aircraft engineers thought about their trade. The same was true of the Model 299, better known as the B-17 Flying Fortress, which Boeing offered to the Army Air Corps in 1934. Historian Stephen Budiansky says the B-17 "was far and away the most advanced airplane in the world" when it debuted. The longer-range B-29 Super Fortress that followed was so capable it made the case for an independent Air Force after the war.

Boeing's B-47, the new Air Force's first all-jet bomber which flew 200 miles per hour faster than the Super Fortress, revolutionized airframe design with wings that were swept back 35 degrees and engines extended on pylons forward of the wing rather than being built in. This became the standard configuration for all large jets, both military and commercial, until well into the 1960s -- a design concept arguably perfected in the B-52 that still is the most common heavy bomber in the U.S. fleet today, over 60 years after it first flew.

The large-aircraft skills that Boeing honed in supporting the military enabled it to consistently surpass competitors in the commercial-transport sector. Every Boeing jetliner was a disruptive entrant to the market that forced other companies to play catch-up with Boeing design innovations. The 737 became the most popular commercial transport in history, the 400-seat 747 transformed the economics of air travel, the 777 was the first jetliner designed entirely on computers, and the 787 was the first transport assembled mainly using composites.

While Boeing was sustaining its market dominance in civil aviation through fearless innovation that sometimes involved major risks -- one source calls the 747 jumbo jet "the greatest gamble in the history of the aircraft business" -- its various legacy cultures were making huge strides in other areas of aerospace. North American became a big player in space and developed the Space Shuttle. McDonnell Douglas evolved the Delta rocket to become the military's most powerful launch vehicle. No other aerospace company can claim such a legacy of innovation.

The F-15 Eagle built by Boeing for the U.S. Air Force and several allies has never been defeated in aerial combat. Originally conceived as the Air Force's top-of-the-line air superiority fighter, it was later adapted into a Strike Eagle variant that is the most lethal fighter-bomber ever built.

SIGNATURE PRODUCTS THAT CHANGED THE WORLD

During its hundred-year history, the Boeing Company and its various legacy enterprises have transformed American commerce and culture. From the Douglas DC-3 transport to the 787 Dreamliner, Boeing has generated a continuous stream of commercial products that changed the way people around the world traveled and interacted. Its military innovations helped the United States to win the biggest war the world had ever seen, and then triumph in the 40-year Cold War that followed.

Although Boeing is best known as an aircraft company, its impact in other areas of aerospace has been similarly profound. Its corporate achievements include construction of the Apollo spacecraft that took astronauts to the Moon; the Space Shuttle that provided the first reusable launch vehicle; the International Space Station that became the most advanced orbital laboratory ever; the Syncom geosynchronous satellite that revolutionized communications; and the Global Positioning System that has become indispensable to civilians and warfighters.

Boeing has produced dozens of such breakthroughs. A handful of aircraft -- all of them still operating today -- illustrate the scope of Boeing's accomplishments. The Boeing 737 is a good place to start. Conceived in 1964 as a successor to the first generation of jetliners, the 737 has become the most popular commercial transport in history. Over 13,000 have been ordered, with a new family of variants called 737 MAX scheduled to debut in 2017. Hundreds of airlines operate the 737, and over a dozen of the planes take off every minute around the clock.

The 737 is so ubiquitous that it represents over a quarter of all the jetliners currently in service worldwide. But the 747 jumbo jet is arguably the airliner that has most symbolized American success over the last half century. The 747 was the first widebody (multi-aisle) jetliner ever produced, and for 37 years it held the record for how many passengers it could carry. Everything about the 747 was unique, from its quadruple-redundant systems designed to assure safety to its huge assembly site -- the largest enclosed space in the world.

The Boeing 777 conceived in the 1990s might be said to have heralded the dawn of the digital age in civil aviation. It was the first jetliner to be designed entirely on computers. Today it remains the world's biggest twinjet, and is also the longest-range commercial transport ever built (it holds the range record for non-stop flight). Boeing has received 1,900 orders for the 777, making it the most popular widebody ever. The company announced in 2013 that a new generation of "triple-sevens" will be developed using technology from the 787 Dreamliner.

The B-52 Stratofortress that today remains the most common heavy bomber in the U.S. fleet six decades after it first debuted is arguably the most iconic military aircraft of the Cold War era. Continuously upgraded with new on-board electronics and weapons capabilities, the B-52 plays a central role in nuclear deterrence, conventional warfare and counter-insurgency operations thanks to its 8,000-mile range, 650 mph speed and 35-ton bombload. Over 700 B-52s were built -- about 10% remain in the force -- and they will likely continue operating into the 2040s.

A second military aircraft that rivals the B-52 for its role in securing the peace is the highly maneuverable F-15 fighter, developed by Boeing legacy company McDonnell Douglas. The twin-engine F-15 was for many years the Air Force's top air-superiority fighter, and it continues to be the most capable tactical-strike (ground attack) jet today. Shared with a handful of America's most valued allies such as Israel and Japan, the F-15 has never suffered a defeat in aerial combat despite participating in every major war since its debut. Over a thousand have been built.

Boeing's single-aisle 737 jetliner is the most popular commercial transport in history, with over a thousand airborne around the world at any given moment. 737 MAX is the next generation in the evolution of the 737, scheduled to begin airline operations in 2017.

BOEING'S IMPACT ON U.S. ECONOMIC PERFORMANCE

In 2015, the final full year before its centennial celebration, Boeing reported record deliveries of 762 jetliners, surpassing rival Airbus to remain the world's biggest manufacturer of commercial transports for the fourth consecutive year. Meanwhile, it continued to sustain robust sales of military products at home and abroad, retaining its title as the world's second-largest defense contractor. Revenues for the year were $96 billion, and the company's cumulative backlog of orders approached half a trillion dollars.

With 160,000 workers and over 20,000 suppliers, Boeing has grown to become one of the biggest industrial enterprises in the world. Its commercial products are among the most complex and challenging applications of advanced technology ever devised, with a typical jetliner costing $100 million -- or more. Its military products can defeat the weapons of any other nation on earth. Its space systems define the state of the art. And perhaps most remarkably in an age of economic globalization, all of Boeing's signature products are made in America.

The fact that Boeing has not chosen to go abroad in pursuit of cheap labor or lower taxes means that it has a significant impact on U.S. economic performance. It has been the nation's biggest exporter for over a decade, with 71% of its commercial-airplane revenues and 31% of its military revenues in 2015 coming from foreign sources. Boeing export sales for the year totaled $57 billion, representing 45% of all exports from the U.S. aerospace industry -- an industry that employs six million Americans.

Some companies claim high exports from their home market even though much of the content in their products comes from foreign sources. That is not the case with Boeing: over 80% of its commercial-aircraft suppliers are located in the U.S., and its military products are similarly dependent on domestic suppliers. So even though the company does business in 150 countries and expects 80% of its commercial sales will be to foreign customers in the future, it is American workers and communities who derive the lion's share of economic benefits.

One reason that Boeing has been so successful is that it invests heavily in technology, facilities and its workforce. Over the ten years ending in 2015, it spent $38 billion on research and development, and another $18 billion on facilities and equipment upgrades. Its workers are continuously trained in new skills, with wages and benefits ranking among the best in industrial America. Its research and technology organization generated over a thousand patent applications from the 787 alone, and manages over 13,000 active patents worldwide.

Boeing is regularly recognized as among the top aerospace innovators in the world. During the first week of its centennial year, it applied for patents covering runway predictive risk technology, use of shape-memory alloys with composite structural members, a loading and handling system employed in manipulating tubular shapes, aircraft-identification techniques for aerial refueling, and curing of hollow composite structures. The company applies for hundreds of such patents covering cutting-edge technology every year.

As the last remaining U.S. builder of jetliners and the sole provider of an array of sophisticated combat systems, Boeing plays a pivotal role in sustaining one of the few U.S. technology sectors that still has a positive trade balance. Its potential for continuing to benefit U.S. workers, businesses and communities is nearly boundless, because an estimated $5.6 trillion in jetliners will be sold worldwide over the next 20 years, and global investment in military technology will be comparable in scale.

One feature of Boeing's economic impact often overlooked is the large share of company revenues that ends up being passed through to subcontractors and suppliers. For instance, a Boeing 737 -- the smallest jetliner the company builds -- contains 394,000 parts. Most of those items (including 42 miles of wire in each plane) are purchased from other U.S. companies according to Boeing's exacting standards. As a result, Boeing creates jobs and fosters skills in virtually every state, sustaining a vast industrial "ecosystem" across America.

The AH-64 Apache helicopter was built by Boeing for the U.S. Army and continues to be ordered by other nations such as India and South Korea. Considered the world's premier airborne tank killer, the Apache is currently being upgraded by Boeing and will likely take on new missions in the future.

BOEING'S CONTRIBUTION TO U.S. NATIONAL SECURITY

No company in U.S. history has contributed more to the nation's security than Boeing. Its products have played a central role in every conflict that America fought over the last century, and they have played an equally important role in deterring war. For example, Boeing built all of the Minuteman missiles and most of the bombers that comprise two legs of the current nuclear "triad," all of the airborne command posts, and the only defense system capable of intercepting long-range missile attacks against the U.S. homeland.

With regard to bombers, Boeing built the Air Force's first heavy bomber, the B-17, which defined the concept of strategic air power during World War Two. It then went on to build the bigger B-29 that was crucial in compelling Japanese surrender in the Pacific. After the war ended, Boeing developed the first swept-wing jet bomber, the B-47, which rewrote the book on how all jet aircraft should be designed. The B-47's design concept was then evolved into the heavier, longer-range B-52.

Boeing forebear North American Rockwell developed the B-1 bomber which today has the biggest bombload of any strike aircraft in the U.S. fleet, and Boeing was the prime subcontractor on the stealthy B-2. In addition, Boeing built all of the aerial refueling tankers that enable bombers and other aircraft to reach targets anywhere in the world. The KC-135 and KC-10 tankers in the current fleet will be replaced over the next several decades by Boeing's KC-46, a new tanker based on the 767 jetliner.

Each of the hundreds of tankers Boeing has supplied have the ability to carry cargo too. But its greatest achievement in military cargo handling is the C-17 Globemaster III, the most versatile strategic airlifter ever built. Collectively, the airlifters and tankers built by Boeing and its antecedents have provided the joint force with global reach -- the kind of fast-response capability no other nation can match.

The legacy enterprises now gathered under Boeing's banner share a remarkable history of innovation in tactical aircraft. North American Aviation built the much admired P-51 Mustang during World War Two, and then the versatile F-86 swept-wing fighter that bested Soviet MiGs during the Korean War. North American and McDonnell won the first two contracts to develop jet fighters for the Navy.

In later years, McDonnell (and then McDonnell Douglas) would go on to build the tri-service F-4 Phantom II, the dominant Western fighter of the 1960s and 1970s. That was followed by three tactical aircraft configured to the needs of specific services: the carrier-based F/A-18 Hornet for the Navy that evolved into the Super Hornet and the EA-18G Growler electronic-warfare plane; the vertical-takeoff-and-landing AV-8B Harrier for the Marine Corps; and the highly maneuverable F-15 air-superiority fighter for the Air Force, which was adapted to become a lethal strike aircraft too.

Boeing also played an important role in building the F-22 Raptor, the Air Force's first stealthy air-superiority fighter. Along with the bombers and tankers Boeing developed, its fighters have come to define U.S. air power in the decades since the Vietnam War. Their ability to enforce global air dominance has been enhanced by another Boeing aircraft, the E-3 Airborne Warning and Control System (AWACS), which tracks airborne threats and manages air engagements.

Boeing's rotorcraft unit produces the U.S. Army's AH-64 Apache helicopter, the world's premier tank killer. It also builds the Army's CH-47 Chinook heavy-lift helicopter that moves troops, equipment and supplies on the battlefield. In addition, Boeing manufactures with Bell Helicopter the unique V-22 Osprey tiltrotor that combines the vertical agility of a helicopter with the speed and range of a fixed-wing plane.

There is much more. Boeing developed the military's highest-capacity communications satellites, its most powerful launch vehicles, its most widely used smart bombs, and a variety of unmanned drones. It also is building the Navy's new maritime patrol aircraft and submarine killer, the P-8 Poseidon -- which like other Boeing military products will be sold to key allies.

The V-22 Osprey that Boeing builds in partnership with Bell Helicopter Textron combines the vertical agility of a helicopter with the speed and range of a fixed-wing plane. The V-22 has greatly enhanced the agility of the Marine Corps and Air Force special operators, and was recently chosen by the Navy to resupply warships at sea.

WHAT BOEING'S BRAND SAYS ABOUT AMERICA

Boeing is frequently ranked among the world's most valuable brands. In other words, the Boeing name confers value because it is associated in the marketplace with innovation, progress, and a range of other desirable attributes. Brands are by their nature hard to sustain, since one mis-step can diminish popular appeal for years. In Boeing's case the challenge is further complicated by the fact that its corporate character was changed in recent years as new product lines and operating units were assimilated through mergers.

In the years since McDonnell Douglas, North American Aviation and Hughes Space joined the Boeing family, the company has worked to integrate under the banner of "One Boeing" -- a unified team that presents one face to the world. That task is now largely completed. Few people can remember a time when Boeing was not as big a factor in the military arena as it is in civil aviation. The Boeing name and brand are ubiquitous across the full spectrum of aerospace offerings, from jetliners to satellites, from hardware to services.

Obviously, this speaks to the success of Boeing as a multi-generation enterprise that has managed to survive continuous change in technologies and markets. But it also speaks to the success of America, as a place where companies like Boeing could be created and go on to lead their industries. The 747 jumbo jet is recognizable around the globe as a symbol not just of Boeing's achievements, but also America's. So it is worth considering what Boeing's brand says about America.

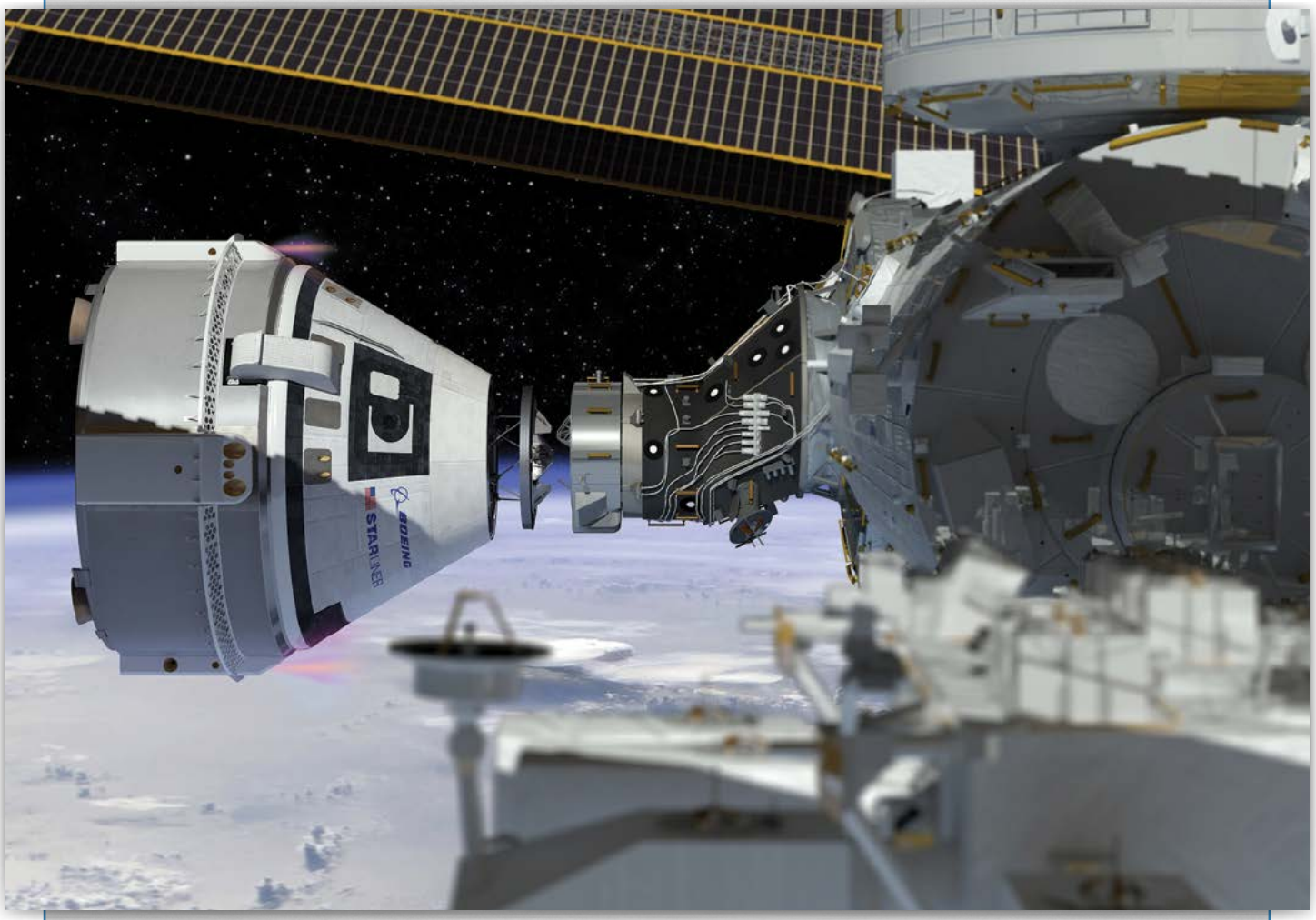
The first thing Boeing's brand says is that America's free-enterprise system produces world-class companies capable of capturing markets and imaginations around the globe. If Boeing were an isolated case, then perhaps the lesson it teaches would be less profound. In fact, though, most of the world's best-known brands are American, even though Americans are only 5% of the world's population. So there really is something unique about America's free-enterprise system, and Boeing's success illustrates the broader pattern.

A second thing Boeing's brand demonstrates is that 100 years after the company was founded, America remains a technology leader -- and not just in aerospace. In order to build a state-of-the-art commercial transport or communications satellite, companies need to integrate innovations from many fields -- lightweight materials, digital electronics, complex software and the like. The manufacturing processes involved include robotics, 3-D printing, and other cutting-edge technologies. Boeing does all of this in the U.S., meaning that America itself is still on the cutting edge.

A third thing that can be learned from the success of the Boeing brand is that manufacturing has a future in America. In recent years, many U.S. manufacturing companies have closed or moved production offshore, provoking pessimism about the future of manufacturing in America. However, Boeing assembles all of its commercial and military products in the U.S. and then exports most of its output. Over 80% of its suppliers are also located in the U.S. Boeing's experience proves American manufactured goods can still compete in global markets.

A fourth thing to be learned from Boeing's success is that in America, it is possible to do business with the government while still succeeding in commercial markets. Some analysts have argued that dealing with federal agencies dulls the ability of companies to stay competitive in other markets. However, Boeing's success is grounded in its ability to leverage skills and technology across the full range of relevant markets, and its highly successful commercial transports have also been used by the Pentagon, NASA, and other government agencies.

There are undoubtedly other lessons to be learned from Boeing's experience about why America outshines other nations decade after decade. Boeing is a quintessentially American enterprise that demonstrates in every product it offers the many virtues of the American system.



The CST-100 Starliner has been developed by Boeing and Bigelow Aerospace as part of NASA's commercial crew program. It can carry seven astronauts or a mix of astronauts and cargo to the International Space Station on which Boeing is the prime contractor, and can be reused up to ten times.

CONCLUSION: THE PROMISE OF A SECOND CENTURY

The Boeing Company begins its second century poised to remain the world's biggest and most diversified aerospace company for another generation -- and beyond. Unlike leaders in other industries that have faltered after long success, Boeing continues to disrupt the marketplace with breakthrough offerings that force customers and competitors alike to rethink how business will be done in the future.

Five trends will likely drive Boeing's business strategy through mid-century. First, it will continue to develop new or improved jetliners that keep it ahead of competitors in operating efficiency and passenger comfort. Second, it will leverage its commercial-aircraft skills into opportunities in military markets at home and abroad. Third, it will expand its business in services, and not just in support of Boeing products. Fourth, it will grow its space business to dominate in all market segments, from satellites to deep-space exploration. Finally, it will innovate to address new markets such as unmanned vehicles.

In the commercial-transport market that currently generates two-thirds of company revenues, three planes will keep Boeing (and America) on top through 2050. The first is the 787 Dreamliner, a fuel-efficient midsize widebody constructed mainly from composites that offers a superior passenger experience no competitor can match. The second is 737 MAX, the fourth-generation version of the world's most popular single-aisle jetliner. The third is 777X, an evolution of the world's longest-range twinjet that will offer a Dreamliner-quality passenger experience.

Even as Boeing prepares for what comes next in commercial transports, it is moving to use the jetliners it has already developed to remain the global leader in large military aircraft. Its 737 has been adapted to serve as the U.S. Navy's P-8 Poseidon maritime patrol aircraft that other countries like India are buying, and has also been developed into an airborne early warning and command aircraft for allies such as Australia, Turkey and South Korea.

The 737 is so economical and easy to support that it doubtless will find many other military uses as Boeing's second century progresses. The larger 767 is being developed into the U.S. Air Force's next-generation KC-46 aerial-refueling tanker, and may eventually replace all of the Cold War tankers in the current fleet. These planes support not only America's joint force but also the planes of coalition partners in overseas military campaigns.

One area where Boeing operates successfully today that still has huge growth potential is services. Most aircraft life-cycle costs are incurred after planes are delivered to customers, in the form of maintenance, modifications, overhauls and the like. No other company in the world has as much experience in providing support and logistics to fielded aircraft, and that part of Boeing's portfolio will continue expanding in the future.

Another area certain to grow in Boeing's second century is space. Its 702 family of communications satellites has two dozen customers, including the U.S. military which relies heavily on the Wideband Global System for worldwide connectivity. Boeing's CST-100 Starliner will carry astronauts to the International Space Station. As space-station prime contractor, Boeing will play a central role in sustaining the orbital laboratory though 2020 (and probably beyond). Boeing is also building the core of the Space Launch System, the most powerful rocket ever developed, which NASA will use for deep-space exploration.

Whether the market segment is rotorcraft or missiles or satellites or jetliners, the Boeing enterprise seems to have boundless opportunities for growth as its second century commences. No other company has built products quite like the V-22 Osprey tiltrotor, or the 787 Dreamliner, or the Space Launch System. In a hundred years of innovation, the Boeing brand has become synonymous with breakthroughs -- which is one reason why Boeing was ranked among the world's most admired companies in its centennial year. That doesn't look likely to change anytime soon.

The Navy's EA-18G Growler electronic-warfare aircraft was evolved from Boeing's F/A-18 E/F Super Hornet, the most successful carrier-based fighter in history. The Growler uses sophisticated jamming techniques to defeat adversary radars and communications so that friendly forces can survive and win in wartime.

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