The Elmer A. Sperry Award

For pioneering engineering advances including lightweight composite wing and monolithic fuselage construction and advanced systems that have led to significant improvements in fuel efficiency, reduced carbon emission, reduced maintenance costs and increased passenger comfort.

Presentation of

The Elmer A. Sperry Award

For 2015

TO

Michael K. Sinnett

AND THE

The Boeing Company 787-8 Development Team

BY

The Elmer A. Sperry Board of Award

REPRESENTED BY THE:

American Society of Mechanical Engineers
Institute of Electrical and Electronics Engineers
SAE International
Society of Naval Architects and Marine Engineers
American Institute of Aeronautics and Astronautics
American Society of Civil Engineers

For pioneering engineering advances including lightweight composite wing and monolithic fuselage construction and advanced systems that have led to significant improvements in fuel efficiency, reduced carbon emission, reduced maintenance costs and increased passenger comfort.

At the AIAA Aviation 2015 Recognition Luncheon
Dallas, Texas • June 25, 2015

Michael K. Sinnett

Michael (Mike) K. Sinnett served as chief project engineer for the 787 program for nearly four years and led the Systems team for the 787 program for more than seven years prior to that. He was one of three members of the program leadership team to serve from the period of program initiation through first delivery.

Mike grew up in St. Louis, one of three children of Jim and Nancy Sinnett. His love of aviation began early; he was often found reading his father's aerospace trade magazines before Jim, who eventually became the Chief Technology Officer for McDonnell Douglas, got home from work.

After earning his bachelor's degree in Aerospace Engineering at the University of Missouri – Rolla, Mike went on to earn a master's degree in Aerospace Engineering as a National Science Foundation Creativity in Engineering Fellow at the University of Missouri – Rolla.

After graduation, Mike spent a year serving with humanitarian organizations serving indigenous populations in the state of Alaska, and six months working on an educational expedition in Africa.

Mike began his aerospace career in a co-op program at the McDonnell Douglas in St. Louis in 1982, working in flight simulation on the AV-8B Harrier II program. This was followed by assignments in AV-8B manufacturing methods, F-15 flight test, Tomahawk operations analysis and F/A-18 flight simulation.

In 1991, Sinnett joined Boeing and held progressively more responsible engineering positions in 747 and 767 flight deck and avionics. He was lead engineer for the 777 and Next-Generation 737 flight deck display systems development.

Prior to his leadership position on the 787 program, Mike held the position of Director of Airplane Systems and supported all Boeing Commercial Airplane programs and services. Earlier he had been chief engineer of the Supply Management and Procurement Division; and chief engineer for 767 Airplane Systems.

In his 787 role, Mike was responsible for airplane design, performance, certification and delivery including flight test, technical configuration of the airplane, product integrity and safety. While he is proud of his association with the 787 program, Mike is quick to point out that it took the efforts of thousands of men and women around the world to create and bring to market the super-efficient new jetliner.

Sinnett was named a Fellow of the Royal Aeronautical Society in March 2011, and an Associate Fellow of the American Institute of Aeronautics and Astronautics in January 2012.

Mike left the 787 program in late 2013 and currently serves as vice president of Product Development for Boeing Commercial Airplanes.

The Boeing 787 Dreamliner

On October 26, 2011, when the 787 Deamliner entered revenue service, Boeing advanced the state-of-the-art of commercial aviation by introducing unparalleled efficiency in operations and a passenger-pleasing interior that is unmatched in the industry. Behind these key advantages are a host of new technologies but the most-important are the extensive use of composites in the airframe and the more-electric systems. The two were developed in parallel and are integrated to ensure maximum value for airlines and their passengers.

Since that first ANA fight from Tokyo to Hong Kong, more than 260 Dreamliners have been delivered to nearly 30 customers. The airplane has flown more than 450,000,000 miles with more than 400,000,000 passengers flying the airplane. The airplane meets its design intent – the benefits planned for the airlines are being realized daily and passengers are appreciating the interior amenities. ANA noted early in operations that fuel efficiency was even better than estimated. Passenger surveys continually rank the Dreamliner flying experience best in class as noted when *Global Traveler* magazine presented the award for best aircraft type as rated by frequent fliers in late 2014.

Boeing continues to improve the airplane, recently delivering the second model of the family – the 787-9 which accommodates more passengers and provides even greater range capability. Reliability of the airplane continues to improve as it matures, with more than 98.7 percent of all scheduled 787 flights departing the gate on time based on technical measures (not counting rain delays or holds for non-technical reasons). More than 800 airplanes remain on the order book and plans are in place to increase production rates to 14 airplanes per month by the end of the decade, an astounding pace of production. Every day, more than 500 flights are flown on the 787 spanning the globe.

Dreamliner flights originate in Asia, North America, South America, Africa, Europe and the Middle East. Fewer than four years into operations, more than 40 new non-stop routes have been opened with the 787, relieving congestion that would otherwise pass through hub airports.

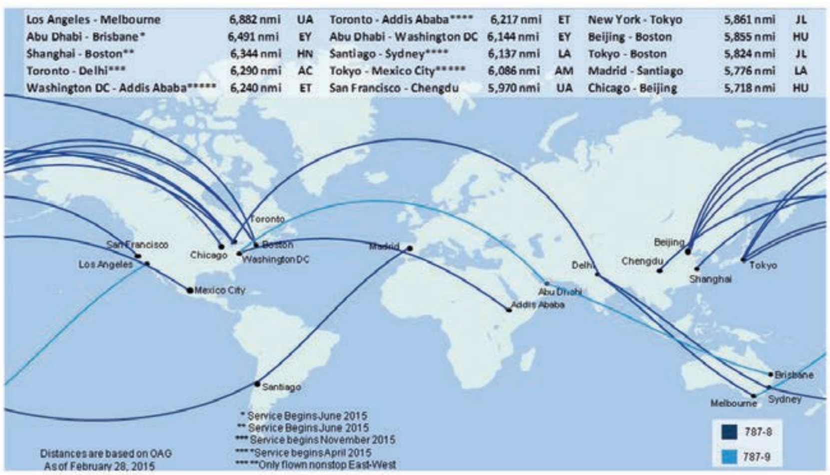
First Boeing 787 Dreamliner delivery to ANA, September 26, 2011.

Unprecedented market response

1,072 orders from 59 customers

787 Dreamliner connecting people around the world

Unmatched in the industry



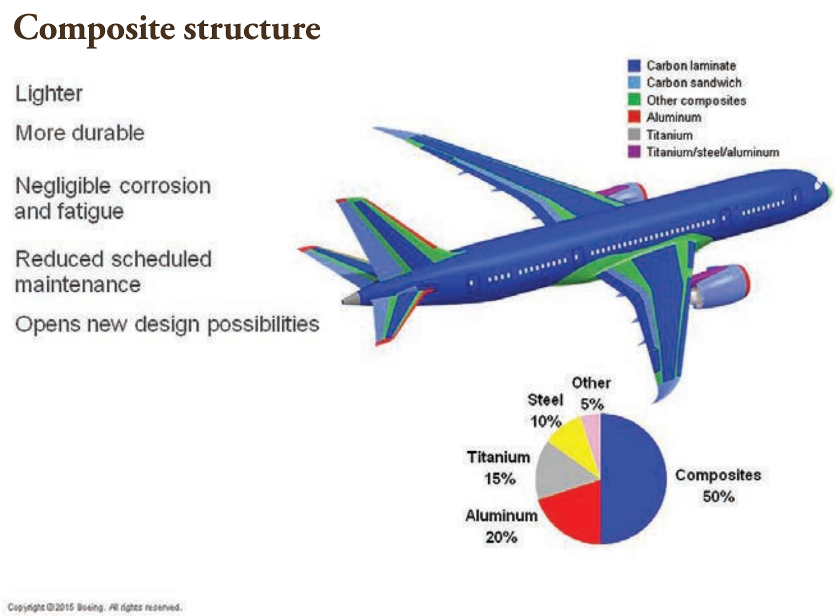
Los Angeles - Melbourne	6,882 nmi	UA	Toronto - Addis Ababa****	6,217 nmi	ET	New York - Tokyo	5,861 nmi	JL
Abu Dhabi - Brisbane*	6,491 nmi	EY	Abu Dhabi - Washington DC	6,144 nmi	EY	Beijing - Boston	5,855 nmi	HU
Shanghai - Boston**	6,344 nmi	HN	Santiago - Sydney****	6,137 nmi	LA	Tokyo - Boston	5,824 nmi	JL
Toronto - Delhi***	6,290 nmi	AC	Tokyo - Mexico City*****	6,086 nmi	AM	Madrid - Santiago	5,776 nmi	LA
Washington DC - Addis Ababa*****	6,240 nmi	ET	San Francisco - Chengdu	5,970 nmi	UA	Chicago - Beijing	5,718 nmi	HU

There are numerous enhancements offered with the 787 Dreamliner. For the airlines, greater range, higher speeds, lower fuel use, fewer emissions, lower landing fees, less maintenance, greater capacity for cargo and higher passenger appeal mean more efficient operations and better return on investment. For passengers, more direct routes, larger windows, a lower cabin altitude, higher humidity in the cabin and cleaner air create a better flying experience.

Composite Structure

Because of the significant strength-to-weight ratio of composite materials, Boeing took the bold decision to make the 787 primary structural material composite in 2003. During a two-day meeting, company executives reviewed years of development and testing results and labored to balance risks and advantages between composites and more traditional aluminum construction. As much as Boeing knew about the material set, the production methods to achieve the rates required were at the time undefined. At the end of day two, the advantages of the composite structure led the company leaders to commit to a composite fuselage and wings for the 787, taking on a production technology development challenge that had to be completed on a tight schedule.

Boeing worked with its international structures team to lead the development of new production technologies that have allowed large fuselage sections to be created as single pieces with integrated stringers. The machines and production techniques were created in Seattle and now operate in Japan, Italy and the U.S. supporting the highest production rates in the history of Boeing production of twin-aisle airplanes.



More than 50 percent (by weight) of the 787 structure is composed of carbon-fiber reinforced plastic, a specific aerospace-grade composite material that was used on a much smaller scale on the 777. Hundreds of thousands of fasteners – nearly 80 percent as compared to traditional jetliners – have been eliminated from the construction of the 787 as a result of the large one-piece sections.

Single-piece composite barrel technology

Unmatched in the industry

Final assembly of the 787 can happen more quickly than other airplanes because of the fabrication techniques. The airplane weighs less, which is a direct enabler for its 20 percent improvement in fuel use over similarly sized airplanes. Using 20 percent less fuel means the airplane is producing 20 percent lower emissions of carbon dioxide.

New emissions benchmark

Smarter choice for the environment

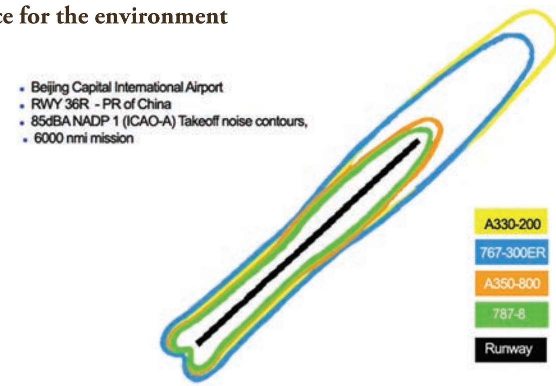
The Dreamliner is also well below regulated limits, as established by the Committee on Aviation Environmental Protection (CAEP) on hydrocarbons, smoke, and nitric oxide. The importance of environmental performance, both as good stewardship of resources and as a good business practice, has driven considerable interest in the 787. Another way the 787 improves over previous generations of commercial jetliners' environmental performance is its smaller noise footprint. This is especially important for communities near airports. The 787 employs improved engine technologies, state of the art acoustic treatments and other structural and aerodynamic enhancements, including scalloped edges on the engine nacelles.

Scalloped engine nacelle trailing edges for noise reduction.

This results in a noise footprint (as measured by an 85 dBA boundary – equivalent to traffic noise when standing on the side of a freeway) that is 60 percent smaller than other airplanes flying in this segment of the market today. For all airports measured, the 787's 85 dBA noise footprint stays within the airport boundaries.

Quieter for the community

Smarter choice for the environment



The wing of the 787 is distinctive with its thin, sweeping architecture also enabled by composites. But more than just looking pretty, this unique structure contributes to the airplane's performance advantage. Using advanced computational fluid dynamics, the design team at Boeing optimized the shape for minimal drag. A unique trailing edge actuation and control surface architecture allows the fairings to be smaller and the wing thinner, also providing an aerodynamic advantage. Systems integrated into the wing allow the moveable surfaces on the wing to automatically adjust to ensure optimum structural loading throughout the flight, as well as reducing the amount of turbulence experienced by passengers. Additionally, the wing adjusts its curvature in flight to optimize aerodynamic performance. The raked wing tips also contribute to the design's overall aerodynamic efficiency.

Computationally optimized composite wing structure.

Advanced aerodynamics

7% better aerodynamics than today's airplanes

In addition to the advantages in manufacturing and design, the composite construction enables a significant reduction in the time and cost of maintenance tasks. Because they are not subject to the same fatigue effects as metal structure, composites require fewer inspections at further intervals. Aluminum aircraft can require heavy maintenance checks up to every six years. The 787 goes twice as long, 12 years, between its heavy maintenance checks. For airlines, more days flying and fewer days in maintenance means their assets are adding more value.

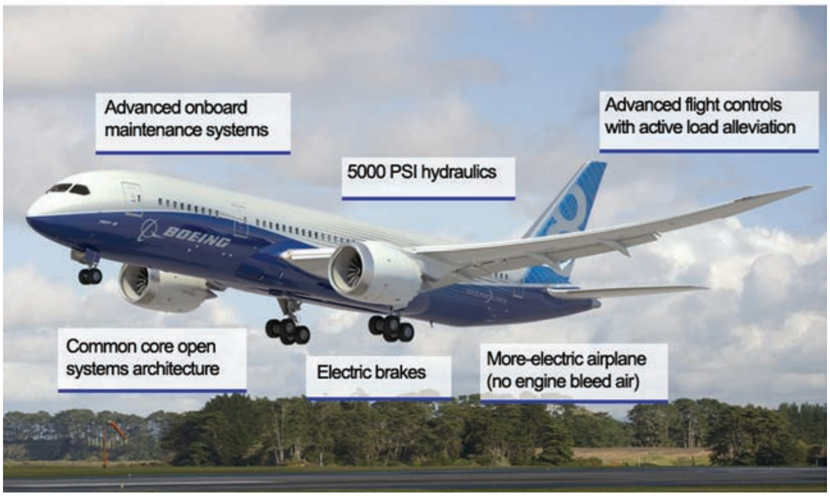
Advanced Systems

Before it ever decided to offer the 787, Boeing was developing new systems approaches for commercial airplanes. Individual systems had been advanced throughout the history of commercial aviation but the general architecture had not changed significantly since the dawn of the jet era. Outside of aviation, the efficiency of electronics had been improved as had the reliability. And, the size of electronics was shrinking at a rate almost unthought-of of even when the 777 had been developed. As a result, Boeing had a concept for how to make a dramatic improvement in efficiency and reliability, a new architecture for airplane systems that eliminates pneumatics and distributes power and data more efficiently.

For context it's important to understand the architecture of traditional jet aircraft. While modern jet engines are very efficient, pneumatic systems take high-energy air from the engines, robbing them of some energy. Use of pneumatics means that the engines produce less thrust, so they must be bigger, work harder and use more fuel. Pneumatics also add weight to the airplane, increase fuel use and require extensive maintenance of the heavy duct works and associated equipment. In addition, traditional systems architectures are based on power (electrical, pneumatic or hydraulic) being moved from the place where it is created to the place where it is needed. If a system on the airplane needs power, there is typically a wire running directly from a power panel to the system that needs power. Each individual system requiring electricity has its own wiring from a main power panel to it. This means miles and miles of wiring inside the airplane – wiring that adds weight and complexity and must be maintained. Data is distributed in much the same manner. Most systems that require data, for example systems that require air speed, each get a unique signal sent to them on a dedicated wiring run from the computer that gathers the data. Those computers are located near the front of the airplane so wiring runs can be quite long especially for systems in the wings and at the back of the airplane.

Smarter systems

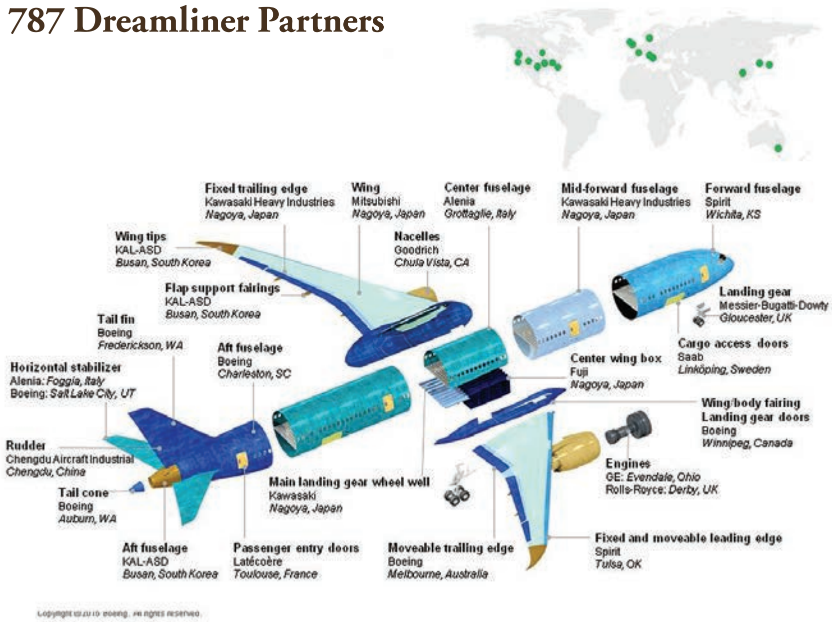
Lower lifecycle costs, less maintenance, greater efficiency



On the 787, the pneumatic system has been removed. Gone is the heavy ducting and associated equipment. The engine is no longer robbed of high-energy air. Instead, four larger generators are driven by the spinning of the engines and create electricity which is used to perform functions previously performed by pneumatics including engine starts and wing-ice protection. Air for the environmental system now flows directly from outside the airplane into the air conditioning system through electrically operated compressors, instead of through the engine and the pneumatics system. Because engines can generate energy electrically more efficiently than pneumatically, engines are able to operate at closer to maximum efficiency. Boeing also introduced the use of remote power distribution on the 787. Instead of each system being powered directly from a large power panel, there are multiple power distribution units (they could be compared to electrical substations) located throughout the airplane. This allows systems to be powered directly from these local distribution units. Likewise, the 787 uses remote data concentrators that enable data to be collected by and distributed to multiple local sources, rather than requiring dedicated wiring from each system to the electronics bay near the front of the airplane. The result is a reduction of approximately 20 miles of wiring even though the airplane makes more use of electrical power. That's 20 miles of less weight, less complexity and less maintenance."

Implementation of these systems improvements required extensive development work with international systems suppliers to ensure the new systems provide the same (or better) levels of performance with the appropriate reliability, redundancies and backups to achieve the redundancy required of airplane systems. Among the innovations contributing to the success of the new systems architecture are new generators, remote power distribution units and remote data concentrators.

787 Dreamliner Partners



Engineering Excellence

Three factors distinguish the 787 engineering contribution: the duration of the effort, the long-lasting impact of the effort and the global effect of the effort.

As important as the individual contributions is the ability for a team to take on large design, integration and application tasks to the advancement of the transportation industry. The span of development of the 787 can easily be defined as more than a decade. Some individuals worked throughout that span of that time on different aspects of development. Others worked only a portion of the time depending on their particular focus. Leading the development effort initially for systems and eventually at the program level was Mike Sinnett, now vice president of Product Development for Boeing Commercial Airplanes. It is difficult to attribute the engineering of the 787 to any individual but more than anyone else, Mike represents the span of effort and the team-wide effort to bring the 787 from concept to reality.

The development of an all-new airplane happens perhaps two or three times in a person's career – on the order of once every 15 years. The decisions made in the earliest days of the program, often more than a decade before the product enters service are fundamental to the long-terms success of the airplane. Once made, they are near impossible to change. As an example from Boeing's past, the good decisions made on the 747 program at its earliest stages regarding the shape of the airplane continue to benefit Boeing more than 50 years later. It is safe to say that the decisions made by the 787 development team in the early 2000s will outlast the life span of many of the people involved – well into the middle of this century and beyond. The 787 continues this proud Boeing legacy of connecting people, places, goods, services and idea.

Elmer A. Sperry, 1860–1930

After graduating from the Cortland, N.Y. Normal School in 1880, Sperry had an association with Professor Anthony at Cornell, where he helped wire its first generator. From that experience he conceived his initial invention, an improved electrical generator and arc light. He then opened an electric company in Chicago and continued on to invent major improvements in electric mining equipment, locomotives, streetcars and an electric automobile. He developed gyroscopic stabilizers for ships and aircraft, a successful marine gyro-compass and gyro-controlled steering and fire control systems used on Allied warships during World War I. Sperry also developed an aircraft searchlight and the world's first guided missile. His gyroscopic work resulted in the automatic pilot in 1930. The Elmer A. Sperry Award was established in 1955 to encourage progress in transportation engineering.

The Elmer A. Sperry Award

To commemorate the life and achievements of Elmer Ambrose Sperry, whose genius and perseverance contributed so much to so many types of transportation, the Elmer A. Sperry Award was established by his daughter, Helen (Mrs. Robert Brooke Lea), and his son, Elmer A. Sperry, Jr., in January 1955, the year marking the 25th anniversary of their father's death. Additional gifts from interested individuals and corporations also contribute to the work of the board.

Elmer Sperry's inventions and his activities in many fields of engineering have benefited tremendously all forms of transportation. Land transportation has profited by his pioneer work with the storage battery, his development of one of the first electric automobiles (on which he introduced 4-wheel brakes and self-centering steering), his electric trolley car of improved design (features of its drive and electric braking system are still in use), and his rail flaw detector (which has added an important factor of safety to modern railroading). Sea transportation has been measurably advanced by his gyrocompass (which has freed humans from the uncertainties of the magnetic compass) and by such navigational aids as the course recorder and automatic steering for ships. Air transportation is indebted to him for the airplane gyro-pilot and the other air navigational instruments he and his son, Lawrence, developed together.

The donors of the Elmer A. Sperry Award have stated that its purpose is to encourage progress in the engineering of transportation. Initially, the donors specified that the award recipient should be chosen by a Board of Award representing the four engineering societies in which Elmer A. Sperry was most active:

American Society of Mechanical Engineers (of which he was the 48th president)
American Institute of Electrical Engineers (of which he was a founder member)
Society of Automotive Engineers
Society of Naval Architects and Marine Engineers

In 1960, the participating societies were augmented by the addition of the Institute of Aerospace Sciences. In 1962, upon merging with the Institute of Radio Engineers, the American Institute of Electrical Engineers became known as the Institute of Electrical and Electronics Engineers; and in 1963, the Institute of Aerospace Sciences, upon merger with the American Rocket Society, became the American Institute of Aeronautics and Astronautics. In 1990, the American Society of Civil Engineers became the sixth society to become a member of the Elmer A. Sperry Board of Award. In 2006, the Society of Automotive Engineers changed its name to SAE International.

Important discoveries and engineering advances are often the work of a group, and the donors have further specified that the Elmer A. Sperry Award honor the distinguished contributions of groups as well as individuals.

Since they are confident that future contributions will pave the way for changes in the art of transportation equal at least to those already achieved, the donors have requested that the board from time to time review past awards. This will enable the board in the future to be cognizant of new areas of achievement and to invite participation, if it seems desirable, of additional engineering groups representative of new aspects or modes of transportation.

The Sperry Secretariat

The donors have placed the Elmer A. Sperry Award fund in the custody of the American Society of Mechanical Engineers. This organization is empowered to administer the fund, which has been placed in an interest bearing account whose earnings are used to cover the expenses of the board. A secretariat is administered by the ASME, which has generously donated the time of its staff to assist the Sperry Board in its work.

The Elmer A. Sperry Board of Award welcomes suggestions from the transportation industry and the engineering profession for candidates for consideration for this award.

Previous Elmer A. Sperry Awards

1955 To ***William Francis Gibbs*** and his Associates for design of the S.S. United States.

1956 To ***Donald W. Douglas*** and his Associates for the DC series of air transport planes.

1957 To ***Harold L. Hamilton, Richard M. Dilworth*** and ***Eugene W. Kettering*** and Citation to their Associates for developing the diesel-electric locomotive.

1958 To ***Ferdinand Porsche*** (in memoriam) and ***Heinz Nordhoff*** and Citation to their Associates for development of the Volkswagen automobile.

1959 To ***Sir Geoffrey de Havilland, Major Frank B. Halford*** (in memoriam) and ***Charles C. Walker*** and Citation to their Associates for the first jet-powered passenger aircraft and engines.

1960 To ***Frederick Darcy Braddon*** and Citation to the Engineering Department of the Marine Division of the Sperry Gyroscope Company, for the three-axis gyroscopic navigational reference.

1961 To ***Robert Gilmore LeTourneau*** and Citation to the Research and Development Division, Firestone Tire and Rubber Company, for high speed, large capacity, earth moving equipment and giant size tires.

1962 To ***Lloyd J. Hibbard*** for applying the ignitron rectifier to railroad motive power.

1963 To ***Earl A. Thompson*** and Citations to ***Ralph F. Beck, William L. Carnegie, Walter B. Herndon, Oliver K. Kelley*** and ***Maurice S. Rosenberger*** for design and development of the first notably successful automatic automobile transmission.

1964 To ***Igor Sikorsky*** and ***Michael E. Gluhareff*** and Citation to the Engineering Department of the Sikorsky Aircraft Division, United Aircraft Corporation, for the invention and development of the high-lift helicopter leading to the Skycrane.

1965 To ***Maynard L. Pennell, Richard L. Rouzie, John E. Steiner, William H. Cook*** and ***Richard L. Loesch, Jr.*** and Citation to the Commercial Airplane Division, The Boeing Company, for the concept, design, development, production and practical application of the family of jet transports exemplified by the 707, 720 and 727.

1966 To ***Hideo Shima, Matsutaro Fuji*** and ***Shigenari Oishi*** and Citation to the Japanese National Railways for the design, development and construction of the New Tokaido Line with its many important advances in railroad transportation.

1967 To ***Edward R. Dye*** (in memoriam), ***Hugh DeHaven,*** and ***Robert A. Wolf*** for their contribution to automotive occupant safety and Citation to the research engineers of Cornell Aeronautical Laboratory and the staff of the Crash Injury Research projects of the Cornell University Medical College.

1968 To ***Christopher S. Cockerell*** and ***Richard Stanton-Jones*** and Citation to the men and women of the British Hovercraft Corporation for the design, construction and application of a family of commercially useful Hovercraft.

1969 To ***Douglas C. MacMillan, M. Nielsen*** and ***Edward L. Teale, Jr.*** and Citations to ***Wilbert C. Gumprich*** and the organizations of George G. Sharp, Inc., Babcock and Wilcox Company, and the New York Shipbuilding Corporation for the design and construction of the N.S. Savannah, the first nuclear ship with reactor, to be operated for commercial purposes.

1970 To ***Charles Stark Draper*** and Citations to the personnel of the MIT Instrumentation Laboratories, Delco Electronics Division, General Motors Corporation, and Aero Products Division, Litton Systems, for the successful application of inertial guidance systems to commercial air navigation.

1971 To ***Sedgwick N. Wight*** (in memoriam) and ***George W. Baughman*** and Citations to ***William D. Hailes, Lloyd V. Lewis, Clarence S. Snavely, Herbert A. Wallace,*** and the employees of General Railway Signal Company, and the Signal & Communications Division, Westinghouse Air Brake Company, for development of Centralized Traffic Control on railways.

1972 To ***Leonard S. Hobbs*** and ***Perry W. Pratt*** and the dedicated engineers of the Pratt & Whitney Aircraft Division of United Aircraft Corporation for the design and development of the JT-3 turbo jet engine.

1975 To ***Jerome L. Goldman, Frank A. Nemec*** and ***James J. Henry*** and Citations to the naval architects and marine engineers of Friede and Goldman, Inc. and Alfred W. Schwendtner for revolutionizing marine cargo transport through the design and development of barge carrying cargo vessels.

1977 To ***Clifford L. Eastburg*** and ***Harley J. Urbach*** and Citations to the Railroad Engineering Department of The Timken Company for the development, subsequent improvement, manufacture and application of tapered roller bearings for railroad and industrial uses.

1978 To ***Robert Puiseux*** and Citations to the employees of the Manufacture Française des Pneumatiques Michelin for the development of the radial tire.

1979 To ***Leslie J. Clark*** for his contributions to the conceptualization and initial development of the sea transport of liquefied natural gas.

1980 To ***William M. Allen, Malcolm T. Stamper, Joseph F. Sutter*** and ***Everette L. Webb*** and Citations to the employees of Boeing Commercial Airplane Company for their leadership in the development, successful introduction & acceptance of wide-body jet aircraft for commercial service.

1981 To ***Edward J. Wasp*** for his contributions toward the development and application of long distance pipeline slurry transport of coal and other finely divided solid materials.

1982 To ***Jörg Brenneisen, Ehrhard Futterlieb, Joachim Körber, Edmund Müller, G. Reiner Nill, Manfred Schulz, Herbert Stemmler*** and ***Werner Teich*** for their contributions to the development and application of solid state adjustable frequency induction motor transmission to diesel and electric motor locomotives in heavy freight and passenger service.

1983 To ***Sir George Edwards,*** OM, CBE, FRS; ***General Henri Ziegler,*** CBE, CVO, LM, CG; ***Sir Stanley Hooker,*** CBE, FRS (in memoriam); ***Sir Archibald Russell,*** CBE, FRS; and ***M. André Turcat***, L d'H, CG; commemorating their outstanding international contributions to the successful introduction and subsequent safe service of commercial supersonic aircraft exemplified by the Concorde.

1984 To ***Frederick Aronowitz, Joseph E. Killpatrick, Warren M. Macek*** and ***Theodore J. Podgorski*** for the conception of the principles and development of a ring laser gyroscopic system incorporated in a new series of commercial jet liners and other vehicles.

1985 To ***Richard K. Quinn, Carlton E. Tripp,*** and ***George H. Plude*** for the inclusion of numerous innovative design concepts and an unusual method of construction of the first 1,000-foot self-unloading Great Lakes vessel, the M/V Stewart J. Cort.

1986 To ***George W. Jeffs, Dr. William R. Lucas, Dr. George E. Mueller, George F. Page, Robert F. Thompson*** and ***John F. Yardley*** for significant personal and technical contributions to the concept and achievement of a reusable Space Transportation System.

1987 To ***Harry R. Wetenkamp*** for his contributions toward the development and application of curved plate railroad wheel designs.

1988 To ***J. A. Pierce*** for his pioneering work & technical achievements that led to the establishment of the OMEGA Navigation System, the world's first ground-based global navigation system.

1989 To ***Harold E. Froehlich, Charles B. Momsen, Jr.,*** and ***Allyn C. Vine*** for the invention, development and deployment of the deep-diving submarine, Alvin.

1990 To ***Claud M. Davis, Richard B. Hanrahan, John F. Keeley,*** and ***James H. Mollenauer*** for the conception, design, development and delivery of the Federal Aviation Administration enroute air traffic control system.

1991 To ***Malcom Purcell McLean*** for his pioneering work in revolutionizing cargo transportation through the introduction of intermodal containerization.

1992 To ***Daniel K. Ludwig*** (in memoriam) for the design, development and construction of the modern supertanker.

1993 To ***Heinz Leiber, Wolf-Dieter Jonner*** and ***Hans Jürgen Gerstenmeier*** and Citations to their colleagues in Robert Bosch GmbH for their conception, design and development of the Anti-lock Braking System for application in motor vehicles.

1994 To ***Russell G. Altherr*** for the conception, design and development of a slackfree connector for articulated railroad freight cars.

1996 To ***Thomas G. Butler*** (in memoriam) and ***Richard H. MacNeal*** for the development and mechanization of NASA Structural Analysis (NASTRAN) for widespread utilization as a working tool for finite element computation.

1998 To ***Bradford W. Parkinson*** for leading the concept development and early implementation of the Global Positioning System (GPS) as a breakthrough technology for the precise navigation and position determination of transportation vehicles.

2000 To those individuals who, working at the French National Railroad (SNCF) and ALSTOM between 1965 and 1981, played leading roles in conceiving and creating the initial TGV High Speed Rail System, which opened a new era in passenger rail transportation in France and beyond.

2002 To ***Raymond Pearlson*** for the invention, development and worldwide implementation of a new system for lifting ships out of the water for repair and for launching new ship construction. The simplicity of this concept has allowed both large and small nations to benefit by increasing the efficiency and reducing the cost of shipyard operations.

2004 To ***Josef Becker*** for the invention, development, and worldwide implementation of the Rudderpropeller, a combined propulsion and steering system, which converts engine power into optimum thrust. As the underwater components can be steered through 360 degrees, the full propulsive power can also be used for maneuvering and dynamic positioning of the ship.

2005 To ***Victor Wouk*** for his visionary approach to developing gasoline engine-electric motor hybrid-drive systems for automobiles and his distinguished engineering achievements in the related technologies of small, lightweight, and highly efficient electric power supplies and batteries.

2006 To ***Antony Jameson*** in recognition of his seminal and continuing contributions to the modern design of aircraft through his numerous algorithmic innovations and through the development of the FLO, SYN, and AIRPLANE series of computational fluid dynamics codes.

2007 To ***Robert Cook, Pam Phillips, James White,*** and ***Peter Mahal*** for their seminal work and continuing contributions to aviation through the development of the Engineered Material Arresting System (EMAS) and its installation at many airports.

2008 To ***Thomas P. Stafford, Glynn S. Lunney, Aleksei A. Leonov,*** and ***Konstantin D. Bushuyev*** as leaders of the Apollo-Soyuz mission and as representatives of the Apollo-Soyuz docking interface design team: in recognition of seminal work on spacecraft docking technology and international docking interface methodology.

2009 To ***Boris Popov*** for the development of the ballistic parachute system allowing the safe descent of disabled aircraft.

2010 To ***Takuma Yamaguchi*** for his invention of the ARTICOUPLE, a versatile scheme to connect tugs and barges to form an articulated tug and barge, AT/B, waterborne transportation system operational in rough seas. His initial design has led to the development of many different types of couplers that have resulted in the worldwide use of connected tug and barges for inland waterways, coastal waters and open ocean operation.

2011 To ***Zigmund Bluvband*** and ***Herbert Hecht*** for development and implementation of novel methods and tools for the advancement of dependability and safety in transportation.

2012 To ***John Ward Duckett*** for the development of the Quickchange Movable Barrier.

2013 To ***C. Don Bateman*** for the development of the ground proximity warning system for aircraft.

2014 To ***Bruce G. Collipp, Alden J. Laborde,*** and ***Alan C. McClure*** for the design and development of the semi-submersible platform.

The 2015 Elmer A. Sperry Board of Award

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