The man from Boeing

It may be the world's biggest player in the aerospace industry, but despite patent-caused difficulties in its early years, Boeing has not always prioritised the systematic creation and exploitation of IP. Robert Gullette is the man charged with turning things around

By **Victoria Slind-Flor**

William Boeing was a little bit like Mr Toad, who got all bug-eyed when he first beheld a motorcar in Kenneth Grahame's *Wind in the Willows*. Boeing was a wealthy young timber company owner who took his first aeroplane ride with a barnstorming pilot in 1915. Boeing's infatuation with flying machines was immediate, so much so that a year later, his own hand-made seaplane – constructed largely of linen, wire and wood – made its maiden flight from Seattle's Lake Union.

This was the first Boeing aircraft ever to fly and clearly Bill Boeing saw a future in the new machine. So much so that he incorporated a company only one month later. Initially known as Pacific Aero Products Co, it operated out of a former shipyard on the Duwamish River south of downtown Seattle. Just one year later, the US Navy ordered 50 Boeing seaplanes and the company was on the way to becoming the industrial giant it is today.

Boeing now occupies the largest segment of the US aerospace economy. The company has a market cap of US$69.6 billion and revenues of US$59.1 billion, and employs more than 153,000 worldwide. In recent years, it has absorbed some of its major competitors, including Rockwell Aerospace and Defense in 1996 and McDonnell Douglas Corp in 1997. In 1960, as a result of acquiring Vertol Corporation of Philadelphia, Boeing also became a leading manufacturer of helicopters. Additionally, in January 2000, the company acquired the satellite operations of Hughes Electronics Corp for US$3.75 billion.

Patent wars

But early aviation patent wars almost kept Boeing permanently grounded. Within weeks of Orville Wright's first flight at Kitty Hawk, North Carolina in 1903, the two Wright brothers turned to a Springfield, Ohio, patent counsel for help in protecting their intellectual property rights. Their attorney, Harry Aubrey Toulmin Sr, wrote what may have been one of the most bulletproof patents that ever issued: the Wright brothers' US Patent 821,393 for a "Flying Machine" granted in May 1906. And the patent owners were vigorous in their assertion of their rights. They always won.

For the various lawsuits they used the firm of Fish & Neave, which became part of Boston's Ropes & Gray in 2005 (until its merger with Ropes & Gray, the Fish & Neave website featured the silhouette of the original Wright Brothers aeroplane). But although they prevailed in court, the Wright Brothers lost the first international aviation contest, the 1909 Rheims Aviation Meeting, to former motorcycle racer Glenn H Curtiss. Curtiss had offered to become a partner with the Wrights in 1906, but instead they ended up bitter enemies in the courtroom. After he was rejected by the Wrights, Curtiss took the US$5,000 prize money he won in France for flying at the fastest speed – 47 miles per hour – and used it to start his own aircraft company. He and the Wright brothers were in court constantly from 1910 onwards; and when they weren't suing each other, they were threatening any and all others who had the temerity to try to build flying machines.

Meanwhile, the assassination of Archduke Ferdinand of Austria in 1914 triggered what would become known as the Great War and flying machines became much more than mere playthings for rich men. The United States entered the war in December

Photo Credit: Boeing Company

Photo Credit: Boeing Company

Far left
William E Boeing (right) in the early days
Left
Lunar rover

1917. Franklin D Roosevelt, who was then undersecretary of the Navy, headed an advisory committee to look at the aviation patent wars and their possible impact on the nascent aircraft industry. The government was concerned that the high royalties the Wrights and Curtiss were asking would drive up the price of aeroplanes and prevent others from becoming aircraft manufacturers.

The committee decided that an aircraft patent pool needed to be created, to resolve all the pending litigation and to force mandatory non-exclusive licences. All aircraft manufacturers joined up and, under the pool agreement, agreed to pay a royalty of US$200 per aeroplane. This money was split between the Wrights and Curtiss, with a small amount also going to the administration of the pool organisation, which became the Manufacturers Aircraft Association/(MAA). The agreement also specified that once the Wrights and Curtiss had each received US$2 million, the royalties would drop to US$25 per aeroplane.

The pool worked. By the war's end more than 30 aircraft companies were in business and they were producing thousands of planes per year. Boeing was airborne, building trainers and flying boats for the Navy. Boeing's 1432700 patent for a propeller that issued in 1922 became one of the patents in the pool.

Litigation-free

That World War I pool agreement is what has made Boeing's history so litigation-free, says Robert Gullette, the vice president who heads the company's IP arm, known as the Intellectual Property Management (IPM) unit. "Compared to the pharmaceutical or semiconductor industry where litigation is a daily part of the business, the aerospace industry is unique," he says. The MAA patent pool, Gullette continues, "ultimately led to a situation in our industry where patents just never became that kind of strategic offensive weapon they are in other industries".

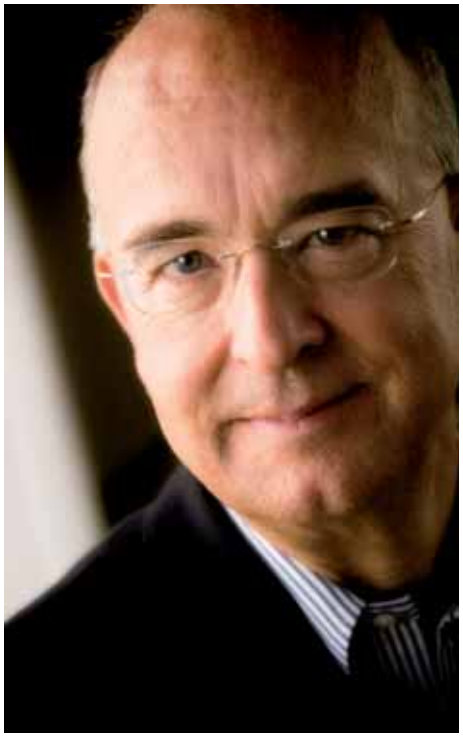
The US Department of Justice broke up the MAA in the 1970s, but, says Gullette, the relatively friendly atmosphere remains. "There has been comparatively little litigation. My personal opinion is that this was the consequence of a culture and a mindset created in the years when the MAA existed."

Gullette declines to discuss any ongoing or proposed patent litigation and it takes real searching to find much of a record of Boeing IP disputes. But there are a few. In January 2006, for example, the Court of Federal Claims found that the National Aeronautics and Space Administration (NASA) infringed a Boeing patent for an aluminium-lithium alloy used for the space shuttle's external fuel tanks. In 1987, the Washington State Supreme Court affirmed a lower court's ruling that that Sierracin Corporation of Sylmar, California, had misappropriated Boeing trade secrets for replacement cockpit windows for the 707, 727 and 737 aircraft.

Boeing was, however, in the defendant's hotseat in a very high-profile case in which Lockheed Martin charged the company and some of its employees with industrial espionage relating to a government contract for a rocket-launch vehicle. Ultimately, the Air Force took away Boeing's part of the contract and awarded it to Lockheed, for more than US$1 billion. That litigation ended in May 2005, when the two companies announced the United Launch Alliance, a joint venture to combine the production, engineering, test and launch operations associated with US government launches of Boeing Delta and Lockheed Martin Atlas rockets.

New patent attitude

Boeing was not a particularly active seeker of patents in its early years, says Gullette.



Robert Gullette
VP IP, Boeing

The aerospace industry is unique

In-licensing and strategic alliances

Like most other large companies, Boeing in-licenses university-developed technology. There's an obvious and longstanding connection with the University of Washington, which has trained several generations of Boeing engineers. But other sources of technology include: the University of Illinois, whose plasma display panels are now part of Boeing's Advanced Airborne Command Post; Purdue University, which developed laboratory manuals for troubleshooting aircraft electrical systems; and Colorado State University for complex algorithms used for tracking aircraft.

In-licensing at Boeing takes place through Technology Ventures, the Phantom Works segment run by Vice President Miller Adams. Although Adams declined to be interviewed for this feature, if recent news stories are any indication, he has been racking up an awful lot of frequent flyer miles. Over the last few years, he has been in countries and regions as diverse as South Africa, Australia, Asia and Europe, generally forging strategic alliances that involve Boeing investment.

- In 2003 Boeing invested US$10 million in TechnoCap Inc, a Montreal-based venture capital company.
- That same year, Boeing made a US$5 million investment in South Africa's Council for Scientific and Industrial Research's satellite tracking facility in Hartebeeshoek.
- Boeing has put US$5 million into the Seattle-based investment fund Alexander Hutton Venture Partners.
- In 2005, Boeing signed a collaboration agreement with Singapore's Agency for Science, Technology and Research to work on advanced materials, computational science and wireless communications.
- Boeing is an investor in the UK's TTP Venture Fund, which in early January 2006 participated in US$9 million second-round funding to Azuro Inc of Santa Clara, California, an electronic design automation software company.

Adams is a member of the National Academies' Committee on Globalization of Materials Research and Development, which released a major report on strategies for global research and development in 2005.

When he joined the company as a patent attorney in 1978, invention disclosures were far and few between. In 1999, only 200 were filed. By 2003, that number had risen to 800. At present, the company has about 4,500 issued US patents, about 3,000 non-US patents and about 1,000 published US applications, he says. "The number of patent applications has risen dramatically in the past five years or so, due to an increased emphasis on IP and patents." But despite the rises, Gullette insists that Boeing is not "doing a numbers game" and remains very selective about seeking patent protection.

Even in the best of all possible years, the amount of possible expansion in commercial and military aircraft manufacturing is finite, depending on airline economics and the vagaries of defence contracts. So for Boeing to grow, the company had to undergo a major restructuring. The process began in the late 1990s and early 2000s under President Phil Condit.

Boeing shocked Seattleites by moving its corporate headquarters to Chicago. This was part of a strategy to emphasise that the company had moved beyond the boom-and-bust cycle of commercial aviation manufacturing. The company would diversify, Condit told the Boeing Management Association in 1998, but would stay within the aerospace industrial segment. "We are an aerospace company. We are not going to build railcars or boats. We are going to build aerospace products: airplanes, launch vehicles, satellites."

And enhancing the role of intellectual property would be the key to some of that diversification, Chief Financial Officer Deborah Hopkins said in a speech given at Westminster College in Fulton, Missouri in 2000. She acknowledged that the acquisition of Hughes Electronics Corporation that year "was all about intellectual property". Success in the new economy, she continued, "means throwing the whole business model up in the air and asking basic questions. Who are we? What are we? Are we in the right business? Are we in the right market? Do we make the right products and offer the right services?"

In 2001, Boeing created the IPM unit to support the company's three principal business units – Boeing Commercial Airplanes, Integrated Defense Systems and Boeing Engineering Operations and Technology (EOT) – which, in 2003, had been put under the leadership of Chief Technology Officer James Jamieson. For the first time ever, Boeing had one individual and a unified organisation to develop technology.

Gullette, who reports to Jamieson, has headed the IPM unit since he was promoted from his position as chief intellectual property counsel in 2004. He has not found it too hard a sell to create a new, more patent-centric culture at Boeing. "Our experience has been that the technical community has reacted very well. And the more applications are filed, the more incentives inventors within our technical community have to submit new disclosures. They see more through put in the system and this enables them to be more proactive in their disclosures."

Higher visibility

Creating a centralised IP management and operation has given patents a new visibility. What has also helped are the specialised IP teams reporting to Gullette that are embedded in each of Boeing's three major business units. Chuck Cruit heads the team for Integrated Defense Systems; Bob Nadalet leads the Engineering Operations and Technology Team; while Luis Valdes runs the Boeing Commercial Airplane team. Each team mainly comprises licensing professionals, who are part of the salesforce: they help sell and market technology and patents, negotiate and sign contracts. Gullette has fewer than a dozen lawyers working for him and they mainly do opinion work.

Surprisingly, financial rewards do not seem to be the major incentive for the company's engineer-inventors to file invention disclosures. "We do provide monetary awards for submitting disclosures, filing applications and issued patents," Gullette says. "But, frankly, my personal view is that while it's a nice thing to have, I think the real motivation is professional and peer and management recognition that the work they do is valued, evidenced by the fact that it's patented."

So Gullette and his crew in the IPM unit make a fuss over successful inventors. Every year they hold a number of recognition events, one in St Louis, one in the Puget Sound region and one in southern California, Gullette explains. "We get senior executive participation, we allow the inventors to bring their spouses and we make a big deal out of it." People who get top awards – in 2006 there were 107 – are rewarded for the value the invention has to the company and the level of technical innovation. "Usually to get one of the top awards, you have to have an invention that scores well in both categories," Gullette says.

Recent winners reflect the company's growing diversification:

Below
PhantomWorks test aircraft

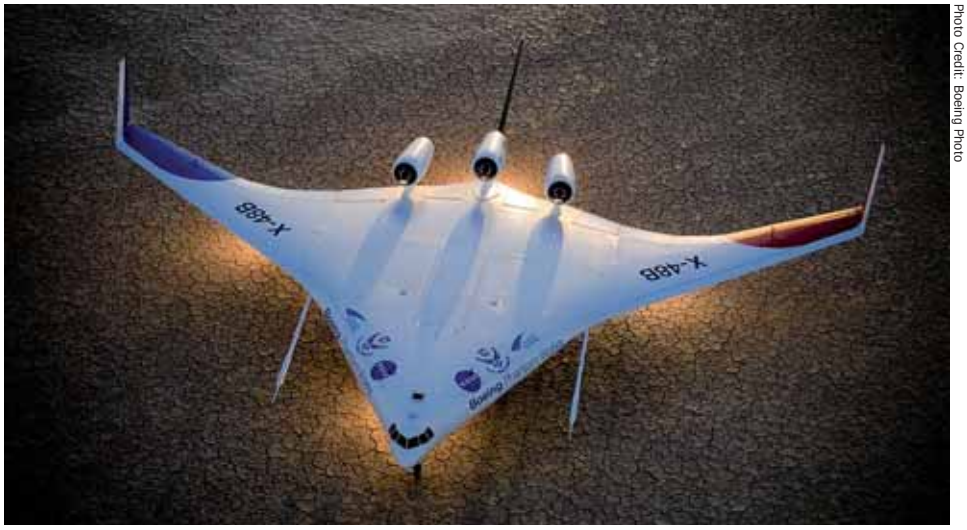


Photo Credit: Boeing Photo

- John Vetrovic is a named inventor on 16 Boeing US patents relating to lasers for missile defence systems. He invented a method of decreasing the laser gases that give a laser weapon a distinctive exhaust signature.
- Rivets are an essential element in aircraft construction and Steven Keener invented a new type that can be used on both composite materials and metals. Like Vetrovic, Keener is also a named inventor on 16 Boeing US patents.
- Aeroplane passengers who watch satellite television or who log onto the Internet while aloft can thank Bernard Lamberty, who developed a new kind of antenna array that enables broadband data links. Lamberty is a named inventor on 14 Boeing US patents.

Outsourcing work

Gullette sends Boeing's patent work to a wide range of outside firms. "Virtually no Boeing patents are prosecuted in-house," he says. "We have outsourced the preparation and prosecution of all of our patents." There was a period in which some in-house work was done, but that ended in the late 1990s. "Once the volume increased to the level we have today, and the pace of work increased to the point at which it no longer was efficient, we moved to a complete outsourcing model."

Gullette will not name specific patent firms but does say that Boeing works with a wide selection. "We carefully distribute the work among firms, based on their capacity to take on new work and their throughput." He also warns that the company is no pushover about prosecution costs. "We have been very aggressive about setting up fixed-fee arrangements with as many firms as we can."

Boeing files applications on about 40% to 50% of its invention disclosures. "We filter them through a network of invention-evaluation teams positioned around various parts of the company." The teams, made up of technology, business and IP professionals, look at each invention disclosure from the standpoint of its value to the company, its technological merit and whether it appears to be used by somebody else. "Patents are valuable if they're used somewhere else. Getting patents on the things [only] we use is not terribly valuable," Gullette says. It's the kind of statement you might expect from a company that enforces its patents vigorously. Gullette won't talk about future strategies, but perhaps the aerospace industry's litigation-free golden era may be nearing its end, as Boeing perhaps begins to view enforcement as a revenue enhancement.

Trade secrets

Many of Boeing's crown jewels, however, are protected by trade secret law rather than patents. "There's a lot that can be reverse-engineered: the loft on wings, the thickness of a composite," says Gullette. "But when you look at manufacturing technology, there's a tremendous amount of know-how that goes into it. The depth and breadth of know-how the company can draw upon is huge."

Another reason Boeing still relies heavily on trade secret law is that much of the company's defence work is classified. "As a general rule we don't file on an invention in a classified area," Gullette says. Such

Licensed out

Some of Boeing's out-licensing deals include:

- In September 2006, Loos & Co Inc of Pomfret, Connecticut, took a data licence from Boeing to use detailed engineering designs to manufacture aircraft replacement spare parts.
- In March 2005, Boeing entered into a licence agreement with EarthMap Solutions Inc of Longmont, Colorado, to provide imagery products and services to the Agriculture and Land Management markets.
- Derco Aerospace Inc of Milwaukee, Wisconsin, has a licence from Boeing to manufacture spare parts for the F-4 Phantom and A-4 Skyhawk military aircraft.
- Air Spares Inc of Puyallup, Washington, is licensed to provide ground-support equipment licensed by Boeing.

Below
Boeing 707 with AWCS dome
Bottom
B-29 Bomber

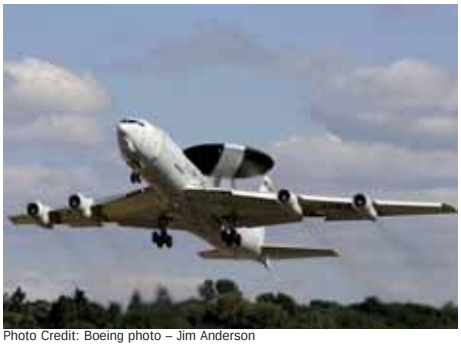


Photo Credit: Boeing photo – Jim Anderson

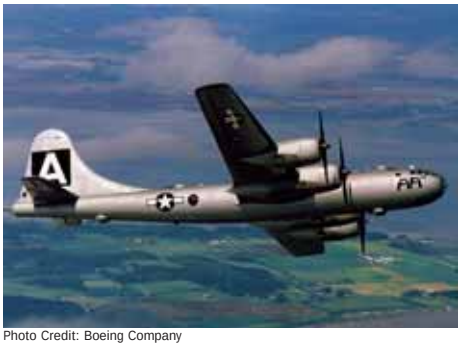


Photo Credit: Boeing Company

applications, he explains, take a lot of special handling and limited access, and drive up the cost substantially in terms of getting an application prepared and filed. And after that work is done, there may be an order coming down sealing the file so it is put on hold for 10 or 20 years. "The patenting process is not a good one, not for the bulk of the [classified] work we do," Gullette says. Boeing is much more interested in getting inventions disclosed and filed quickly and in having patents published and issued in a short timespan.

Spin-offs

In recent years part of Gullette's job has been spinning off surplus patents that came aboard with the McDonnell Douglas and Rockwell mergers. Boeing donated some patents to universities, but after the law was changed in 2004 to limit tax deductions for such donations the number the company makes has dropped off markedly.

At present, Gullette's team is still evaluating recently acquired companies' patent portfolios. The Rockwell, McDonnell Douglas and Hughes satellite mergers, he explains, presented some real challenges in terms of inventorying, categorising and understanding the IP that was acquired. Some of the technology from the new companies duplicated what Boeing already had. And, of course, simply figuring out the reach of the acquired companies' various patents required a careful reading of each and every document. The technologies are complex and, in many cases, involve interwoven patent stacks.

"I'd say we're still in the process of integrating those," Gullette says of the acquired companies' patents. Some are being sold and others abandoned outright. Boeing even placed nine patents in the October 2006 Ocean Tomo auction in New York, but none received bids that reached the minimum required for sale. Gullette says he's also had discussions with Nathan Myhrvold's Intellectual Ventures, but so far Boeing has not made any investments in that IP-development company.

For now, Boeing's emphasis is firmly on out-licensing. Gullette says he has sales teams whose job it is to market Boeing technology and patents. They focus on three major areas: the commercial aircraft business, the defence business and Boeing's engineering operations and technology. Some of the team members are home-grown, while he has recruited others from outside companies or university technology-transfer offices.

For the most part, Boeing's out-licensing is based on one-off transactions, with no babysitting or tech support. "We want to enable the technology transfer and be done with it," Gullette says. To date, the licensing revenues are still relatively insignificant additions to the company's bottom line. "You're looking at a company with revenues of US$55 billion to US$60 billion. The IP revenue does not tilt the needle very much," he says.

New paths

While people still mostly associate the company with jet aeroplanes, these days Boeing operates in a wide range of fields. According to its website, the company also produces a wide range of mathematical software modules, a system for producing technical documents in simple standard English, software enabling the manipulation of virtual objects, the Hummingbird Unmanned Aerial Vehicle that can stay aloft at high altitudes for a long time and an upgrade of the Global Positioning System.

And Boeing's reach keeps expanding into areas that are far removed from aerospace. In 2003, Boeing spun off MessageGate, an anti-spam program that was originally developed to filter in-house communications. MessageGate is based in Bellevue, Washington, just down the road from the headquarters of that other Washington-born industrial giant, also started by a guy named Bill. With the way product lines are blurring, who knows: could Boeing some day even end up licensing software to Microsoft? ■

Vslind-flor@iam-magazine.com