Embraer: Brazil’s pioneering aviation giant

By Catherine Jewell, Communications Division, WIPO
Brazil’s Embraer is at the forefront of global aviation technology. Its pioneering spirit and commitment to innovation and excellence have enabled it to become one of the world’s leading aircraft manufacturers, building jets for the commercial, executive and military markets. Wander Menchik, Head of Embraer’s Technology Development Program, offers an insider’s view on the importance of innovation and intellectual property (IP) to the company and its future goals.

How did Embraer get started?

Embraer grew out of a national drive to develop aeronautical engineering and aircraft manufacture in Brazil. The company was founded in 1969 by Ozires Silva, a former major in the Brazilian Air Force.

Where does Embraer stand within the global aerospace industry today and what is the scale of its operations?

Embraer is one of the world’s leading manufacturers of commercial and executive jets, with substantial and growing operations in defense and security. In commercial aviation we have a client portfolio of more than 100 airlines in 60 countries, with 1,700 planes in operation. To date, Embraer has also delivered more than 1,000 executive jets to clients in 70 countries, and more than 50 armed forces around the world operate defense airplanes and systems supplied by Embraer.

“We live to stretch the limits of what is possible, and give wings to what is still unimaginable. We live to innovate.”

Embraer
What role does innovation play at Embraer?

Innovation is deeply rooted in the company’s culture and mindset. It is part of our daily routine and is not just limited to the development of new aircraft. Innovation permeates everything we do across the value chain, from the development of new and improved products, processes and business models to finding better ways to position ourselves in the global market. You could say that innovation is in our DNA.

How do you encourage innovation within the company?

We actively encourage innovation in various ways. Our Innova Program, for example, is a structured approach that seeks to encourage our highly skilled professionals to develop and implement new solutions, processes and strategies that benefit the company. Over the years we have also cultivated a working environment that encourages new ideas and rewards achievement. So there is a great deal of spontaneous innovation by employees as they go about their daily work. In our constant search for excellence, we actively support incremental innovation and encourage employee participation in improving internal processes.

How does Embraer stay at the cutting-edge of innovation?

Our long-term survival depends on our ability to come up with and apply game-changing ideas and concepts. That is why every year we invest nearly 10 percent of our revenues in research and development (R&D) and in upgrading our industrial facilities. This is essential because it allows us to remain competitive within the global aviation market.

Innovation is at the heart of Embraer’s business strategy and since we began operating nearly 50 years ago, innovation has driven our success, enabling us to constantly break new ground, identify unexplored niches and reach new heights. Today, almost half of Embraer’s revenue comes from innovations or significant improvements implemented over the last five years.

Embraer has a number of partnerships with universities. Why are these important?

The company is constantly reinventing itself to come up with new products and solutions. These partnerships are an important part of this process because they enable us to access cutting-edge scientific knowledge, to share best-in-class R&D infrastructure and to support the development of highly qualified technical professionals. These collaborations are an important part of our R&D strategy.

What role does intellectual property (IP) play in the business?

Our intellectual property strategy is closely aligned with our business strategy. Our goal is to create and preserve the best possible portfolio of IP assets to ensure the company remains competitive and can leverage its partnerships and business opportunities.

How has the company’s IP strategy evolved?

Prior to 2007, Embraer’s intellectual property strategy was built around trade secrets and know-how. Thereafter, in line with the rapid global expansion of the company’s operations, our growing portfolio of products and services, and the need to protect our innovative technologies in global markets, the company became an active user of the patent system. Today Embraer holds some 800 patents in a variety of countries, many of which have been filed through WIPO’s Patent Cooperation Treaty (PCT). We regularly cross-license these assets with our partners – often at no cost – to complement our technical expertise.

What are the advantages of using the PCT for Embraer?

The PCT is an extremely useful tool that is supporting our drive to expand our global footprint. It is particularly useful because it provides a preliminary opinion on the possibility of obtaining a patent grant on a given technology in different countries, and buys the company additional time to take strategic business decisions in relation to a particular technology for which protection is being sought. So it is a cost-effective option that takes the legwork out of the process of obtaining patents in international markets and provides us with feedback that is invaluable in shaping the patenting strategies for our new technologies.

What factors determine your patenting strategy and who decides whether or not to patent a new invention?

An internal high-level management committee is responsible for deciding whether and how to protect new inventions. The decision as to whether we use the
PCT or simply file for protection directly with the national patent office of our choosing (the so-called Paris route) depends on the nature of the invention and the products, processes or services to which it can be applied as well as the markets it can influence.

**What are the main IP challenges the company faces?**

When it comes to managing our IP portfolio, our overriding concern is to assure the best cost-benefit ratio between the size of our portfolio and appropriate and effective IP protection.

**What impact has Embraer had on the Brazilian economy in broad terms?**

Embraer is the largest Brazilian exporter of high-value-added products, and contributes significantly to the country’s trade balance.

The company is also responsible for generating many highly skilled jobs, and as such has a significant positive impact on direct and indirect employment and income generation opportunities in Brazil and elsewhere.

The company’s activities drive the entire Brazilian aerospace chain, which is made up of more than 60 companies, including, for example, suppliers of airplane parts and components.

And finally, we have partnerships with universities and research centers in our R&D programs which support research at the frontier of knowledge and establish a valuable basis for innovation. Through these joint programs new lines of research are established, laboratory infrastructure is improved and researchers help keep the country at the forefront of technology.

Photo: Courtesy of Embraer

Embraer’s Ipanema is the only airplane in the world to run 100 percent on ethanol.
Embraer’s Business Innovation Center recently established a partnership with Uber to create the Uber Elevate Network. What are you seeking to achieve there?

This partnership is focused on the establishment of an ecosystem – dubbed the Uber Elevate Network – that will allow the deployment of small electric vertical take-off and landing vehicles (VTOLs) for shorter urban commutes. The first prototype is planned for 2020 with entry into service foreseen by 2025. We think that the development of VTOLs is an opportunity both to help improve urban mobility and to pursue the development of new technologies that have the potential to improve performance and efficiency in a range of aerospace applications. We believe it is important to explore a number of new business concepts that have the potential to shape air transport in the future. Our partnership with Uber is a unique opportunity to complement our air-transport knowledge with that of a visionary and revolutionary ground-transport company. Through this partnership we will be developing new technologies, new products and new business models which could generate interesting opportunities for Embraer in the future.

Does 3D printing have a future in the aerospace industry?

The use of additive manufacturing or 3D printing in the aerospace sector has strong potential to generate significant savings in the aircraft manufacturing process and to enhance the quality, resilience and durability of
manufactured outputs. We already have a number of 3-D printed non-structural pieces installed in our planes, and our researchers are evaluating other applications.

**Do you foresee greater use of biofuels in the future?**

Embraer manufactures the world’s only general aviation aircraft to run on ethanol. The first model of our ethanol-fueled Ipanema was certified in 2004. As a whole, the aviation industry is fully committed to reducing greenhouse gas (GHG) emissions, whether by improving aircraft technology or using aviation biofuels. But aviation biofuel needs to be sustainable, price competitive and able to be produced on a large scale. We believe that aviation biofuel will play an important role in reducing emissions in the future. The recently approved global Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA), approved by the International Civil Aviation Organization (ICAO), will foster the use of aviation biofuel around the world and help reduce GHG emissions.

**Embraer recently launched its Phenom 300E private jet. How long does it take, on average, to develop a new aircraft?**

On average, it takes from five to seven years to develop a new aircraft, and the number of people involved in that process varies from case to case.

**What is Embraer’s approach to open innovation?**

One of the key characteristics of this industry is the need to be at the forefront of the development of innovative,
state-of-the-art technologies. We believe that long-term thinking about technological development is essential for the competitiveness and sustainability of our business. Open innovation is increasingly moving beyond pre-competitive technologies. That is why we have in place an open innovation strategy that includes risk-sharing partners, suppliers and start-ups, and others. Today, Embraer has outposts in some of the most innovative environments in the world, including Silicon Valley and Boston. Our aim is to look for new technologies and business models in partnership with start-ups and accelerators. This way, we can bring the most advanced technologies to our headquarters, strengthen the innovative process that is already underway and increase our competitiveness.

In Brazil, Embraer also participates in an investment fund that seeks to strengthen the national aerospace, defense and security sectors by investing in small companies operating in these sectors.

**What are the company’s main challenges?**

We need to improve fuel efficiency, reduce noise, greenhouse gas emissions and operational costs, and, of course, continue our focus on enhancing the passenger experience. These are common challenges facing all airline manufacturers.

**What is the future of flight?**

All the main players in the aerospace market tend to agree that the future of flight is tied up with greater fuel efficiency, a low carbon footprint, and faster, safer, more comfortable, quieter and hopefully more affordable air travel.