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# Editorial

# Aeronautical technology in Brazil: a long way to go

The Brazilian aeronautical industry today enjoys a respectable reputation and is one of the all-time success stories of the country. If we take into account the number of airplane manufacturers that disappeared in the last 40 years – either in mergers/acquisitions or simply that have gone bankrupt –, it is amazing to see a Brazilian company as one of the largest in this industry, increasing its relative importance year after year. There are only a few technologically advanced sectors in Brazil that are considered as world-class, and the aeronautical industry is certainly one of them.

The Brazilian aeronautical industry – Embraer in particular – is the consequence of a strategic vision and long, sustained effort. Right after the Second World War, the vision of the aeronautical technology as a powerful lever for the country development became strong in the minds of some Brazilian military officers. An aeronautical industry in Brazil could only be envisaged upon the solid foundations of education, knowledge, and technology. Therefore, the first initiatives were the creation of the Centro Técnico de Aeronáutica (CTA) and Instituto Tecnológico de Aeronáutica (ITA) in the late 1940s, to lay the ground for the development and manufacture of the future airplanes. It was in the CTA that the Bandeirante was conceived and designed by ITA engineers in the 1960s, being the precursor of a very successful genealogy of airplanes to be designed and built by Embraer.

If we look back, we can easily conclude that Embraer always developed and brought to the market the right airplane at the right time. And it was not by chance, the company has been ready, technology and business wise, as opportunities arise.

The EMB-110 Bandeirante was ready in the 1970's by the time deregulation happened in the USA. With deregulation, a great number of regional airlines was created and a great number of regional airplanes was needed. The 19-seater, non-pressurized EMB-110 Bandeirante certification to the strict North-American and European requirements was quite an accomplishment at the time, and a very important step towards real global operations.

In the early 1980's, with the development of the regional aviation around the world, a larger, faster, and more comfortable airplane was required. The 30-seater, pressurized EMB-120 Brasilia was a bold initiative, bringing several innovative features to this market and being certified to large airplanes FAR Part 25 standards.

In the 1990's, another step change was demanded by the continuing growth of regional airlines. This time, the 50-seat jet ERJ-145 was the right airplane at the right time, when pilot union agreements with the airlines – the scope-clauses – boosted the demand for this category of airplanes. The ERJ-145 was developed during very difficult times for Embraer, right before its privatization, and other innovations in the business model – like risk-sharing partnerships – were brought to the market.

In the 2000's, the 70 to 120 seat E-Jets marked the beginning of a new era, bringing comfort and performance standards of larger jets, thus blurring the line between regional and mainline aviations.

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*Mauro Kern was born in 1961 in Porto Alegre, Brazil. He received a Mechanical Engineering degree from the Federal University of Rio Grande do Sul (Universidade Federal do Rio Grande do Sul – UFRGS) in 1982 and attended several extension courses in Business Administration. He started his career at Embraer in 1982 as a Systems Engineer, being assigned to the development of the landing gear system for the AMX military aircraft. In 1984, he joined EDE (Embraer´s Equipment Division specialized in landing gear and hydraulic equipment), leading engineering, marketing, sales, customer support and program management activities for over a decade. In 1999, Mauro joined the EMBRAER 170/190 Program, acting in the Program Management Office. He played a key role in the development of the EMBRAER 190, as Chief Engineer and Program Manager. In July 2005, he was assigned to the position of Vice President, Airline Market Programs, where his responsibilities included product development, planning, customer support, technical and commercial negotiations with suppliers, program management and support to the sales campaigns, especially those involving the E-Jets family. In April 2007, Mauro took the responsibility for one of Embraer's most important business units, as Executive Vice President, Airline Market. In April 2010, he was assigned to the position of Executive Vice-President, New Programs, Airline Market, with the responsibility to develop strategies and bring new commercial airplanes to the market, thus ensuring longevity and growth to this business. In April 2011, he was assigned to the position of Executive Vice-President, Engineering and Technology.

In more recent years, with the strategic determination to become also a key player in the executive jets business, new products have been developed and are changing the shape of this market. The Phenom 100 and 300, the Legacy 600 and 650 and the Lineage 1000 have made a huge difference in their respective segments, attracting strong interest from very demanding customers.

Every new airplane has been a complete new story, with long development cycles permeated by the evolution of technology and the urge to bring innovative products to the market. The new aircraft under development, like the Legacy 500 and the KC-390, and the future developments for the commercial aviation market will bring even greater challenges to Embraer.

The technology intensive nature of the aviation industry poses unique challenges to the aircraft manufacturers. The new technology development cycles are long, typically around 15 years from a new discovery or invention to the maturity level necessary for their application and certification on an airplane. No single company can afford the huge expenses necessary to be the state-of-the-art in this industry. Global partnerships, including manufacturers, research centers and universities, with substantial government support, are more necessary for any company to remain competitive.

An additional challenge is posed to the aviation industry these days: global warming. Despite the fact that air transport is responsible today for only 2 to 3% of green-house gas emissions, the growth of air travel demand, especially in developing countries, will make it increase its relative contribution to alarming levels in the next decades.

Emissions are intimately linked with fuel burn, which is the number one cost element of the airlines. With the competitive nature of the airline business, the quest for efficiency has made airplane and engine manufacturers strive for developing and adding new technologies at every new generation of products. In fact, very few industry segments have seen such an important efficiency improvement – airplanes today burn around 70% less fuel than they did 40 years ago. The next generation aircraft will incorporate more and more technology to cope with this environmental challenge, such as bio-fuels, new and lighter materials, advanced flight controls and navigation systems, just to name a few.

In summary, education, knowledge, and technology formed the foundation for the creation of the aeronautical industry in Brazil more than 60 years ago. They will keep being key factors to ensure competitiveness and growth of this industry for decades to come.