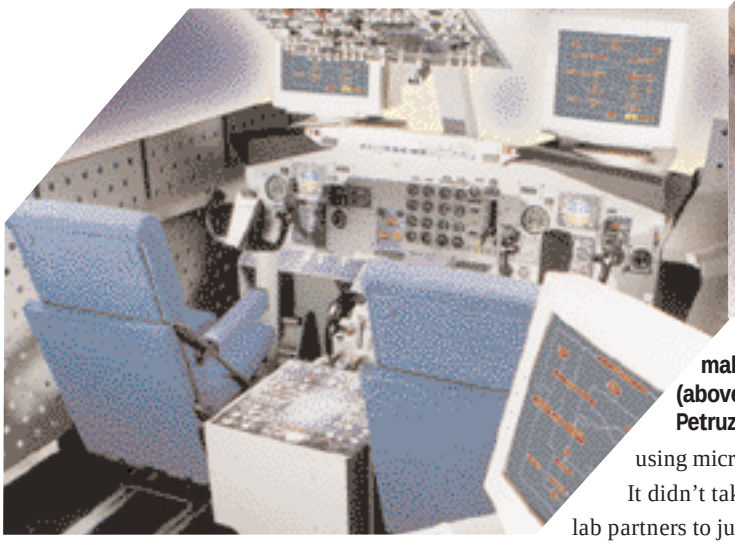
Mechtronix:

5 Men and Their Baby

BY STEVEN DELONG

Back in 1983, engineering students Fernando Petruzziello and Thom Allen were ecstatic. They had approval to build their dream project – a new type of flight simulator. This simulator would be different than others then in use. It would be built using microprocessors, a then-new technology.



(left) Computer projections enable the Mechtronix system to avoid malfunctions that plague analogue instruments on other trainers. (above) Thom Allen, Xavier Hervé, Fernando Petruziello, Jo Frazao and Marco Petruziello.

For two years, Fernando and Thom toiled away in Concordia University's applied engineering lab, assisted by fellow students Xavier Hervé, Jo Frazao and Marco Petruzziello. And in the end they built a working simulator.

The only problem was it couldn't be marketed. Microprocessor technology was still in its infancy, prone to breakdown and, in a machine as complex as a flight simulator, a nightmare to program. Xavier recalls with a laugh that the programming "required way too much imagination."

For most students this would have been the end of the story. They would have recorded their "A" for the project, gone to graduation and begun looking for work. But things worked out differently for the five partners.

Shortly before graduation, Fernando announced that he wanted to start a company and build "intelligent" industrial machines using microprocessor technology.

It didn't take long to convince his lab partners to jump on board.

In 1985 the five opened their company, Mechtronix Systems Inc., in Montreal. Soon, they had their first contract: to design and build a machine that would count bolts and put them in plastic bags. That contract led to many others, including one for a machine that rolled powder into dynamite detonators.

By 1994 the company was well established. The partners, looking for new challenges, found their thoughts turning back to the simulator project. "We figured the technology we had used years back could be revamped and some of the ideas taken up again," says Xavier. "But in the end we started from scratch."

From scratch, however, wasn't going to be so difficult this time around. Microprocessor technology had come a long way since the partners had first dreamed up their simulator idea. It was now more reliable and much easier to program. And there was a huge market for flight training equipment opening up overseas.

Europe's newly formed Joint Aviation Authority (JAA) was planning changes to harmonize training programs across the continent. Where previously each country had its own confusing array of regulations, the JAA would standardize all of this.

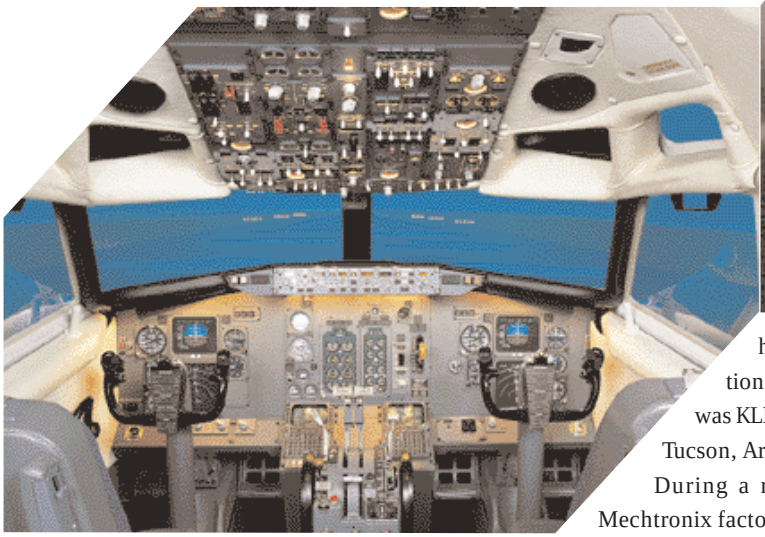
Airlines and flight schools were thrown for a loop by these changes and this was all the opening Mechtronix needed. In a series of meetings, the five partners convinced European officials, airlines and flight schools that they could design and produce training equipment for this new environment.

In late 1995 they unveiled the Ascent Full Flight Trainer. It did not have motion so it was

not a complete flight simulator, but it nonetheless met the needs of the European aviation community and, with prices well under $1 million US, did so at a very attractive price.

The first model, a Beechcraft King Air 200, was sold to Flightware BV, a Dutch flight-training centre. Shortly thereafter, another was sold to the Moncton Flight College in New Brunswick.

The new flight trainer had much to recommend it. Unlike other training devices in its price range, it had forced feedback controls and instruments that were computer projections, thus avoiding pesky malfunctions that plagued analogue instruments on other trainers. It also featured a Mechtronix-designed Visual Display System that would show terrain, runways and clouds in both night and day mode. Customers could order standard visuals or custom designs could be produced to suit a particular training situation or site.



The Visual Display System shows terrain, runways and clouds in both night and day mode.

Since the initial sales, the Full Flight Trainer has been produced in a variety of configurations, including the Boeing 737 and Canadair Dash 8. Customers include European firms such as the Aeronautical Institute of Denmark, RWL German Flight Academy, North America Embry Riddle University, Flight Safety Canada, Indiana State University and Air Canada. In total, 20 have been sold at prices ranging from $100,000 US to $2 million US, depending on requirements.

Buoyed by the success of the Ascent Full Flight Trainer, the partners decided to produce a less expensive trainer suitable for initial training. Combining forces with Jeppesen Sanderson Inc., well-known producers of courseware and flight training software, they produced the Jeppesen Ascent Flight Training Device in 1999.

Available in single-engine or twin-engine piston configuration, fixed or retractable gear, the Jeppesen Ascent is suitable for a variety of training environments. Like its big brother, the Full Flight Trainer, it features Visual Display System, forced feedback controls, computer-projected instruments and a realistic cockpit. And it is easily convertible from one aircraft type to another. Just change a template on the instrument panel, add new software, and you have a new simulation. The first customer was KLM Flight Academy in Tucson, Arizona.

During a recent visit to the Mechtronix factory, I had the opportunity to test fly a Jeppesen Ascent Flight Training Device. The factory itself is state of the art, with computer-aided design and manufacturing, and several trainers were in the midst of construction, including a Boeing 737. But the high point of my visit was a ride in the Jeppesen Ascent. This particular model, set up for twin engine piston training, was being readied for shipment to a customer in Europe. My "instructor" for the day was Tari Kaye, manager of aircraft simulation software. After some trainer orientation, I took my seat and Tari activated the computer at the instructor station behind me. We fired it up, I gave it full throttles and, thanks to the visual display in front of the windshield, I was hurtling down the runway and launched into a flight over rural Britain. The controls worked flawlessly and the instrumentation looked very realistic. There was even real engine noise.

My short flight demonstrated the value of these devices in provision of a safe environment for practicing dangerous manoeuvres. At one point, without warning, Tari introduced another airplane on a collision course. Luckily, I made the requisite steep right turn. And on final, we were able to freeze the simulation to discuss landing characteristics of the simulator. Overall, it was great fun. All too soon I touched down and my flight was over.

Amazingly, after 15 years, all the original partners are still active in the business. Xavier put this down to a dose of luck and the realization early on that they were running a business, not a democracy.

"We used to run on the basis that everyone had a vote, but it slowed everything down. We are all friends, but we still have a boss. Fernando is the CEO and he runs the show. In the end if someone has to arbitrate, he is the one."

This structure seems to have worked. In the last three years Mechtronix sales have grown by over 100 per cent annually. Staffing has doubled to just over 100 and the manufacturing space has been increased four times.

So what's coming up? Xavier says the big project for 2001 is a full flight simulator. Mechtronix believes this will only require slight changes to their current models. Based on past results, he is probably right.