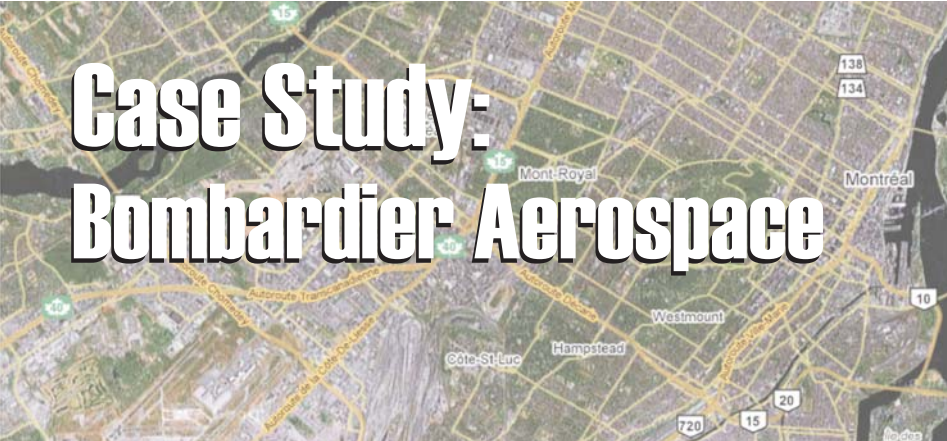


Case Study: Bombardier Aerospace



Software: JETCAM Expert Premium
MRP, RCP and Free-form high performance nesting modules
JETCAM Orders Controller

Machines: American GFM Ultrasonic Cutter
Multicam Router
Shoda Quad 4 Router

At a glance:

- ✘ Replaced outdated Unix-based system that had poor nesting efficiency
- ✘ Speed of nesting MUCH faster than all other benchmarked systems
- ✘ Software paid for itself in around 2 months because of composite material savings alone
- ✘ 500% faster programming time
- ✘ 375% improvement in nesting time with dramatically improved nest efficiency
- ✘ Machine cycle time improved by 5% due to optimised cutting path (120 hours per year)
- ✘ Part identification improved due to auto-printing of ply information
- ✘ Maintenance cost decreased over previous system
- ✘ Support needs are much less than before
- ✘ Minimal training requirements, with staff knowing the basics in 2 hours
- ✘ 8000 CAD files with problem geometry fixed automatically in a couple of hours
- ✘ 'Automatic ply mirroring during nesting' functionality developed on request

Bombardier Aerospace, based in Montreal, Canada is a world leader in the design and manufacture of innovative aviation products and services for the regional, business and amphibious aircraft markets. In 2004 it began a project to replace its existing Unix-based CAM/nesting system, which had not improved in nesting efficiency for some time. Bombardier Aerospace embarked on benchmarking several systems.

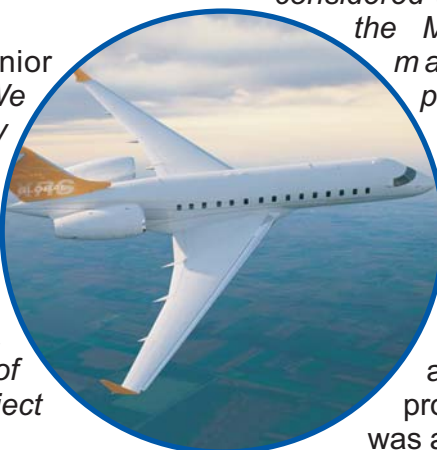
Said Phil Bagshaw, Senior Application Specialist; "We were looking for a company that was very progressive in terms of development, which JETCAM appeared to be. Also, their nests were approximately 5-7% better than the closest competitor. As nest efficiency was one of the main reasons for the project we chose JETCAM."

In 2005 five licenses of Expert Premium were installed, along with JETCAM's high performance nesting module to drive the AGFM composite cutter. Remote Control Processing was used to automate the nesting process.

JETCAM Expert was installed on a Citrix server platform to allow users to run on client systems throughout the organisation worldwide. JETCAM Orders Controller (JOC) was also installed on the server being accessed by method

engineers (programmers), logistics staff and production staff. Further licenses were added in 2006 to drive the Multicam router, with licenses for the Shoda being installed at the end of 2006.

"After the installation of JETCAM for the composite cutter some of the licenses were not put to full use, due to the high level of automation that RCP and JOC provided, so JETCAM swapped these for routing licenses. We never initially considered using JETCAM Expert for the Multicam router, as this machine is used for prototyping and spares, however the success of the composite project demonstrated that it was worthwhile."



Bombardier had 8000 legacy CAD files, of which almost all had geometry problems. JETCAM software was able to 'heal' most of these automatically in about 3 hours, with the remainder being quickly fixed manually over a couple of days. Phil added; "We had anticipated this would take upwards of a month."

The initial benchmarks gave Bombardier an indication of the material savings they could expect and in practice this alone quickly paid for the project. Phil added; "We saw on average an approximate 15-20% saving which meant that the software paid for itself in around two months due to composite material savings alone."

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IMAGE GALLERY



The automation now in place is such that once a component has been designed and its outline geometry is available no other process has to take place manually within the CAM system. Staff simply order parts from JOC, and CNC programs arrive in the appropriate network location a few minutes later.

Further savings were noted on the shop floor, with machine cycle time seeing a 5% improvement (saving around 120 hours on the machine per year) as the software did not force the cutter head to keep rising after each cut, which the previous system did.

Programming time was drastically reduced due to the fact that component 'tooling' is now virtually instantaneous. Previously, if an error was noticed on a component, it would have to be repaired in the CAD system and go back through the CAM process again. Now operators can perform modifications within JETCAM. "On average 10-15% of plies need adjusting; couple this with the overall speed and ease of use, and this means we saw a 500% improvement in our composite programming."

Aircraft components are often symmetrical resulting in only a left-hand design. Phil continued; "We start by programming the left-hand part. We had developed an in-house routine, which automatically mirrored and programmed components. The down side was in house support and maintenance. At our request JETCAM developed a new function within JOC that automatically created mirror components, tooling and naming them to our naming convention. The components were immediately ready for nesting which reduced our manufacturing cycle time, tool proves and first article inspection."

Training was performed onsite for 8 staff. Phil noted that staff became proficient extremely quickly, citing; "Most users were well on their way with just two hours of training!"



With any software purchase the ongoing cost of maintenance is also something to consider. Bombardier realised a further saving of 5% against the maintenance of the previous system, with Bombardier's internal support staff estimating that users required only a fraction of assistance on JETCAM Expert compared to the previous situation.

In addition to the quantifiable benefits there were also a number of other features that saved more time and reduced the possibility for error, such as the automatic printing of part/ply information. "Prior to JETCAM Expert parts were misidentified up to 30% of the time, causing delays."

Bombardier is already on its third installation of JETCAM Expert in its Saint Laurent facility, with its Belfast facility also now a long-time user of the system. Further installation projects are also under review. Phil concluded; "The whole project was delivered to our specification. The dedication and commitment from JETCAM to have people on-site and developing with us exceeded anything we had expected and helped to complete the installation, with the first project completed to schedule in only a couple of months. The composite project was based primarily on waste reduction, however there have been many other benefits which have continued to provide considerable additional savings."