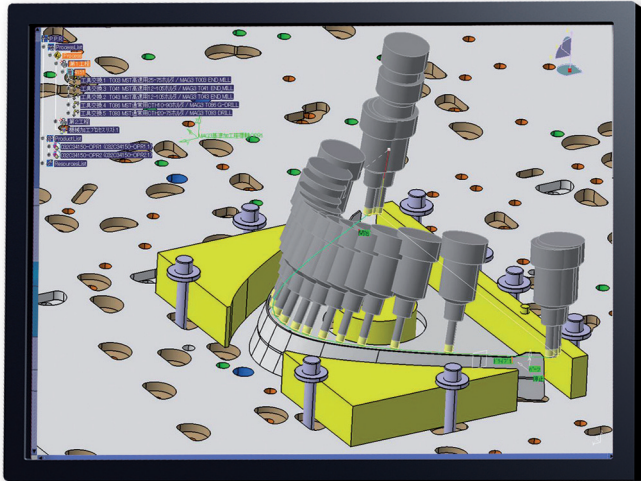


Kaji Metal Industries

Forges ahead with a three-fold increase in productivity with CATIA V5



“When expert NC programmers use CATIA V5, more ingenuity can drive more capability from the machining equipment.”

Ryuichi Ogawa, Executive Director in charge of production technology, Kaji Metal Industries.

Overview

■ The Challenge

With an increase in the volume and complexity of parts and a simultaneous shift to component production, reducing production time was critical for Kaji Metal Industries

■ The Solution

CATIA V5 achieves fixture design and 5-axis machining at higher speeds and accuracy to meet increasing customer demands

■ The Benefit

Compared to conventional methods, Kaji has achieved a three- to four-fold increase in machining productivity with CATIA V5.

More parts, faster production times required

Kaji Metal Industries does high speed, high accuracy machining for aeroplane bodies and main wing components, from the design and production of fixtures necessary for part production to surface treatments and protective coating (painting) of machine products. Kaji is one of the few plants certified by Boeing in Japan and its technology, reliability, high quality and short delivery times are highly valued internationally and domestically.

The company is well-known for large scale machining, for example, both large and complex three-dimensional shapes. To ensure light-weight, uniformity, high strength and reliability, Kaji cuts parts one-by-one from aluminium alloy blocks instead of mass producing parts with die casting using sand or metal molds.

Production within the industry, however, is shifting from independent parts to component production or part assemblies of multiple parts, while the numbers and kinds of parts produced is increasing and companies are under ever-increasing pressure to reduce production time.

Keeping pace with its customers

Kaji Metal Industries had been using CATIA V4 for fixture design, but like its customers and partner companies, quickly realised that CATIA V5, an IBM PLM solution developed by Dassault Systèmes, was becoming the de facto standard in the industry and a shift was necessary.

Kaji introduced CATIA V5 and began using CATIA V5 for fixture design in December 2003. It has been a smooth transition for Kaji because CATIA V4 data can be read and is compatible with CATIA V5. Furthermore, because CATIA V5 is the most widely used system in the Aerospace industry, Kaji can easily share data and collaborate more effectively with its customers and supply chain partners.

In addition, to meet the increasing demand of its customers, Kaji examined the introduction of a CAM system for 5-axis NC machining to achieve higher speed and accuracy. In a three-way benchmark, CATIA V5 was assessed for workability of tool path creation, reliability of NC data and short machining time.

With CATIA V5 already being used for fixture design, the solution had the advantage of a direct link for NC data creation and modelling and offered Kaji a consistent production system from design to assembly. However, because the quality of final machined products is so heavily influenced by human capability, the CAM solution that offered the greatest advantage to operators was important.

“The CAM solution that can make a difference for the operator is better for us,” says Yasumasa Kaji, the company’s CEO.

Because the company machines parts that are thin, light weight and highly rigid from aluminium alloy blocks, differences in tool path can directly influence the processing time. For finish machining, tool approach and the method for moving to the next process start point, greatly influences tool lifetime and processing time. In addition, the 5-axis method, which changes tool axes continuously, provides quality finish surfaces in a short time.

“CAM products other than CATIA are, in a way, like low-priced automatic cars,” explains Ryuichi Ogawa, the Executive Director in charge of production technology. “While they are automatic, they cannot represent unique tastes for original ways of machining. CATIA, on the other hand, is like a manual car. When expert NC programmers use CATIA, the processing data for each tool path can be created at will and more ingenuity can drive more capability from the machining equipment.”

Kaji chose CATIA V5 for both modelling and CAM because of its flexibility and expandability and in September 2004 began 5-axis tool path generation using CATIA V5.

Increasing productivity four-fold with CATIA V5

5-axis machining, due to the variety of tool postures and degrees of freedom it offers, takes more time to master than traditional 3-axis machining. But with the virtual machining capabilities of CATIA V5, which simulates the tool path generated to create the final part and verifies them from various angles by reproducing the actual 5-axis machining on the screen, operators have been able to make the shift to 5-axis machining smoothly.

The transition also has been eased by the natural and realistic simulations that can be achieved thanks to the graphic performance delivered by IBM's IntelliStation hardware selected by Kaji.

More than 200 individual parts were produced in the first 20 months after introduction of the CATIA V5 5-axis machining.

"Since the solid model can be used to determine the cutter path and multiple cutter paths can be created from one cutter pattern, the operation man-hours are reduced," said Ogawa. "In addition, the NC program verification system identifies interference points and corrections for these points can be made using the tool path video function in advance, reducing errors, rework and potentially costly tool damage."

Using CATIA V5 from fixture design to NC data creation, Kaji Metal Industries estimates it has increased productivity by a factor of 3.3- to 4-fold, depending on part complexity. With the Knowledgeware capabilities and power copy functions of CATIA V5, the company believes it can increase automation even further.

In addition, dimension inspection instructions for machined parts are shifting from tangible drawings to model data using the inspection instruction note. Kaji says that in addition to promoting the systematic QA for the entire organisation in accordance with ISO9001/JISQ9100, for which all production processes are certified, the company is promoting the framework for quality inspection and insurance using automatic dimension measurement.

"While machining speed increased thanks to improvements in machine specifications, the inspection must come faster too or it will not matter," said Ogawa.

With the limitless possibilities with CATIA V5 the chips are not the only things flying high in Kaji Metals

Future plans include the sharing of design information with customers and a framework to support the submission of relevant data in response to requests for bids.

"We will focus more than ever before on shortening production lead time and reducing management man-hours for our customers by aggressively introducing new technologies to maintain a superior position," said Kaji.

Kaji Metal Industries also plans to take advantage of its part production know-how and flexibility for small-volume, multiple-copy production (mass customisation) for aerospace clients, coupled with its refined and improved production systems for processes from design to machining, to break into other advanced fields, such as semi-conductor products, robots and high-speed railways.

With a boost from CATIA V5, Kaji Metal Industries aims to become a top metal part supplier across the board.

For more information

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