
FIGEAC AERO & MITSUBISHI MATERIALS

SUCCESS STORY



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Figeac Aero Difficult-to-cut Materials Workshop

FIGEAC AERO

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Technical Process Leader

2: Edouard NOUIRA

Machining Team Leader

3: Damien GRANDET

Technical Project Manager

4: Ludovic BRUEL

Difficult-to-Cut Materials
Industrialization Manager

5: Yohan POUGET

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Process Manager

6: Freddy COUDERC

Cutting Tools Expert

MMC METAL FRANCE

7: Grégory Lafon

Application Engineer

8: Laurent Le Méteil

Aerospace Business Manager

But it was at the cost level, that the results were most impressive: **“With the new ASPX milling cutter, we have halved the production costs of certain roughing operations, and more precisely, obtaining gains of 48%! ”**, says Yohan Pouget, Process Manager for Difficult-to-Cut Materials at Figeac Aero.

In an economic context, the priority of the aerospace sector today lies in reducing production costs. Figeac Aero, a Tier 1 subcontractor well known to aircraft manufacturers, is committed to continuous progress planning to initiate lower prices. It is in this context that Figeac Aero has managed to halve the costs of machining of certain roughing operations for aerospace structural parts. These savings are due to the specific development of multi-flute indexable milling cutters from Mitsubishi Materials. Called ASPX, this range of dedicated milling cutters is now available as a standard stock item in the Mitsubishi Materials catalogue.

This is a project that took several years to develop. In the small town of Figeac, a mecca for the aerospace industry, hundreds of employees from the **Figeac Aero** site have returned to the various production workshops: Aluminium, Engine and Precision Parts, Assembly, Difficult-to-cut Materials; in this last department, entirely dedicated to the production of aircraft structural parts, made from materials such as titanium and inconel, around 90 people work in three 8-hour shifts machining aircraft components.

The Difficult-to-cut Materials unit realizes around 2.2 million Euros in monthly sales, based on approximately 7,000 hours worked. Its role? To produce structural parts such as spars, ribs, fittings and engine mounts for aircraft. “To do this, our workshop houses eight large machines, for parts up to 4 meters in length, and around thirty medium-size machines, where we

can machine parts up to 1.50 meters”, specifies Yohan Pouget, the Difficult-to-machine Dept. Process Manager at **Figeac Aero**. In the three years in this position, he has lead a major project in this production unit, aimed at setting up a new multi-flute milling cutter, with performance capacity that will further efficiencies and considerably reduce machining costs.

The need to renew the rough machining process

By February 2018, the factory was running at full capacity. The order books were full and the machines were running continuously, in three 8-hour shifts, including weekends. In this context, the production units had only one priority: “Always go faster to produce at lower costs”, recalls Yohan Pouget. However, the milling cutters used in the machines for roughing parts had remained unchanged during the preceding ten years, and seemed to have had their day. “In ten years, technologies had rapidly evolved in the field of machining, recalls Laurent Le Méteil, Business Aerospace Manager at **MMC Metal France**, in charge of responding to the call for tenders launched by **Figeac Aero** a little over four years ago. The VFX multi-flute milling technology from **Mitsubishi Materials** in use until then, with its 2-cutting edge inserts, could easily compete with monobloc or high-feed milling, even if the chip flow rate was of secondary consideration.”

Certainly, since the start of the project in 2018, the Covid-19 crisis has taken its toll, dampening the aerospace industry’s dreams of growth by brutally breaking the dynamism of an entire sector. “Produce faster” has



ASPX milling cutter ready for machining



ASPX milling cutter in the foreground; VFX milling cutter in the background.

therefore been set aside, to make way for “produce at lower costs”. A vital strategy for **Figeac Aero** which, like that of so many Tier 1 subcontractors, has been hit hard by the long-haul flights crisis. “Nevertheless, even though the crisis delayed the project, it did not prevent us from moving forward. After carrying out a market study and after placing different cutting tool manufacturers in competition with each other, our choice quickly fell on **Mitsubishi Materials** and their new multi-flute milling cutter technology, which we have since finalised the developed together.”

A roughing solution designed for the aerospace sector

When Ludovic Bruel, former cutting tools manager of the Difficult-to-Cut Materials unit, launched the call for tenders with the various cutting tool manufacturers, **Mitsubishi Materials** was also embarking on the development of a new multi-flute milling cutter with three other major customers in France, as well as one in Great Britain. Among them were the subcontractor Mecaprec (located in Lavelanet, in Ariège) and **Figeac Aero**.

“The R&D Department at the **Mitsubishi Materials** headquarters in Japan asked us to carry out tests on a new milling cutter project called ASPX. We were chosen because it is in France that milling cutters of this type are most often used. This is due to the strong presence of the aerospace sector in our country,” confirms Laurent Le Méteil. “To do this test, we selected three metal cutting sites, and Figeac was one of them. After

presenting our project, we were able to start the tests both at Cetim and also at **Figeac Aero**, in order to check the parameters of strength, speed, the absorbed forces, as well as the repeatability and the service life.”

For his part, Freddy Couderc, Cutting Tools Expert at the Difficult-to-Cut Materials unit of **Figeac Aero** was fully involved in the project, specifies that he used the “method on test specimens to determine the absorbed forces and generate wear curves, before moving on to full-scale tests; a way to measure the stresses on the part in real time and evaluate if the results agreed with those of **Mitsubishi Materials**”.

The results did not disappoint. The reduced forces generated on the axis have made it possible to significantly decrease the stresses on the spindle, whilst also maintaining an optimal level of machining quality. In addition, the ASPX milling cutter made it possible to secure reliability of the process: where the old generations of tools were sometimes prone to breakage. This is no longer the case today, mainly due to the reduction of forces on the spindle. However, it was at the cost level, that the results were most impressive: “With the new ASPX milling cutter, we have halved the production costs of certain roughing operations, and to be more precise, obtaining gains of 48%.” says Yohan Pouget.

Advanced technology combined with customised support

Intended for high-performance roughing, the ASPX milling cutter, combined with its 4-cutting edge

ANTI-VIBRATION MULTI-FLUTE MILLING CUTTER FOR ROUGH MACHINING TITANIUM

DC (mm):	50 to 80
Vc (mm/min):	50
Fz (mm/tooth)	between 0.10 and 0.15 Ae from 10 to 100%





JPGX inserts in MP9140



Rough stock spars ready for machining by the ASPX



ABOUT FIGEAC AERO

The **FIGEAC AERO** Group, a reference partner for major aeronautical manufacturers, specializes in the production of structural parts in light alloys and difficult-to-cut materials, engine parts, landing gear and sub-assemblies. An international group, **FIGEAC AERO** is present in France, the United States, Morocco, Mexico, Romania and Tunisia. As of March 31, 2021, the Group had annual revenues of €204.6 million.

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ABOUT MMC METAL FRANCE S.A.R.L

MMC Metal France, based in Orsay (France), is one of the 7 European subsidiaries of the Japanese company **Mitsubishi Materials** Corporation, Cutting Tools Division (Metalworking Solutions Company). Since its creation in 1992, MMC Metal France has been supplying DIAEDGE brand precision cutting tools, and offering processing solutions for the automotive, aeronautical, medical and die & mold industries. **MMC Metal France** reports to the European headquarters in Germany. With a large number of qualified partners, **MMC Metal France** is able to offer a wide range of precision tools for turning, milling and drilling to French industrial sectors.

Mitsubishi Materials Corporation employs over 27,000 people in 31 countries, operating from various headquarters in Europe, India, Brazil, China, USA, Japan and Thailand, a modern Research and Development Center in Japan, M-TEC Technology Centres (Mitsubishi Technology & Education Centre) in Germany and Spain, as well as various production sites around the world, including one in Spain.

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inserts, won over **Figéac Aero** for various reasons: "This milling cutter is capable of slot machining in titanium with a high chip flow rate – almost 500 cm³ per minute, with the depth and width of cut of 80 mm, and a cutting speed of 50 meters," explains Laurent Le Méteil. Grégory Lafon, Applications Engineer specialising in aeronautics at **MMC Metal France**, adds that this five-flute milling cutter "is definitely an original product, integrating new insert geometries, a more tenacious grade – the MP9140 – originally developed for heat resistant materials, but which can also be applied to many other materials."

But for **Mitsubishi Materials**, other challenges would lie ahead. Under no circumstances should production be disrupted; "it was important to replace the existing VFX tooling with the ASPX directly on the machine, without the need for any extensive reprogramming." A challenge that was met thanks to a collaboration between Yohan Pouget and Freddy Couderc with the French team of **Mitsubishi Materials**. The team was made up of Laurent Le Méteil and Grégory Lafon, who also stated they had received very significant support from Japan. Moreover, Yamazaki Kiichi, the designer of the ASPX cutter, and Takayuki Azegami, the aerospace industry technical coordinator at the European level, came on site and provided significant support to us in this project". Support that was highly appreciated by **Figéac Aero**: "The various members of the **Mitsubishi Materials** team were always there, whenever we needed advice. There were many presentations and

discussions about our expectations, which also greatly helped in evolving the product."

Deployed in the B10 building, the ASPX multi-flute milling cutter from **Mitsubishi Materials** will also be integrated into the machines in the B6 building over the next two years. This will be in readiness to be able to fulfill new orders, especially for the long-haul flights sector of the passenger aircraft business. In any case, at **Figéac Aero**, we say we are "resolutely ready" to meet the challenges posed by the long-awaited rebound of the aerospace machining sector.