COULOT DÉCOLLETAGE & MITSUBISHI MATERIALS

VQXL: THE MICRO-CUTTER WITH MIRACLE COATING

SUCCESS STORY: MEDICAL INDUSTRY

A shared passion for quality

COULOT écolletage

MMC Metal France S.A.R.L.
A Group Company of MITSUBISHI MATERIALS CORPORATION

MITSUBISHI
MITSUBISHI MATERIALS

Aerial view of the Coulot Décolletage site (Châtellerault - France)

ABOUT THE VQXL CUTTER

Range	Ø 0.2 - 1 mm
Geometry	Long neck length
Coating	(Al, Cr)N with ZERO-µ technology
Characteristics	Solid carbide cutter, short cut length, 3 or 4 teeth

High efficiency end mill for optimised chip evacuation during machining of difficult to cut materials.

VQ cutter and medical implement

As market demand evolves, the workshop must adapt

With a fleet of over 30 machines, the company Coulot Décolletage has become a major player in subcontracting in the west of France. Founded in 1985 by Gabriel Coulot, the Châtellerault company grew by valuing the cultivation of highly technical cutting in a region where high-technology, precision industries need an environment with flexible and meticulous subcontracting partners.
The manufacture at the Coulot workshop of parts for enabling repairs to the spinal system, became the main activity of the ISO 9001 and ISO 13485 certified workshop (registered with the FDA and ANVISA). The fact that the production of implants with a Torx "star-screw" clamping device had doubled in a couple of years, raised questions regarding economic optimisation of this particularly challenging manufacturing process. The quality of clamping provided by the Torx screw being superior to that of other systems meant that demand from clients grew in 2016 to an estimated 120,000 out of the total of 200,000 units that were to be produced from titanium and stainless steel. More than any other clamping system, this type of machining requires a lot of precision and care in its execution.
Denis Bessière, Head of the Small-Diameter Cutting Machine Department and Éric Lavrard, Head of Production Planning, have made their provider; Mitsubishi Materials, aware of these developments and of the impact on machining time and the cost per part. "Doubling production with the Torx screw (to the detriment of more simple

shapes) led to a sufficiently large increase in average machining time per screw that it contributed to saturation of the capacity of the machines," remembers Denis Bessière. In contrast to manufacturing a standard six-facet screw, usually performed simultaneously with other machining, the machining sequence for the Torx shape required a considerably more processing time.

A shared passion for quality at the best price

The continuous drive to improve the workshop with regard to machining quality and economic profitability spearheaded the partnership with MMC Metal France, represented by James Perochon, Regional Manager. He remembers those first conversations: "In 2009, we resolved

On the left: Denis Bessière (Head of Small-Diameter Cutting Machines at Coulot Décolletage)
In the centre: James Perochon (Regional Head of MMC Metal France)
On the right: Éric Lavrard (Head of Production Planning at Coulot Décolletage)

Coulot Décolletage workshop

some tool stability issues on a deep drilling operation by using Mitsubishi Materials "Mini-MWS" micro-drills with a through coolant supply. Trusting the quality and performance of our tools, Coulot Décolletage put us to the test on other applications, to which we brought significant advantages in terms of process improvement and reduction of the price per part. " This was the case with the Torx star shapes, previously machined with the MS two-flute cutters from Mitsubishi. The tool diameter varies from Ø 0.4 mm to Ø 1.2 mm, depending on the screw size required.

The recent integration of high-frequency spindles on the machine tools provided an opportunity to revisit and improve the spectrum of manufacturing Torx screws. This prompted a consultation of tool specialists to be organised.

In the production planning office, we highlighted the limitations on concentricity and the surface finish achieved with the method of plunging the cutter into the material. Well aware of the difficulties of this delicate machining in the context of weekly production which can exceed 5000 units, James Perochon brought stakeholders together to verify, at close quarters, the targets sought to meet the manufacturing process requirements. As well as the gains in productivity, Denis Bessière was also interested in better tool longevity, wanting to match the planned weekly changes to the other processes.

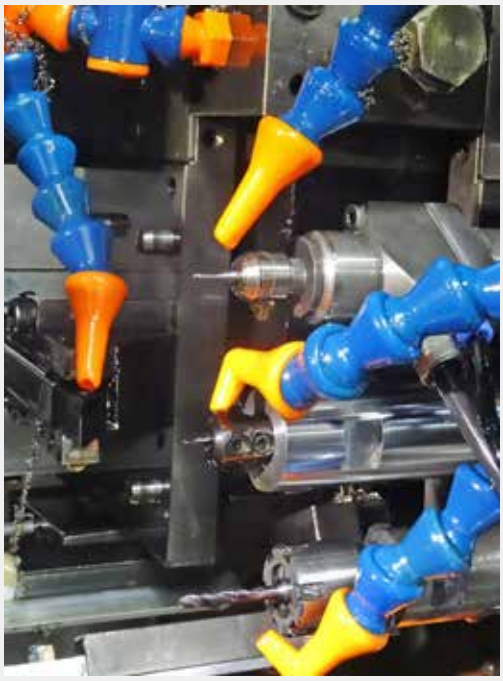
Miracle coating, for production in hidden time

The new range of anti-vibration cutters and micro-cutters, developed in 2013 by Mitsubishi Materials and aimed at difficult to cut materials, already came armed with innovative new technology: an anti-wear "Smart Miracle" coating with a smooth surface which ensures that the cutting edge remains sharp and also improves tool life. Furthermore, the VQXL type, created for fine machining, has 4 flutes even on diameters as small as Ø 0.4 mm, which is unprecedented and especially promising with regard to benefitting from a feed rate that can be up to double that of a two-flute tool. These unusual qualities and characteristics, which Mitsubishi Materials has brought together in its micro-end mills, offer a theoretical potential for twice the productivity of other tools in the market. Sharing a common view, the experts in production planning and machining, together with the tool specialist arranged a trial of the Ø0.8 mm VQXL end mill in real production. There has been no need to seek maximum performance to satisfy Éric Lavrard, who is looking first and foremost for an overall result in terms of quality, productivity and practical applicability in day-to-day life. "The increase in speed and feed rates by around 30 to

"The increase in speed and feed rates by around 30 to 40% per revolution has been more than enough to greatly reduce machining time.. From now on, the screw will be cut simultaneously with other operations and will no longer interfere with the machine's occupancy rate."

ERIC LAVRARD: HEAD OF PRODUCTION PLANNING
COULOT DÉCOLLETAGE

VQXL cutter mounted in the machine



Polyaxial nut in the foreground and polyaxial head to be repelled in the background

ABOUT COULOT DÉCOLLETAGE

A family enterprise founded in 1985 in Châtellerault in the Vienne region. The company specialises in precision machining of small and medium components of batches up to 20,000 pieces in all types of materials (titanium, PEEK, stainless steel, cobalt chrome etc.), up to 60 mm in diameter.

Starting by subcontracting for the major French aeronautical companies, the business decided to make a significant shift from 1996 onwards by putting focus on the service of the medical profession.

The company collaborates with the largest international medical distribution countries (United States, Brazil, Switzerland, Belgium etc.) and is able to manufacture the most complex products, notably for instrumentation, implants and medical prostheses such as spinal parts, orthopaedics, traumatology and neurology.

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ABOUT MMC METAL FRANCE

MMC Metal France, based in Orsay (France), is one of the seven European branches of the Japanese company Mitsubishi Materials Corporation, cutting tools division. MMC Metal France reports to the European headquarters in Germany and since its establishment in 1992, the company has been producing precision cutting tools and providing integrated solutions for the automotive, aeronautical and medical sectors and the mould and die industry. MMC Metal France is in a position to offer French industry a varied range of precision tools for turning, milling and drilling.

Mitsubishi Materials Corporation employs over 23,000 people in 77 countries, operating with various head offices in Europe, India, Brazil, China, the United States, Japan and Thailand, as well as having modern research and development centres in Japan and Spain and at aifferent production sites across the world.

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40% per revolution has been more than enough to greatly reduce machining time. Screws can now be cut simultaneously with other processes and no longer interferes with the machine's capacity. " This aim having been achieved, the quality of the process and tool longevity were the new priorities and these have led to excellent results:

- The work on helical plunging of the cutter has improved, with several teeth in permanent contact with the material and the surface finish is well within tolerance. The reduction in effort on the tool also ensures perfect concentricity – resulting in two parameters where quality has improved.
- With regard to machining capacity, which exceeds 5000 parts, the replacement of the Mitsubishi Materials VQXL cutter is now synchronised with all the other machine tools on a weekly basis. Its longevity has removed the cost of the 2 or 3 machine stops which were required in the previous process.
- With the benefits linked to the reduction in processing time for parts and production halts, the workshop's overall productivity has made significant steps forward. The machines are available more often to deal with clients' orders.

The excellent formula devised by Éric Lavrard along with Denis Bessière and James Perochon deserves total success. Having overtaken his challengers, the Regional Head of MMC Metal France really wanted to utilise the partnership with his clients, taking into account the requirements, which had been optimised to ensure success. Knowing that a standard model of end mill needed to be available from stock, MMC Metal France ensured sufficent stock of this cutter would always be available at an acceptable price.
New ways to improve performance are also underway with MMC Metal France. Drilling of implant components with MMS solid carbide micro-drills with through coolant has just been verified with promising results.
Invested in its mission as a subcontractor at the service of professional suppliers of medical products, Coulot Décolletage uses the recipe for client satisfaction: everyone wins! As success has come, the need to start pushing the boundaries even further will soon arrive.