



num information

At EMO, Num confirms its two targets: **Manufacturers and Users**



In early 2004, we clearly oriented our strategy to simultaneously satisfy machines manufacturers and end users. To do this, several projects were launched, such as the creation of MTCs (Machine Technical

Centers) to enhance our reactivity in the various countries, or the launch of many new products that are clearly operator-oriented (ergonomics with the consoles, user-friendliness with Visual Tool graphic programming, etc.). At EMO 2005, Num confirmed this orientation, putting the emphasis on its two development paths: product and service quality, and relevance of comprehensive solutions with the development of dedicated applications. A product hub allows visitors to discover the latest lines of variable speed drives. While the first elements were presented at the start of the year, EMO will also showcase a world premiere with the launch of the new NUMDrive C. family. We remind you that all the CNC systems have been completely overhauled over the previous three years.

This full reconstruction of the Num variable speed drive lines does not come as a surprise. Variable speed drives play a key role in the global control system of a machine, and therefore in final machining quality. For us, 2005 is an opportunity to reiterate this and prove it. In parallel with this product hub, a "trade" hub will highlight the latest applications created such as grinding, tool and gear cutting, and transfer machines. These developments, which are the fruit of close collaboration with end users, provide them with such comfort of use that it leverages their efficiency. The end user gains in productivity, the machine manufacturer gets a satisfied customer, and Num has reached its two targets!

Philippe Toinet
Num Sales and Marketing Manager

The **NUMDrive C** family is coming!

For EMO 2005, Num is presenting the first members of its new family of NUMDrive C drives. The smallest, in particular, which has one or two high-performance 14 A axes in a 50 mm x 355 mm x 210 mm enclosure, justifies the C in the name of this range, C for Compact.

All the outstanding features of NumDrive drives, including the fast high-speed synchronous digital interface, powerful setting algorithms for controlling different types of motor and the use of precise, high quality sensors, have of course been maintained in this new range, along with special functions such as backlash compensation and active damping for oscillating or non-rigid mechanical parts.

In versions with built-in SAM (Safety Monitor Module), the NUMDrive C drives have functions such as safe stop or low speed, providing complete safety, conforming to DIN EN954_1 category 3 requirements.

(Continuation page 2)

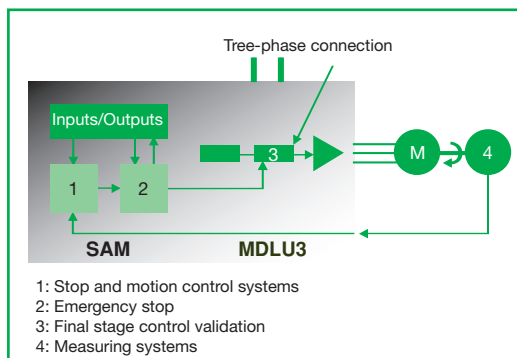


Num launches a new drive range: NUMDrive C

Continuation of the page 2

These new drives are compatible with existing Num Drive control ranges and can be used with them. For commissioning and servicing the user can thus continue to use proven parameter-setting and diagnostic tools such as SETTool. Given that the needs for compactness are increasingly critical whatever the application, higher-current versions are already under development, with the aim of housing all the controllers with their power supply and regenerative braking units in new NUMDrive C range compact enclosures.

When the Drive becomes a safety element!



Axiom Power CNC drive systems, the MDLU3 integrates a safety module enabling it to be compatible with standard EN954-1 Cat 3. This module is also working with the new family of drives, NUMDrive C.

As regards safety, the MDLU3 provides users with two types of solutions. They can choose a configuration compatible with category B of standard EN954-1; the wiring is then clearly simplified compared to the previous MDLU generation. If this category is insufficient for the machine, the installation can be completed

with the appropriate supplementary equipment. Users can also adopt the SAM (Safety Monitor) solution. The MDLU3/SAM assembly obtained is then compatible with category 3 of standard EN954-1.

Certified by the BIA (Berufsgenossenschaftliches Institut für Arbeitsschutz - certificate No. 03 03001), the SAM module applies a patented process for protection against dangerous movements. Instead of monitoring the movements of the motor and managing its power supply with auxiliary components such as additional position sensors, stop control devices and safety relays, to achieve an equivalent degree of safety, the SAM solution uses the components already present in the system. While in a conventional solution the intermediate circuit is uncoupled from the power system on fault detection, the SAM solution only

blocks the final stage. This provides a considerable gain in production time since restarting once the fault is eliminated is much quicker: no need to reload the intermediate circuit, a very time-consuming operation. The SAM adapter simplifies wiring. It has centralized wiring of safety items such as the key switch, emergency stop switch, authorization key, etc. At the same time, the connection between the SAM module and up to five MLDU3s is achieved via a simple connector cable, which greatly facilitates assembly. If there are more than five MLDU3s, several SAM modules can be cascaded. In addition to the component savings achieved, the advantage of the SAM solution is to concentrate the safety functions in the SAM module. This simple structure is easy to install and contributes to cutting down commissioning time.

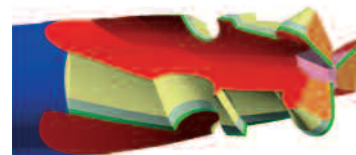
NUMROTPlus® profile cutter option

The market for profile tools and other special tools has grown substantially in recent years. While standard tools (cutters, drills, etc.) are tending to stagnate, profile tools and special tools are showing around 10% annual growth. The expansion of this market is driven by the rationalization of production processes, in particular by vehicle manufacturers and their suppliers.

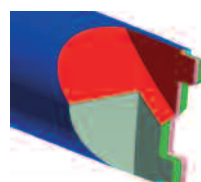
In this context, the NUMROTPlus® “profile cutter” option has attracted many customers over the last five years. This is no surprise, given its very broad range of applications:

- “normal” profile cutters
- universal-teeth profile cutters
- profile cutter with frontal profile
- profile blades, indexable profile inserts, profile grooving tools and stick blades

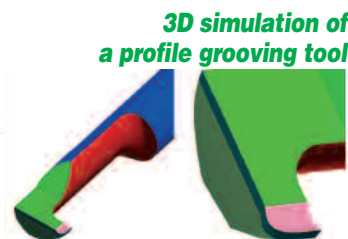
Further information:
www.numroto.com



3D simulation: profile cutter with normal relief land



3D simulation of a profile cutter with frontal profile



3D simulation of a profile grooving tool

Axiom Power : a user-oriented CNC!

Num's Axiom Power CNC system has been designed to be particularly suited to setting up dedicated machining applications. It's true that Num has always encouraged this type of

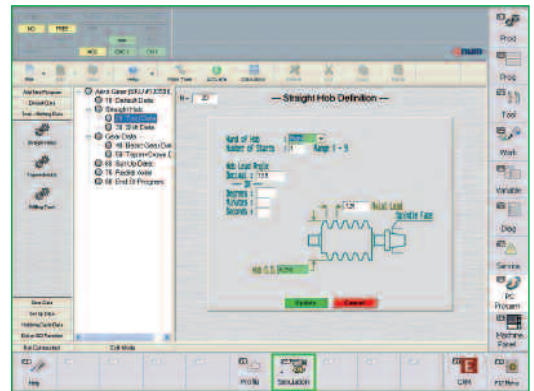
development, by supplying manufacturers with all the necessary tools, even for its previous ranges, but Num also supplies its own "turnkey solutions" which feature user-friendly interactive graphic programming. This procedure simplifies

data input and accelerates the learning curve because it always places the operator in a clear, familiar and even supportive environment.

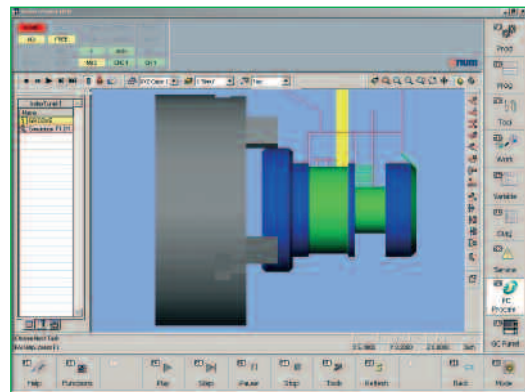
Cylindrical and surface grinding

The cylindrical grinding process consists of a complete external and internal diameters grinding cycle for 2 axis (X/Z) machines. It can incline the axes by pivoting the wheel holder or the table. The dressing station can be mounted on the table or placed at the rear in order to adapt to all the existing machines. Other options include the wheel dressing with one or two point tools or with rollers and profile grinding.

For surface grinding, Num proposes complete grinding cycles for 3 axis (X/Y/Z) machines with wheel



Num's gear cutting solution is totally integrated with the Axiom Power MMI. Two packages are available: the basic one is mainly intended for machines with three axes (X, Z and C) and one spindle. The advanced package is intended for applications including up to 6 axes (X, Y, Z, A, C and W) and one spindle, for manufacturing conical and helical gears with straight or conical cutting tools.



The grinding solution offered by Num includes video teaching programs and a graphic simulation that further accelerate understanding and mastery of the system.

HIGHLIGHT

Ewag celebrates its 200th EWAMATIC machine!



On 1 June, EWAG AG celebrated the handover of the 200th EWAMATIC LINE. The EWAMATIC LINE production grinding centre, controlled by an Axiom Power CNC system and NUMROTOplus[®] software, is an optimum package for the manufacture of hard metal and polycrystalline diamond tools. Perfectly suited to the individual needs of its customers, this grinding centre can perform a large number of grinding operations without changing the workpiece setup.

The star-shaped turret grinding head, capable of accepting up to 6 independent spindles (up to 12 grinding wheels), meets all the needs of tool manufacturers.



dressing by one or two point tools or rollers.

The system under Windows is extremely user-friendly. The operator does not have to know ISO programming: he only has to fill in the data fields proposed by the program. Once he has done this, the cylindrical grinding program is automatically generated and recorded. It is then ready to execute. These operations are made even easier by on-line video teaching programs that introduce the process step-by-step and a graphic simulation of grinding.

Gear cutting

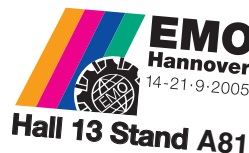
Using Num's very user-friendly interactive/graphic system, the operator can program the machine without knowing ISO program-

ming. He is guided by image data and questions displayed on the screen. Input screens provide him with an extended graphic approach, clearly and concisely describing the gear hob or grinding wheel, the gear and the associated installation data. All he has to do is fill in the data fields displayed on the screen. The program is then generated automatically and ready to execute. Once again, video teaching programs and a graphic simulation are available on-line.

If he wants to, the operator can also either combine the interactive/graphic programming with ISO programming or use one or the other on its own.

Machining composite materials

The latest **Dufieux** machine, driven by **Axiom Power**, hits **two targets** simultaneously!



EMO
Hannover
14-21-9-2005
Hall 13 Stand A81

To comply with the specifications drawn up by Bretagne Composite, Dufieux-Industrie had to reconcile Production imperatives with those of Research. Using a Num Axiom Power CNC system helped them meet the challenge.

The foundations of the 5 axis portal milling machine developed by Dufieux-Industrie for Bretagne Composite (here during installation) have an original feature: in order to make the evacuation and filtering of the sludge generated during machining easier, the civil engineers created an inclined plane. In addition, this machine is one of the first to be fitted with 3rd generation filters.



Due to their lightness, mechanical strength and lack of corrosion, composite materials are playing an increasingly dominant role in sport, cars, water sports and, naturally, aerospace, the market for which they were originally developed. Though the aeronautical industry started off using them for non-vital parts, today they are being used increasingly in parts of the primary structures (central section of the aircraft, fuselage beams...). Yet, because of their non-uniform structure, these types of materials behave mechanically and thermally in very different ways from metals when they are machined. This is one of the reasons why a skills centre has been created in the "Pays de Loire" region (France – see boxed text below). Thus, when Bretagne Composite was looking for a supplier for a new machine, Dufieux-Industrie's knowledge of

carbon fibres was another plus to add to its other strong points: experience of aeronautical applications and know-how in the machining of large parts (see boxed text opposite).

Production side

The 5 axis portal milling machine made by Dufieux will start to produce at the end of 2005. It is the largest in Bretagne Composite's pool. The spindle (up to 40,000 rpm) is fitted with a stainless steel fairing because a composite part is not cooled with oil but with hard water. In fact, the Dufieux machine accepts two types of processes.

"We weren't simply happy to just follow the initial specifications, explained Arnaud Danvin, the project leader, we also proposed some facilities such as the tool management and palletizing systems which both have specific Man Machine Interfaces."

With the possibility of machining up to ten parts by pallet, the loading and unloading system developed by Dufieux considerably improves the machine's utilization rate. Furthermore, by coupling two tables (single table: 9000 x 4800), it doubles the size of the parts machined, thus providing an undeniable flexibility of use. The Airbus A380 is a shining example of the way needs are developing in this direction.

Mobilising a region

To promote the development of the aeronautical sector, already well represented in the "Pays de Loire", this French region has launched a programme of research into the machining of three families of materials: composites, light alloys and hard metals. This machine, developed by Dufieux-Industrie for Bretagne Composite, is part of this project.



“WE ARE NOT SINGLE INDUSTRY BASED...”



...it's one of our strengths, declared René Panczuk, Chairman of Dufieux-Industrie” because, even though the aeronautical industry represents 50% of its turnover today, Dufieux knows how to profit from its different experiences, in order to then combine them more successfully: with the Rail industry, it's the robustness of machines and the removal of large quantities of chips, with the Power industry, machining of hard materials, with moulds and dies, high speed cutting and, finally, the aeronautical industry combines all these skills and adds its own particularities like the use of composite materials. The only constant feature is that Dufieux Industrie is specialised in the design of large machines. “Basically, this type of machine requires a great deal of flexibility because you must be able to offer the best response at both economic and technical levels, he continued.” Furthermore, there is a new trend appearing in the sector: knowing how to integrate the machine into a manufacturing process (CAD-CAM, Flow of parts, palletizing..), a service that Dufieux is able to offer.

But this machine is not simply intended to meet Bretagne Composite's production requirements, it must also have the properties required of a test machine because it is also intended for the programmes carried out by the Ecole Centrale de Nantes, in the framework of the “Pays de Loire” project.

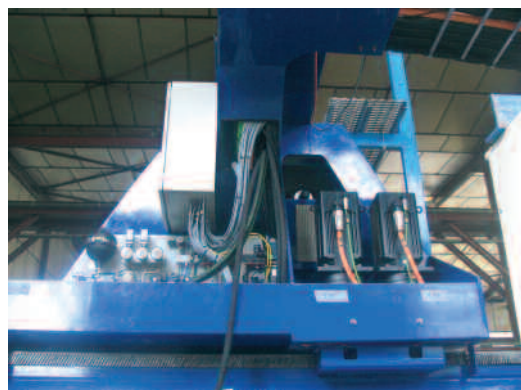
Research side

“To meet the R&D requirements, we increased the head's performances, via Num HP Drive drives, said Arnaud Danvin. By doing this we gained 20% of torque, which means that we can machine with larger tools.”

They also had to adapt the spraying characteristics: the flow and pressure were increased in relation to those of a traditional use.

A test machine must also have very particular capabilities in terms of repetitiveness, accuracy and flexibility of use. “We installed all the Axiom Power 5 axis functions, continued Arnaud Danvin.”

The RTCP, inclined plane, high precision contour... functions are all used to guarantee the precision and the quality of the surface condition. On a machine of this size, it is essential that everything possible is done to ensure excellent rigidity. Therefore, the backlash compensation system developed by Num was also installed. This is made up of two Num BPH motors mounted in tandem and is used to electrically pre-stress the transmission system. Each of these motors supplies an acceleration or braking torque whose resultant ensures acceleration (or deceleration) of the slide (tandem control) and an antagonist prestress torque keeping the gear teeth in contact, thereby eliminating the adverse effect of backlash (prestressing torque). To optimize security, the prestressing torques are applied gradually when the drives are turned on, preventing snapping of the gear teeth. Thus, the specific requirements of both production and research have been minutely studied with the aim of providing a suitable response that does not penalise the other use each time.



BPH tandem used motors. Compared to traditional prestressing systems, the tandem motors backlash compensation system has the advantage of being a reliable and economic solution. In addition it is mechanically simple and easy to adjust and maintain. But above all, it provides much greater rigidity by prepressing the mechanical components.

Laser cutting and marking

Lasermac and Num : using laser in all its splendor!



Aiolfi specializes in complex cut parts adorned with decorations, marquetry, relief, 3D marking, etc.

“I started up my business in Caravaggio (about 50 kilometers from Milan) in 1980 with my wife and two employees, remembers Giacomino Aiolfi, owner of the company of the same name. In the beginning, we manufactured dies for the mold industry. With the purchase of laser cutting and marking systems, our business greatly expanded and the company began to make Plexiglas display cases and more generally various subcontracted cutting jobs.” The introduction of the laser technology was to completely change the profile of Aiolfi: from die supplier, the Italian subcontractor became a specialist in complex cut parts adorned with decorations, marquetry, relief, 3D marking, etc. In addition to the three numerically controlled pantographs for cutting (with chip removal), Aiolfi also has two laser marking and cutting systems. The latter uses a latest-generation Lasermac Tesi 515 machine equipped with a 1,000-watt CO₂ Laser source.

It's all in the control!

Controlled by a CNC Num Power 1040, this machine allows cutting of soft iron (up to 8 mm thick), aluminum (up to 2.5 mm), Plexiglas (up to 25 mm) and wood (up to 30 mm). The diameter of the laser beam, adjustable from 0.1 to 1 mm, allows operators to achieve sharp edges and small-size holes, optimize the quantity of material used, and obtain an excellent quality finish.

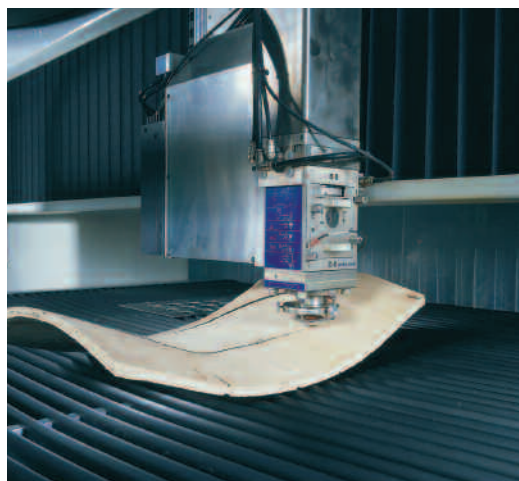
With its 5 x 1.5 m table, the Lasermac Tesi 515 machine is perfect for making large individual parts or large quantities of small parts obtained

by nesting (nesting and arrangement of parts to optimize the use of materials).

“Great cutting precision”, explains Giacomino Aiolfi, “combined with the perfectly controlled machining speed allows us to move quickly from prototyping to production. This flexibility and the easy use of the Num Power 1040 system are just a few of the many advantages of this equipment.”

“A CNC dedicated to these operations”, adds Claudio Cadegiani, Lasermac technical manager, “must, among other things, have fast interpolation and be capable of handling accelerations perfectly, especially for sharp edges, to avoid transmitting vibrations to the mechanics. This would deteriorate the part's finish. The system must also be open, to allow the creation of macros. Using the Num Dynamic Operators, we have created routines that modify the power of the laser during profile execution, while taking account of the speed variations on the path; this method allows us to avoid burning the material while complying with the part's geometry.”

“The Num Dynamic Operators and Structured Programming”, adds Claudio Cadegiani, “have allowed us to create a special “G” function which, on the one hand, controls the axis supporting the laser (axis Z), and on the other hand, combines several features, including plunge work management. This function also allows control of the torch load line according to the distortion of the material: by keeping the laser at precisely the same distance from the part surface, we gain a clear advantage in terms of cutting consistency and compliance with dimensions.”



Laser technology produces stunning results in terms of finesse and attractiveness. However, it requires total control over several characteristics: feed speed, constant distance between part and torch, etc.

Lasermac Tesi 515 machine. With laser technology, it is very important to control the torch load line very precisely according to part geometry, and this for any part geometry. This guarantees the beam diameter, avoids burning, and allows for a better cut resolution.

Gear cutting using a hobber

To produce its **very high quality gears...**

... Rossi Carlo Meccanica has chosen Ravaglia snc and Num! Ravaglia re-engineered the machine, while Num contributed to the success of the operation through the performance of its Axiom Power CNC system incorporating its gear cutting package.



Rossi Carlo Meccanica specializes in the manufacture of complete gear sets for hydraulic pumps and works for the major Italian manufacturers.

“Designing and manufacturing a gear is expert work,” declares Andrea Rossi, joint owner of Rossi Carlo Meccanica with his father Carlo. “We specialize in the production of complete gear sets for hydraulic pumps, and we work for the major Italian manufacturers,” he adds. “In our plant at Spilamberto, in Emilia Romagna, we also produce rods for export markets. Our production has ISO 9001 2000 certification.” In addition to many numerically-controlled lathes and grinding machines, the tooth-cutting workshop has three hobber gear-cutting machines controlled by PLCs and above all an imposing Liebherr machine. The latter, with its six axes and a powered tailstock, has recently been fitted with a Num Axiom Power CNC system, the Num dedicated gear cutting software package and Num HP Drive servosystems.

“With machines controlled by PLCs,” continues Andrea Rossi, “cutting operations are much more difficult to program than with CNC machines. On the Axiom Power, using the Num application, all it takes is changes in a few parameter settings defined in the Procarn interactive programming pages. Furthermore, switching from one job to another is very straightforward, which greatly increases the flexibility of the system.”

Num, a partner for twenty years!

Ravaglia snc is the company that handled the re-engineering of the Rossi Carlo Meccanica system. Its owner, Paolo Ravaglia, tells the story: “Since 1978 we have specialized in gear cutting machines and in shaving and grinding techniques. Our collaboration with Num has already lasted twenty years and, over and above the products, we appreciate the contribution of its technicians, which has enabled us to develop innovative solutions that always give full satisfaction to our customers.”

“Axiom Power and its open language,” he continues, “have enabled us to design custom packages simply using standard development tools (Visual Basic, Visual C ++). In addition, the inclusion of an application server in the CNC (PCToolKit) has given us access to the CNC data, but also the servosystem and PLC data; this greatly simplifies

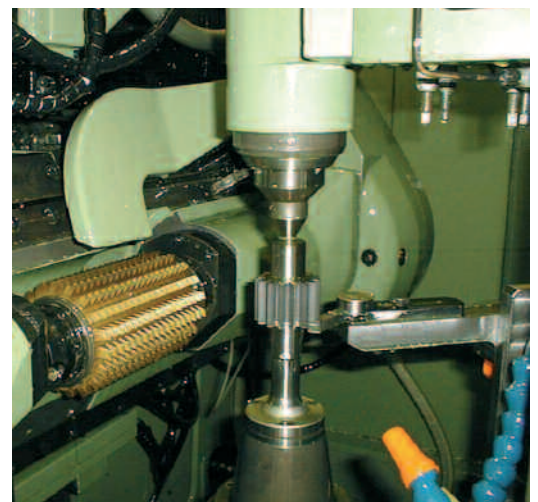
The imposing Liebherr machine has six axes and a powered tailstock. It has recently been fitted with a Num Axiom Power CNC system, the Num dedicated gear cutting software package and Num HP Drive servosystems.



“Designing and manufacturing a gear is expert work,” declares Andrea Rossi, joint owner of Rossi Carlo Meccanica with his father Carlo.

the management of an unsupervised multi-lathe system, for example.

Given our business, the gear cutting software developed by Num is of enormous interest to us. It enables us to control machines with up to six axes (X, Y, Z, A, C, W) plus a spindle and even meets the needs of complex gears such as bevel and helical gears. Moreover, the automatic alignment enables us to carry out rework automatically after rough machining or treatment.” It is always best to choose partners who speak the same language!



Precision micromechanics

A precision expert chooses the Witech/Num pair

Nothing like demanding users to showcase the properties of a system. That's just what happened at STEEC which, given its lines of business, has strict precision and repeatability requirements.

Strict planning, optimized technologies, a culture of precision and the infinitely small... the French company STEEC can boast all these strong points.

"We deliberately chose to specialize in a field with high added value", admits Paul Rolland, Chairman of the PRF Group to which STEEC belongs, "and to establish ourselves on this type of market, we use two strategies simultaneously: process control, and regular investments." It is true that with a total of 24 employees, administrative staff included, and a population of 18 CNC machines, this subcontractor, an expert in precision micromechanics, doesn't shy away from allocating the resources required to succeed. "In 1983, we were the first French company to use the Yag laser technology on an industrial scale", adds Paul Rolland. "Today, we are proficient in laser cutting, as well as electrical discharge machining and micro-drilling, which allows us to choose the technology best suited to the type of part requested."



Paul Rolland, Chairman of PRF Group to which STEEC belongs, has chosen to specialize in areas with high added value. Today, his company has expertise in several technologies and manufactures parts for the aerospace, nuclear and medical fields, among others.

Perfectly organized to meet the needs of large prime manufacturers, STEEC makes parts in small series (10 to 15) or per unit, designed for very high-tech fields such as the aerospace and nuclear industries. "Given the lines of business of our customers, there's no room for error, and we are held to a very high level of quality." The 1,500 m² of workshops are therefore air-conditioned, in accordance with the most stringent precision machining rules. Under such conditions, it is legitimate that STEEC be so demanding with its suppliers.

Witech, Swiss precision!

"Witech showed it was able to make strong proposals", remembers Paul Rolland, "and they gave us real support in defining the machine."

"Our service and flexibility policy is a strong point that is highly solicited today", admits Lilian Meunier, Sales Manager at Witech. Witech has in fact chosen to address niche markets where its technological expertise allows it to achieve a very high level of performance. The quality of the Axium Power automatic controls, combined with the mechanical capacities of the Witech machines, allows excellent results.

"We want to propose that little plus that will make all the difference in user productivity", continues Lilian Meunier. "That's what we focus on in our relations with STEEC. To meet their precision and repeatability requirements, we specially studied the mechanical rigidity and lack of vibration aspects." "A user-manufacturer dialog allows all the synergy needed to achieve a good solution", he concludes. With Mr. Rolland and Mr. Poncet at STEEC, we've found experts in precision who urge us to go higher, and in their field the word is even more relevant!"

Operational for several months, the Witech 628 machine is now one of the major micro-drilling production tools at STEEC, and it allowed the French subcontractor to continue manufacturing parts whose technology has evolved.



"STEEC, Num and Witech share the same approach", explains Lilian Meunier of Witech. "It's not on paper or in brochures that we want to be the best, but in the field."



The Witech 628 machine is a 5-direction machining center that is specially suited to making very high precision parts.



STEEC was the first French company to use the Yag laser on an industrial scale.

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