

**crazy about**

**customer projects**

TECHNOLOGY CENTER & SERVICES





## GOOD REASONS FOR A CO-OPERATION WITH MIKRON TOOL AS A TECHNOLOGY PARTNER

- You reap the benefits of our extensive industry expertise in performing complex machining tasks.
- You receive the most cost effective solution from us.
- Close cooperation between the Technology Center and tool production ensures that your projects run smoothly.
- You have a reliable partner at your side. From the choice of the right tools through to series production.
- Take advantage of our know-how in working with high-tech machining centers.
- We have won numerous awards for our innovative tooling expertise.
- You can count on professional project management and state-of-the-art reporting.

# Your success is our goal

**When people call us “crazy,” we take that as a compliment. In our Technology Center, we tackle seemingly unsolvable machining challenges.**

Finding solutions that will surprise you is our goal. At the same time, we strive to offer you the most cost-effective option. We can do this because we manufacture tools that are unique and set new benchmarks in terms of precision and performance. We also provide services that cater perfectly to your needs. Furthermore, we adhere to one principle for all our new projects: There is no such thing as impossible. Our “CrazyService Products” will support you to optimize your machining processes and cost-effectively produce even the most complex workpieces.



**CRAZYSERVICE**  
by Mikron Tool

The following pages will provide you with a detailed overview of our engineering services and inform you about our well-established Technology Center, which is the key to making all of this possible.

A handwritten signature in blue ink that reads "Gotti A.".

Alberto Gotti (Head of Development and Customer Projects, Member of the Senior Management)



## WE ARE READY TO TACKLE YOUR CHALLENGES

### CrazyService Products

Efficient component production requires optimizing the entire production chain. This includes machine selection, coordinated speeds, the required coolant pressure of the internal coolant feed, suitable production equipment such as tool holders, part clamping, coolant, and the most appropriate tools. Identifying these factors requires extensive expertise and time. Businesses often lack the latter. Mikron Tool services can solve this problem. Mikron Tool has gained extensive knowledge by developing precision tools and has established itself as a one-stop solution for machining companies. As a result, we have been able to create various service packages tailored to the needs of our customers: from tool testing to optimizing or redefining a process through to prototype series.



### Technology Center

Our development and research department is exceptionally well equipped. At its heart are state-of-the-art production and measuring facilities. The machinery includes automatic lathes, state-of-the-art 5-axis machining centers, and a new highly flexible turning and milling center. It operates with spindle speeds of 8,500 to 60,000 rpm and an internal coolant feed of 40 to 200 bar. We use coordinate-measuring machines and high-precision roughness testers to perform high-quality inspections. Here, tools are subjected to rigorous testing and fine-tuned for high performance. Mikron Tool employs CAD/CAM systems to develop machine-specific and user-oriented manufacturing processes.

Our machining specialists in the Technology Center work on customer projects and provide high-performance expertise to numerous industries every day.



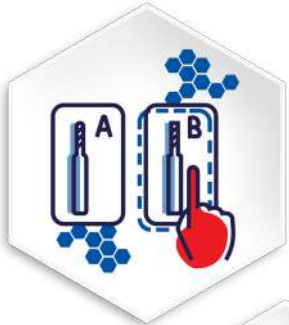
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# Our 5-service packages

## HOW CAN YOU OPTIMIZE YOUR MANUFACTURING PROCESS?

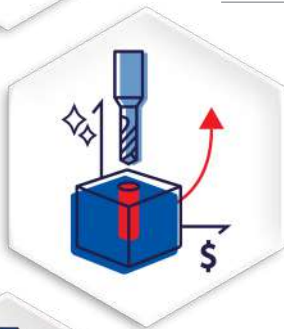
## BENEFITS



### 1. TOOL EVALUATION

Determination of the best tools for an existing machining process or a new component.  
Tool testing for machining a new material.

- ASSURANCE BEFORE YOU BUY
- SAVE RESOURCES AND MACHINE TIME
- TIME SAVINGS THANKS TO PROVEN EXPERTISE
- FAST RESULTS



### 2. PROCESS DEFINITION

Analysis of critical operations and their optimization through using tools from our catalogue. We create a CAD-CAM simulation of the new manufacturing strategy. Machining tests are carried out as an option.

- PROFICIENCY TESTING OF TOOLS FROM MIKRON TOOL
- NO ADDITIONAL INVESTMENTS IN MEASUREMENT OR PRODUCTION EQUIPMENT
- NO COMMITMENT OF COMPANY RESOURCES
- TIME SAVINGS AND COST EFFICIENCY



### 3. TOOL LIFE TEST

Tool testing for existing machining processes and establishment of their profitability.  
Estimation of tool costs per produced part and identification of the most cost-effective tools to increase the savings potential.

- ASSISTANCE IN THE SELECTION OF TOOLS IN TERMS OF EFFICIENCY
- IDENTIFICATION OF SAVINGS POTENTIAL
- SAVINGS IN COMPANY RESOURCES
- RESULTS IN NO TIME



### 4. PROCESS ENGINEERING

Customer-specific tools are used to optimize critical features or processes.  
Validation through machining testing on the machine.  
Reduce process and tooling costs.

- OPTIMIZED PRODUCTION PROCESSES
- NO IN-HOUSE EXPENDITURE IN TERMS OF PERSONNEL AND MACHINERY
- TIME SAVINGS
- REDUCED COSTS, INCREASED EFFICIENCY



### 5. TURNKEY SOLUTIONS & PROTOTYPING

Development of an entire process, including the production of a prototype or pilot series for product or process validation.

- IN-HOUSE CAPACITIES OR MACHINING EXPERTISE IS NOT REQUIRED
- ZERO INVESTMENT RISK
- INCREASED TIME SAVINGS
- COST AND PERFORMANCE EFFICIENCY

Find out more!



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01

## TOOL EVALUATION

Are you planning the production of a new work-piece and would like to use the most suitable tools for the already defined process? You have a new material and want to use the right tool for the machining process? You are not sure about the previous selection of your tools and want to test for the first time a Mikron Tool product? Precisely for these tasks, we have defined the "Tool Evaluation" service.

### Our service

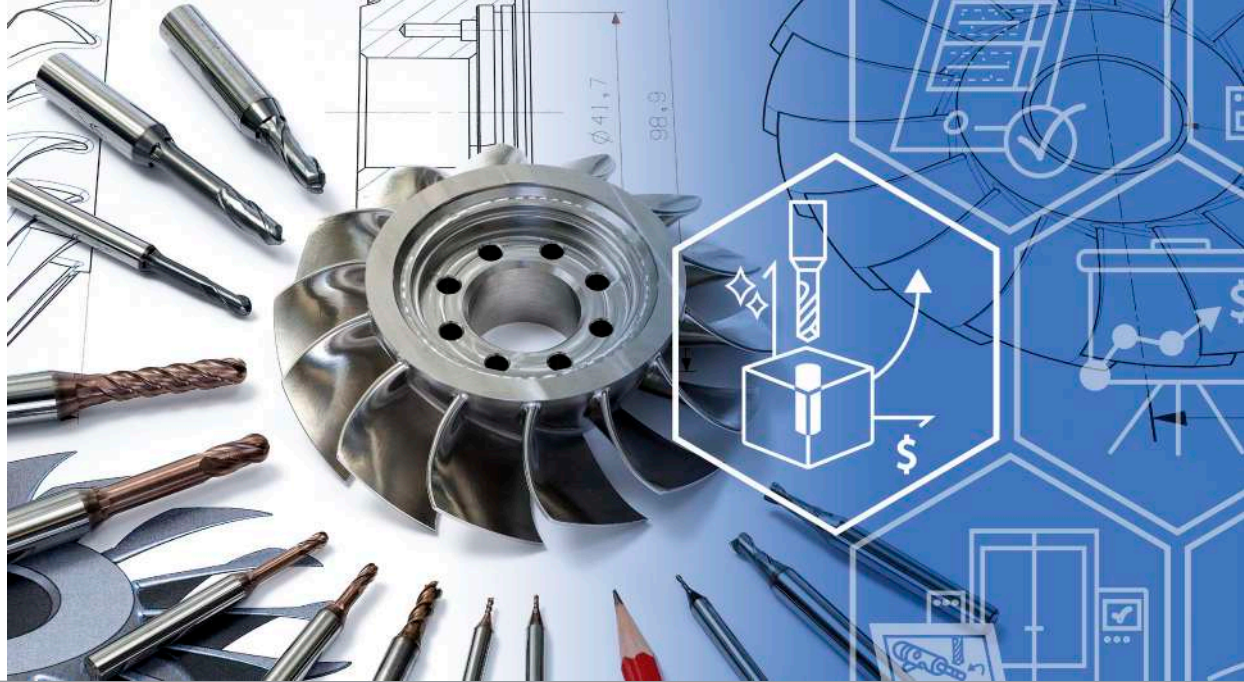
- According to your requirements, we determine the best tool for your individual chip removal task on our state-of-the-art machining centers.
- We produce a report with tool recommendation and tool evaluation.
- We provide you with cutting data and all relevant information for the proposed tools.
- On request we provide corresponding measurement reports.

### Your benefits

- Certainty before buying: We document the suitability of our tools for your application with measurement reports.
- Resource and machine time savings: by outsourcing you save valuable productive hours of your personnel and avoid unproductive use of your machines for trials.
- Time saving through profound know-how.

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02

## PROCESS DEFINITION

The production of one of your components involves critical processes. By using the Crazy Tools from our range, these processes should be optimized. Our “Process Definition” service can offer you significant support in this context.

### Our services

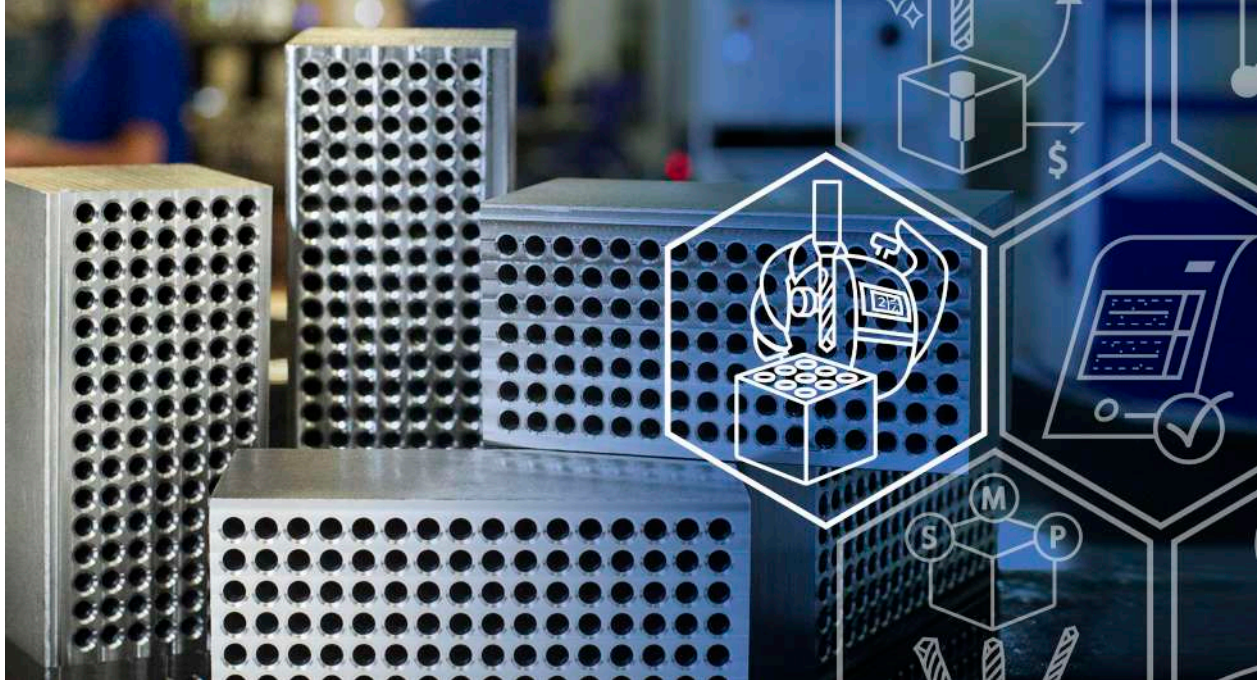
- We analyze the critical features or processes using drawings or CAD files. Then, we define a new manufacturing strategy with the appropriate tools from our range that will significantly improve your operation methods.
- We will create a CAD-CAM simulation for you.
- You will receive a report that contains recommendations for tools, cutting data, and the machining concept.
- Optionally we do machining tests of the manufacturing strategy (subject to an additional charge).
  - Tools and cutting parameters are validated in the tests. An inspection of the tool and work piece will be carried out.
  - We will provide you with reports, measurement protocols, and CAM or NC files.

### Your benefits

- By using our CrazyTools, you will gain an optimized machining process.
- Using efficient tools you optimize your manufacturing process in terms of cycle times and machining quality. You will gain new knowledge for future projects.
- You won't spend additional money to determine the cutting data and set-up the process. Leave that in our capable hands.
- Fast results: make the most of our extensive experience and targeted approach.

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03

## TOOL LIFE TEST

Do you want to achieve a more economical chip-removal process? Do you intend to calculate the tool cost per part and take advantage of possible cost savings by finding the most economical tools? This is precisely what our service "Tool Life Test" does.

### Our service

- We define on our DMG MORI machines the work-piece machining cost based on the tools used.
- We supply you with a report including tool evaluation, tool recommendation, cutting parameters and relevant measuring data.
- You receive all guidelines for tool usage, including wear analysis and estimated tool life.

### Your benefits

- Assistance in tool selection in terms of cost efficiency: we are evaluating the tools used for your application, determining the tool life and subsequently the overall tool cost.
- Identification of potential savings: Along test results you receive a verified evaluation with corresponding tool recommendation based on the premise to reduce tool costs per produced work-piece.
- No commitment of your own resources: we take charge of the tests and come up with a tool evaluation used for your specific applications. Therefore, you don't have to provide any resources (staff or machinery).
- The time required is minimal.

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## 04

### PROCESS ENGINEERING

One of your components has critical features or process sequences. You are looking to optimize your process using specially developed cutting tools. We have created our “Process Development” engineering service for such cases.

#### Our services

- We analyze the critical processes using drawings or CAD files. Then, we define an alternative manufacturing strategy with newly developed tools (where necessary, in combination with tools from our catalogue) that will optimize your process. This with a focus on reducing cycle times, using fewer cutting tools, reducing process costs, and improving part quality.
- We perform validation of the tools, cutting parameters, and machining strategy. This involves performing machining trials on the machine.
- We produce a report that contains tool recommendations, valuations and cutting data for tool use.
- We will provide you with CAM or NC files.
- You will get recommendations on coolant, pressure, and tool clamping devices.
- An inspection of the workpiece will be done.

#### Your benefits

- Optimized machining processes: We will find the most suitable tools for your machining processes, taking into account the machines you have available.
- Significantly improved component quality.
- No in-house expenditure in terms of personnel and machinery. No need to invest in measurement and production equipment.
- Our targeted approach delivers fast results.

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05

## TURNKEY SOLUTIONS & PROTOTYPING

Do you have an idea for a new work-piece, but not yet a notion on how to achieve the goal through a chip removal process? In this case our service "Turnkey Solutions & Prototyping" is precisely the right service for you.

### Our service

- We develop an overall process (including recommendations for machines, coolants, tool holders, work-piece clamping, CAD/CAM programming, QC definition etc.).
- We handle the production of a prototype resp. the pilot series for the determination of product and process validation.
- If desired, we train your staff for the processes defined by us.

### Your benefits

- It's not necessary to use own capacities or know-how: no need to tie up of your engineering resources or production capacities. We handle all that for you. You don't need any expertise in machining technology.
- No investment risk: you avoid costly investments in engineering, tools, machines and specialized staff. On the other hand, you have the benefit of working with a strong partner who has vast experience in chip removal technology.
- Shorter through-put time: take advantage of our highly experienced specialists to reach goals quickly.

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## Innovative technology for best results

### **Machinery**

The Technology Center has an efficient machine park composed of an automatic lathe, various state-of-the-art 5-axis CNC machining centers and an automated turning and milling center for six-sided machining. We work with spindle speeds of 8,500 to 60,000 rpm and an internal cooling supply of 40 to 200 bar.

### **Fixturing and Cooling**

Regarding production technology we use precision tool holders, shrink fit and hydraulic chucks. Workpiece clamping includes zero-point fixtures, centering collets as well as three-jaw chucks. For cooling we use vegetable based cutting oils, synthetic and mineral oils as well as emulsions.

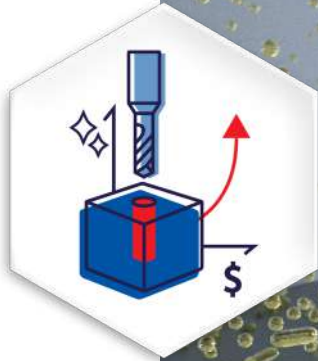
### **Analyzing and measuring**

Measuring equipment and systems include, among others, 3d axes are part of our equipment. We analyze bores for run-out, cylindricity, diameter, roughness etc. as well as milled features regarding perpendicularity and planarity. In addition, we have a measuring arm for a measuring range of 1200 mm and a precision of 16  $\mu\text{m}$ , surface roughness measuring devices, a scanning electron microscope for photomicrographs with 50.000 amplification as well as rotating dynamometers for cutting force measuring (feed and torque) and torsion force analysis.

### **CAD/CAM**

With CAD-software-solutions of the latest generation we can model complete surfaces, parts or meshes. Thus, we are capable to import, analyze and potentially optimize projects submitted by our customers. Our modern CAM software allows us performant programming, precise simulation and optimal CNC coding for each machine tool. The capacity of the machines is fully used in synergy with the CrazyTools.

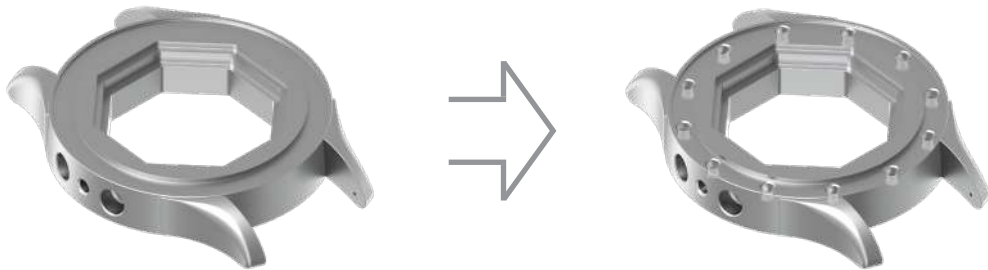
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## EXAMPLE OF APPLICATION – PROCESS DEFINITION

### Watch case

The task was to reduce significantly the machining time of the boreholes. For this, we used tools from the Mikron Tool catalogue.



### THE SOLUTION FROM MIKRON TOOL

#### Material

- X2CrNiMo 18-14-3 / 1.4435 / AISI 316L

#### Machining

- 12 holes:  $d = 0,6 \text{ mm}$  (**0,023"**), drill depth 3 mm (**0,118"**)
- Tool used: CrazyDrill SST-INOX Type IK

### THE RESULT

#### Cycle time

- Initial time: 50 sec
- Optimized machining time: 10 sec

⇒ **5 x** Time saved: 40 s / part

#### Additional benefits

- Despite shorter machining times, we achieve significantly longer tool life
- High process reliability with optimal chip removal



## EXAMPLE OF APPLICATION – PROCESS ENGINEERING

### Machining solution for Torx®-Sockets

A new tool concept and a perfect machining strategy for the Torx® shape on titanium or stainless steel bone screws have resulted in significant efficiency gains.



### THE SOLUTION FROM MIKRON TOOL

#### Material

- Ti Gr.5 ELI / TiAl6V4 ELI / 3.7165

#### Machining

- Drilling, chamfering, milling, and deburring: Four operations in three steps with two tools
- Tools used: CrazyDrill Hexalobe (combined drill, custom-made) and CrazyMill Hexalobe
- Spiral interpolation

### THE RESULT

#### Cycle time

- Initial hexalobe machining time: 62 sec
- Optimized hexalobe machining time: 33 sec



50 %

Time savings: 29 s / part

#### Additional benefits

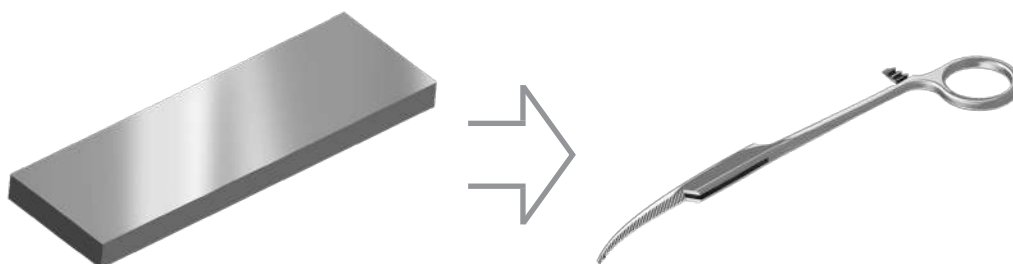
- Significantly reduced milling process
- High profile accuracy and virtually burr-free
- Excellent surface finish
- Long tool life



## EXAMPLE OF APPLICATION – TURNKEY SOLUTIONS & PROTOTYPES

### Hemostatic clamp

Mikron Tool has developed a turnkey solution, including developing a prototype, for this medical instrument to ensure efficient production while meeting the stringent quality requirements. The manufacturing strategy includes all the necessary information regarding machine, coolant, tool holder, CAD-CAM programming, and cutting tools.



### THE SOLUTION FROM MIKRON TOOL

#### Material

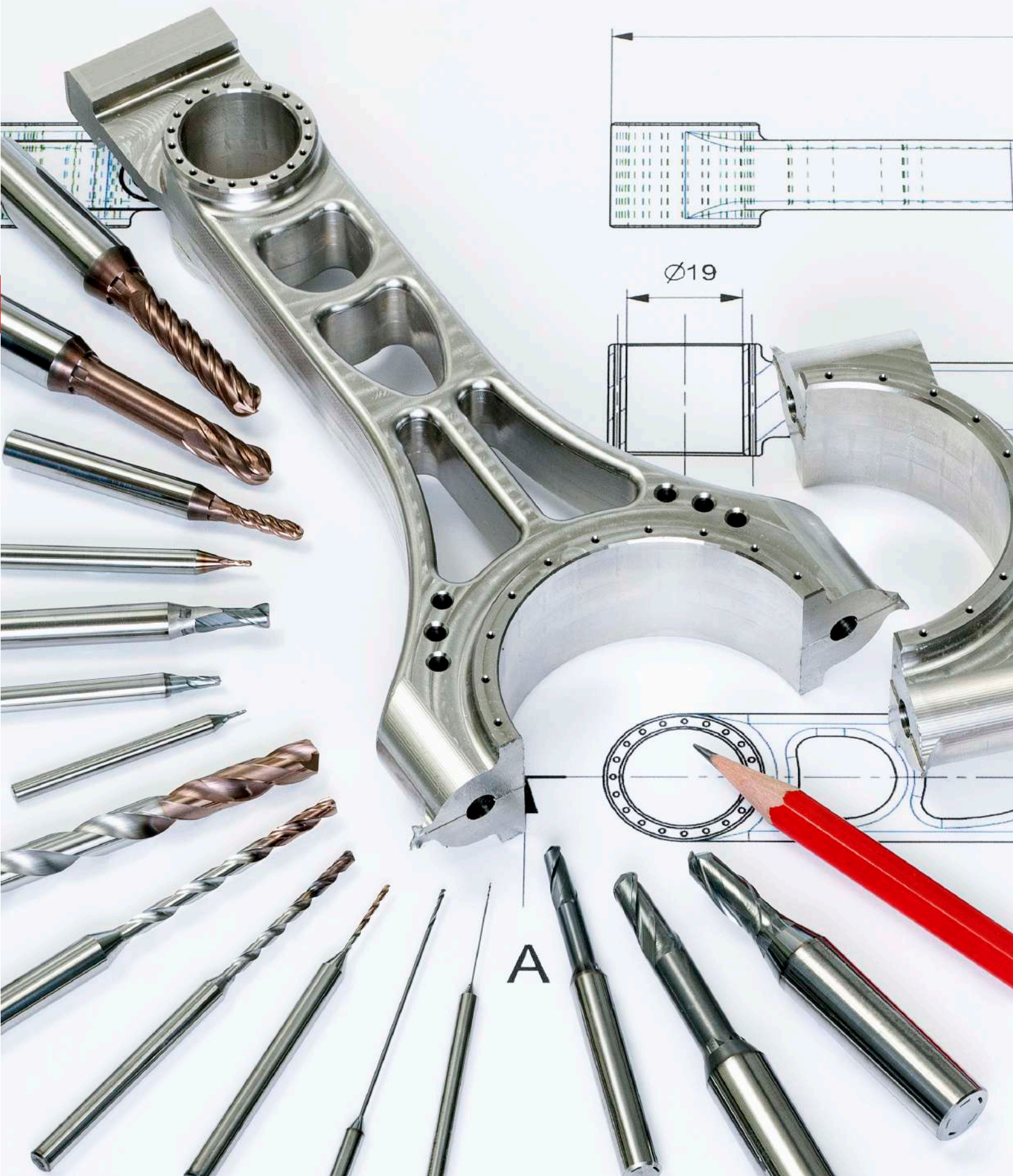
- X5CrNiCuNb 16-4 / 1.4542 / ASTM 17-4 PH
- Dimensions: 130 x 55 x 12 mm (**5,11" x 2,16" x 0,47"**)

#### Machining

- Number of tools: 10 (special and catalogue tools)
- Number of process steps: 18
- Machine used: Vertical high-speed machining center with 24.000 rpm and 40-80 bar
- Cooling system: 80 bar internal cooling with cutting oil (viscosity: 10 mm<sup>2</sup>/s)

### YOUR BENEFITS

- You will get the entire manufacturing process without using your own capacities, that can be transferred one-to-one to your machine.
- You can delegate prototype production to us for product or process validation.
- Your investment risk is zero.



# There are many good reasons to cooperate with Mikron Tool, a DMQP-Partner. Let's have a look at seven.

- 1. We have practical experience in demanding chip removal tasks from many industries.**
- 2. We find for you the most economical solution, even if it's not obvious from the beginning.**
- 3. We offer smooth projects through short distances and powerful machines.**

Since our foundation in 1998 we are passionate about helping our customers when it comes to precision machining in the micrometer range. We are familiar through years of practice with the requirements of many industries and continue to learn constantly. Through our concentration on difficult to machine materials such as stainless steels, titanium or super alloys, Mikron Tool is the right partner for all questions about challenging production projects – independent whether you come from the automotive industry, medical and dental field, watch industry, aero-space or a completely different sector.

Is your workpiece best machined with standard tools or does a customer specific solution achieve better results? What would optimal tools, cutting parameters and processes for an economical solution look like? We find it out for you, since innovation is in our genes. We prove this, amongst others, through the regular launch of new and unique products. You can be sure that we will think outside the box while working on your project.

Our Technology Center and our tool manufacturing plant are only steps away from each other. In Agno we develop, produce, test and if needed adapt our tools. The machining centers in our Technology Center live up to the latest technological standards.



4.

**We are tool specialists, winners of several awards for innovation.**

25 years from our foundation, we are a leader in development and production of small, solid carbide tools for difficult to machine materials. In the years after the launch of the first CrazyDrill tool many other products followed, equally crazy and patented for difficult to machine materials. The success is impressive: 2012, 2014 and 2019 we were honored with a Prodex Award, the most prestigious Swiss Prize for the manufacturing sector. We work daily on new "crazy" innovations to revolutionize the market.

7.

**We guarantee professional project management and modern reporting.**

Complex projects are under control. The use of WBS (Work Break Down Structure) guarantees efficient management of all activities and resources. Thanks to a good time planning and follow-up of the assigned tasks, the progress and maintaining of defined deadlines are continuously monitored and can be corrected swiftly if needed. Each test is documented with a report and if desired can be supported by pictures, videos and analyses.

5.

**We support you with the right tools all the way to serial production.**

Customer specific solutions have always been our strength. This means that you can order tools directly from Mikron Tool when you go into serial production in order to transfer the gained technology into your production environment. Besides, we also support you on site with the implementation.

6.

**We speak the same language as your machines.**

Mikron Tool has a high level of cutting tool and machine expertise. The Technology Center is equipped with the latest manufacturing technology from renowned manufacturers:

- 1 vertical high-speed CNC machining center with oil as cooling lubricant (24,000 rpm/40-80 bar).
- 1 vertical high-speed CNC machining center with emulsion as cooling lubricant (24,000 rpm/40 bar)
- 1 high-precision CNC universal machining center with 5-axis technology (24,000 rpm/40-80 bar) + additional spindle 60,000 rpm with internal cooling.
- 1 eight-axis automatic lathe for horizontal production turning (2 spindles à 8500 rpm /200 bar)
- 1 compact 6-sided turn & mill complete machining center (20,000 rpm/80 bar)

This means that the tested results can be easily and efficiently transferred to real conditions in production.



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## PARTNERSHIP AND SCIENTIFIC INTERACTION

### Training and Technology Days

In our Technology Center we regularly hold training courses for employees, sales partners, and customers to maintain highest levels of knowledge. We also organize regular events with our partners from the machining industry to ensure a continuous transfer of knowledge, which significantly benefits joint research and development work. We host technology days on a variety of topics in well-equipped facilities or even in real life machining environment. At the Technology Days, our machining specialists share their expertise with interested participants, either in lectures or live demonstrations on the machines.



### A reliable partner

With Mikron Tool, you have a reliable partner with years of tool and machine expertise at your side. The intensive cooperation between the tool production and R&D department in the Technology Center is to the great advantage of our customers, as considerable increases in productivity are achieved through the pooling of competencies (tools and machines). The highly modern equipment of our Technology Center offers the customer the opportunity to carry out tests on the most suitable production machines in a cooperative partnership. The results can be transferred 1:1 to the customer's own production.



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# We let others do the talking

## “ FEEDBACK

By optimizing an application, we were able to achieve both quality on our product and a reduction in runtime. This was made possible by a new approach to the milling strategy. With the support of Mikron Tool's CrazyService Products, we were able to achieve cost-effectively an increase in performance with our existing peripherals and at the same time gained more certainty for defining upcoming investments.

The possibility of perfecting a technological approach and gaining know-how without having to take an investment risk facilitates process optimization, reduces its costs and shortens the project time many times over.

”



**Marcel Günthner**

Division Manager Turning at Medentika CNC GmbH



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