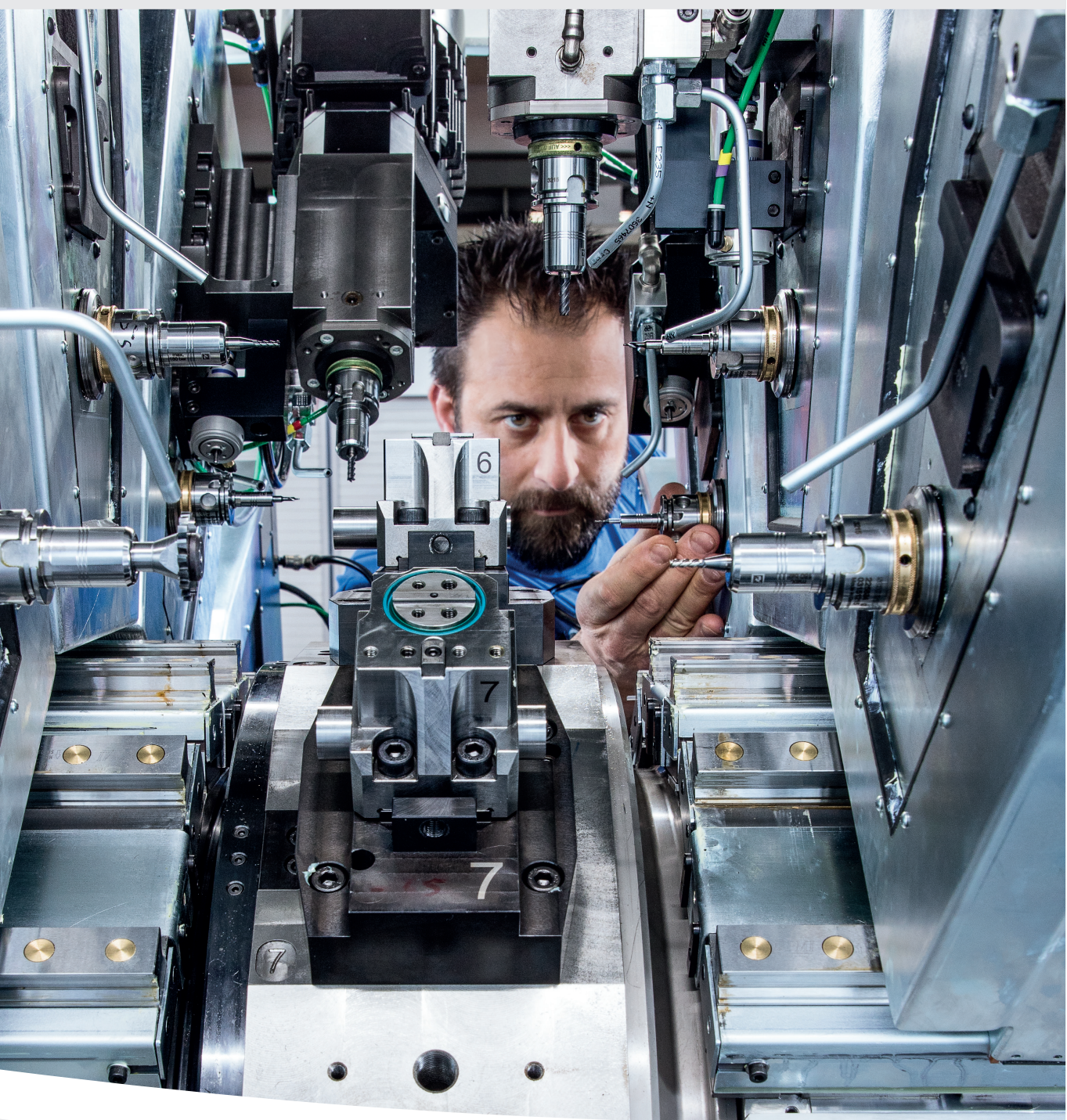


Mikron Machining



Enables productivity and quality gains in the manufacturing processes of our customers.

 **MIKRON**

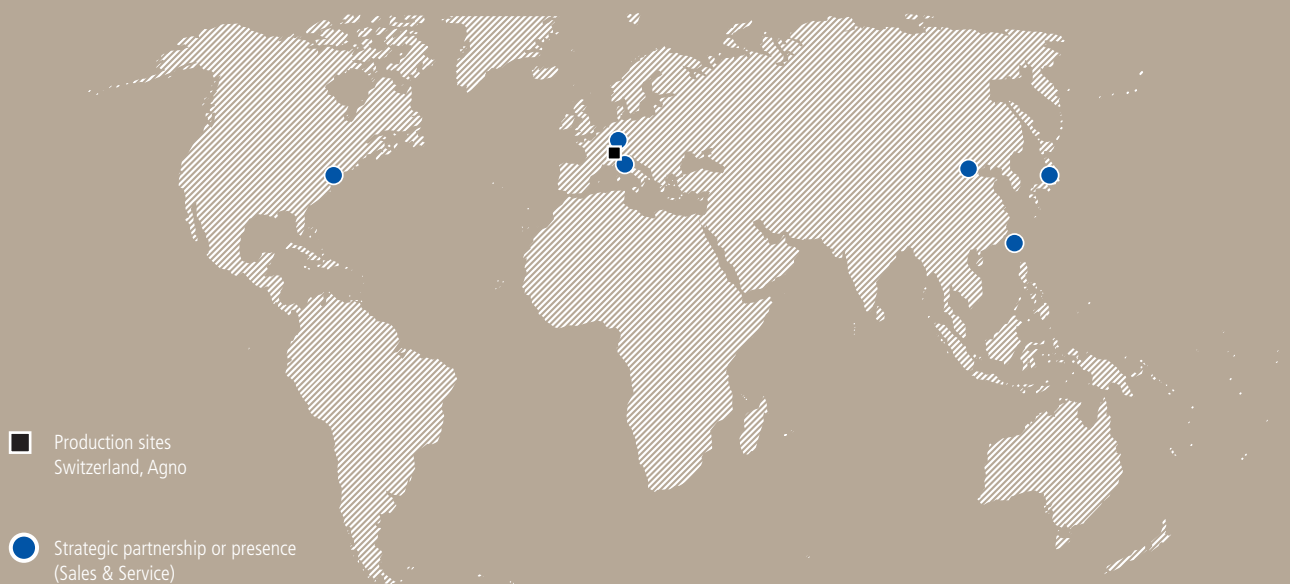


Mikron Machining

Mikron Machining is the leading supplier of high performance machining systems which enable productivity and quality gains in the manufacturing processes of our customers.

Mikron's high performance machining systems and solutions support industrial production companies in a wide variety of sectors by reducing unit costs, space requirements and staffing costs, and by increasing manufacturing quality. Mikron's ultimate goal is to enable its customers to improve their production processes, product quality and profitability. With its gear-cutting machines and tools, Mikron, a company rooted in the Swiss culture of innovation, contributed significantly to the industrialization of Swiss watchmaking in the first half of the last century. Today, Mikron markets machining solutions for the highest precision manufacturing processes, supported by digital services and technologies. Pro-active and long-term customer services supplement the high-tech offering.

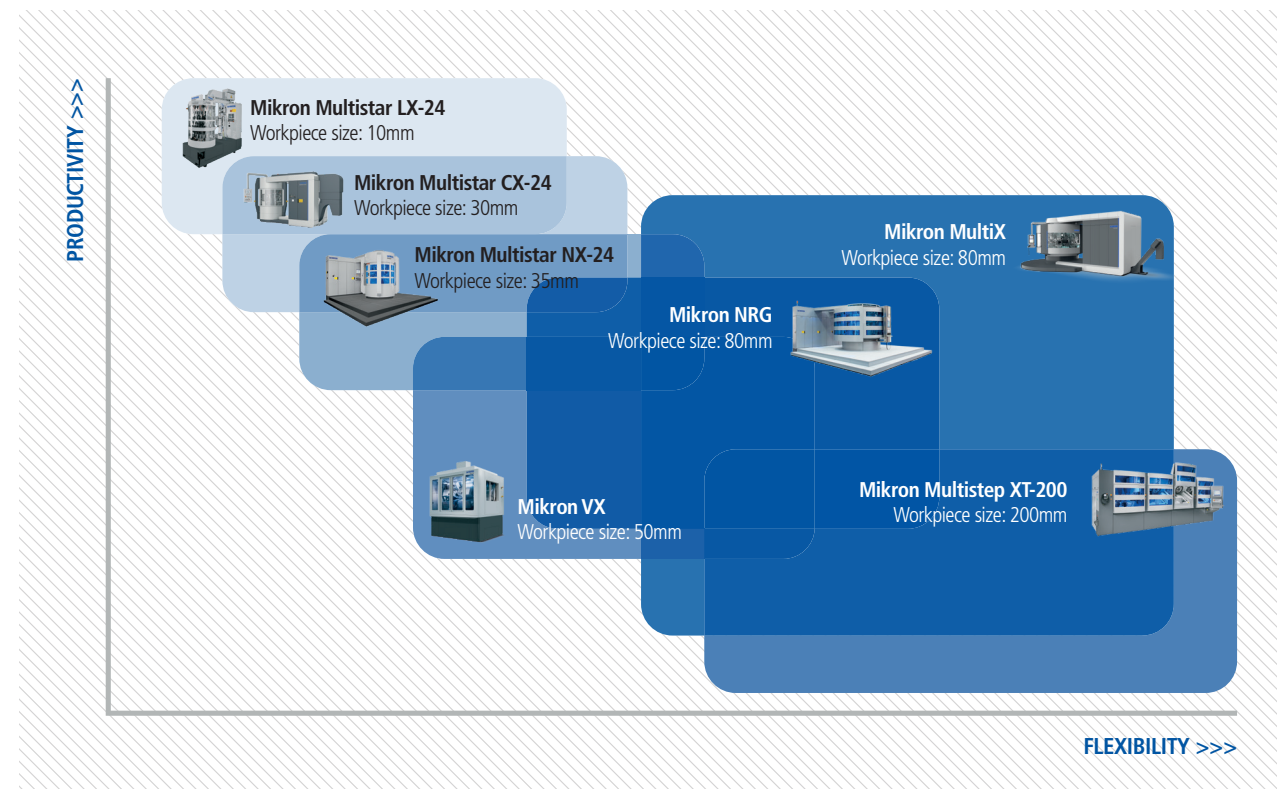
Highly productive transfer systems for the manufacturing of complex high-precision components made of metal such as turbocharger housings, injection nozzles and ballpoint pen tips.



Machining Systems

Efficient production solutions

High performance turnkey production solutions from A to Z to enable productivity and quality gains in the manufacturing processes of our customers.



With over 110 years of experience, rooted in Swiss innovation and quality culture, we are a long term process and technology partner to industry leaders. We show passion for precision and reliability in all we do.

Blank	Pre-machining	Loading Systems	Machining	Unloading Systems
<ul style="list-style-type: none"> » Cast » Bar » Wire » etc. 	<ul style="list-style-type: none"> » Mikron RP-32 » Mikron TR-42 » Mikron TF-120 	<ul style="list-style-type: none"> » Pick & Place » Robot » Belt conveyor » Vibrator » Pallet 	<ul style="list-style-type: none"> » Precise complete machining on Mikron systems » Dedicated Mikron cutting tools 	<ul style="list-style-type: none"> » Automatic » Manual » Deburring » Washing

Customized high-performance machining solutions with:

- » Loading and unloading system
- » Pre-processing system
- » Dedicated Mikron cutting tools

Major market segments

Application samples

ELECTRIC ELECTRONICS



AUTOMOTIVE



CONSUMER GOODS



WRITING



HYDRAULIC PNEUMATIC



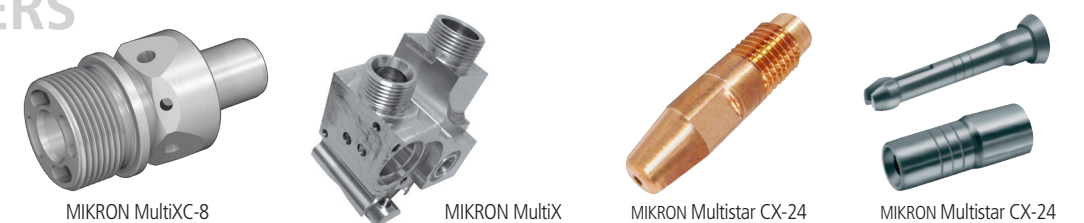
PHARMA MEDICAL



INDUSTRIAL BUILDING

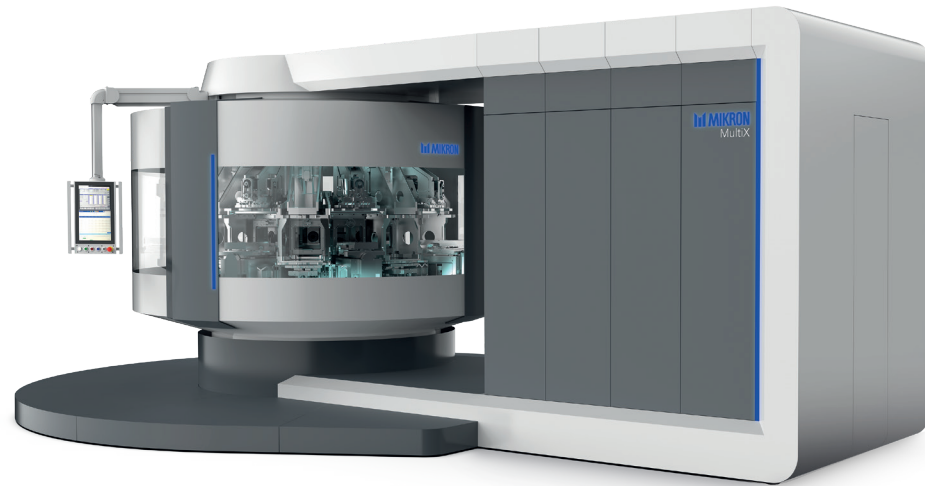


OTHERS



Mikron MultiX

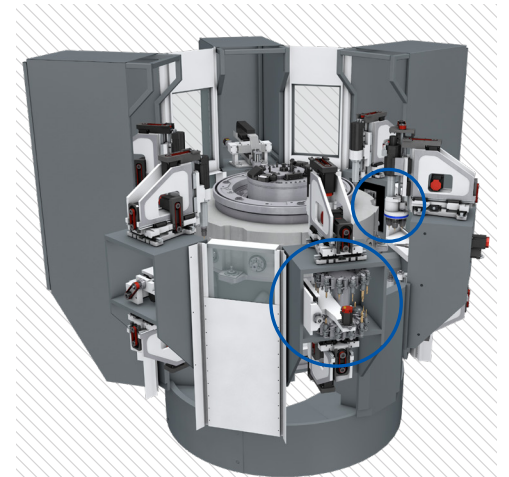
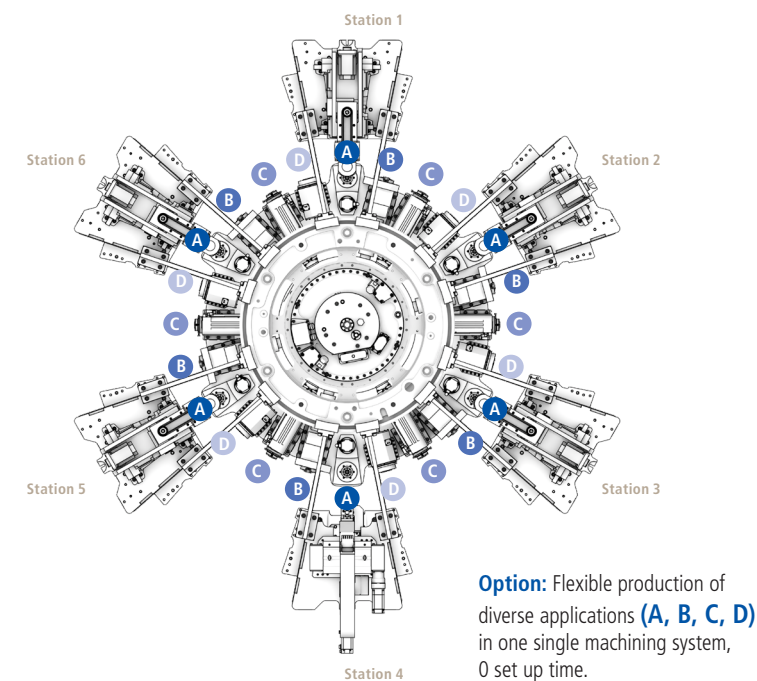
Unrivalled possibilities - Dedicated configurable highly productive and flexible machining solutions



THE PLATFORM

- » **Freely combine** the platform elements according to the Mikron MultiX rules and set up your machining solution. By choosing the optimal size and architecture for every unit and station you achieve superior productivity by less investment costs.
- » **Distinct technical features:** Direct machining from the bar (turning or milling), 3 machining units working simultaneously at each station, multispindle-lathe and transfer machine capabilities in one single machining system.
- » **A set of diverse machining units in different sizes** to serve all the requirements you might need. The machining units differ in size, number of axis, size of compatible spindles, strokes, stiffness, etc..
- » **Scalable:** Start producing with a single cycle Mikron MultiX configuration and add supplementary cycles according to volume grow

FLEXIBILITY: LOT-SIZE ONE



UP TO 168 CUTTING-TOOLS AND 4 DIFFERENT CLAMPING SYSTEMS ON BOARD (HORIZONTAL AND/OR VERTICAL)

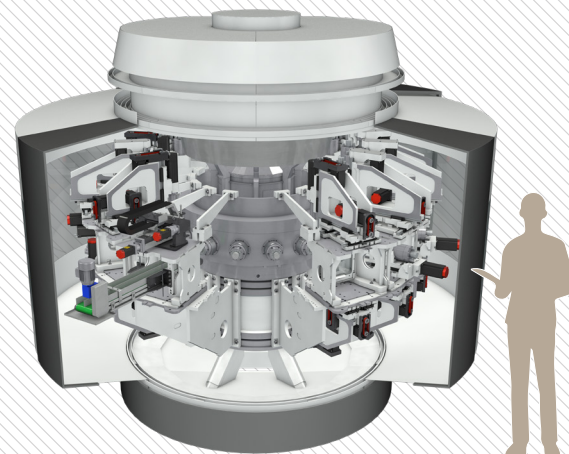
Automatic Tool Changer available in different versions:

- Spindle with 4 Tools
- Disk with 12 Tools
- Upper and lower disk with each 12 Tools
- Standard HSK-40, HSK-63 on request

MIKRON MULTIX-P

Available in 10-12-16 Stations

PRODUCTIVITY



Ø 4.00m
Working area from XxYxZ 50x80x150 up to 210x150x155 mm



GDI pump housing
in 4 different variants
Automotive industry

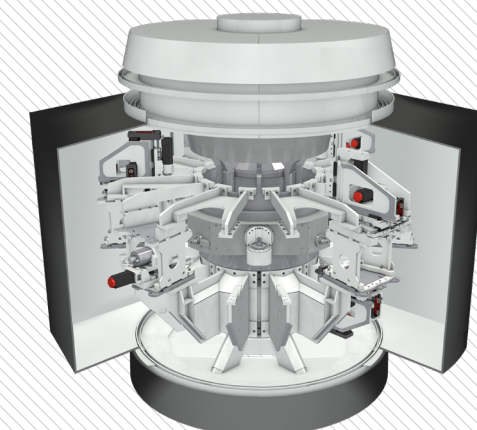
CONFIGURATION FOR HIGH VOLUME PRODUCTION OF FIST SIZE PARTS. INDEXING THROUGH VERY STIFF AND REPEATABLE HIRTH COUPLING.

- » 16 stations
- » 3-axis machining units
- » Spindle with HSK-63 / -40 / -32
- » Automatic tool changer

MIKRON MULTIX-C

Available in 6-8 Stations

FLEXIBILITY



Ø 4.00m
Working area XxYxZ up to 210x150x155 mm



Part
Job shop

CONFIGURATION FOR HIGHEST FLEXIBILITY AND MASS PRODUCTION.

- » 8 Stations
- » 4 x horizontal clamping, turning
- » 4 x milling 5 axis
- » Spindle with HSK-63 / -40 / -32
- » Automatic tool changer

Mikron Multistep XT-200

Advantage
through
modularity

CASE HISTORY TURBO COMPRESSOR on Mikron Multistep XT-200

The challenge

- » 5 different bodies made of casted AlMgSiCu-alloy
- » Turning, milling, drilling on 6 faces of the workpiece. Depending on the component, 30-40 operations. Variable lot sizes from 500-10'000 pieces
- » Tolerance: $\pm 25 \mu\text{m}$ Cpk 1.67 (systematic sampling 10%)
- » Annual requirement approx. 500'000 pieces
- » (three-shift-operation)



The traditional solution

Production area: **300 m²**

Required machines: **4**

12 employees

Cost/part

- » Operations in 2 clampings; milling on Multispindle-Machining Centers and turning on Automatic Lathes
- » Loading/Unloading manually
- » Setup time: **80 min.**

Mikron: The innovative solution

Production area: **165 m²**

Required machines: **2 Mikron Multistep XT-200**

6 employees

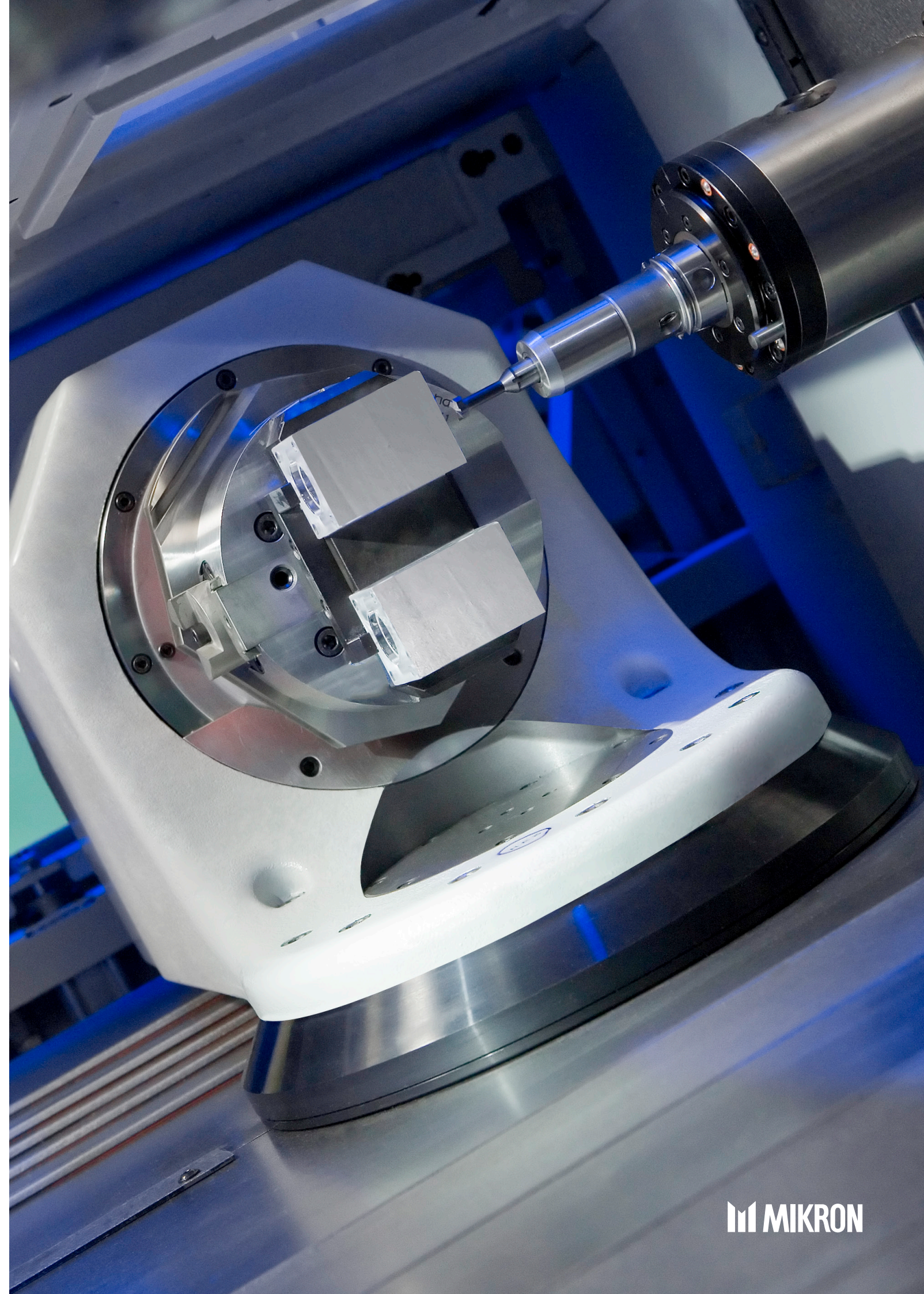
Cost/part

- » Complete machining on one production system
- » Intelligent automatic built-in loading/unloading system (incl. palletization and measuring of blank parts parallel to main processing time)
- » Setup time: **20 min.**



Mikron Multistep XT-200

- » 5 1/2 side machining, simultaneously with 5 axis in a single clamping
- » The loading module can perform parallel tasks such as, for example, fully automated repositioning of work-pieces for 6th-side machining, dimensional checking of blanks, deburring, cleaning and much more...
- » Chip-to-chip in less than one second
- » 2x tool magazine discs with 18 tool slots, up to 36 tools per module. When stacked to the maximum level (4 modules), the Multistep XT-200 can accommodate 144 tools
- » 2x alternately operating spindles, chip-to-chip time under 1 second at full spindle speed
- » 1x B/C- axis: The extremely stable table guarantees stable machining even with heavy load operations
- » Options: electronic tool wear detector – tool breakage detection with mechanical sensor – tool coding with chip and reader
- » Twin gripper transfer arm for transporting work-pieces (clamped in the fixture) between the machining modules
- » Slanted machine bed for optimal chip removal



Mikron Multistar

CASE HISTORY SOCKET on Mikron Multistar CX-24

The challenge

- » High Volume production of approx. 12 million pieces/year
- » Part Dimension: Ø 2.54mm L 15mm
- » Raw material (brass) supply from wire coil
- » Approximately 20 operations such as turning, milling, drilling, reaming, deburring, forming, 100% extraction force measurement integrated in the process
- » Tolerances: External Ø (turned) $\pm 0.01\text{mm}$, Internal Ø (reamed) $\pm 0.01\text{mm}$, length between machined surfaces $\pm 0.02\text{mm}$



scale 3:1

The traditional solution

Production area: **136.2 m²**

Machines: **16**

Employees: **3.2 + 3.2 + 3.2**

Cost/part

Raw material from bar-stock

The fastest transfer machine
in the world

Mikron: The innovative solution

Production area: **38.64 m²**

-71%

Machines: **1 Mikron Multistar CX-24 & 1 Mikron TF-120**

-94%

Employees: **0.5 + 0.5 + 0.5**

-85%

Cost/part

-45%

Raw material from wire coil

Models available

- » Mikron Multistar NX-24 (100% programmable)
- » Mikron Multistar CX-24
- » Mikron Multistar LX-24

- » Workpiece size: diameter from 0.4 up to 35 mm and max. length of 60 mm
- » Machine with 12 or 24 stations
- » Compact construction
- » Full CNC or mechanically driven versions
- » Available with one, up to 4 simultaneous cycles, depending on the part complexity and the required volumes
- » In single cycle output up to 150 parts/minute
- » Quick and simple tool change



Mikron Multistar CX-24

Typical Multistar workpieces made from steel, aluminum, brass, beryllium-bronze & copper



Mikron NRG

The new generation of
transfer machines

CASE HISTORY ADAPTER on Mikron NRG

The challenge

- » 5 different "Adapter Plate" models. Length from 15 to 35mm
- » Material: AlMgSi starting from bar Ø 57mm
- » Operations: from 30 to 40 according to the type
- » Target tolerance: $\pm 6\mu\text{m}$ with Cpk 1.33
- » Yearly volume: 750'000 pcs on 3 shifts



The traditional solution

Production area: **193 m²**

Machines: **7**

Employees: **18**

Cost/part

5 double-spindle machining centers with motorized tools
2 measuring systems (100% control)
Productivity: 750'000 pcs/year

Mikron: The innovative solution

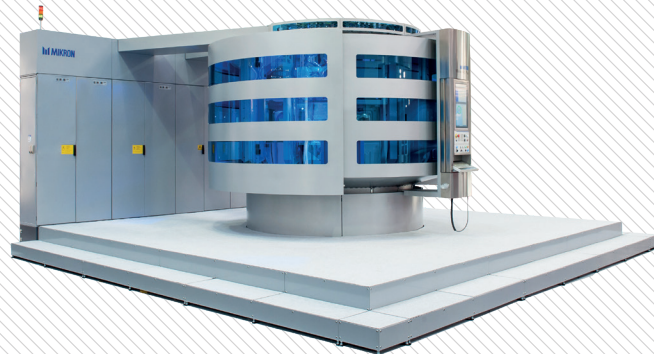
Production area: **127 m²**

Machines: **1 Mikron NRG**

Employees: **3**

Cost/part

Efficiency: 92%, Precision: $\pm 4.5\mu\text{m}$
System integrated with: bar saw Mikron TB-200, robotized measuring station, palletized system, bar loader, filtration
Productivity: 1'500'000 pcs/year



Mikron NRG

- » Full CNC high-precision rotary transfer machine
- » Workpiece dimension: up to 80 x 80 x 80 mm and Ø 65 x 100 mm
- » Compact and modular construction with 12 stations, anytime adaptable to individual production needs
- » ATS (Advanced Thermal Stabilization): the temperature of all elements remains stable
- » Up to 3 machining units per station
- » Up to 30 machining units work simultaneously
- » Up to 22 automatic tool changers (ATC) on board
- » Up to 96 cutting tools on board
- » Machining on 6 faces in one clamping
- » Milling or drilling on one station with three units simultaneously
- » Per spindle interpolation with up to 5 CNC-axis

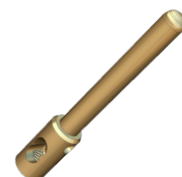


Mikron VX

INDIVIDUAL LINKS for luxury watch bracelets

Produced from stainless steel on a Mikron VX-10 machining system, working directly from bar.

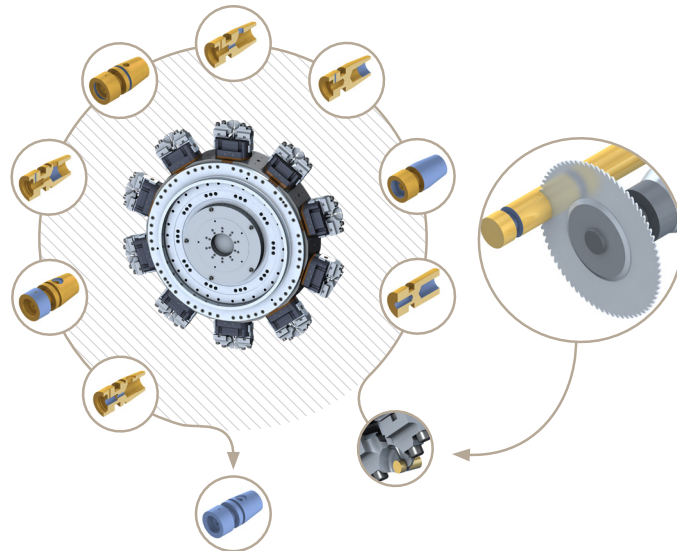
- » Production rate: 8 pcs/min
- » Production of different lengths from the same wire, automatically sorted



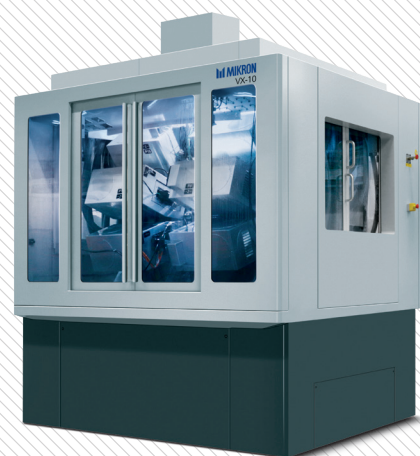
Machining on 6-sides, from bar, wire or blank

Complete machining on 6 sides

Mikron VX-10, pre-machining directly on wire or on bar stock



Other possible segments: eyewear components, automobile applications, lock industry, electrical contacts, mobile phone and laptop computer components, medical applications.



Mikron VX-10

- » Full CNC high precision rotary transfer machine with 10 or 12 workstations for the production of variable batch sizes.
- » Maximum workpiece dimensions up to 40 x 40 x 80 mm (optional 40 x 40 x 160)
- » Vertical table, thermostable main motor with inner cooling for maximum precision
- » Table positioning: $\pm 2 \mu\text{m}$
- » Complete machining on 6 faces from coil, bar or blank
- » 4-axis pre-machining of bar before clamping



Pre-machining Equipments

Pre-machining Equipment
Manufacturing of blanks on
Mikron wire processing
machines.

Mikron machining systems are designed to produce precision workpieces directly from wire coil or bar stock. However, it is often expedient to manufacture small blanks on Mikron wire processing machines to achieve a higher output rate on the transfer machines in the downstream process.

WIRE SHEARING MACHINE

Mikron TR-42/2

Mikron TR-42/4

Reliable accuracy, high production machine for straightening and shearing of wire material.



WIRE CUTTING MACHINE

Mikron TF-120

Machine for straightening and sawing of wire material.

- » High productivity, up to 200 pieces/minute, according to material and size, by using 2 saws simultaneously
- » High cutting accuracy, repeatability ± 0.05 mm
- » Possibility to cut up to 4 pieces simultaneously, depending on material and size
- » Direct piece loading from the TF-120 to the Multistar
- » Easy programmable machining cycles, such as cutting speed and output rate
- » Straightening and sawing of wire material

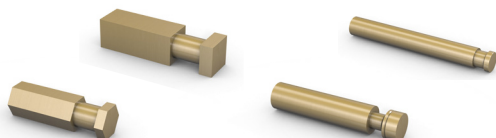


WIRE CUTTING MACHINE

+ PRE-TURNING UNIT

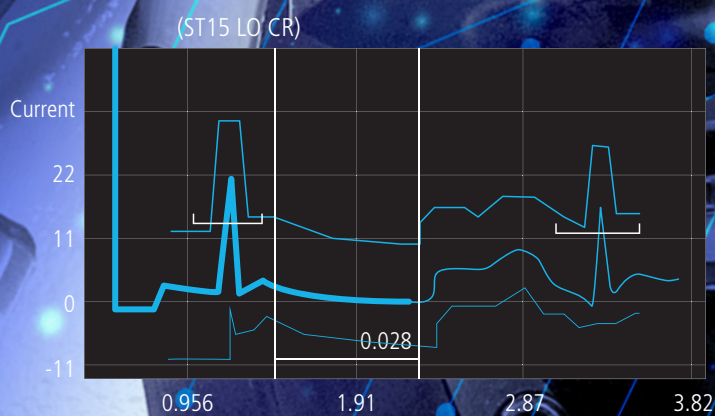
Mikron TF-120 + pre-turning unit

Pre-turning operation from wire with turning head.



Mikron miTool

The next level
of tool monitoring



MIKRON

Mikron miTool

The next level
of tool monitoring



Mikron miTool monitoring becomes crucial to avoid unexpected machine downtime, machine breakage, tool damage, material scrap and the likely issues. Surface finish and tolerances can be improved with the detection of tool wear and damaged and expensive tools can be changed before any severe damage takes place.

Mikron miTool is easy to install and customers benefit greatly in terms of efficiency and expenditure.

- » Prevention of damage due to tool breakage or tool overload
- » Sensorless with automated learning of load limits (Option to integrate vibration and temperature sensors)
- » For turning, milling and drilling and smallest tool sizes (up to 1.5 mm diameter)
- » Powerful algorithm for efficient monitoring after the first workpiece. It has a built-in learning function, allowing it to compensate for differences in processes.
- » The system maximizes the service lives of both the tools and Mikron high performance machines

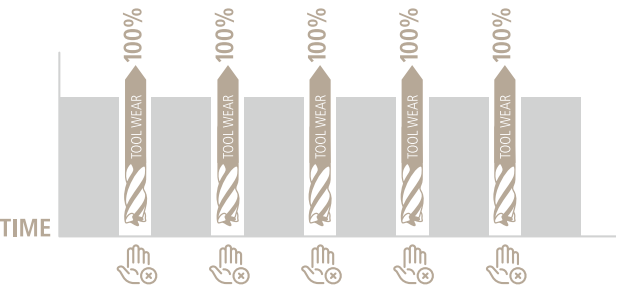
WHAT MAKES Mikron miTool SO SPECIAL FOR YOU

- » Highest sensibility and quality of data points deliver the finest and exact monitoring curves
- » Intuitive icon driven graphical interface for easiest use and monitoring by operators
- » Intelligent algorithm for advanced process optimization and cutting tool wear identification
- » Mikron miTool is able to storage data and history for each tool configuration and monitoring curve
- » Dashboard with statistical overview for each tool allows the optimization of the entire production process
- » Mikron miTool permits all modifications (set up, regulations...) without machine stop
- » Automatic actions programmable for each channel e.g. save data in database, send notification, preventively stop the machine
- » Perfectly integrated into Mikron high performance systems

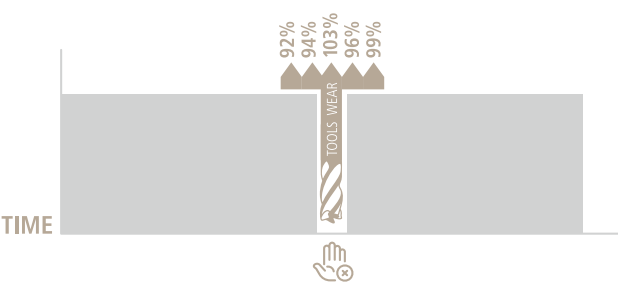
Attractive
pricing
and fast return
on invest

Intelligent powerful algorithm for optimal intervals to change several cutting tools at the same time leads to higher machine efficiency and economy (less machine stops).

5 CUTTING TOOLS CHANGED AT 5 STOPS



5 CUTTING TOOLS CHANGED AT 1 STOP



Number of machine stops for cutting tool changes

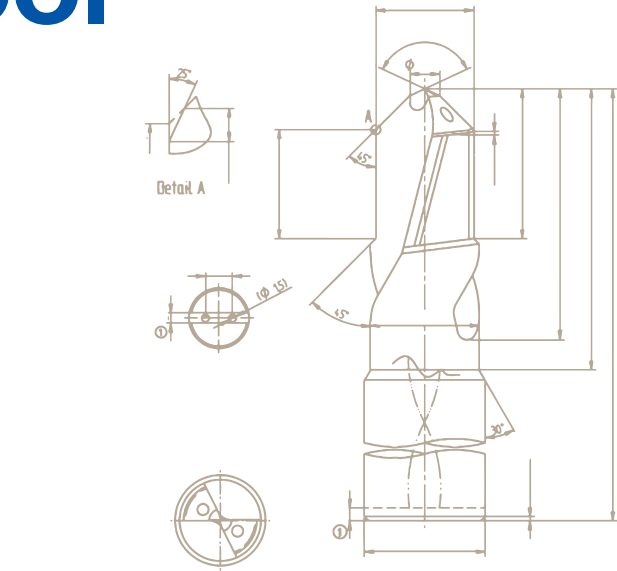
Case History Mikron miTool

on Mikron VX

The challenge

The customer produces 6.13 mio parts per year (OEE 80%) for the automobile industry on Mikron VX.
Target: Reduce tooling costs, improve part quality and increase machine efficiency.

Productivity	17.4 Pc/min
Daily working time	1'440 min/day
Annual working days	306 days/year
OEE 80%	
6'133'709	Pc/year



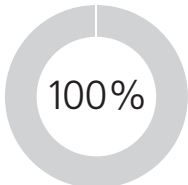
Cutting tool costs Station 5	211.00 chf/Cutting tool
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CUTTING TOOL MONITORED WITH Mikron miTool STATION 5 (SEE DRAWING ABOVE):

EXISTING / TRADITIONAL TOOL MONITORING STATION 5

Tooling costs per year

TOOL LIFE 10'000 PC	
N°. of tools per day	2
N°. of tools per week	12
N°. of tools per year	613



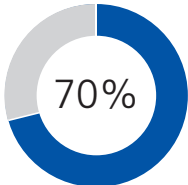
Time to change the cutting tool

TOOL LIFE 10'000 PC	
Time for tool change per day	10 minutes
Time for tool change per week	60 minutes
Time for tool change per year	3'067 minutes

TOOL MONITORING WITH Mikron miTool STATION 5

Tooling costs per year

TOOL LIFE 14'000 PC	
N°. of tools per day	1.4
N°. of tools per week	8.6
N°. of tools per year	438



Savings on time to change the cutting tool

TOOL LIFE 14'000 PC	
Time for tool change per day	7 minutes
Time for tool change per week	43 minutes
Time for tool change per year	2'191 minutes
Δ daily	-3 minutes
Δ weekly	-17 minutes
Δ yearly	-876 minutes

Approx **37.000 CHF** savings / year
with one cutting tool monitored
(cutting tool cost/pc 211.00 CHF).
The machine is **876 min** more in production

Mikron Service Solutions

Flexible and
modular

We ensure quick, competent and uncomplicated service and support for our customers.
We work together with you to design a service solution profile tailored to your individual needs.



REACTIVE

Technical Support – repair your machine

- » Helpdesk
- » Remote Diagnostics
- » Augmented Connection
- » Service Assignment



PREVENTIVE

Service & Maintenance – prevent machine stops

- » Technical Evaluation
- » Preventive Maintenance
- » Spindles & Groups Overhaul
- » Extended Warranty
- » Software Backups



PREDICTIVE

miS4.0 – predict your machine maintenance

- » Production Monitoring
- » Condition Monitoring
- » Failure Analysis
- » Mikron cloud and IoT platform
- » Mikron miTool – The next level of monitoring



PROACTIVE

Business Support – keep & improve machine productivity

- » Process Monitoring (OEE Improvement)
- » Training
- » Energy Consumption
- » New Applications & Simulations
- » Engineering
- » Interactive Troubleshooting
- » Startup & Production Support
- » Service Level Agreements



SPARE PARTS

Spare Parts – reliable supply of original Mikron spare parts

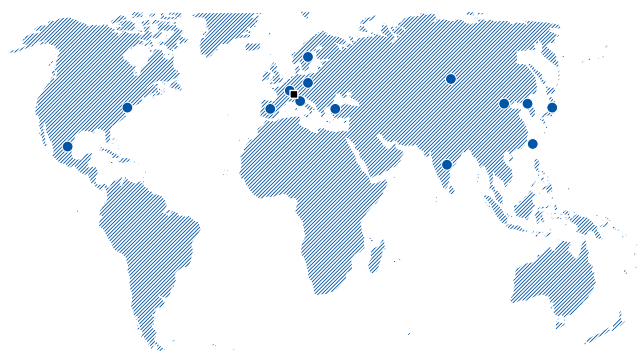
- » Original Mikron spare parts
- » Xchange Modules



SECOND LIFE

2nd life – guarantee continuous use of your investment

- » Machine Overhaul
- » Retooling
- » Safety & Environments
- » Updates & Upgrades
- » Retrofitting



Contact your Service Center today,
we gladly be of assistance.

■ Production sites
Switzerland, Agno

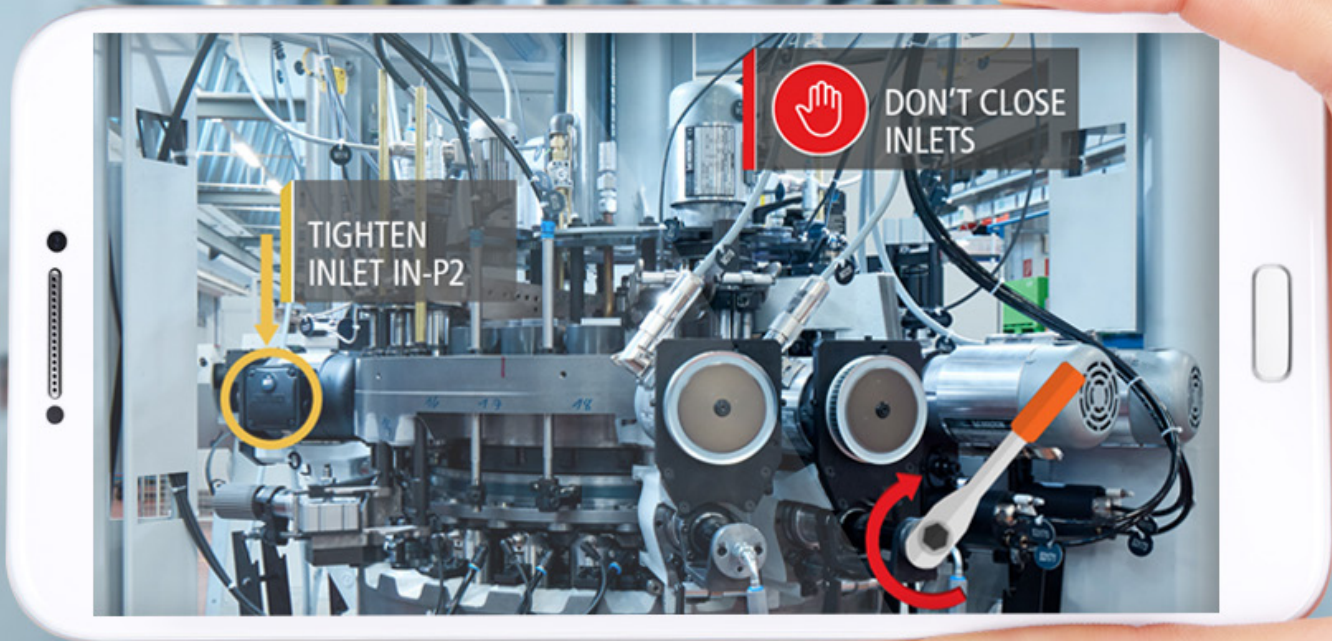
● Strategic partnership or presence

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