PRACTICE REPORT

VIEW

HIRSCHMANN AUTOMOTIVE
MHF
fischer INNOVATIVE MOULDS
toolcraft

PRODUCTION QUALITY IN FOCUS

Daniel Gruber, Managing Director of CIMTRODE GMBH

EVERYBODY HAS HEARD OF IT AND ALMOST EVERYONE HAS ONE. THE OLDER WE GET, THE MORE WE NEED IT: THE MAGNIFYING GLASS. BUT UNFORTUNATELY IT OFTEN IS NO LONGER SUFFICIENT. THE PARTS WE BUILD ARE GETTING SMALLER BUT THE MEASURING REQUIREMENTS ARE GETTING HIGHER..

Honestly: how can you evaluate a cutter with a one millimeter diameter with a magnifying glass? Today there are cutters in use which are smaller than one millimeter. Frequently the parts that are built with them aren't bigger either. In short, the magnifying glass has been in our manufacturing environment for decades and has provided valuable services, however in today's world, it is obsolete. Magnifying factors from 8 until 12 times are not sufficient for quality assessment of our building components anymore.

It used to be that the cutter had to be remilled or reworked with a file and emery cloth; today many efforts are being made to reduce these manual steps. To this end, we are striving to get components such as inserts, slides or electrodes from the milling and erosion machines so that no subsequent work is necessary. Once this has been achieved, it is possible to reap the rewards by further automating the processes which in turn leads to profits.

Our goal is daring but accessible. Due to the intensive effort to move the entire machine production process from the hundredth into the thousandth, the goal is being achieved without any manual rework. For this to be achievable, one has to keep an eye on all possible sources of tolerance and error. For example, a complete linkage of tolerances occurs during milling. If you want to mill in the µ-range, it is necessary to have the entire Z-axis under control – from the spindle over the HSK chuck to the milling cutter.

The milling cutter and its abrasion play a very important role. New tools correspond to certain tolerances, the milling cutter is subject to wear during the milling process – and precisely this leads to a gray zone, of which little is known.

TO ENLIGHTEN THE MATTER, WE HAVE BUILT C-VIEW.

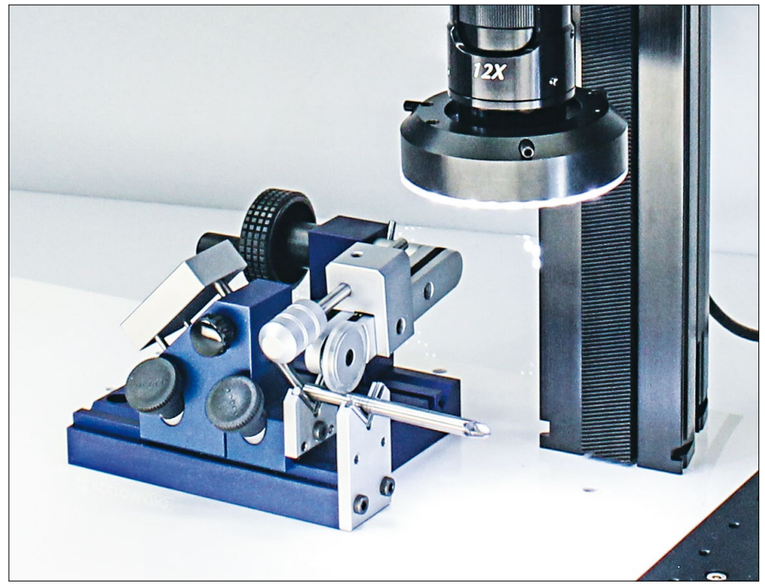
With the help of our newly developed high-precision HSK spindle fixtures, milling tools can now be evaluated and examined before and after machining in the tensioned state for their contour accuracy. The quality and dimensional accuracy of the milled component can be derived in a very effective manner, this results in safety in the company's own production quality and reduces any follow-up work, especially in the case of components that cannot be measured tactically because of their small size.

C-VIEW is an aid for early detection of errors and is ideally suited for reducing rejects and rework. It is often used where high dimensional requirements and the quality of surface finishes are concerned, requirements which are practically applicable in the field of mold and tool making.

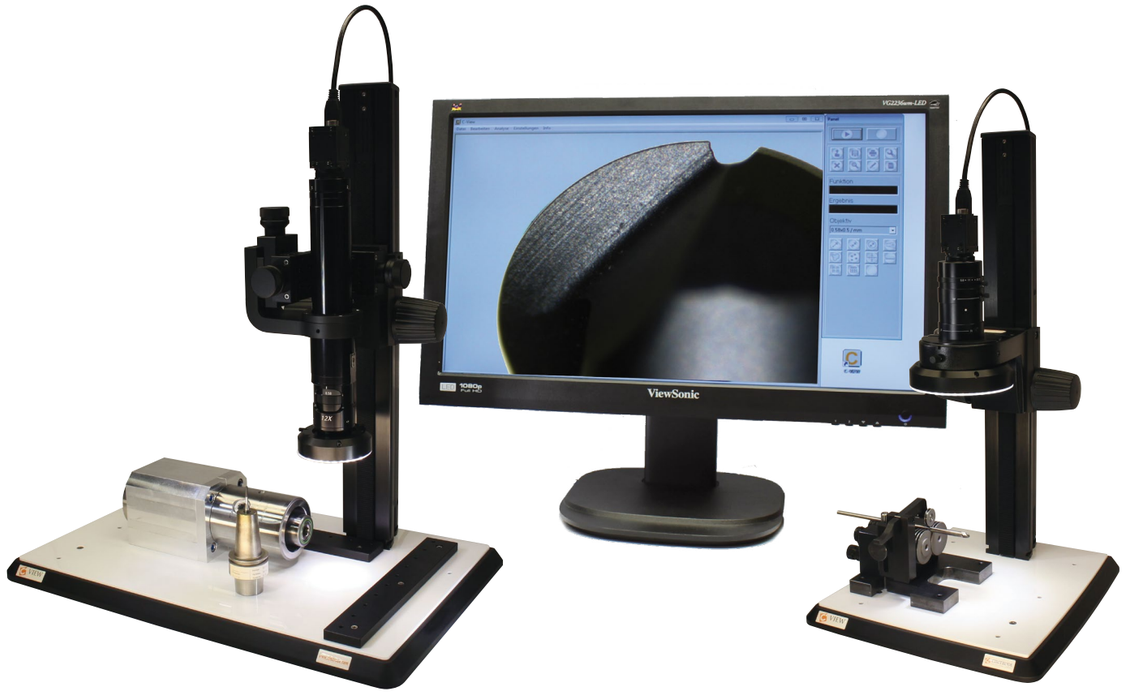
In addition to the evaluation of milling and drilling tools, the device is also suitable for assessing separating edges, mold insert cores, welding points, air inclusions and burr formation on injection molding, for incoming goods control and for documentation of the actual procedure. Our latest USB 3.0 camera with full HD resolution features 60 images per minute, which makes it possible to work under 70- 1000 fold magnifications, for example, during polishing or welding.

The multifunctional usability of C-VIEW results in a very large area of application, such as medical engineering, electrical engineering, material science, mold making, injection molding, milling, machine manufacturers, coating companies, mechanical engineering, hospitals, the semiconductor, racing and aircraft industry, and more.
With C-VIEW, we wanted to create a modern tool for production which would be easy to use and suitable for daily use in the work place – similar to the magnifying glass.

To read how well we have succeeded, please see our customer reviews.



Clearance mount for basic components, for example for milling tools

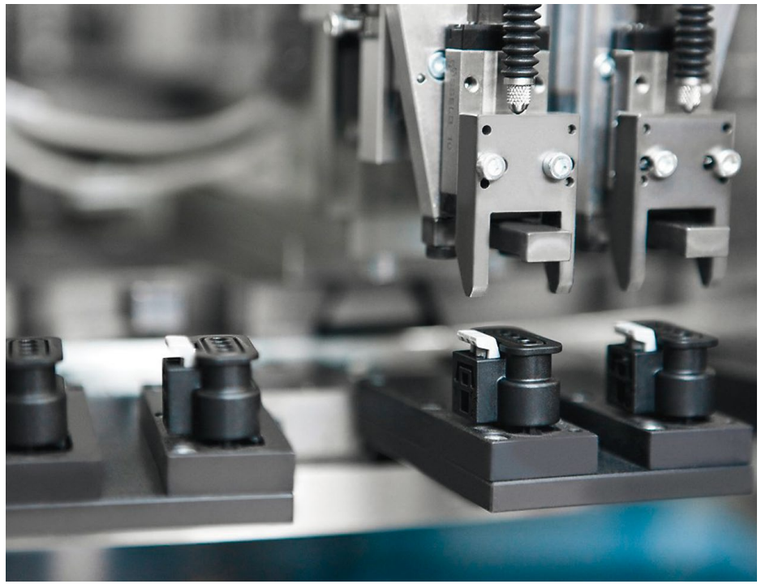


***C-VIEW 500** with a high precision HSK clamping, USB 3.0 camera with full HD resolution, fine adjustements in all axles x/y/z, radius, length and angle measurements under a magnification of 500 to 1000 times*

***C-VIEW 75** with precision mount for round components, USB 3.0 camera with full HD resolution, up to 75-fold magnification, zoom continuously adjustable up to 75 x 50 mm*

C-VIEW 500 OPERATIONAL AT **HIRSCHMANN AUTOMOTIVE**

COMPANY PROFILE



The development and production of electrical connectors is one of the core competences

HIRSCHMANN AUTOMOTIVE IS A SUCCESSFUL AUTOMOTIVE SUPPLIER AND HAS FACTORIES AROUND THE GLOBE.

CUSTOMIZED CLIENT SOLUTIONS FOR HIGHLY DEMANDING AREAS ARE THEIR SPECIALTY.

Hirschmann Automotive is a successful internationally established and reliable partner of all well-known automotive manufacturers in the supplier industry. Their specialty: customized client solutions for highly demanding areas, development and production of plugging and contacting solutions, special cable assemblies, high voltage applications, plastic overmolding technology and sensor systems for the automotive industry.

The employees at Hirschmann Automotive are constantly working towards progress in the automotive industry. Flexibility, reliability and innovation are the key drivers of the company. The product range features the latest technology and market trends. The company's own machine and tool making shop enables the efficient implementation of new products and special parts, which prove their reliability in extreme environments and in highly stressed vehicle areas.

The company's roots are in Rankweil in Vorarlberg, but Hirschmann Automotive is always close to the customer thanks to its six factories in various countries such as the Czech Republic, Romania, Morocco, China and since 2016 also in Mexico. A sales and application office has recently been opened in the USA. At present, around 4,500 employees work for the company which was founded in 1959.

HIRSCHMANN AUTOMOTIVE

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C-VIEW 500 IN THE IMPLEMENTATION AT HIRSCHMANN AUTOMOTIVE: **EMPHASIS REVIEW OF MILLING TOOLS**

People from around the world working for Hirschmann Automotive

THE OPTICAL INSPECTION SYSTEM: C-VIEW IS AN IMPORTANT INSTRUMENT OF QUALITY ASSURANCE FOR HIRSCHMANN AUTOMOTIVE. ACHIEVING PROCESS SAFETY THRU HIGH QUALITY CERTIFICATION.

We at Hirschmann have set ourselves the goal of continuously improving our mechanical production in tool and mold construction accurately, meaning, we want to permanently cut up to 5 µm accurate milling in the foreseeable future. The task is not simple as several tolerance fields are linked and moving the margins is difficult but achievable.

In order to achieve a dimensional stability of 5 µm, all tolerable causes have to be controlled and optimized to the end. Only in this way is there a real chance of a continuous dimensional accuracy in the µ-range.

The interaction of CAM with the milling machine is a science in itself and is very crucial for the accuracy in milling. A high-precision milling machine is a basic requirement. Even when clamping tools, one or the other µ can be quickly found. The milling tools used are very important, because today there are only very few manufacturers who are true to their stated dimensional stability.

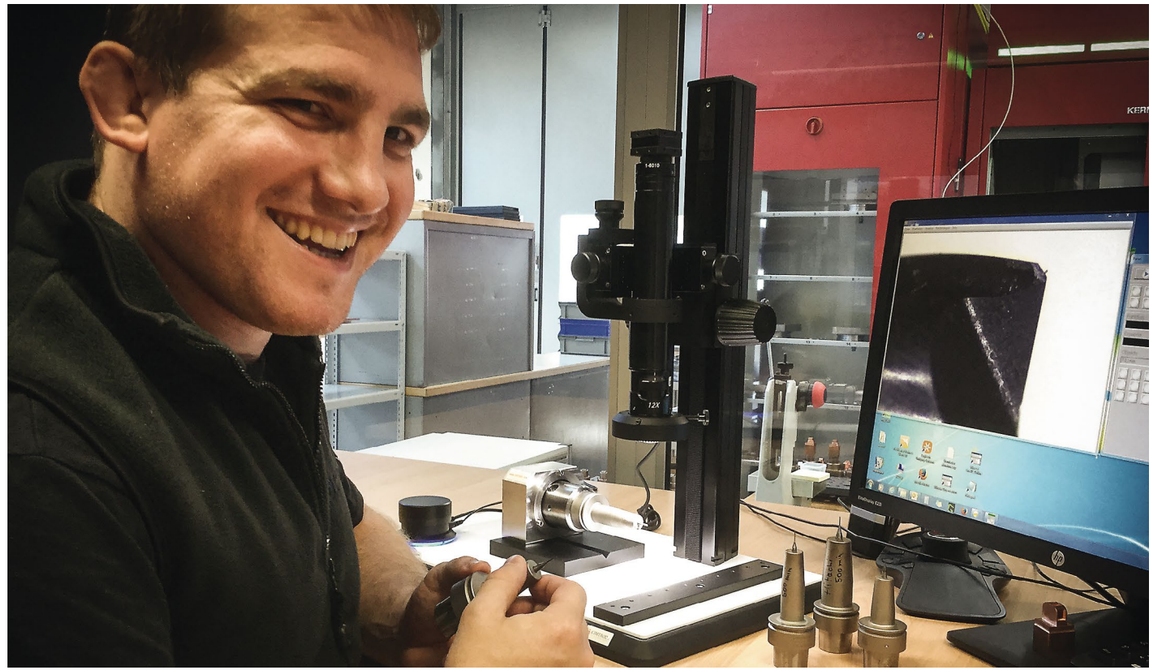
Milling tools poses two challenges: dimensional accuracy of new tools and the assessment of abrasion. This is precisely why it is very difficult to master.

Thanks to C-VIEW, we now have the opportunity to evaluate and estimate new milling tools before they are even used in the machine. As a result, we have made significant progress towards our goal of “milling to a precision of 5 µm”, with C-VIEW, a clear picture of the state of the individual milling tool is shown and thus we can assess the situation again and again.

This technical possibility has not only helped us to achieve our goal, but has also saved us a lot of time and money.

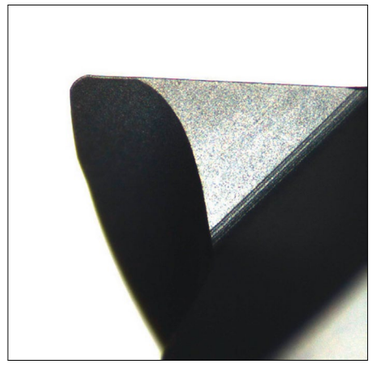
For us, the investment of C-VIEW has been profitable after only a few weeks. I would recommend it to anyone.

Markus Gapp
Manager of CNC Milling



Employee controlling the milling tools in clamped condition with HSK 400.

The quality of the products is controlled down to the smallest detail. C-VIEW has established itself as an important test instrument in our company.



Torus cutter diameter 0,6 mm under 500-fold magnification

Ball cutter diameter 0,2 mm under 450-fold magnification

C-VIEW 75 OPERATIONAL AT **TOOLCRAFT**

COMPANY PROFILE

view in the mold making department at Toolcraft

TOOLCRAFT PROVIDES A FULL RANGE OF SERVICES FOR THE SEMICONDUCTOR INDUSTRY, AEROSPACE, MEDICAL TECHNOLOGY, OPTICAL INDUSTRY, SPECIAL ENGINEERING WORK, MOTORSPORTS AS WELL AS THE AUTOMOTIVE SECTOR.

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TOOLCRAFT manufactures high-end precision parts, assembly units, tools and injection moldings. The entire process chain is mapped in-house. The company employs a total of 290 employees at its headquarters in Georgensgmünd as well as its tool and mold making department in Spalt. In order to be present on the Asian market, TOOLCRAFT opened a location in Singapore (Toolcraft Wohlrab Ltd) at the end of 2015. In the future, plastic parts will be produced, surfaces coated and complete assemblies will be installed there.

The willingness to invest is reflected above all in the expansion of the product portfolio by laser-felted precision components in 2011. Since then, the machine park has been continuously expanded. This innovative process ensures added value through the combination of proven core competences, particularly in the areas of turning and milling difficult-to-cut materials and the production of rotary-milling components. Also in the field of spark erosion, TOOLCRAFT is an experienced partner. Furthermore, the measurement and qualification of the manufactured products is an elementary component of the offered complete solutions.

Another business area is injection molding and mold making. The competences ranges from standard thermoplastics to high-temperature materials and from insert molding with inserts to multi-component injection molding. In mold making, TOOLCRAFT produces molds from contract manufacturers to serial tools. From the production and measurement of electrodes, wire and sink erosion to complete machining, all services can be offered exclusively.

The company sees itself as a comprehensive service provider. TOOLCRAFT manufactures universal robot solutions – from design to construction, to software. For this, the long-term cooperation with the software company Unicam is of great value.

In addition to the ISO 9001 certification, the company is also certified in the field of aerospace (EN9100) and medical technology (EN ISO 13485). Members in the QuB-association as well as participants in the environmental pact which characterizes TOOLCRAFT as the most environmentally responsible company. Part of the company philosophy involves intensive team work with cooperation partners.

C-VIEW 75 IN THE APPLICATION AT TOOLCRAFT: **FOCUS DOCUMENTATION OF REPAIRS AND CHANGES**

Toolcraft sink spark erosion

WITH THE OPTICAL INSPECTION SYSTEM C-VIEW BY CIMTRODE, THE COMPANY MAINLY EXAMINES COMPONENTS FOR DAMAGE AND DOCUMENTS THEM FOR SUBSEQUENT REPAIRS.

In addition to the production of new tools, the mold manufacture is also responsible for the maintenance and repair of injection molds from our in-house production. When repairing worn or damaged tool components, it is often a question of locating and evaluating the defective area at the first point, in order to be able to subsequently derive the type of repair. C-VIEW 75 offers very simple and practical functions. Thus, for example, a sufficiently large field of view is available with 75 × 50 mm, which also makes it possible to display larger areas of components on the screen very well.

Previously, we used conventional magnifying aids such as magnifying glasses and microscopes, which had the disadvantage that only the individual viewer had the full view and the information transfer to colleagues, suppliers or customers was difficult. Today the situation is displayed on the monitor using C-VIEW, so all parties can see, evaluate and discuss the status and develop solutions. This has significantly improved the quality of our work and the overall cost of repairs is not insignificantly reduced.

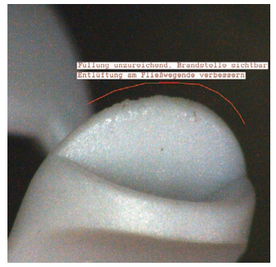
Another way the C-VIEW has minimized workload is the function of juxtaposing two images. It is a simple way to present and document situations before and after, this is often particularly helpful when welding as well as other manual activities.

Due to the possibility of continuous zooming up to a 75-fold magnification, we see the smallest detail. Especially when evaluating plastic parts, this assists us greatly, because burrs or misalignment on the component can often not be measured tactically, and are very important for tool adaptations and repairs. With the aid of the measuring functions of C-VIEW, measurements of this type can be carried out and the resulting values can be directly inserted into a standardized project report, this makes it possible to document and archive changes to components without issue.

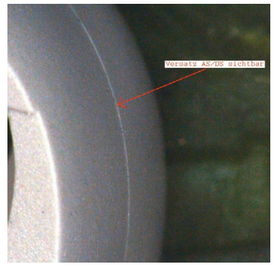
Due to the versatile possibilities of C-VIEW, we are considering expanding the use of the device internally. We are currently investigating its performance in the evaluation of milling wear as well as checking graphite electrodes before eroding.

The device has so far provided us with many positive services in our daily work. Thanks to the

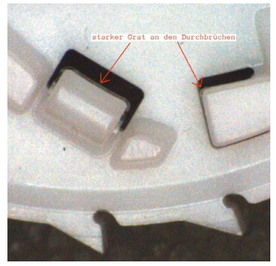
Markus Scheuerlein
Project manager / team leader milling
mold making department



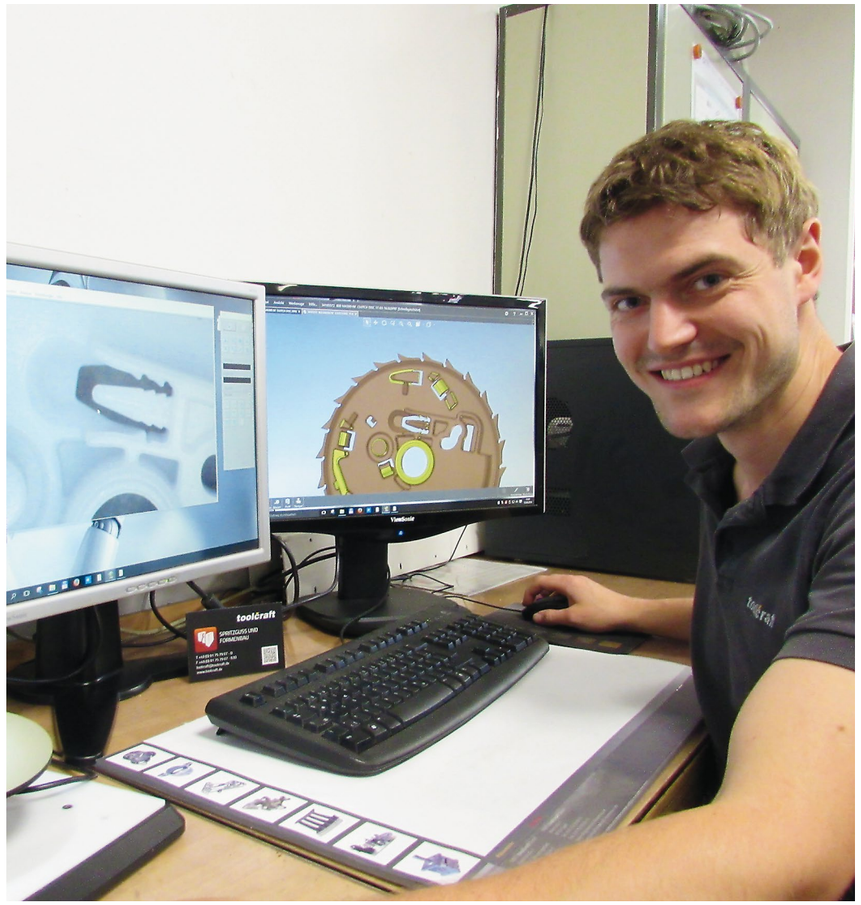
Air pocket in plastic component



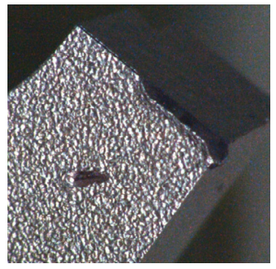
Misalignment on injection molded

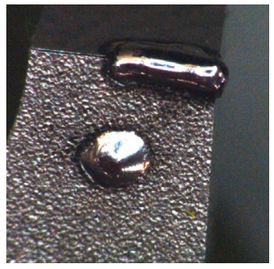


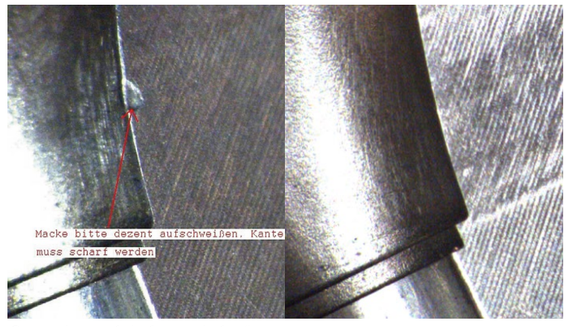
Flash on part



Analysis of an injection molding component with C-VIEW 75. The offset function is determined and documented with the aid of the measuring function. Required change measures are derived and discussed with the executing colleagues.


Before laser welding


After laser welding



Comparisons of „before and after“


Situation meeting with the team

C-VIEW 500 OPERATIONAL AT **MHF**

COMPANY PROFILE

Owner of MHF and managing director Martin Halbgewachs

THE FOCUS OF MARTIN HALBGEWACHS GMBH & CO. KG IS MILLING AND SPARK EROSION FOR COMPLEX COMPONENTS, AS WELL AS THE GEAR CUTTING OF GEAR PARTS, TURNING, LASER WELDING AND MARKING. ADDITIONAL 3D PRINTING OF PLASTICS AND, IN THE FUTURE, OF METALS IN THE PORTFOLIO.

Martin Halbgewachs GmbH & Co. KG

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MHF Martin Halbgewachs GmbH & Co. KG is based in Steinheim and has been a competent partner of renowned companies in the region since its founding in 1992. With modern machinery, MHF manufactures parts for customers in the fields of mechanical engineering, motorsports, medical technology, automotive and gardening tools - just to name a few.

The main focus of the company is milling and spark erosion of complex components made of a wide variety of materials. MHF processes hardened steels up to 64HRC, carbide, ceramic, aluminum, stainless steel, titanium, tungsten alloys, graphite and copper. The operation is milled and drilled with a tool diameter of 0,1. Twelve machining centers, of which three and five axes are manufacturing, four HSC and eight standard machines are used.

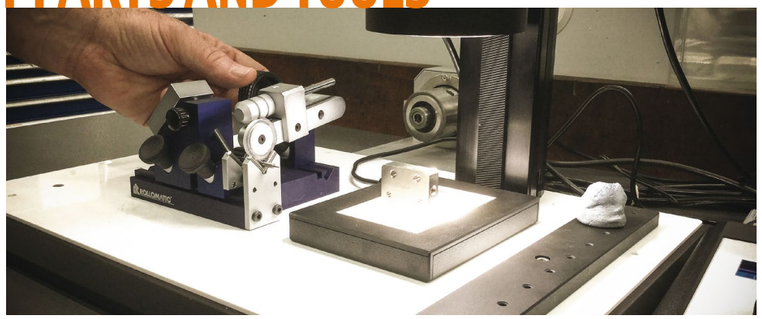
In the field of spark erosion, the company uses two start-holes, three sinking and seven wire-cutting machines. Customers here are the classic tool and mold makers as well as from the mechanical engineering and automotive sector. One of the MHF specialties is the gear cutting of gear units.

The increased customer demands in the last few years have led MHF to not only work as a service provider, but also deliver completely finished components. For this reason, the portfolio is constantly expanding.

Today, there are three lathes with powered tools, Y-axis, counter-spindle, etc., available for turning complete parts. The company also has a laser welding system, a laser marking system and a 3D printer for plastics. In the near future the equipment will also include a 3D printer for metals.

MHF currently employs 35 people, of which 5 are in apprenticeship.

C-VIEW 500 N THE APPLICATION AT MHF: **TEST OF SMALLEST PARTS AND TOOLS**



C-VIEW 500 with light and a high precision concentricity clamp

THE OPTICAL INSPECTION SYSTEM C-VIEW IS USED AT MHF TO CHECK THE QUALITY OF INDIVIDUAL WORK STEPS AS WELL AS TO EVALUATE THE TOOL WEAR. FROM THE COMPANY'S VIEW, THE CONTROL RESULTS HAVE A DIRECT INFLUENCE ON THE QUALITY OF THE PRODUCTS.

Whether for milling, grinding or eroding; in all areas, the components are becoming smaller and smaller and tolerances are increasing. Nowadays, thanks to highly precise and state-of-the-art machines, it is not always just the manufacture of the components that is the major challenge, but rather the verification. The high-resolution C-VIEW camera system from CIMTRODE is ideally suited for this purpose. Even the smallest details can be displayed easily under a magnification of up to 1000-fold and thus be checked for its quality. For example, in the case of MHF 0.10 - 0.40 mm holes in hard metal are milled on a highly precise HSC machine and subsequently checked and examined for dimensional accuracy, roundness and raptures with C-VIEW.

Possible imperfections can be discussed with the team directly at the monitor and corrective measures initiated. If necessary, C-VIEW also offers very easy-to-use documentation aids, so that a ready-to-print document is available with just the click of a button. In addition, the device is extremely simple and very practical to use.

Due to the high-resolution optical inspection of milling tools before and after machining, very valuable conclusions can often be drawn about the dimensional accuracy and the quality of the component very quickly and easily.

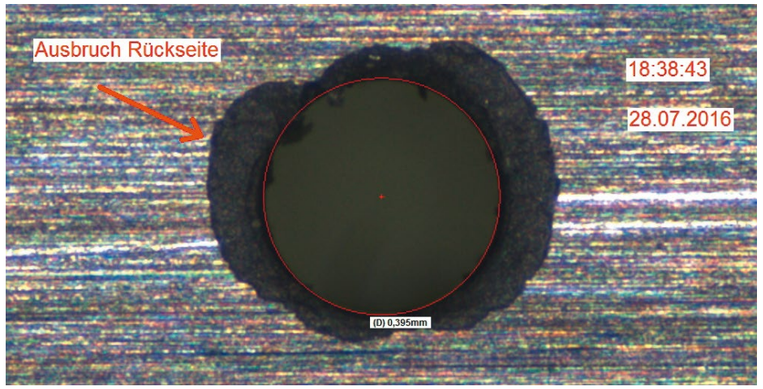
Above all, the inspection of milling tools before machining increases the hit rate with regard to quality for the company as a small-batch and single-part manufacturer. The contouring accuracy of the milling tools is one of the decisive criteria for dimensional accuracy. Tools in which, for example, the corner radius of the toroidal cutter or the spherical shape of the ball milling cutter does not correspond with the required tolerance and does not run parallel, consequently cannot produce rejects. The C-VIEW investment has already paid off in the shortest possible time.

With the help of the C-VIEW optics, one can detail, which was impossible until now. For this reason, working on new and unknown materials used to be a tedious and costly adventure; today the background is visible with C-VIEW and the reason why one cutter works and the other doesn't is revealed quickly.

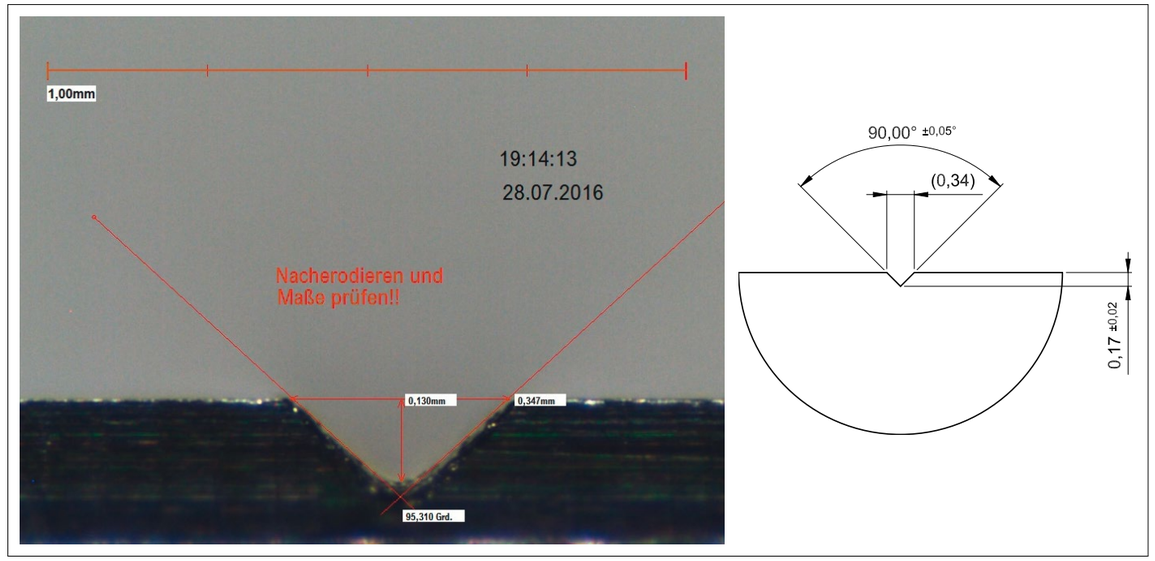
C-VIEW allows you to analyze your own milling process exactly. At MHF, we are able to process materials such as tungsten carbide efficiently and in the narrowest tolerances.

Martin Halbgewachs
Geschäftsführer MHF

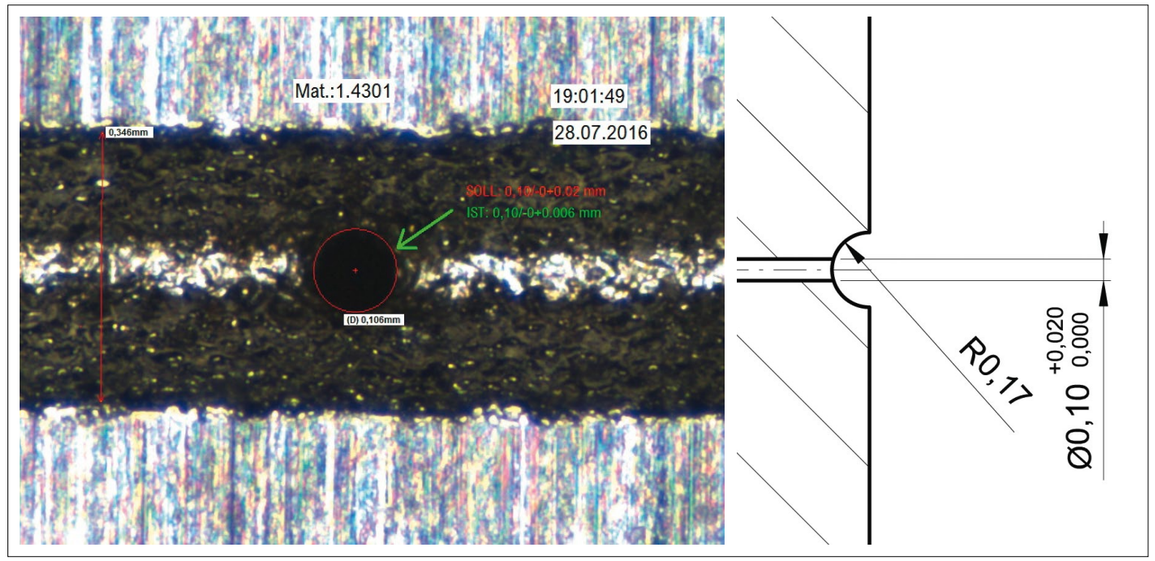
Diamond coated cutter diameter 0,10 mm under 750-fold magnification



Milled hole diameter 0,395 mm in carbide K40



Eroded geometrie in carbide K40



Eroded hemisphere with milled blind hole (diameter 0,10 mm / depth 1,90 mm) in carbide 1.4301

C-VIEW 75 OPERATIONAL AT
FISCHER INNOVATIVE MOULDS

COMPANY PROFILE

Tool manufacture at fischer Innovative Moulds

THE „FISCHER DÜBEL“ AND THE TOY „FISCHERTECHNIK“ HAVE MADE FISCHER A GLOBALLY KNOWN AND RECOGNIZED BRAND. TODAY, THE FAMILY BUSINESS FOUNDED IN SCHWARZWALD IN 1948 HAS 44 SUBSIDIARIES IN 33 COUNTRIES WORLDWIDE AND EMPLOYS MORE THAN 4,400 COLLABORATORS .

fischer INNOVATIVE MOULDS

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Freiburg-Hochdorf and in the Czech town of Vyskov. Fischer employs approximately 120 employees in the „Innovative Molds“ segment.

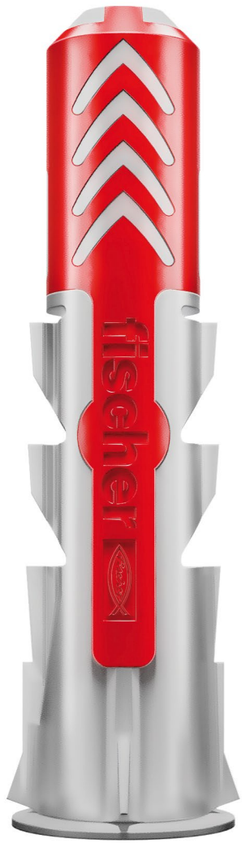
The holistic solution spectrum - from the development to the finished product - is used by international customers in the automotive sector, as well as by companies from the construction and industrial sectors, medicine, electrical engineering, appliance industry, packaging and plumbing heating.

The performance portfolio of fischer Werkzeug- und Formenbau includes technical consulting Moldflow® and FEM calculations, designs, tool making - from the prototype to auxiliary and pilot series tools to the serial tool - as well as modifications, repairs and service.

The machine park includes two fully automated production cells with milling machines, a six-axis robot and a measuring machine. The park is equipped with automated EDM machines, automated wire cutting machines and CNC grinding machines.

The injection molding tools are manufactured according to customer requirements for single-component / multi-component technology up to 3K, hybrid technology (insert tools), In Mold Labeling / Decoration, In Mold Assembly, Indumold (Inductive Tool Heating), Direct Skinning / Direct Coating (PUR surface technology) and surface techniques such as, for example, chromium plating or graining.

C-VIEW 75 IN APPLICATION AT FISCHER INNOVATIVE MOULDS: **FROM CUTTER TO PLASTIC PART**



fischer 2K dowel DUOPOWER

THE TOOL AND MOLD CONSTRUCTION OF THE COMPANY GROUP FISCHER HAS BEEN USING STANDARDIZED AND AUTOMATED PROCESSES FOR MANY YEARS IN ORDER TO CONTINUALLY IMPROVE ITS ECONOMIC EFFICIENCY AND COMPETITIVENESS.

Whether injection molds for dowels or for technical components of the automotive industry, the technical and scheduling requirements are usually enormous. Speed without compromising quality is the major challenge in the production of our molds.

Even though we are a manufacturer of individual parts, we do not consider ourselves as a manufactory. We use state-of-the-art machines, which are mostly controlled remotely by robots. This way, we are able to use our equipment efficiently over long distances, even in the night and on weekends, thus fulfilling tight schedules.

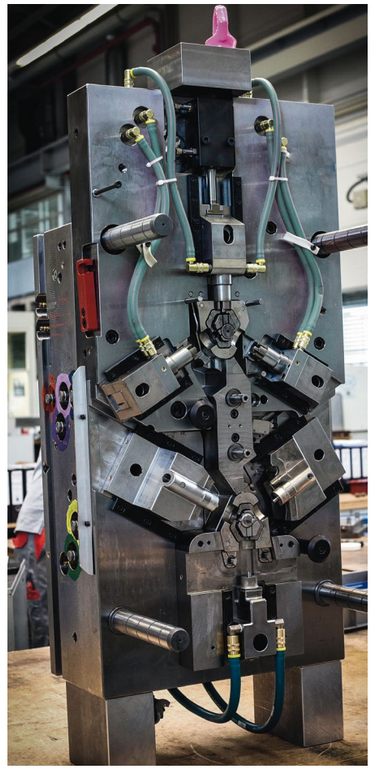
Working in such highly automated environment has posed many new challenges. If individual work steps, such as milling, measuring and eroding are manufactured by machines, working with a ZERO defect policy is very important, because even a single mistake can completely eliminate the advantages of an automated system. Pure tactile measurement is often not sufficient to determine the quality of a component, for example, when 99 good electrodes have passed through the automated manufacturing process milling-measuring-erosion and subsequently, there is an unexpected error in the hundredth electrode.

To avoid this situation we use C-VIEW. Due to the large field of view of 75 x 50 mm, it is possible to inspect large details of the components and to inspect them for defects. If you have found one, you can enlarge it by continuous zooming up to 75-fold and look at the monitor together with colleagues. Creating documents for the description of the respective situation and sending them by email to colleagues, suppliers and customers have become simple and quick.

Due to its versatile application possibilities, C-VIEW is in a very central position in our workshop. This allows an efficient use of the device by all departments. For example, milling tools are evaluated for their wear, erosion surfaces are determined, expert knowledge is assessed, welds are assessed, burrs are measured on plastic components ... in short, everything that is produced and used daily in mold and tool making.

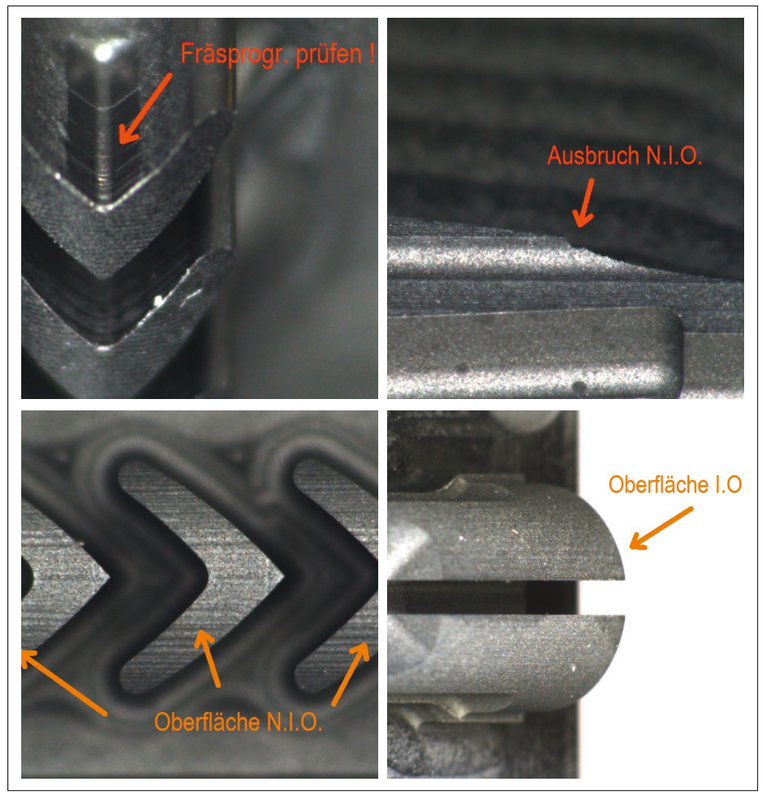
Thanks to C-VIEW, we are able to detect and avoid many errors at an early stage. The device has already paid off in the shortest possible time.

Gordon Länge
Area manager
Tool and mold making



Injection mold with index rotating unit ESP-holder with five feeders

Ventilation nozzles / 3K-control wheel



Pictures to quality test of graphite electrodes, made with C-VIEW 75

C-VIEW 75 in application

VIEW PROOF μ.o

Current as of 07/2025 | Articlenr. 92419

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