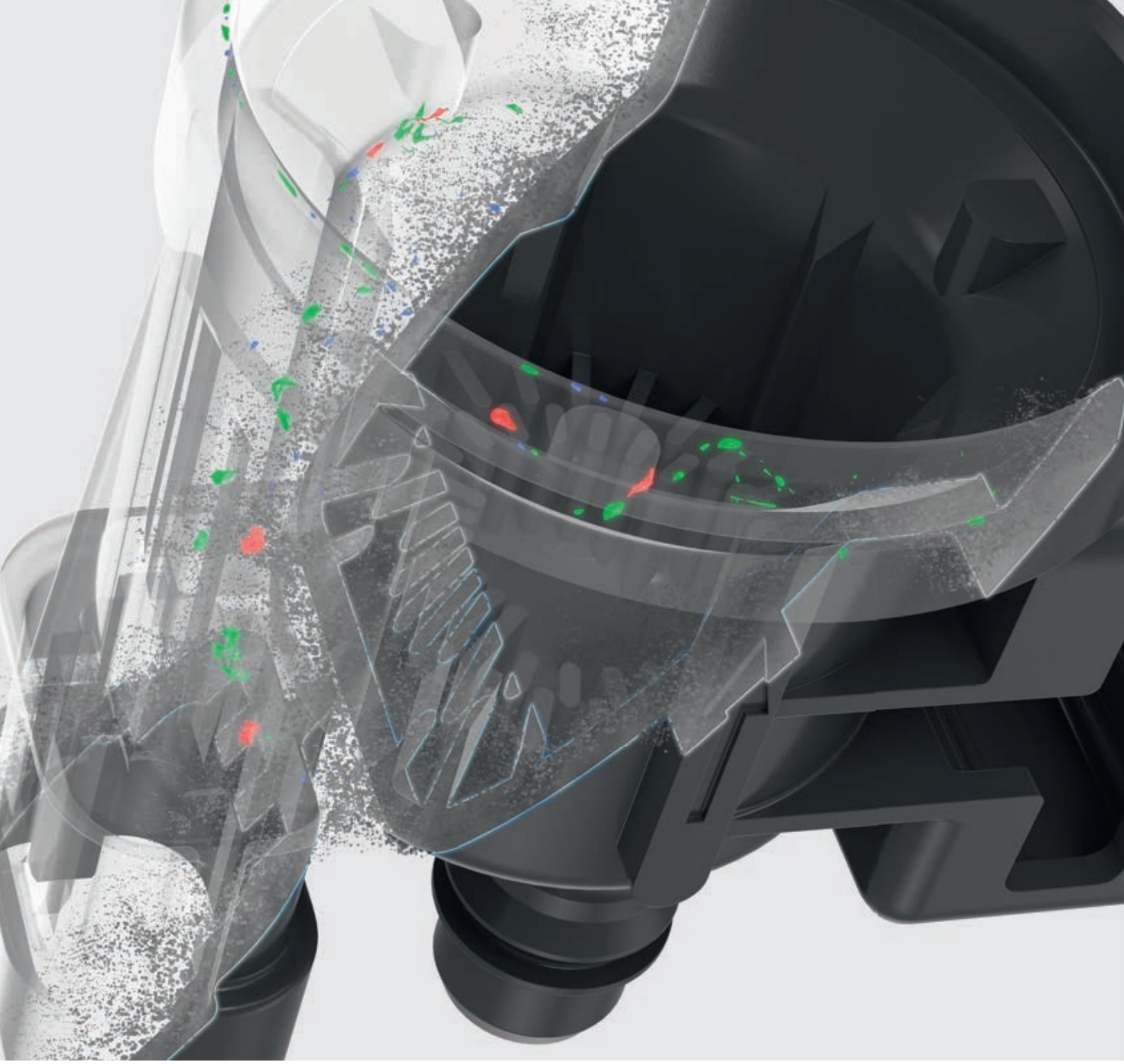


ZEISS CT Solutions

Computer tomography in the plastics industry

When you improve your production process substantially.

ZEISS CT Solutions

// RELIABILITY
MADE BY ZEISS

Optimization for the entire process

ZEISS CT solutions for the plastics industry

In order to achieve sustainable quality improvement in the manufacture of plastic parts, it is not sufficient to perform assessment at just one point in the value creation process. Every process step influences quality, beginning with development through tool manufacture, mold making and injection molding all the way to the assembly of different components. As the specific quality requirements vary from one step to the next, the quality inspection methods do as well.

With its wide range of computer tomographs, software products and inspection services, ZEISS makes available solutions for all these different jobs – tailored to the particular process step and embedded in the overall process. Effectively ensuring overall quality means having an eye on each individual part of the process chain and understanding how each stage is dependent on the other.

Computer tomography is an inspection technology which can be networked and used along the entire process chain. It offers many advantages as compared with other measuring procedures, particularly in the plastics industry.

Benefits of CT technology

- CTs work without destroying the workpiece. The properties of the specimen are not changed by the testing process.
- Nothing is hidden from CTs. Components can be captured completely, including inner structures and irregularities in the material.
- CTs work quickly. All selected characteristics can be evaluated together with just a single scan. A lot of information can be obtained in a comparatively short period of time.
- CTs capture data in 3D, meaning they provide more information than ultrasound or 2D X-ray scans.

ZEISS CT technology in the industrial process

General research

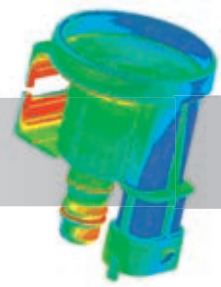
Product and process development

Exchanging CT quality data

ZEISS Xradia
X-ray microscopes

Material analysis
P. 6-7

ZEISS METROTOM
Computer tomographs



Tool correction
P. 8-11

ZEISS VoluMax
Computer tomographs

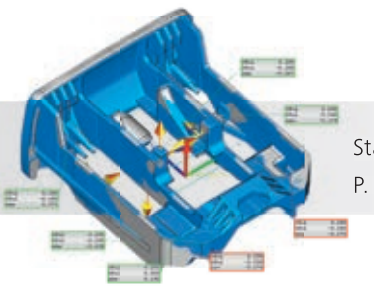
Resolution – high-resolution detail analysis

CT in research and development
ZEISS high-resolution X-ray microscopes are used in the development of plastic workpieces. These microscopes can resolve the fibers of composite materials or microstructures of polymer foam in the sub-micrometer range. This enables the examination of materials under simulated external conditions such as tension or compression in order to better understand the development of defects under real-world conditions.

CT for tool correction
For optimal modeling, highly accurate, traceable ZEISS CT measuring machines are used which can display the dimensional stability of a workpiece completely. ZEISS REVERSE ENGINEERING software converts the deviations from the CAD model captured using CT into a corrected tool shape. This significantly accelerates the tool correction process and greatly reduces time-to-market.

Parts manufacturing

Performance test
P. 12-15



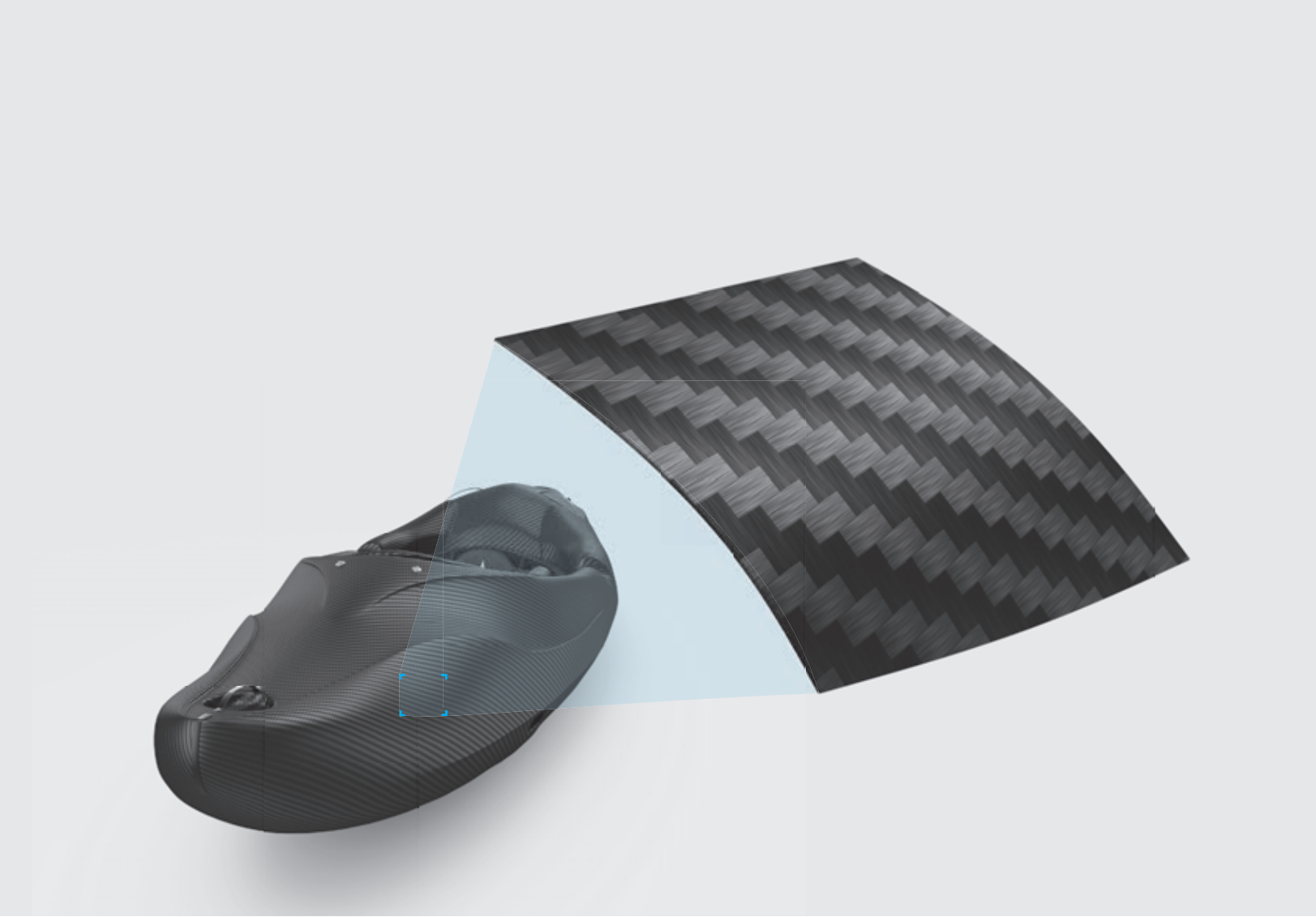
Statistical process inspection
P. 16-21

In-line inspection
P. 22-25

Speed – inspection with high throughput

CT in plastic casting

For the in-line inspection of critical plastic components, fast CT systems are used which fully automate the particular inspection job and automatically identify defective components. Unlike other processes, ZEISS VoluMax CT technology allows multiple characteristics such as dimensions, wall thicknesses, burrs and pores to be tested at the same time. The integrated software ensures that inspection results are traceably documented and archived for safety-relevant components. Moreover, ZEISS quality data management enables easy access to all inspection results at different sites and in real time, opening up new possibilities for the statistical and correlative analysis of production processes. Defects and their causes in production can be identified more quickly and resolved.



Material analysis

Example: high-resolution examination of a multi-material composite material

Background

Fiber-reinforced plastic materials are being used more frequently in the aerospace, automotive, shipping and construction industries. The reasons for this development are the the high load capacity, stability and light weight of the fibers. For example: a compound plastic material consisting of poly-propylene and glass fibers which have been poured into a polymer matrix are used for the hull of a canoe. The material offers excellent shock resistance, general stability and durability while still being lightweight. It also costs significantly less than plastics reinforced with carbon fibers, making the canoe:

- more resistant to water pressure and the impact resulting from hitting rocks
- lightweight and easy to maneuver
- affordable

Understanding the causes of defects

The interior structure of compound materials exerts a strong influence over their material properties. In order to study the characteristics of different materials, engineers must be able to make the interior structure visible and measure it.

ZEISS Xradia Versa X-ray microscopes enable quantitative, high-resolution 3D analyses of the microstructure in relatively large material specimens, creating the necessary preconditions for understanding the causes of stability and the vulnerability of different material structures. The X-ray does not influence the material properties. This is the only way to examine material specimens before and after stress tests performed using tension or compression so that the changes in the microstructure are visible.

A segmented 3D rending of the compound material shows glass fibers (green), polypropylene fibers (orange), and voids (white). The sub-micron 3D data shows that the distribution of glass fibers through the matrix does not appear uniform, which may have an effect on material property. The occurrence of air voids with a variety of size could also affect material strength. Courtesy of Professor Abbas S. Milani, University of British Columbia.

Benefits of the ZEISS Xradia Versa

ZEISS Xradia Versa systems feature a spatial resolution in the submicrometer range, high contrast and the possibility of maintaining high resolution at a great working distance, ensuring that even relatively large, in-tact specimens are imaged in detail.

Results

High-resolution 3D visualization and subsequent analysis of composite materials can provide valuable information on porosity, fiber orientation and fiber distribution, resulting in a better understanding of core material properties.

System used

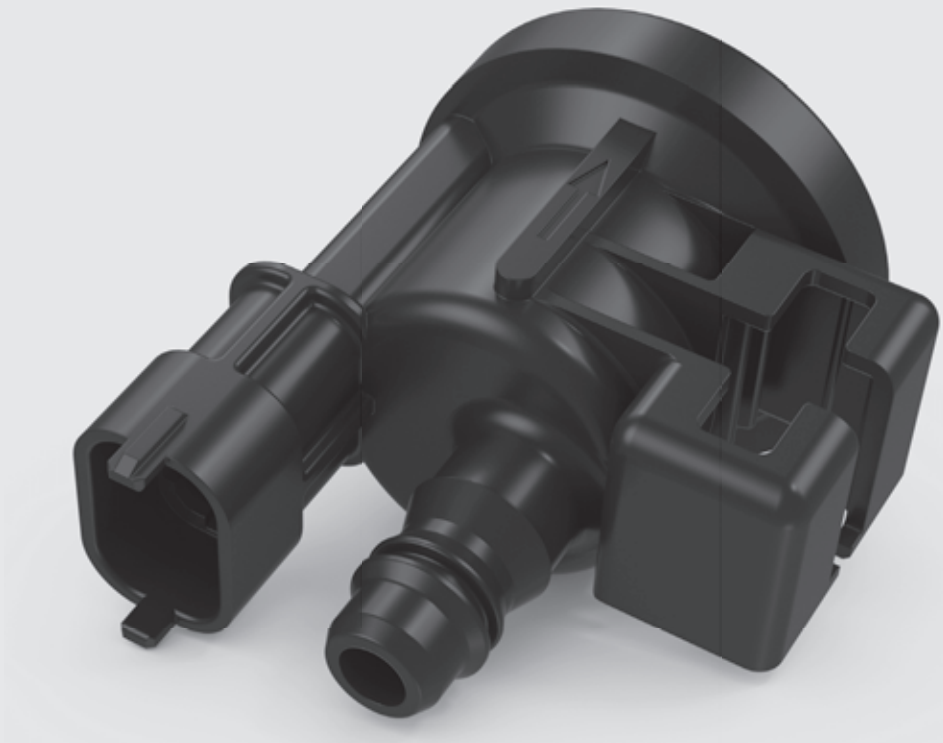
ZEISS Xradia 520 Versa

Software used

S+S

ZEISS Xradia Scout and Scan
System software

ORS DragonflyPro
Visualization and analysis software



Tool correction using ZEISS REVERSE ENGINEERING

Example: housing for a tank venting valve

The fastest route to the perfect tool

Plastics manufacturers must meet ever-increasing quality standards. Installing defective parts requires considerably more time and effort and for this reason is to be avoided. This is why quality criteria need to be observed when engineering and constructing the tool shape – without making any compromises. At the same time, developers and mold makers are usually under time pressure because the time to market is one of the decisive factors in determining the success of a product launch.

Influencing factors for quality

The quality of plastic parts manufactured using plastic injection molding depends on many influencing factors: from the injection mold itself, the various process parameters to the type of plastic used. For example: the shrinkage behavior influences the dimensions of the injection molded part. Shrinking, in turn, depends on the other aforementioned influencing variables and cannot be predicted with great accuracy. The quality of the injection molding tool cannot be assessed by a simple measurement. Whether or not an injection mold will provide good results can only be determined by inspecting the parts manufactured using it.

The tool correction process

Due to the difficulty in predicting the quality of an injection mold process, tools must often be reworked multiple times until the molded parts meet the quality standards. The components must be measured completely and exactly in every correction loop, and the molding tool must then be modified in line with these results. The challenges

The color-coded display in ZEISS REVERSE ENGINEERING shows you at a glance where and by how much the component diverges from the nominal data. A shift into the blue spectrum indicates undersize whereas a shift into the red spectrum indicates oversize.

when performing any correction loop are:

- capturing as many evenly-distributed and exact measuring points as possible
- transferring the measuring results to the CAD data of the tool shape
- ensuring an accurate fit for integrating the corrected segments into the overall shape

System used

ZEISS METROTOM 800 130kV/225kV

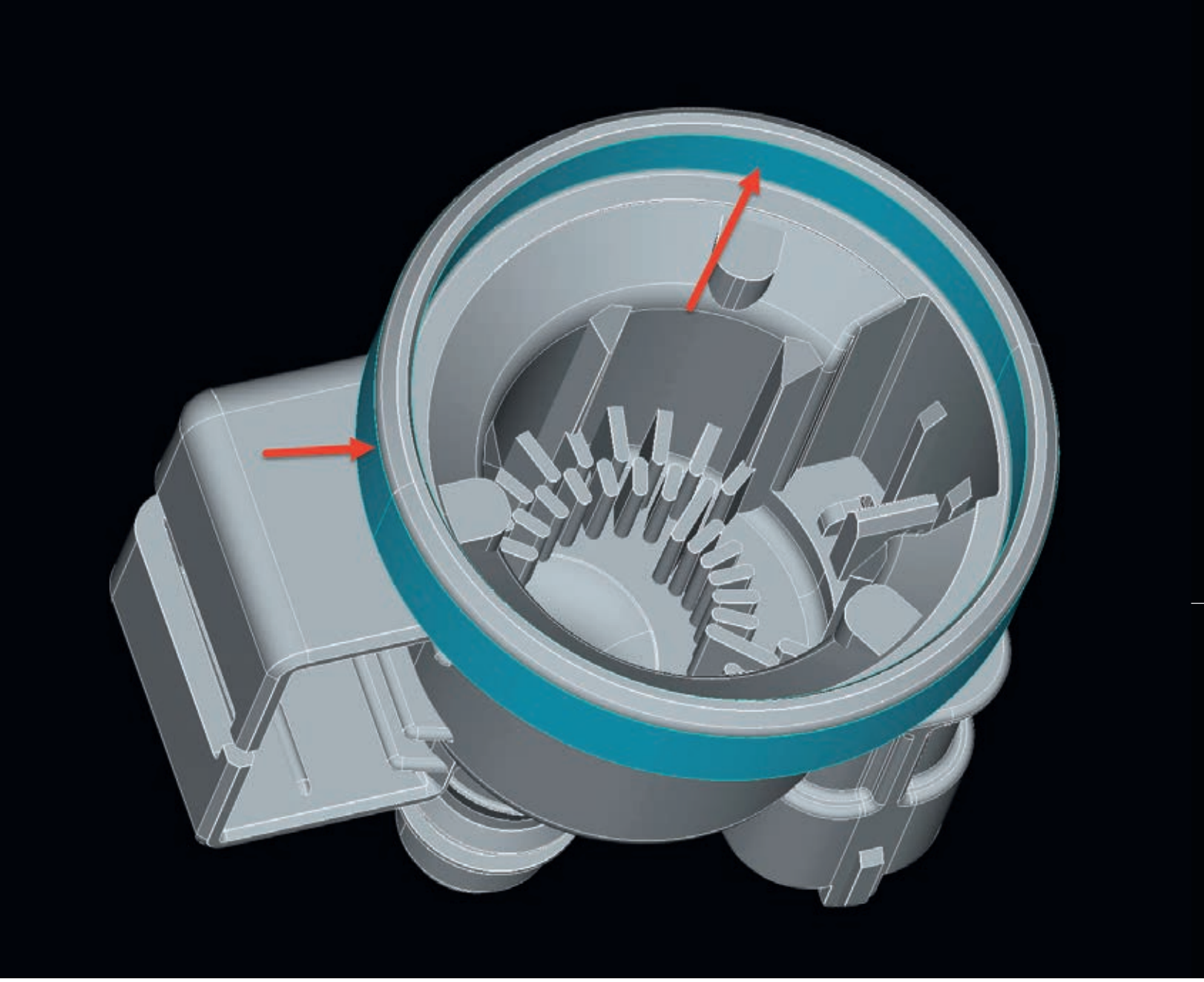
Software used

MOS

ZEISS METROTOM OS
System software

RE

ZEISS REVERSE ENGINEERING
Reverse engineering and tool correction



Only the area marked in blue is considered for tool correction because this is decisive for fit accuracy.

ZEISS METROTOM CT

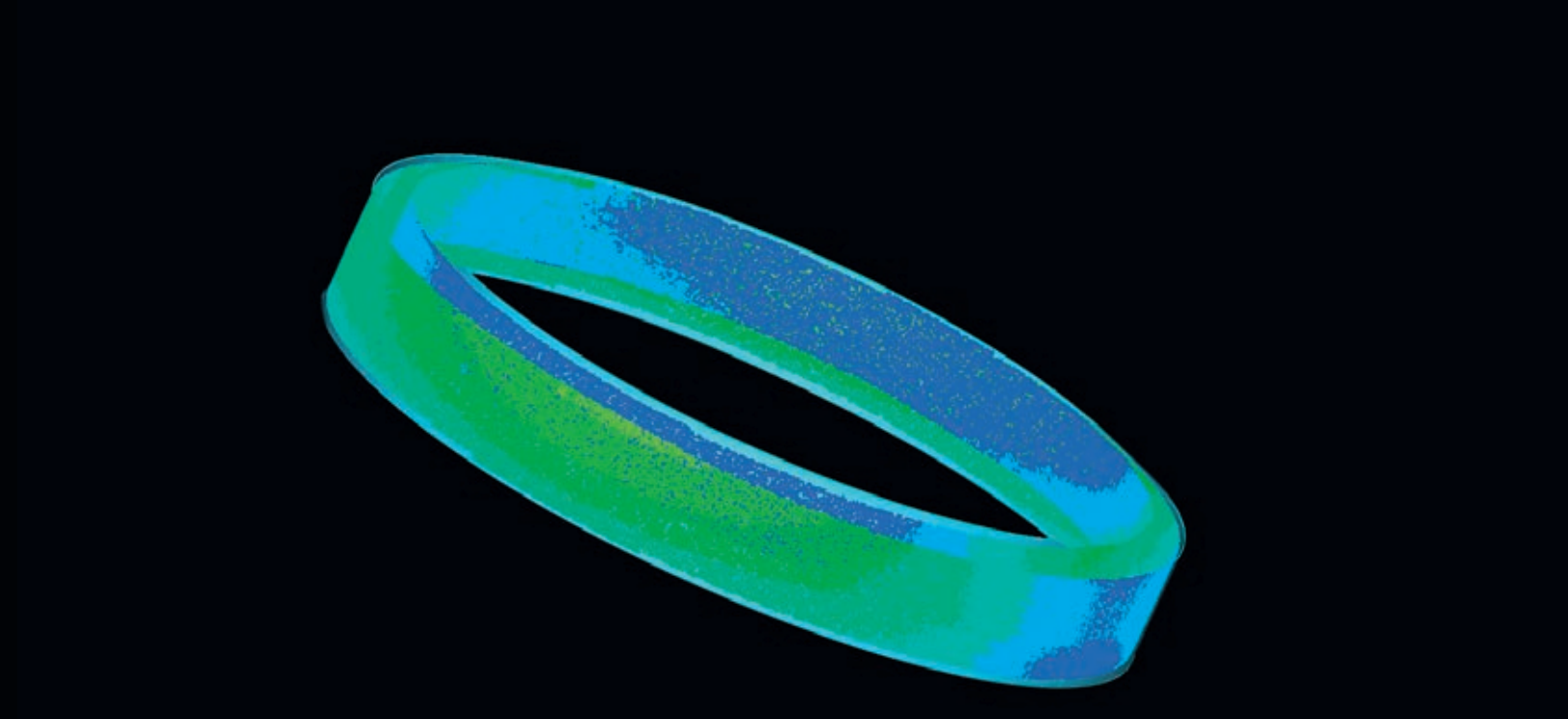
ZEISS offers coordinated solutions to ensure the entire tool correction process is efficient. This begins with determining dimensional stability using a ZEISS METROTOM computer tomograph, which captures all internal and external structures of the component completely. In contrast to other standard processes where the component is actually dissected and the individual segments are measured, computer tomography offers important benefits:

- The inspection process does not destroy the component.
- The amount of time required is drastically reduced.
- The process is reliable: there is no risk of deforming within the scope of the inspection process.
- The amount of information provided is greater because the entire component is captured, and not just individual sections. This can significantly reduce the number of correction loops required.

The CT systems from ZEISS are also highly accurate and the results are traceable.

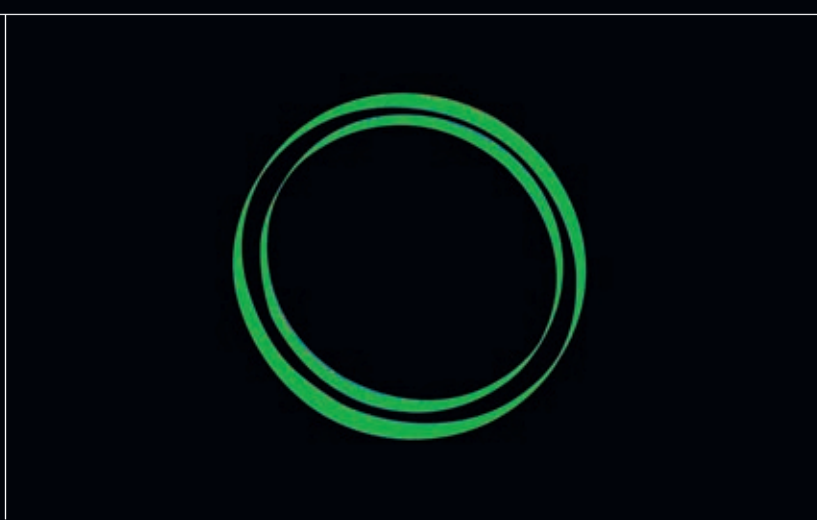
ZEISS REVERSE ENGINEERING

With ZEISS REVERSE ENGINEERING software, the CAD model of the injection molding tool can be corrected using the nominal data of a plastic component and the actual-data generated using the ZEISS METROTOM. The software corrects defective component segments in the tool data set and ensures that the selected segments fit appropriately.
ZEISS REVERSE ENGINEERING detects the underlying geometries using CT volume data. The mathematically calculated surfaces are then merged



Color-coded nominal/actual comparison of the selected sub-area

The nominal data of the product (yellow), the current tool shape (green) and the areas which must be corrected (white) in one display

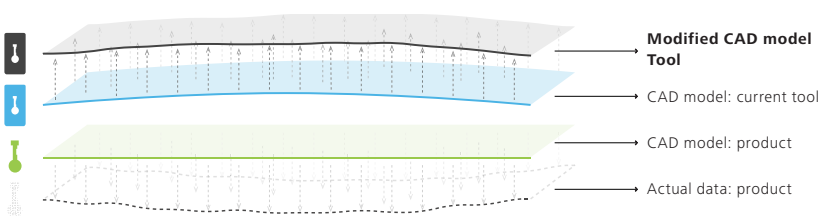


Display of the corrected and smoothed tool shape. The shape has been corrected in such a way that punctual deviations (red and blue) are negligible.

to create a watertight model, meaning that there are ideally no gaps or overlaps between the surfaces. Stipulated continuity conditions can be guaranteed extremely conveniently and reliably using ZEISS REVERSE ENGINEERING. With practically no intervention, the algorithms automatically smooth the surfaces to such an extent that the transitions are as tangentially constant and curvature-constant as possible – a must for optimal milling paths. In particular the automatic functions ensure continuous transitions of the corrected segments to the rest of the tool shape – without crevices or kinks.

Faster product manufacture

Thanks to the fast and informative capture of the actual condition with the ZEISS METROTOM and efficient tool correction using ZEISS REVERSE ENGINEERING, iteration loops can be significantly reduced and shortened for tool correction – while still meeting premium quality standards.



ZEISS REVERSE ENGINEERING inverts the component deviations and transfers them to the tool data set.

Assembly inspection in product development

Example: fit accuracy of a plastic screw-cap

Successful model: PET bottle
Bottles made from polyethylene terephthalate, also known as PET bottles, are the most commonly used beverage packaging. About one-third of all drinks worldwide are bottled in PET containers. Glass is the second most-popular material for bottles, but only makes up approximately one-sixth of the packaging currently used.

The shapes of PET bottles have changed many times since their introduction in the 1980s and become increasingly diverse. Advances in production technology have made it possible to significantly reduce the weight and the quantity of materials used. Customized shapes have helped beverage producers better position their products on the market.

It's the cap that counts
The cap is a particularly critical area when developing a new bottle shape because it is vital for the function and safety of the PET bottle. The impermeability must be guaranteed in order to prevent both the beverage from flowing out of the bottle and germs from getting in. An additional security feature is the so-called tamper evident band which is designed to tear open or tear off when the cap is twisted. Thanks to the tamper evident band, consumers know that the bottle has not been opened after being filled.

Conventional inspection
If a CT system is not available, destructive testing is a standard process for inspecting the fit accuracy of the seal and the bottle. The area around the cap on a sealed bottle is embedded in resin. When cured, the resin gives

The CT data display using ZEISS NEO insights software shows if the seal is properly positioned on the bottle.

the molded plastic stability, which is necessary for preventing deformations during sectioning. After being cut into many thin sections, the cross sections are checked optically to ensure defect-free contact between the cap and the bottle.

Disadvantages of destructive testing

The greatest drawback to the aforementioned process is the significant amount of time required. Moreover, destructive inspection is always incomplete: only those defects which appear on the cut

System used

ZEISS METROTOM 800 130kV/225kV

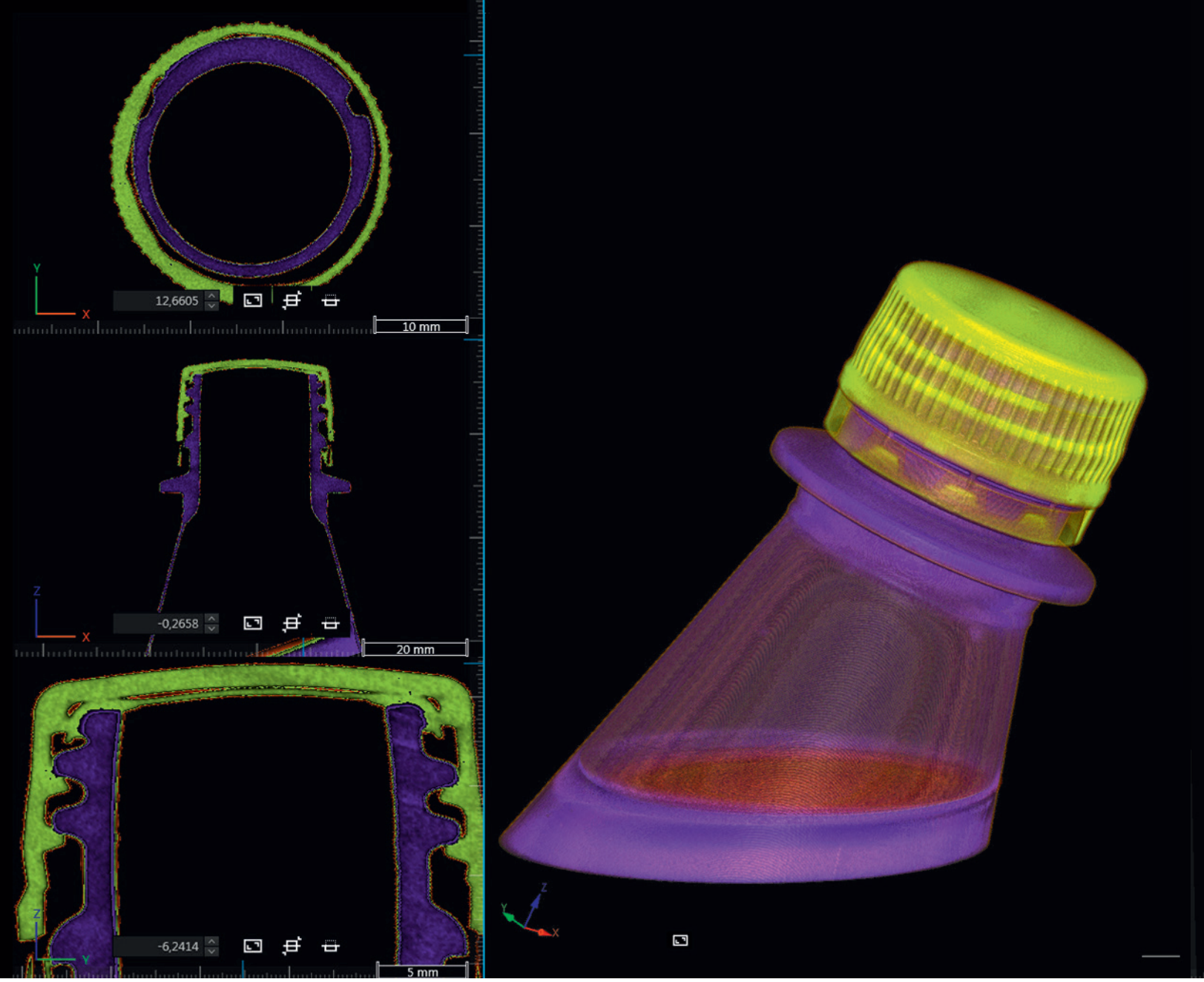
Software used

MOS

ZEISS METROTOM OS
System software

NI

ZEISS NEO insights
Volume visualization and analysis



Different material densities are used for the color display of the bottle and cap.

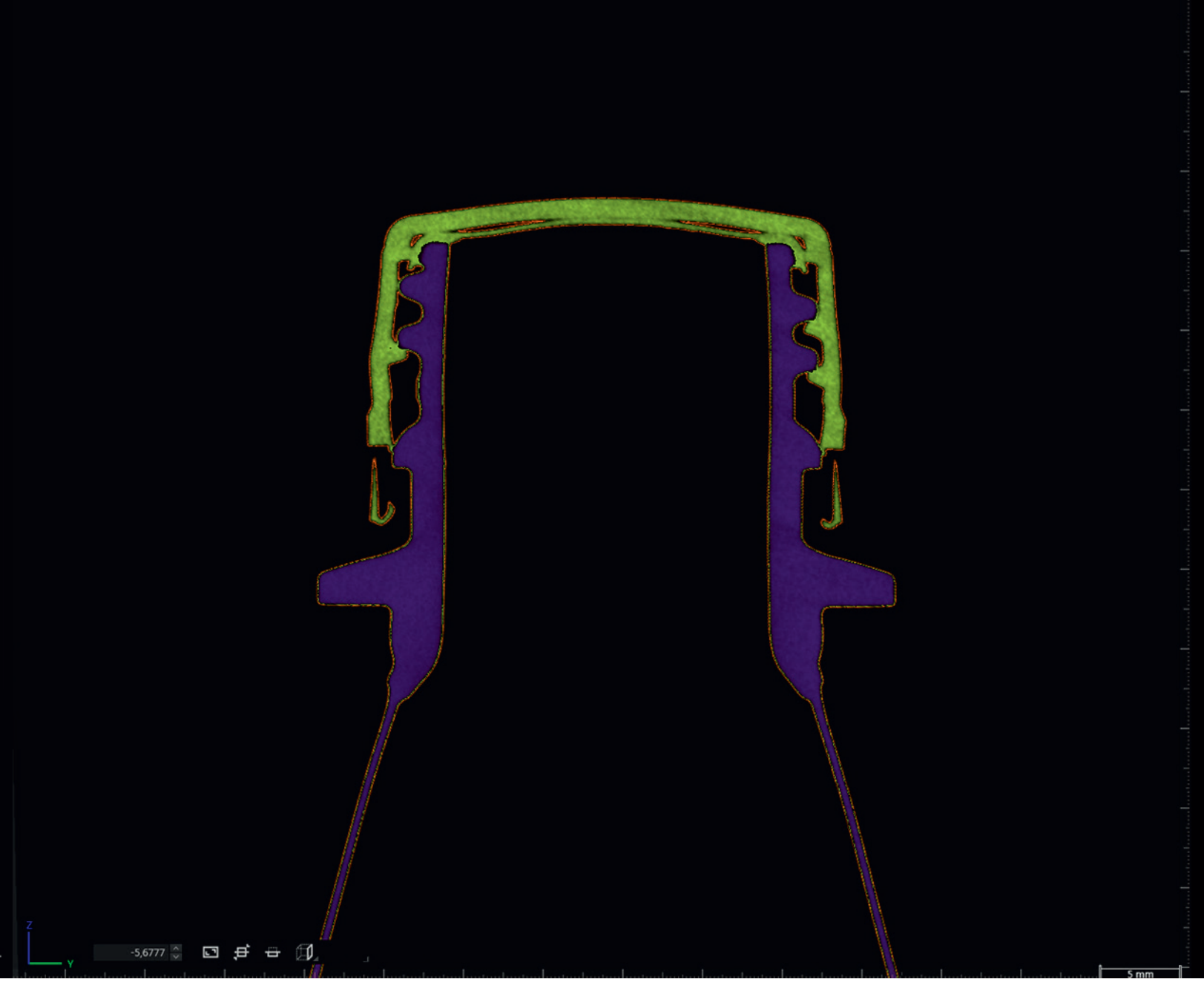
surfaces are spotted. Defects in the areas in between the sections remain hidden. Although the 2D cut makes it easy to identify defects, information about the spatial dimensions of the defects is lacking. It is not possible to know where and how the molding tools need to be corrected without taking further steps. This process also poses the risk that the resin warms up when hardening, deforming the plastic. This distorts the inspection result because the introduction of heat can reconnect areas which originally had not been joined.

Inspections with the ZEISS METROTOM CT

With a ZEISS METROTOM CT system, it is possible to examine the quality and function of the cap in its original, screwed-on state without cutting apart the bottle. Using the CT data obtained, the cap can be cross sectioned at random on the computer using ZEISS NEO insights software so that the analysis is as complete as possible. A freely rotatable, semi-transparent 3D view facilitates orientation and interpretation. The different material density of the cap and the bottle can also be used for differentiated color rendition, further simplifying analysis. The complete 3D visualization makes it possible to locate all parts on the screw thread with missing material contact so that the origin of potential leakage can be determined. Moreover, the different display formats show where and how the tool shapes of the screw top or the bottle must be corrected.

Random sampling in production

Highly precise inspecting and measuring computer tomographs such as the ZEISS METROTOM are not only used for



examining prototypes in product development, but also are equally suitable for performing random sampling in volume production later. The test parts are not only inspected on a purely visual basis in 3D, but also measured precisely using ZEISS CALYPSO CT. Regular random sampling and statistical evaluation using ZEISS PiWeb makes it possible to discover potential reductions in quality, e.g. caused by tool wear – even as the component is being manufactured. The benefits: tool endurance can be better planned, preventing the production of rejects and the resulting subsequent costs. Information obtained using a ZEISS METROTOM in volume production can also be used later in development to design new bottles. The necessary data and analyses can be conveniently made available at different locations in the production process via ZEISS PiWeb.

Random sampling for statistical process control

Example: button for a seat belt buckle

Background

The button on a seat belt buckle in the car must meet high quality standards to ensure that this safety-relevant component works faultlessly. Even though it is subjected to frequent mechanical stress in daily use, the button's stability over the lifetime of the car must be 100% guaranteed.

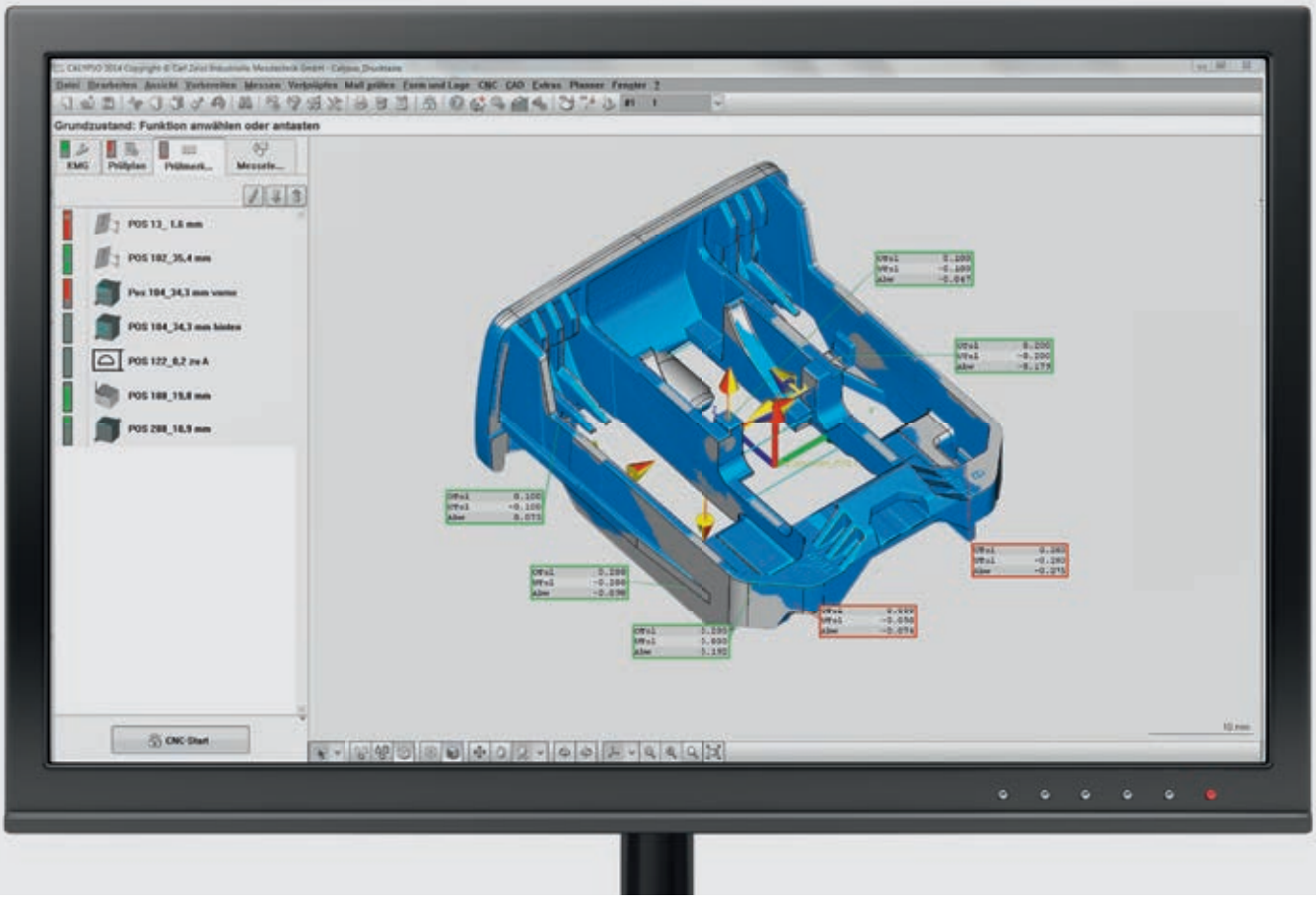
Together with the other seat belt buckle components, the button also affects safety. Dimensional accuracy and mechanical stability are required for a perfectly functioning seat belt button.

Quality assurance requirements

Quality assurance for the button should ideally be as comprehensive as possible and should be performed immediately after its manufacture in the plastic injection mold. Otherwise, defects are only identified after the button has been installed, leading to high subsequent costs because the entire safety-relevant module must be exchanged. In a worst-case scenario, this defect can impair safety, e.g. because the seatbelt can no longer be used.

Statistical process control

Regular random sampling guarantees the quality of the production process because, for financial and technical reasons, it is not possible to inspect every seat belt button. Defined component dimensions are captured regularly and deviations are monitored exactly over time. Statistical analysis enables the process to be stopped at the ideal moment as well as the early identification of gradual deterioration in the process. The shape of the value progression also provides information about potential defect causes.



Best fit of CT data (blue) and CAD data (gray). Measuring values outside tolerance are marked in red.

System used

ZEISS METROTOM 800 130kV/225kV

Software used

MOS

ZEISS METROTOM OS
System software

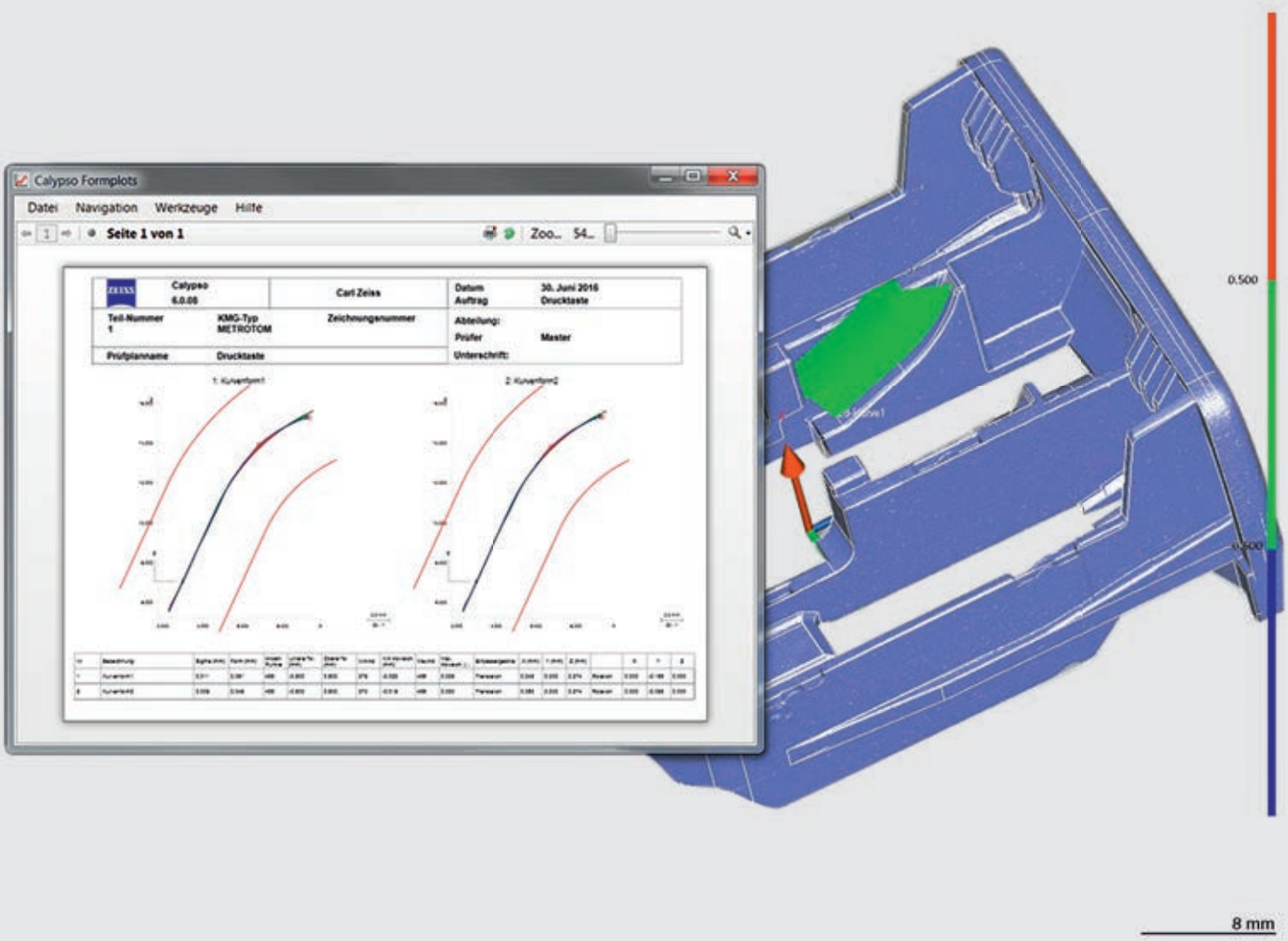
CY

ZEISS CALYPSO
Analysis of standard geometries

Pi

ZEISS PiWeb
Networked quality data management

VGStudio Max from Volume Graphics
Software for volume visualization



Detail analysis of a curve form on the component using ZEISS CALYPSO CT

Characteristics

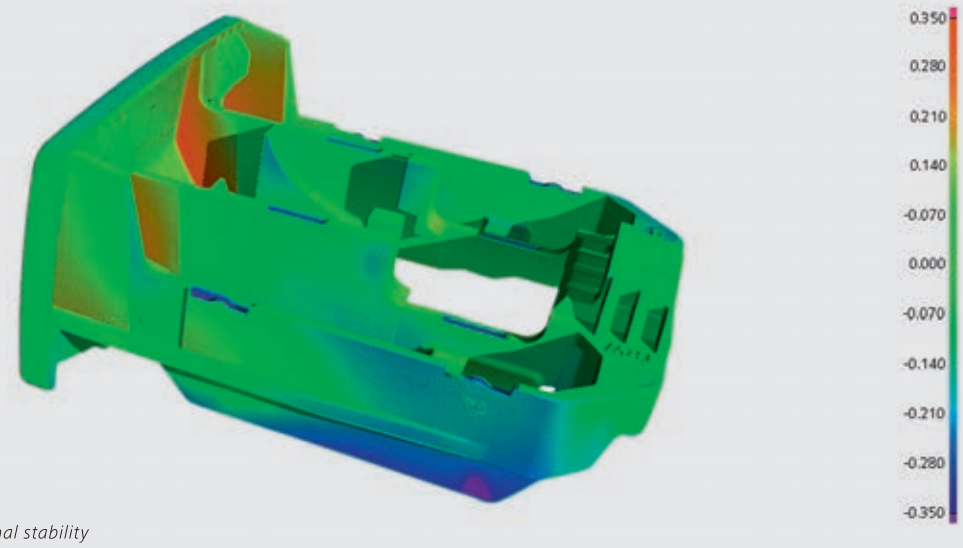
These features predominantly determine the quality of the button:

- The dimensional stability of the shape, i.e. the correspondence to the defined nominal values in the CAD model.
- Stability which could be potentially limited by cavities, if applicable.

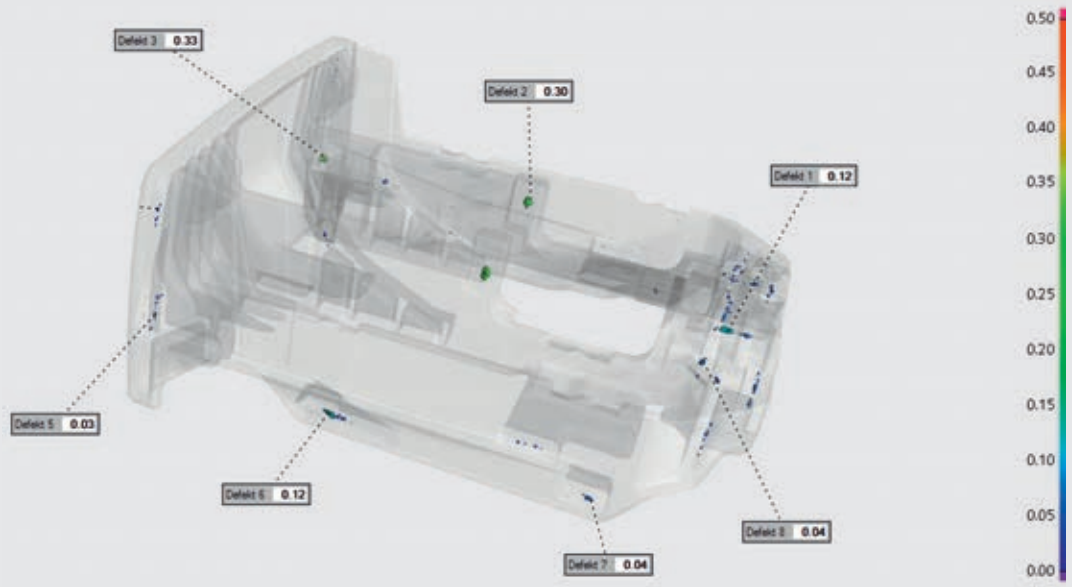
Conventional inspection with a coordinate measuring machine

The stability is typically inspected using a coordinate measuring machine with contact or optical sensors. The more dimensions to be captured, the more time is required for inspection. In some cases the component must also be reclamped. Moreover, it is difficult or even impossible to measure the concealed structures using a coordinate measuring machine without destroying the component. Pores in the interior cannot be inspected.

The time required for regular inspections increases with the frequency of random inspections. However, more frequent measurements help stabilize the process and minimize tolerance deviations, reducing both the number of rejects and the subsequent costs of defective production.



Color-coded display of dimensional stability



Inspection of pores

CT inspection with the ZEISS METROTOM

With a ZEISS METROTOM computer tomograph, all dimensions to be captured within the scope of process control can be inspected with just a single scan. It is even possible to insert multiple components into the CT system at once and inspect them. Depending on the component size, a complete shot is also possible. Moreover, additional dimensions can be inspected at any time using the voxel data generated to perform supplementary analyses. If necessary, a color-coded display of the nominal/actual comparison provides an overview of the dimensional accuracy of the entire component. The particular strength of the ZEISS METROTOM: the measuring results are traceable and dependably meet the current metrology standards.

CT material inspection

In addition to dimensional stability, the ZEISS METROTOM also provides CT volume data to inspect possible pores in the material, providing information on the stability of the seatbelt button.

Networked process control with ZEISS PiWeb

With the ZEISS PiWeb solution, ZEISS provides a tool for statistical process control which is ideally matched to the ZEISS METROTOM. ZEISS PiWeb bundles the data captured by the ZEISS METROTOM and other measuring machines and makes them available at other sites via a secure web connection. The analyses necessary for process control are available in ZEISS PiWeb.

Inspection in volume production with large quantities

Example: connector housing

Background

The connector housing to be inspected is combined with other components to form a plug over the course of the production process. This plug is ultimately integrated into machines and systems. Defects in the connector housing which are only identified in later process steps can lead to high additional costs. Thus quality defects in the plastic casting should be identified as quickly as possible and with 100% reliability.

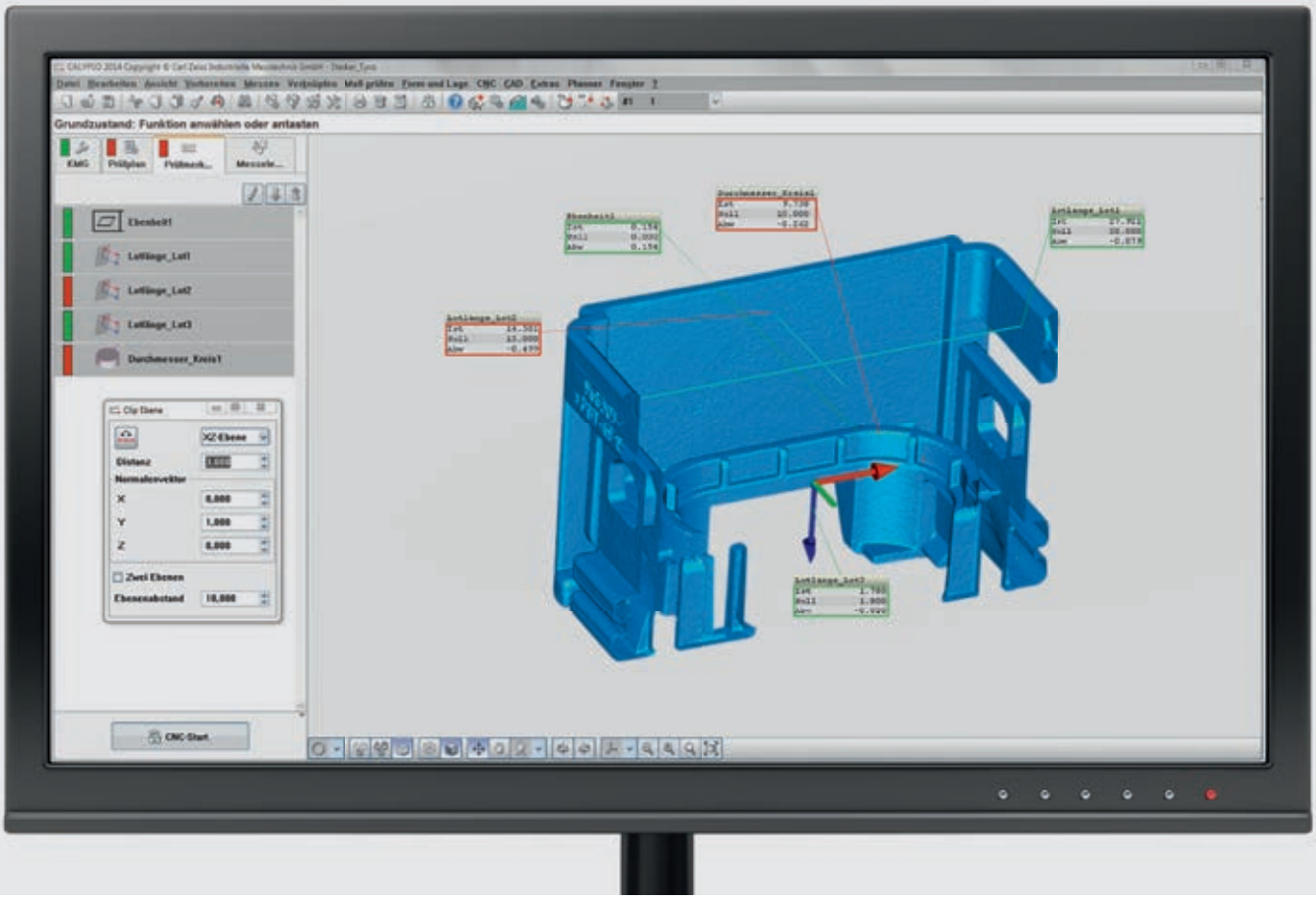
Characteristics

Defects which can occur in the plastic casting and must be inspected are:

- cavities
- deformations
- deviating dimensions and wall thicknesses
- burrs

Standard inspection methods

Standard, non-destructive inspection methods such as visual inspections or gage testing only enable particular aspects of the total quality to be monitored. In order to achieve an overall picture of the object, multiple processes must be combined and the results merged. Materialography is a destructive inspection process which provides information about the interior structures. However, it requires a lot of time and effort, making it unsuitable for regular inspections.



The 3D dimensional stability can be ideally inspected using ZEISS CALYPSO CT.

System used

ZEISS VoluMax

Software used

MOS

ZEISS METROTOM OS
System software

VOL

Simplified user interface
for ZEISS VoluMax

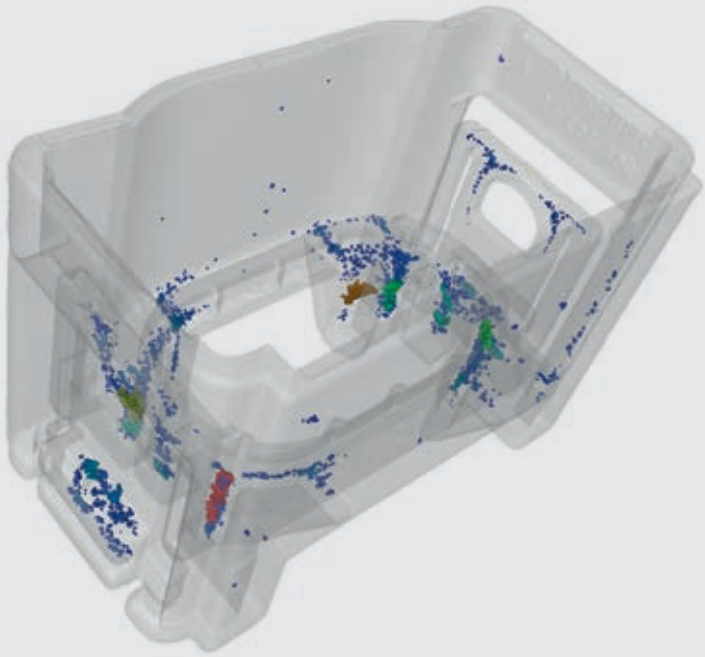
CY

ZEISS CALYPSO
Analysis of standard geometries

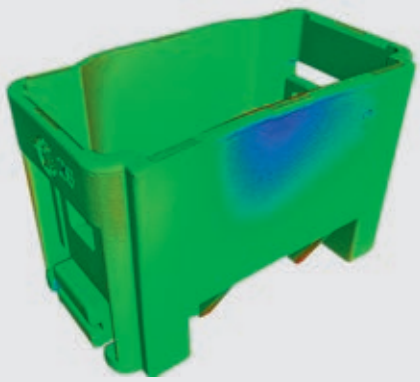
Pi

ZEISS PiWeb
Networked quality data management

VGStudio Max from Volume Graphics
Software for volume visualization



Inspection of pores using VGStudio Max



Color-coded display of dimensional stability in ZEISS CALYPSO CT

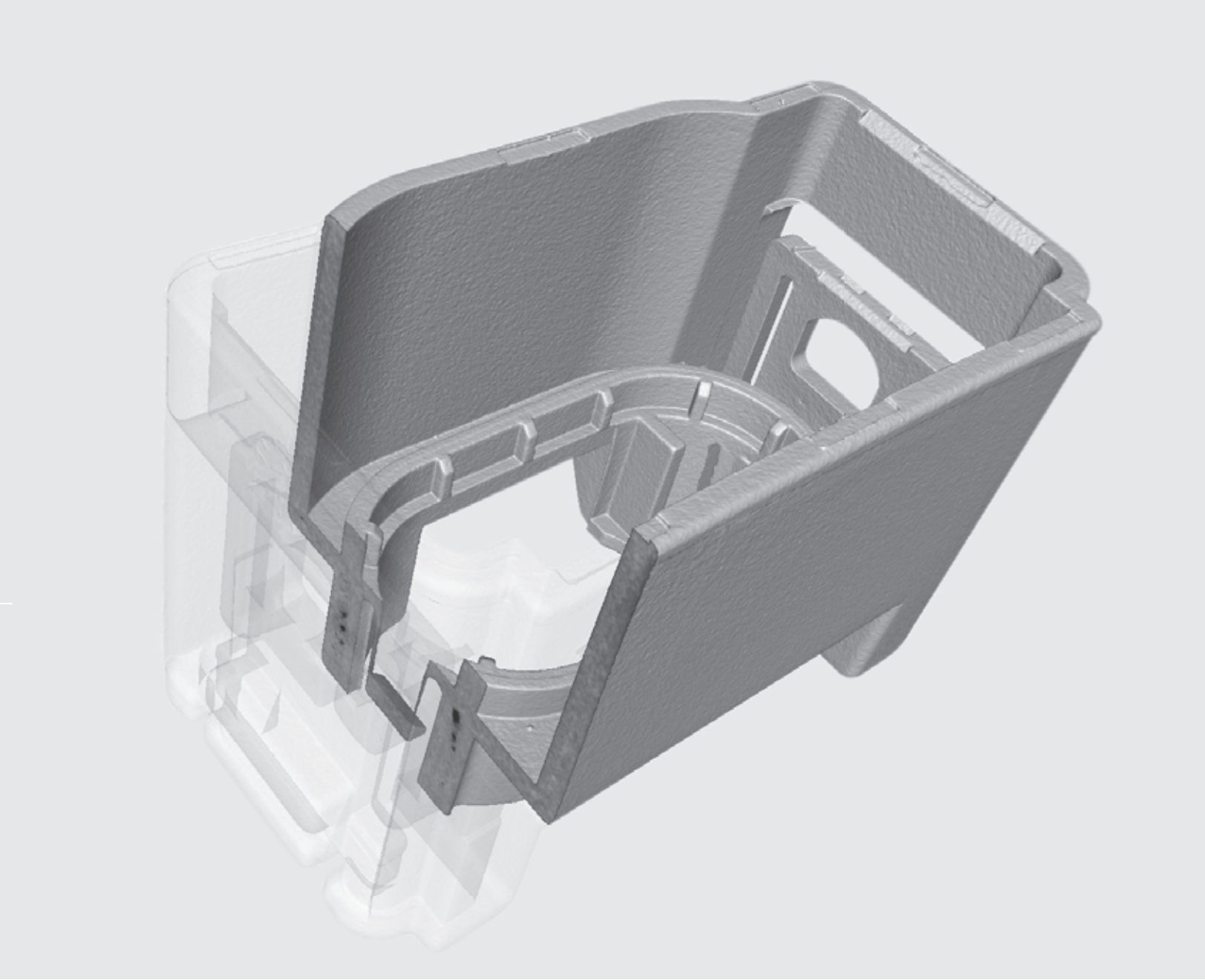
Detection of a material overhang (red) in ZEISS CALYPSO CT

Benefits: ZEISS VoluMax
With the ZEISS VoluMax, all required quality features can be checked on the basis of just a single scan.
As a single procedure, computer tomography enables destruction-free 3D inspection of hidden structures. This largely prevents subjective evaluations or operator influences. A particular strength of the ZEISS VoluMax is the dimensional analysis. The entire component can be compared in terms of its dimensional stability using CAD data or a reference section. Deviations are, for example, comprehensively displayed using color-coding.

Inspection in practice
Generally a shot of injection molded parts is taken from each injection molding machine during every shift and inspected using the CT machine. In special cases, multiple random samples are taken each shift. The components are recognized automatically, and prepared inspection programs perform an automated analysis. The number of cavities in the component can be read so that a detected defect can easily be attributed to an injection mold and a manufacturing cluster.

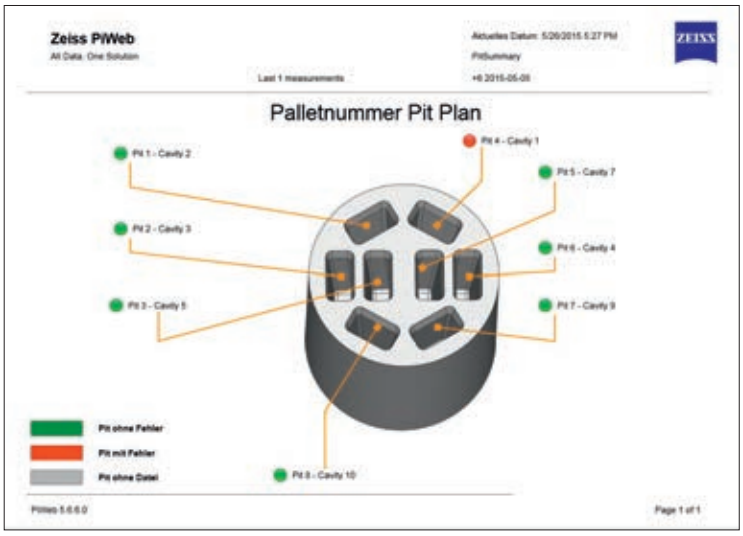
Based on the inspection results, the operators decide to what extent components in the shift are approved for additional processing.

Quality data management using ZEISS PiWeb software
ZEISS VoluMax automatically generates a large quantity of valuable quality data which can be documented using ZEISS PiWeb software, made available anywhere in the world and evaluated.



Virtual component cross-section using VGStudio Max

For example: ZEISS PiWeb offers the option of visualizing the captured data in chronological order. Gradual changes in quality, e.g. because of wear, can be made visible and monitored. ZEISS PiWeb is also an ideal solution for the automatic and professional documentation of quality data. Stored centrally, these data can be accessed via a secure internet connection in real time and at any time, further processed and analyzed in relation to other data.



The ZEISS PiWeb report shows which cavity is defective.

Using ZEISS CT technology in the industrial process

General research

Product and process development

Exchanging CT quality data

	ZEISS Xradia X-ray microscopes	**ZEISS METROTOM** Computer tomographs
Application	High-resolution detail analysis	Measuring and analyzing entire components
Particular strengths	Resolution in the submicron and nano ranges	Standard-compliant and traceable precision Acceptance as per VDI/VDE 2630 Analysis with ZEISS CALYPSO CT or ZEISS NEO insig
Place of use	Lab	Measuring lab
Resolution	Under 700 nm (Versa), 50 nm (Ultra)	3.5–100 µm
Speed	Hours	Minutes

Parts manufacturing

Assembly in volume production

ZEISS VoluMax
Computer tomographs

	Inspection with high throughput
	Customized product design
	Comprehensive project experience
nsights	Fully automated evaluation
	In production and near production
	30–400 µm
	Seconds

ZEISS NEO insights offers comprehensive visualization possibilities in 2D and 3D as well as user-specific views and reports.

Easily visualize and analyze CT volume data
ZEISS NEO insights

CT analysis made easy
ZEISS NEO insights is the new software from ZEISS for visualizing and measuring CT volume data from ZEISS CT systems. Visual inspection, dimensional nominal/actual comparisons and reporting results – all these jobs can be performed with minimal previous knowledge thanks to the system's clear design, process-oriented user-navigation and different automatic functions. In particular, ZEISS NEO insights accelerates the work with its straight-forward operation: for many jobs, you can work directly in the image window by using the mouse instead of spending comparatively more time and effort clicking through different menus.

Automatic material detection
ZEISS NEO insights features comprehensive visualization options for voxel data in 2D and 3D views. A highlight is automated material separation: multiple material components are detected automatically with one click according to their density and can then be overlaid with contrasting colors.

SnapViews
Once found, informative visualizations can be stored in SnapViews. With just a quick click, they are available immediately or ready for use in later reports.

Automatic alignment
With ZEISS NEO insights, measuring in CT volume data has never been this fast or easy. Automatic alignment helps make this possible. Both the pre-alignment and fine alignment can be performed conveniently with a click, making metrology knowhow unnecessary.

Create inspection plans easily via Click&Pick

Inspection plans for measuring jobs are created effortlessly with ZEISS NEO insights. Measuring elements such as circles or lines are automatically recognized by the software and can be easily selected by clicking on them. ZEISS NEO insights then suggests possible characteristics based on the context, e.g. the distance between two circle centers. All it takes is one more click to select and program the feature. Inspection plans are created with a few clicks and picks in next to no time.

Integrated ZEISS PiWeb reporting

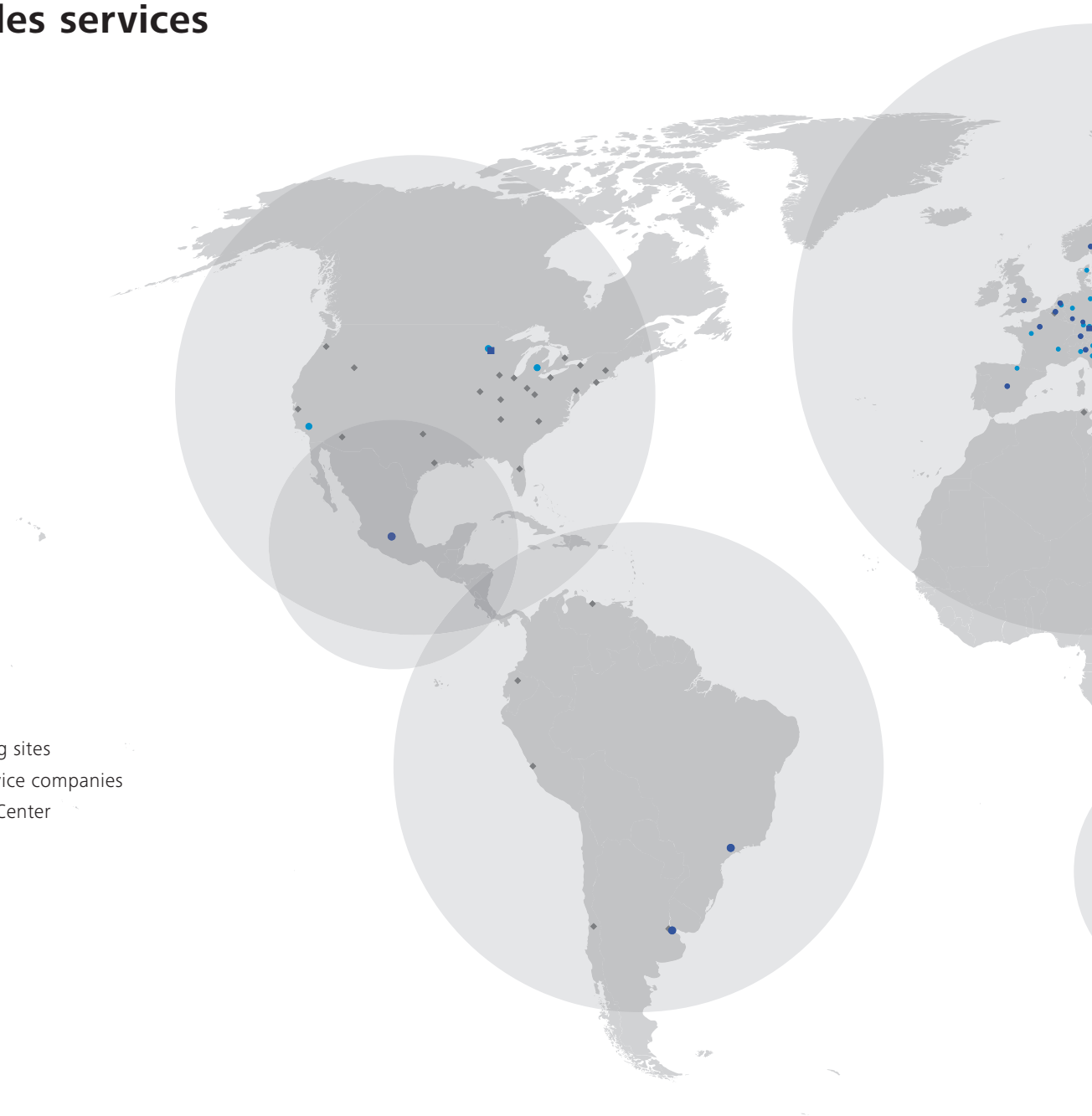
ZEISS PiWeb reporting is already integrated into the software, quickly compiling professional measuring reports, including informative displays. A design module for a company-specific report design is available as an add-on. If necessary, ZEISS PiWeb reporting can be extended with comprehensive statistics functions and can be embedded in networked ZEISS PiWeb quality data management systems.

Free ZEISS NEO viewer

The free ZEISS NEO viewer makes the inspection results obtained with ZEISS NEO insights available to anyone. Results can be presented interactively in the original software environment. ZEISS NEO viewer also gives anyone the option of opening CT volume data and having different 2D and 3D views displayed.

ZEISS CT Solutions

After sales services



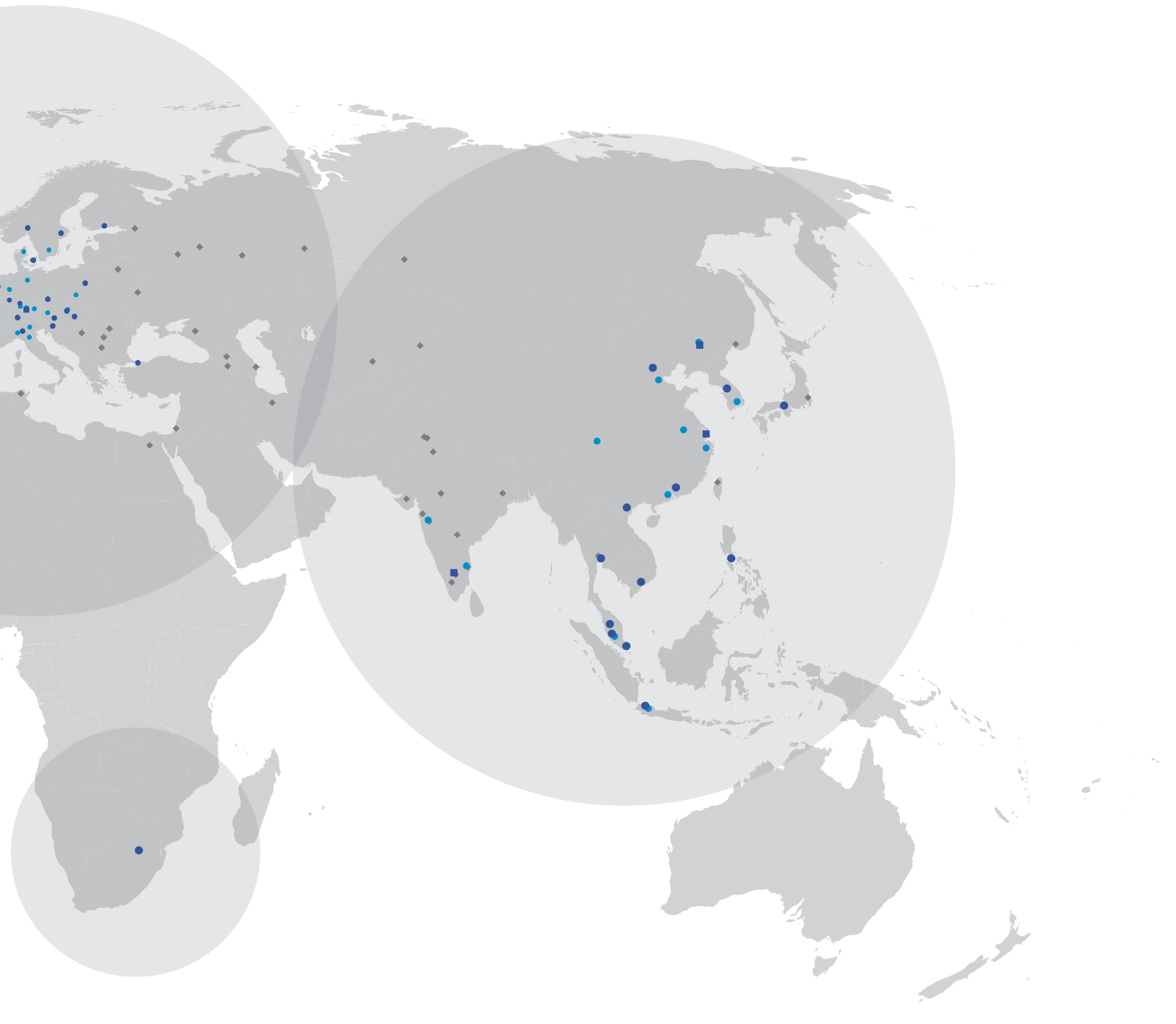
- Manufacturing sites
- Sales and service companies
- Competence Center
- Sales partners

Strong service

Over 750 service and application technicians work for ZEISS worldwide. Thanks to our regional structure, experts and spare parts are available quickly. When it comes to service, you will benefit from our more than 90 years of experience in industrial metrology and our one-stop service offering.

Well maintained – optimally installed

Keep your ZEISS computer tomograph ready for use and your software up to date. ZEISS offers maintenance agreements for machine service and ongoing software updates. This way you ensure that you always work optimally and productively.



Invest in knowledge

ZEISS offers a wide range of training courses for both metrology in general and CT technology in particular. These include training courses for effectively using your CT machines as well as training courses for performing your own maintenance. You can also book our proven training programs for all software products from ZEISS. Our multi-step, manufacturer-neutral AUKOM training courses also teach general metrological know-how.

Service program for the ZEISS VoluMax

Uptime is crucial because the ZEISS VoluMax is used directly in the production environment. That is why ZEISS offers its own service program for VoluMax CT machines with three different service levels:

- intensive training and consultation for in-house maintenance
- a telephone hotline
- fast on-site service

By providing you with intensive training for on-site maintenance and a telephone hotline, we do our best to ensure that you can help yourself should the need arise. This is the most effective method for preventing downtime. In exceptional cases where a ZEISS application technician needs to come to your site, our extensive service network ensures that we will be there quickly. We offer customized maintenance strategies based on the required machine uptime. We perform scheduled maintenance on a day that is suitable for you and in line with your shift model.

ZEISS CT Solutions

CT inspection services

You do not need to have a ZEISS computer tomograph to be able to benefit from ZEISS CT technology. Our measuring centers can perform different CT inspection services for you. Try out ZEISS CT solutions risk free.

Dimensional measuring technology with the ZEISS METROTOM

We create metrological evaluations for the interior and exterior structures of a component. That is why we use ZEISS METROTOM CT machines and ZEISS CALYPSO CT software.

Our services include:

- Measuring standard geometries and freeform surfaces
- Nominal/actual geometry comparison with a color-coded 3D visualization
- Complete initial sample test report

ZEISS METROTOM CT scans

We create ZEISS METROTOM volume data as a separate service for those who use our ZEISS NEO insights, CALYPSO or REVERSE ENGINEERING software products. This ensures that various defects can be analyzed, metrological evaluations can be performed and reverse surface engineering can be created at any time.

Detecting and analyzing defects with the ZEISS VoluMax

On the basis of a CT scan performed with a ZEISS VoluMax, we search and examine defects in plastic and light metal components without destroying them.

Our services include:

- Porosity and inclusion analysis
- Damage and failure analysis
- Mounting checks
- Assembly checks

Reverse engineering with the ZEISS METROTOM

Computer tomography with the ZEISS METROTOM enables you to completely and precisely capture the deviation of a workpiece from the CAD nominal data. These differential data can be used for the targeted correction of tool geometry. Our specialists will help you generate corrected CAD data for your injection molding or casting tools which are in line with your specifications and particular needs.

X-ray microscopy with the ZEISS Xradia Versa

From the layers of a thermal shield coating to individual fibers in carbon fiber components – we visualize minuscule structures for you with ZEISS Xradia Versa X-ray microscopes. Xradia Versa machines offer a resolution from 0.7 µm and a minimal voxel size from 70 nm. This allows 3D analyses in the submicron range. The special thing about these machines: the resolution of the ZEISS Xradia Versa does not diminish, even for components with a diameter up to 300 mm and a correspondingly large working distance.

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