



Schneider

# Measurement software



## U·SOFT SOLID ultra

Measuring with the highest precision and maximum convenience

- Fast measurement of individual parts
- Universal learning program
- Simple and fast documentation
- CAD-Offline

SIMPLY PRECISE



*Schneider*

# Measurement software U-SOFT SOLID ultra



**U-SOFT SOLID ultra** has been a Schneider Messtechnik product since January 2016. Following the successful in-house integration, we have now also transformed the external appearance into a modern layout.



U-SOFT  
SOLID ultra

## U-SOFT SOLID ultra – Efficient software that sets standards

User software in the measurement technology sector must always form an integral part of the production process. It must link the user and measurement device, workpiece and production process, mathematics and technology to form a single tool.

Unrestricted, continuous measurement of geometric elements, free-forming surfaces, curves, connections – **U-SOFT SOLID ultra** is so well designed that only one software application is required for all of the measurement tasks. Everything can be measured from a single interface – simple, workshop-compatible and in accordance with high-end requirements.

Thanks to the integrated philosophy and superior, modular structure of **U-SOFT SOLID ultra**, you can consistently measure the full complexity of your test piece and reflect it accurately without any limitations regardless of its contour, shape and surface.

### U-SOFT SOLID ultra. Accurate measurement. Easier. Faster.

#### Fast measurement of individual parts

40-60% less input effort, half the measurement time

#### External creation of parts program

CAD-Offline, according to data record, (standard formats incl.: DXF, IGES, VDA-FS, STEP)

#### Feature-based test reports

Easy to understand and operate, simple, comprehensive with graphic display – right from the measurement through to the display of the results, that are generated in the background and are available on an ad hoc basis.

#### Checks

You can choose from a variety of test reports that you require for your current task: target/actual comparison, actual dimensions, actual dimensions plus drawing, dimensions in the drawing, initial sample test report according to VDA, Excel table, etc.

### Benefit from the following functions and characteristics:

- Presetting of workpieces or electrodes for processing machines
- Creation of learning program on test piece
- 3D-Best-Fit
- CNC test run
- Graphic user guidance
- Free-form surface according to a data record
- Loop formation
- Tolerance tables: e.g. H7, J6, etc. and plastic tolerances, etc.
- Pallet measurement
- Geometric and positional tolerances DIN/ISO 1101
- Creation of parameter program
- Formula interpreter
- Curve measurement
- Statistics, SPC, Q-DAS
- Special solutions upon request

## Measurement software U-SOFT SOLID ultra

### Title bar

In addition to the available information, the extended title bar also provides information about the workpiece or work area and current mode.

### Tool bar

Standard functions such as "Open", "Save", "Print", "Copy", etc. that you already know from other Windows applications.

### Workpiece coordinate system

At a glance, you will always know how your workpiece is currently positioned in relation to the measurement device.

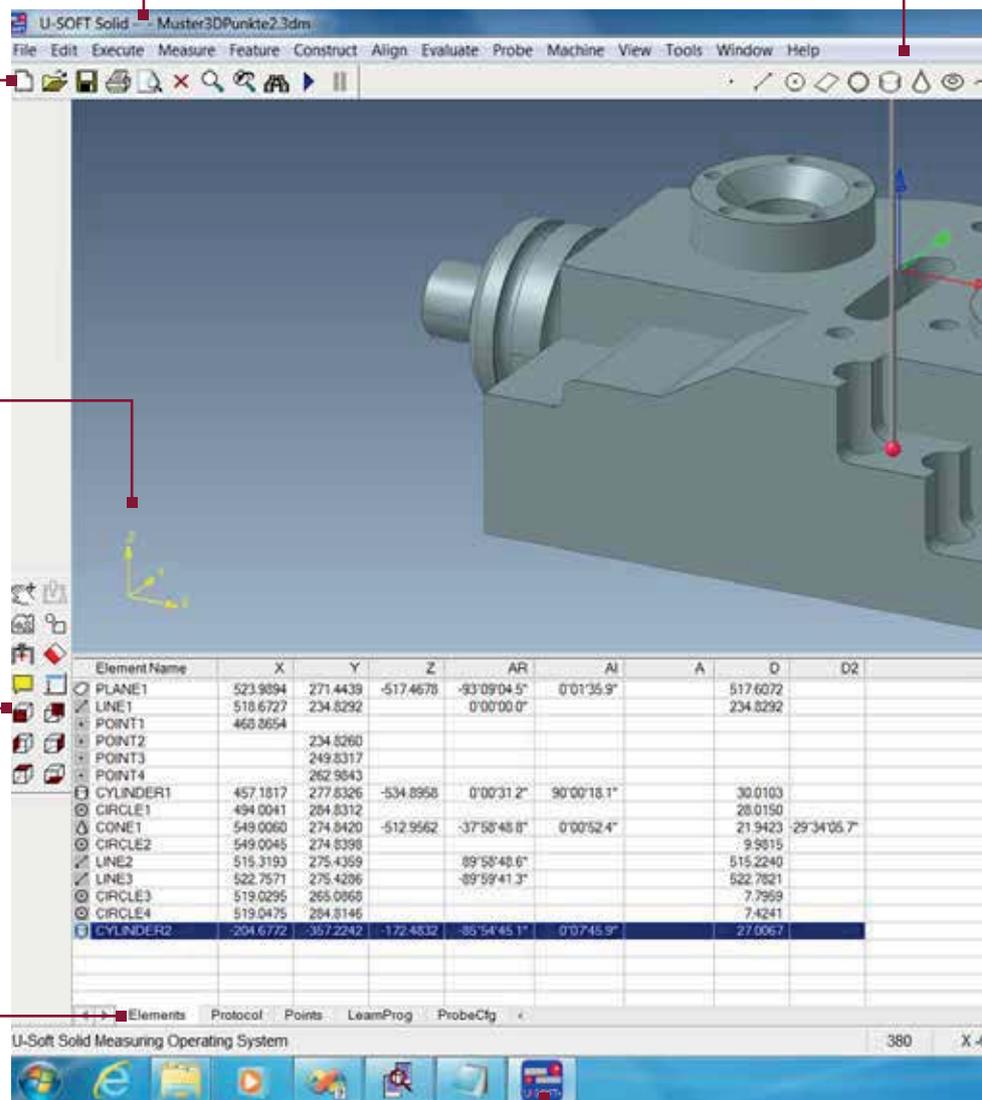
### Control bar

Selected icons are positioned here for quick access. These can include: moving the measurement machine by mouse click, virtual workpiece illumination, freely selectable workpiece view or any other function that will help you complete your work quickly.

### Tabs

The tabs that are relevant for the current program status are located here. These include:

- Elements - Overview of all measured geometric elements in list format
- Protocol - Measurement report
- Points - A list of associated probe points is provided as a function of the elements
- LearnProg - The appropriate program is written during the manual measurement
- ProbeCfg - List of calibrated probes and stylus data



**Menu bar**

**U-SOFT SOLID ultra** has several menus from which important program functions can be accessed. Additional functions can be accessed via the individual drop-down menus.

**Display area**

2D or 3D overview of the workpiece or measurement process depending on the selected and active probe.

**Position display**

Must not be overlooked: specifications of the current probe position in three axes.

**Virtual workpiece position**

Use the right mouse button to rotate your workpiece. Use the left mouse button to move it to a selectable position that you can determine accurately using the integrated zoom function.

**Probe information**

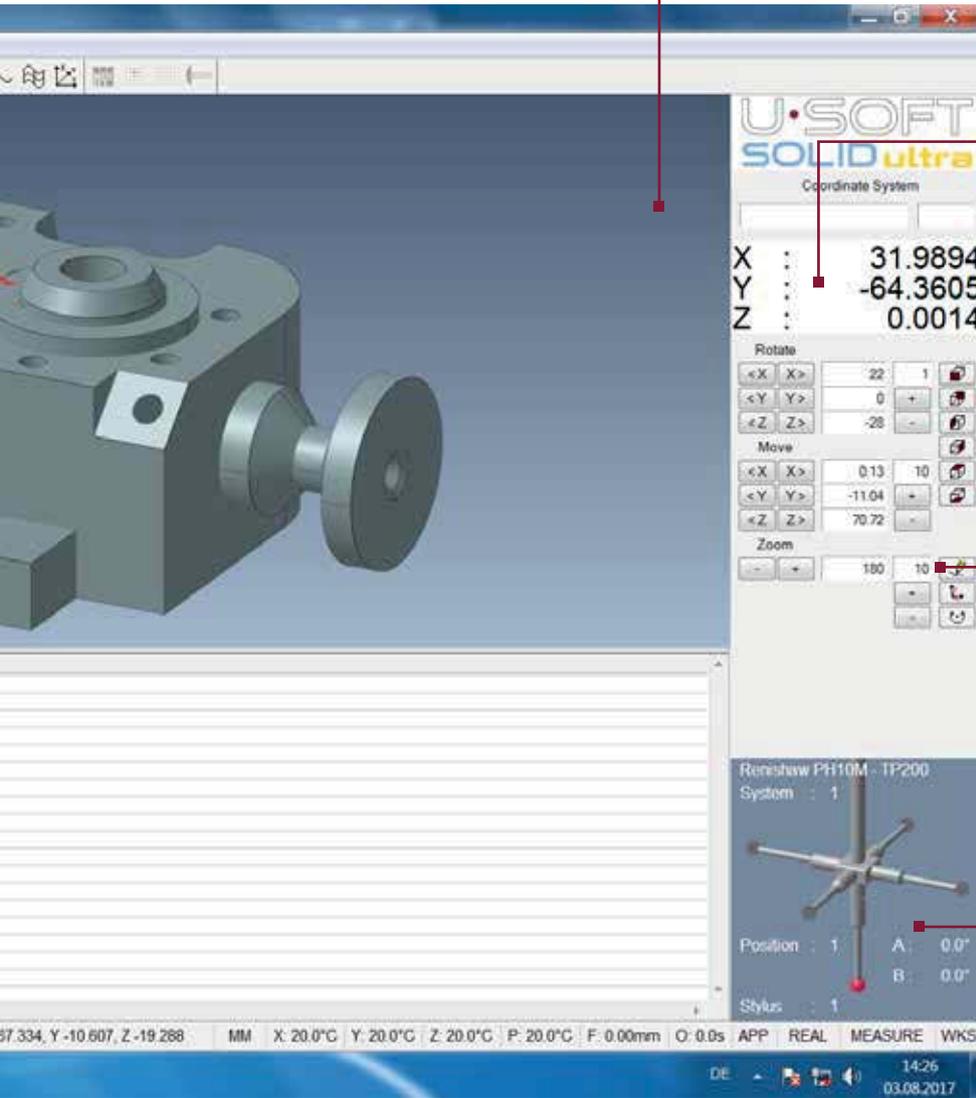
A quick glance will provide you with all the important parameters on the active probe, stylus and probe configuration.

**Status bar**

Clear overview of the current program status.

**Task bar**

Of course, **U-SOFT SOLID ultra** is capable of multi-tasking. You can use the task bar to switch to another program that is open at any time.



### Multi-sensor system – a perfect combination

This is a unique software function for which there is no direct comparison. A multi-sensor system enables you to use different probe systems within the same measurement centre. Depending on the spectrum of the part, you can choose between various Renishaw probes and probe mounts that are either fixed, manual or motor-controlled.

### Renishaw PH10M: fast pivot/swivel joint

Thanks to the multi-sensor system, **U-Soft SOLID ultra** enables you to use the controllable and indexable Renishaw PH10M probe system with 675 positioning options at 7.5° increments.

The exceptionally high level of accuracy means that the system can either be called up by entering the angles, via the joystick or as part of the CNC run without a subsequent calibration being required.



## Probe calibration

Regardless of whether it is an individual probe, star probe or a controllable probe head, it suffices to record a single probe point in the pole direction of the calibration sphere to quickly and accurately calibrate all of the probe combinations. Of course, important information relating to the quality of the calibration is displayed on the monitor.

### Automatic probe calibration

Switching, scanning (passive, active)

- **U-SOFT SOLID ultra** offers a variety of calibration processes to achieve the highest level of accuracy when calibrating the position and diameter of the styluses and workpiece.
- On switching systems, touch the pole of the calibration sphere with the stylus sphere. The calibration is then completed automatically. However, this does not include fully compensated probe deflection.
- Scanning probe systems also enable the highly accurate calibration of the tensor by scanning the calibration sphere. The probe deflection is compensated in all of the possible sampling and scanning positions of the probe tip in relation to the workpiece.

## Geometric elements

Even the standard version of **U-SOFT SOLID ultra** is comprehensive. The following geometric elements can each be determined and measured fully with up to 1,000,000 probe points:

- |          |            |          |             |
|----------|------------|----------|-------------|
| • Point  | • Ellipse  | • Torus  | • Parabola  |
| • Line   | • Plane    | • Cone   | • Hyperbola |
| • Circle | • Cylinder | • Sphere |             |

## Connections /design

**U-SOFT SOLID ultra** allows you to establish any connections between all of the geometric elements that are actually available and connections between virtual geometric elements, resulting from the connections.

## Initial conditions

Accuracy from the outset. **U-Soft SOLID ultra** will help you to position your workpiece correctly. An appropriate measurement is only possible once all of the initial conditions have been met in full and the coordinate systems for the measurement centre and test piece have been correctly coordinated with the following functions:

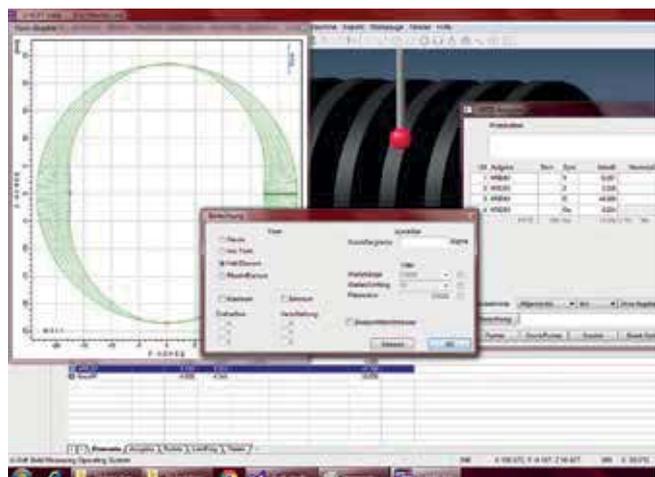
- Rotation within the area
- Rotation on the plane
- Zero point or
- Zero point offset

## Evaluation process

Most 3D measurement programs only use Gauss calculations to evaluate the measured elements. During daily operations, this limitation is often a disadvantage, for example, if you have to test the fit of a hole and shaft. In this case, implementing the correct evaluation with the enveloping and fitting-in element is far more sensible, as you can make better use of possible tolerances and thus reduce any waste.

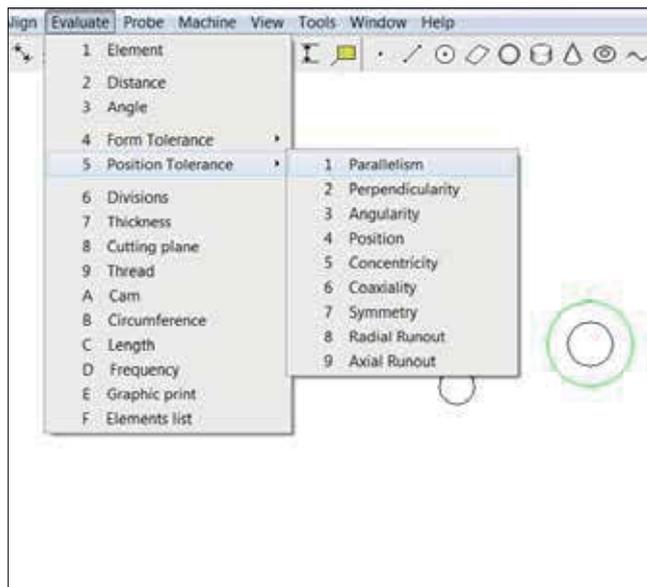
When using **U-SOFT Solid ultra** you can select the most sensible evaluation process to calculate your measurement tasks:

- Gauss element
- Chebyshev element
- Enveloping and fitting-in element
- 2-point measurement



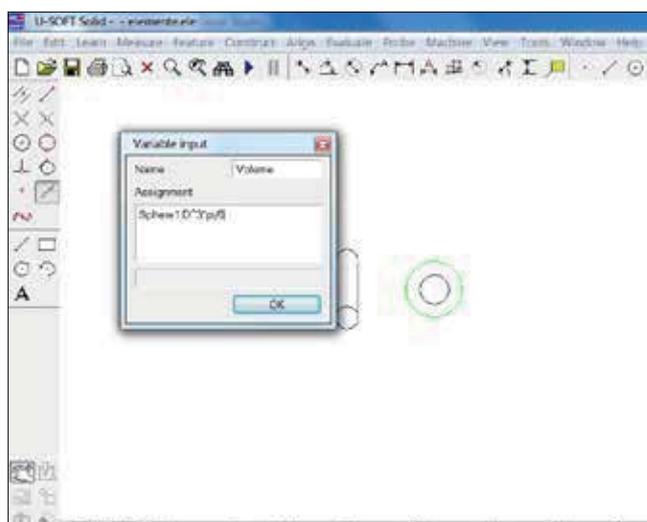
## Geometric and positional tolerances according to DIN/ISO 1101

**U-SOFT SOLID ultra** contains the complete geometric, dimensional and positional tolerances in accordance with DIN/ISO 1101 and also provides you with the option of converting it to a required reference length.



## Measurement cycles

The measurement cycles function enables you to automatically adopt individual measurement points and n-point measurements from geometric elements. You can define them freely, thus optimising the measurement procedures and accelerating the creation of a learning program.



## Special solutions

### Thread position

Simply enter the type of thread or slope as well as the right- and left-handed thread. **U-SOFT SOLID ultra** independently looks for the next measurement points, taking the slope into consideration, and uses them to quickly and safely calculate the determined centre point.

### Cone processing

With **U-SOFT SOLID ultra**, you can simply determine the diameter of the cone at the required height or calculate the height based on the diameter.

### Wall thickness measurement

It is important to note that **U-SOFT SOLID ultra** always provides the dimensions of the determined wall thickness for the points that you touched. You will always receive the actual results in which the dimensional, geometric and positional errors are also taken into consideration.

### Tangents

This function will help you save time and money as you will no longer need to manually insert expensive measurement spheres in the cone. Instead, **U-SOFT SOLID ultra** provides a perfect theoretical sphere and simulates the fitting process on the screen. All of the required dimensions can thus be evaluated quickly and safely.

## Formula interpreter

You will increasingly encounter everyday workpieces with measurement points that cannot be determined by sampling the geometric elements of the connections. Before completing measurement tasks, such as the surface of a sphere, enter the underlying mathematical formula before the sampling process. The program will then automatically recognise how to calculate the geometric element, that is being measured, and execute the exact measurement.

## 3D-Best-Fit: Using the positioning tolerance

You can use the specified positioning tolerances not just in two but even in three dimensions thus reducing the number of scrap parts.

The Best-Fit function in **U-SOFT SOLID ultra** guarantees the best possible use of the tolerance on the screen, enabling you to optimally rotate, move or rotate and move the actual hole pattern into the existing target hole pattern.

## MCC: increased tolerance, less waste

MMC stands for maximum material condition and consists of clever mathematical calculations. This helpful standard function ensures optimum use of the extended tolerance range, as specified for certain specially designated dimensions in the drawing.

## Loop formation

This function speeds up the creation of learning and measurement programs, as you can call up and re-use any measurement task that has already been completed for a workpiece as often as you like.

## Pallet measurement

Reducing the measurement time lowers the costs. The pallet measurement function helps you to reduce setup downtimes at your processing centres, as you can change clamped workpieces faster and can even measure several workpieces in one operating cycle. In conjunction with the loop formation function, the integrated "variable pallet measurement" add-on enables you to repeat previously created measurement programs as often as you want. This enables you to not only measure the same, but also different workpieces, on the same pallet. Any missing "clusters" are detected during this process and are simply skipped.

## Pallet pattern generator

You can use the dot pattern generator to quickly and simply create your measurement program for the dot pattern.

### General dot pattern

Enables you to specify or copy coordinates and diameters from an ASCII or EXCEL file.

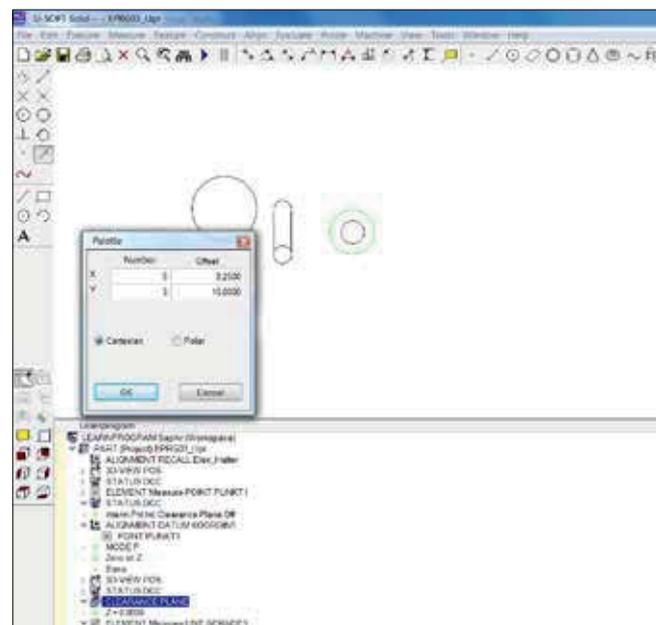
### Linear or grid dot pattern

Enables a simple and fast measurement based on the start and end point of the lines and columns, and the number of holes. The measurement program is ready to use.

### Polar dot pattern

Enables the fast creation of a measurement program using the target/actual values by specifying the radius, start and end point, and number of holes.

## Pallet measurement

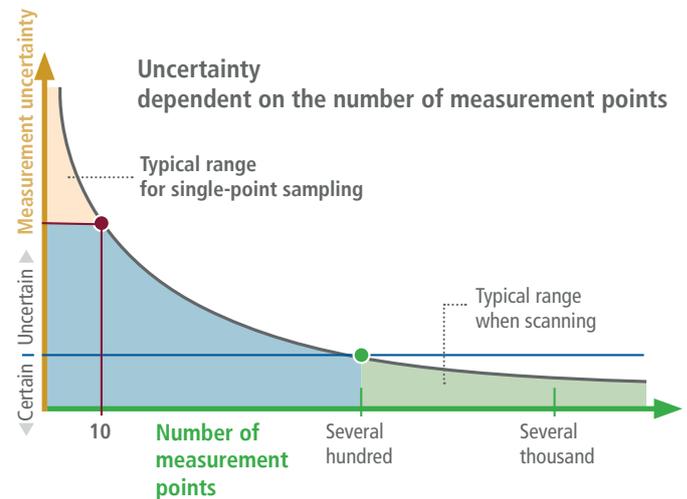


### Scanning – increased tolerance for production thanks to optimum measurement of the surface

#### Scanning with U-SOFT SOLID ultra: an end to uncertainty

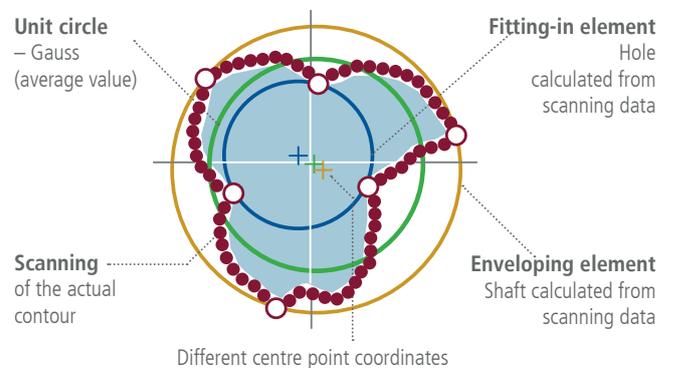
In contrast to single-point sampling with switching probe systems, the continuous scanning of the workpiece surface ensures that up to 2000 measurement points can be recorded per second for an inspection characteristic - even in the workshop.

Numerous scientific studies demonstrate that there is a direct correlation between the uncertainty regarding an inspection characteristic and the number of measurement points.



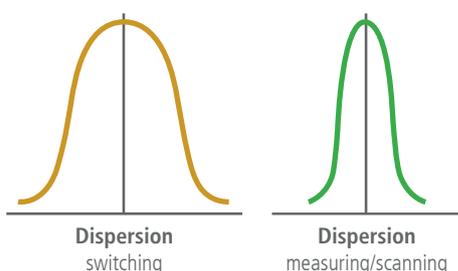
#### Does it fit or not?

Only the most complete possible measurement of the workpiece surface will enable the function-oriented evaluation of the inspection characteristics. For example, by evaluating the enveloping and fitting-in element. In this case, only the multi-point scanning measurement ensures that all prerequisites are met.



#### Stable results from multi-point measurement

The reducibility of repeat measurements is improved by a factor of two. This ensures that any disagreements between the customer and supplier regarding the quality of the results are reduced significantly.

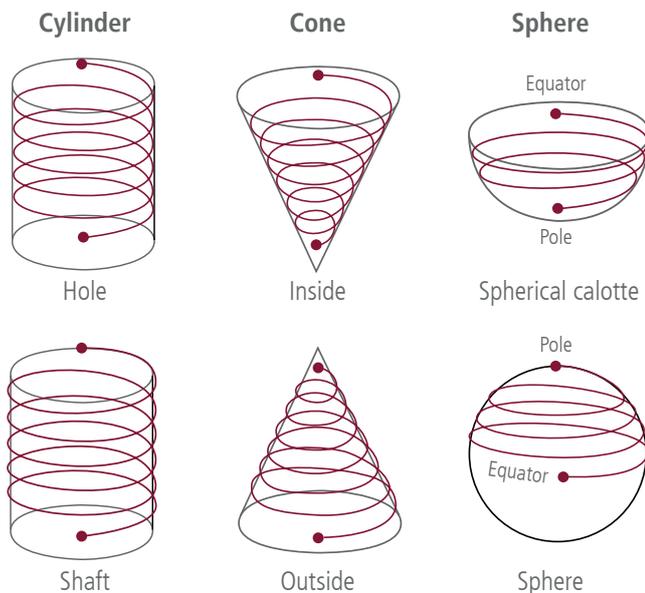


#### The most important scanning advantages

- Measurements are safer and more stable thus increasing consumer confidence
- Reduced throughput times thus preventing expensive downtimes
- Measurement results are available faster thus reducing production errors
- Measurement results are more accurate thus providing additional scope for the manufacturing tolerance

## Helix scanning options

Complete measurement of the 3D geometric element and the dimensional, geometric and positional tolerances. Achieved by the absolute certainty of the scanning technology.



## Scanning probe system from Renishaw

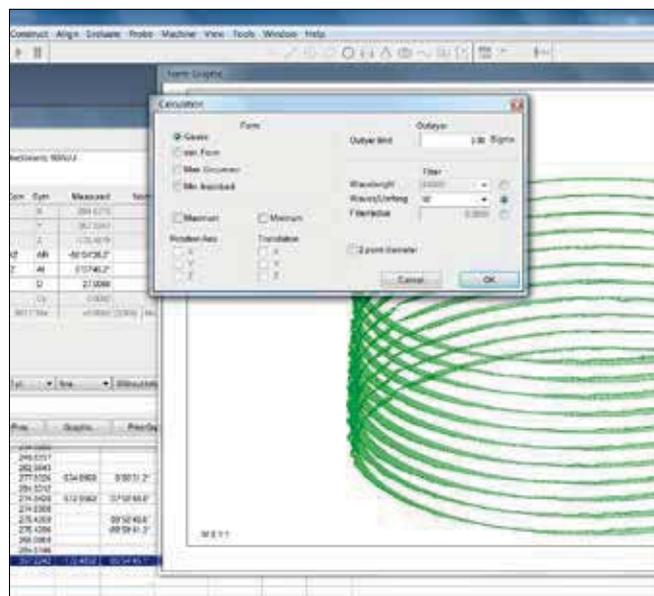
The probe system quickly and accurately measures the geometric elements being tested for the evaluation of the required characteristics. Active scanning probe systems provide additional measurement options, including the self-centring function and large probe dimensions with probe lengths of over 400 mm.

## Geometric and positional measurement using coordinate measurement devices saves on additional investments

Thanks to the excellent progress in the development of efficient, high-performance probe systems combined with synchronised system components within the complete coordinate measurement device, a full inspection of workpieces, including the dimensions, geometric shape and position, can be completed in one clamping. Special shape testers are therefore usually not required.

## Filter functions

**U-SOFT SOLID ultra** includes all of the standard procedures used during geometric shape inspections to filter measurement points and eliminate outliers. These processes are made available exactly when they are required during the evaluation.



## U-SOFT SOLID ultra – options

### CAD-Offline: External creation of parts program based on data records

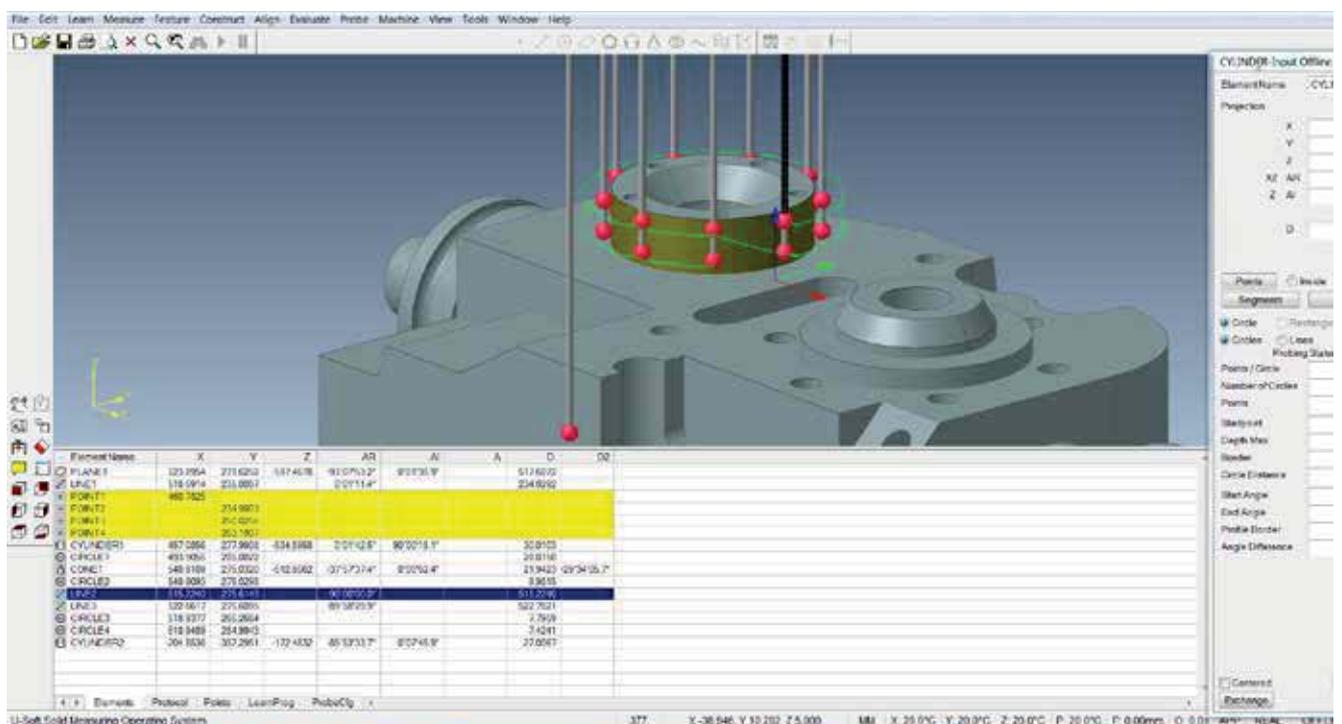
The workpiece to be measured was designed using CAD. Is the CAD data available? With CAD-Offline, you can use the data record to create the measurement program for the corresponding workpiece. This means that a different computer can be used, independently of the measurement device. The test report, which has various design options, is also easy to create offline.

### Saving 60% or more of your time!

Do not waste the valuable resources of your measurement device with simple computer processes, reduce downtimes and unproductive running-in times. During daily operations, you will increase your measurement capacity by more than 60% if you use the CAD-Offline software module with U-SOFT SOLID ultra.

### CAD-Offline with U-SOFT SOLID ultra

- ❶ Import CAD data
- ❷ Select probe
- ❸ Fully automated clearance planes
- ❹ Align CAD data
- ❺ Define elements
- ❻ Automatic creation of the measurement program in the background
- ❼ Evaluate characteristics and assign tolerances
- ❽ Simulation
- ❾ Transfer and adjustment to the measurement centre



## Pattern cut

Enables any plane to be cut through a workpiece (curve, free-form surface) and the fast single point and/or scanning measurement of the pattern cut to be offset by the cutter centre-line (probe radius).

## Surface point measurement

Measurement of free-form surfaces based on the data record and RPS alignment. Graphical support when creating the measurement program. Simple interpretation of the measurement results thanks to graphic illustration of the complete measurement.

## Variable parameter programming

Quickly and safely measure all of the workpieces from a range of parts with different dimensions using a single part program. The variables are simply changed and this automatically changes the traverse paths.

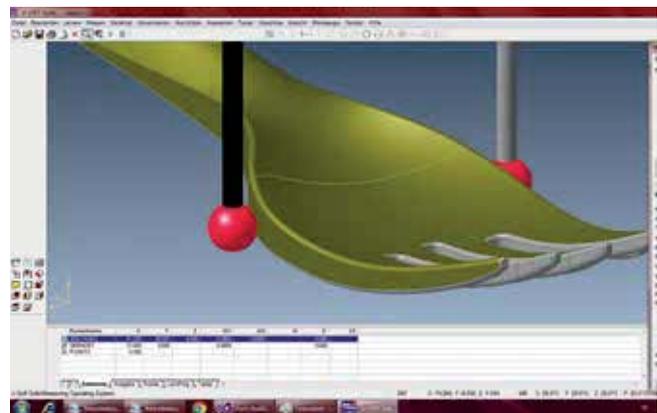
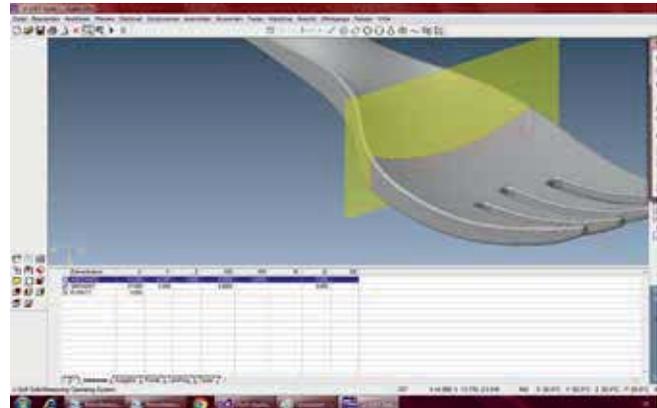
All of the geometric elements, connections and designs can be changed without restrictions via the characteristic variables (such as X, Y, Z, diameter, distance, angle, tolerances, etc.).

Of course, the swivelling and tilting angle of the locking pivot/swivel joint can also be changed via the variables.

In addition, the variable parameter programming can be used in conjunction with the formula interpreter for arithmetic operations.

Variable parameter programming can also be used for ranges of parts that are not 100% identical (e.g. missing hole).

Even with a limited range of parts, the system pays for itself, as there is no need to create new parts programs.



## AUTORUN

Users who have not worked with **U-SOFT SOLID ultra** before can use the AUTORUN automation interface to simply start the measurement by clicking on the photo or drawing.

- Start parts program by clicking the mouse
- Entry via bitmap
- Workpiece drawing, etc.

## Converting Q-DAS statistics

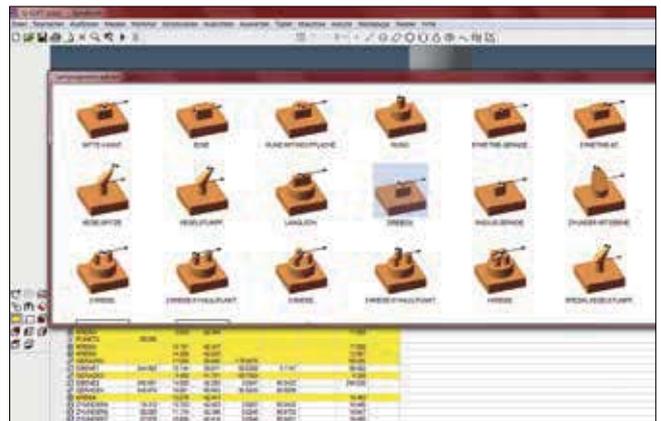
The "Statistical evaluation of measurement results" module in **U-SOFT SOLID ultra** will help you with preparatory work, goods receipt, sampling and especially production control.

You can, for example, use series measurements to clearly identify error trends and to correct them in good time. This will help you to avoid any waste and reduce expensive downtimes.

## Presettings

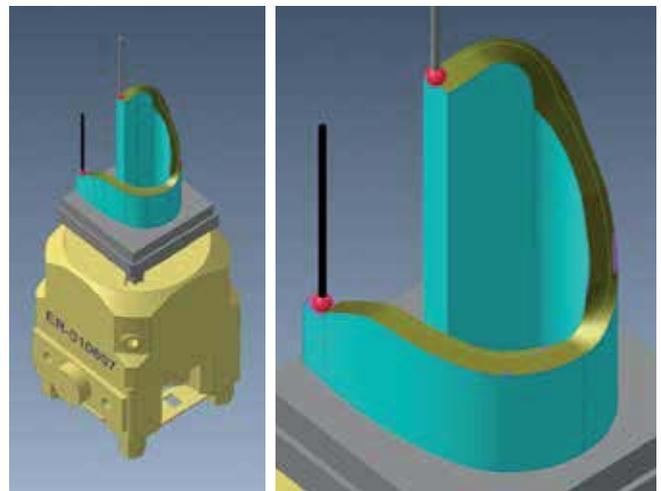
By using the **U-SOFT SOLID ultra** "Presettings" module, operators of EDM machines can quickly and safely preset their electrodes and workpieces from the outside. The determined values are simply transferred to the CNC control unit or programming system of the EDM machine using a data storage device or network connection.

If you separate the acquisition and processing of the necessary offset data both in time and space, this not only reduces the expensive setup and non-productive times of your machines, but will also generate valuable foundations to establish a time- and cost-optimised process chain that will help reduce your personnel costs while achieving machine running times of up to 6000 hours per year.



## Curve measurement

**U-SOFT SOLID ultra** differentiates between known and unknown curves. It will provide you with a graphic and a numerical evaluation for both of them – not only in accordance with Gauss but also as an enveloping and fitting-in element. For known curves, you can access a data record in which the curve characteristics are detailed. This can be entered in the program and used as the basis for the measurement process. If you are measuring unknown curves, **U-SOFT SOLID ultra** will initially sample an adequate number of measurement points and use them to generate a master curve that can then be used to measure the curves of other workpieces with a corresponding tolerance range.



*Correct interfaces provide the foundations for establishing a time- and cost-optimised process chain. Right through to the full integration in a flexible production system.*

## Test report variants and feature-based test reports

The key feature of a good measurement software application is definitely the provision of an accurate and fast measurement. However, it is equally important that the program provides the processed values in a user-friendly format.

All of the reports in **U-SOFT SOLID ultra** are automatically created in the background. This process is fast, easy to understand, provides a clear overview, is unambiguous and, above all, flexible. This means that reports can be tailored to your needs. Simply choose the test reports based on the

different variants and characteristic features that you require for your current task.

For example: Target/actual comparison, actual dimensions, actual dimensions plus drawing, dimensions in drawing, important initial sample test report according to VDA, Excel table to ensure values can be transferred quickly by e-mail, for example, or copies can be used for element graphics in which all of the dimensions are clear to read.

**Part Submission Warrant**

Part Name: [ ] Part Number: [ ]  
 Safety and/or Government Regulation:  Yes  No  
 Engineering Drawing Change Level: [ ] Date: [ ]  
 Additional Engineering Changes: [ ] Date: [ ]  
 Drawing Number: [ ] Purchase Order No.: [ ]  
 Checking List Number: [ ] Engineering Change Level: [ ] Date: [ ]

**Supplier Manufacturing Information**  
 Supplier Name: Dr. Heinrich Schneider  
 Supplier Ref: [ ]  
 Street Address: [ ]  
 City/State/Zip: [ ]

**Submission Information**  
 Dimensional  Material/Functional  Appearance  
 Customer Name/Code: [ ]  
 Supplier Code: [ ]  
 Application: [ ]

**Reasons for Submission**  
 New Submission  Change to Original Construction or Material  
 Engineering Change(s)  Sub-Supplier or Material Source Change  
 Tooling Transfer, Replacement, Refurbishment or additional  Change in Part Processing  
 Correction of Dimensionality  Parts Produced at additional location  
 Other - please specify [ ]

**Requested Submission Level (Check one)**  
 Level 1 - Warrant only (and for designated acceptance items, an appearance approval Report) submitted to customer  
 Level 2 - Warrant with product samples and initial supporting data submitted to customer  
 Level 3 - Warrant with product samples and complete supporting data submitted to customer  
 Level 4 - Warrant and other requirements as defined by customer  
 Level 5 - Warrant with product samples and complete supporting data reviewed at supplier's manufacturing location

**Submission Results**  
 The results for  dimensional measurements  material and functional tests  appearance criteria  individual process packages  
 These results meet all drawing and specification requirements.  Yes  No (If No - Explanation Required)

**Declaration**  
 I affirm that the samples represented by this warrant are representative of our parts and have been made to the applicable customer drawings and specifications and are not regular production pieces. (Have noted)

**3D Model View**  
 A 3D model of a cylindrical part is shown with various dimension callouts (P01 to P25) and their corresponding values. The values range from +0.108 to -0.034.

**Test Report Table**

Nr.	Event	Comp.	Sym.	Actual	Nominal	UpperT.	LowerT.	Dev.	Dist.
1	DISTANCE1		Y	15.032	15.000	+0.100	-0.100	+0.032	[Bar Chart]
2	PLANE1	XZ	AR	0°0'753.2"	0°0'0'0.0"	+0°0'0'0.0"	-0°0'0'0.0"	+0°0'753.2"	[Bar Chart]
3	PLANE1	Z	AI	0°0'1'35.9"	0°0'0'0.0"	+0°0'0'0.0"	-0°0'0'0.0"	+0°0'1'35.9"	[Bar Chart]
4	PLANE1		FI	0.0098	+0.100			+0.0902	[Bar Chart]
5	CYLINDER1	XZ	AR	0°0'1'42.5"	0°0'0'0.0"	+0°0'0'0.0"	-0°0'0'0.0"	+0°0'1'42.5"	[Bar Chart]
6	CYLINDER1	Z	AI	90°0'0'18.1"	90°0'0'0.0"	+0°0'0'0.0"	-0°0'0'0.0"	+0°0'0'18.1"	[Bar Chart]
7	CYLINDER1		D	30.0133	30.0000	+0.1000	-0.1000	+0.0133	[Bar Chart]
8	CIRCLE2		D	8.9815	10.0000	+0.1000	-0.1000	-0.0185	[Bar Chart]
9	CIRCLE3		D	7.7553	7.7000	+0.1000	-0.1000	+0.0553	[Bar Chart]
10	CIRCLE4		D	7.4261	7.4500	+0.1000	-0.1000	+0.0261	[Bar Chart]

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U-SOFT SOLID ultra

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Form: [ ]  
 Teil Nr.: [ ]  
 Sachnummer: [ ]  
 Teilname: [ ]  
 Bemerkung: [ ]

Probe: [ ]  
 Maschine: [ ]  
 Aufspannmittel: #130915  
 Bemerkung: [ ]

# U-SOFT SOLID ultra – program characteristics

## The standard software package offers

### Freely definable initial conditions

- Probe calibration
- Area alignment
- Axis alignment
- Zero point
- Rotational displacement of zero point in the area

### Freely definable print-out requirements

- Metric, inch
- Cartesian, polar
- Decimal, degrees
- Degrees, minutes, seconds

### Geometric elements

- Point
- Line
- Circle
- Plane
- Ellipse
- Cylinder
- Torus
- Cone
- Parabola
- Hyperbola

### Connections

- Distance
- Angle
- Intersection
- Bisector
- Line
- Tangent
- Circular connection
- Vector

### Geometric and positional tolerances

- DIN ISO 1101
- Straightness
  - Circularity
  - Evenness
  - Cylindrical shape
  - Cone shape
  - Spherical shape
  - Line shape
  - Surface form
  - Parallelism
  - Perpendicularity
  - Inclination
  - Position
  - Concentricity, coaxiality
  - Symmetry
  - Concentric run-out
  - Axial run-out

### Special solutions

- Wall thickness measurement
- Long hole/web
- Specifications for small cut-outs
- 3D-Best-Fit
- Cone processing
- Formula interpreter
- Dot pattern generator
- Loop formation
- Pallet measurement
- Measurement cycles
- Enveloping and fitting-in circle
- Tolerance tables
- Self-centring
- Measurement force can be adjusted via software
- Bridged scanning (interrupted cuts)
- Parameter programming
- etc.

### Operating systems

- Windows 7
- Windows 10

### Test report

- Actual dimensions
- Character + actual dimensions
- Feature-based test report
- Target/actual comparison
- Dimensions outside warning limit
- Dimensions outside tolerance
- Drawing dimensions
- Initial sample test report according to VDA, DIN, PPFB, PPAP
- ASCII/TXT output format
- EXCEL output format
- Graphic output...
  - with flags
  - tolerance output in false colour representation
  - vectorial direction (in colour)
- ... of formula tolerances:
  - straightness
  - circularity
  - evenness
  - cylindrical shape
  - cone shape
- etc.

## Optional

### Free-form surface + curve (radial + axial)

Measurement of free-form surfaces against the data record, known and unknown curves, and graphic or numerical evaluation.

### External programming station + simulation

Creation of part programs based on the data record, including simulation of the traverse paths.

### Direct interfaces

CATIA V4, V5, V6, CREOparametric (PRO-E), XMP (PARASOLID), SAT, SOLID EDGE, UG-NX (UNIGRAPHICS), etc.

### Presetting of electrodes + workpiece

Based on regular geometry and free-form surfaces of processing machines such as sinking and wire EDM machines, milling machines and coordinate grinding machines.

### Statistics + Q-DAS interface

Original data chart, histogram, probability grid, control chart, measurement functions, statistical data

### Integration in flexible production systems

CERTA (Zwicker), RÖDERS, SOFLEX, INDUNORM, Zimmer & Kreim, System 3R, Georg Fischer, etc.

### Customised special solutions + customer requirements

U-SOFT SOLID ultra is continuously being developed in close collaboration with customers based on feedback of experiences. Specific tasks and problems can be resolved on an individual basis with adjusted software modules, for example, for stationary blades, propelling screws, propellers, threads, gear teeth, etc.