

Software Additions for Camera

- ❑ Video module is available as stand alone package for Video only measuring machine or as addition to Touch Probe software to be used on hybrid CNC machines.
- ❑ Interfaces to majority of frames grabbers and USB cameras
- ❑ Complete system solution for manual and CNC machines offered
- ❑ Extensive Video calibration routines
- ❑ Adaptive edge detection techniques
- ❑ Auto Feature detection
- ❑ AutoFocus for manual and CNC machines
- ❑ Off-Line CAD programming
- ❑ Profile comparission
- ❑ '**Go mode**' for running manual measurement sequences
- ❑ '**Dry Run**' for testing CNC sequences
- ❑ History/SPC

NEW Software Additions for Camera

The screenshot displays the Axcel Systems software interface. The main window shows a camera view of a circular part with a red circle labeled 'Circle_8' overlaid. The interface includes a menu bar, a toolbar, and several data panels.

Circle_8 Data Table:

Measured	Nominal	Deviation	Up-Tol	Lo-Tol	in/out	Out-Tol
Dia	6.6086	6.6330	-0.0244	0.0300	-0.0300	intol
X	34.8354	34.8310	0.0044	0.0500	-0.0500	intol
Y	32.2012	32.2090	-0.0078	0.0500	-0.0500	intol
Z	0.0000	0.0000	0.0000	0.0500	-0.0500	intol

Feature Data Table:

N	Name	X	Y	Z
1	DP	34.4560	35.4724	0.0000
2	DP	33.1495	35.0453	0.0000
3	DP	32.1374	34.1186	0.0000
4	DP	31.5798	32.8519	0.0000
5	DP	31.5961	31.4635	0.0000
6	DP	32.2076	30.2178	0.0000
7	DP	33.2568	29.3142	0.0000
8	DP	34.5665	28.9197	0.0000
9	DP	35.9197	29.0953	0.0000
10	DP	37.1120	29.7833	0.0000
11	DP	37.9010	30.9114	0.0000
12	DP	38.1465	32.2628	0.0000
13	DP	37.8237	33.5922	0.0000
14	DP	37.0057	34.6861	0.0000
15	DP	35.8103	35.3476	0.0000

Real-time Coordinates:

X: 157.201
Y: 15.428
Z: -0.022

Light Control Unit
Extended Camera Probe
Extensive Video Calibration

Two Screen Operation
AutoZoom control
Axel Config Utility

Joystick for Video

NEW Software Additions for Camera

The screenshot displays the Axcel Systems software interface with several key components highlighted by callouts:

- Main Menu:** Located at the top, it contains various tool icons for measurement and alignment.
- Measure Window:** The central area showing a camera view of a circular part with a red circle labeled "Circle_8" overlaid.
- Measure Window Toolbar:** A vertical toolbar on the left side of the Measure Window.
- Results Window:** Located at the bottom left, it displays a table of measurement data and a graph of data points.
- Status Line:** A horizontal bar at the very bottom showing system information like "cam(1)", "Features", "mm", "Cartesian", and "FPS: 277".
- Probe Window:** A small window at the bottom center showing a probe icon and the label "S1".
- DRO Window:** A window at the bottom right displaying large yellow text for X, Y, and Z coordinates.
- Feature List:** A table on the right side listing various features and their properties.

Name	Calc	N	Coord
Plane_1	err	0	<machine>
Line_1	OK	45	<machine>
Line_2	OK	45	<machine>
<element>	err	3	<machine>
Circle_1	OK	15	<element>
Circle_2	OK	15	<element>
Circle_3	OK	15	<element>
Circle_4	OK	15	<element>
Circle_5	OK	15	<element>
Circle_6	OK	15	<element>
Circle_7	OK	15	<element>
Circle_8	OK	15	<element>
Circle_9	OK	15	<element>

N	Name	X	Y	Z
1	DP	34.4560	35.4724	0.0000
2	DP	33.1495	35.0453	0.0000
3	DP	32.1374	34.1186	0.0000
4	DP	31.5798	32.8519	0.0000
5	DP	31.5961	31.4535	0.0000
6	DP	32.2076	30.2178	0.0000
7	DP	33.2568	29.3142	0.0000
8	DP	34.5665	28.9197	0.0000
9	DP	35.9197	29.0953	0.0000
10	DP	37.1120	29.7833	0.0000
11	DP	37.9010	30.9114	0.0000
12	DP	38.1465	32.2628	0.0000
13	DP	37.8237	33.5922	0.0000
14	DP	37.0057	34.6861	0.0000
15	DP	35.8103	35.3476	0.0000

	Measured	Nominal	Deviation	Up-Tol	Lo-Tol	in/out	Out-Tol
Dia	6.6086	6.6330	-0.0244	0.0300	-0.0300	in/out	
X	34.8354	34.8310	0.0044	0.0500	-0.0500	in/out	
Y	32.2012	32.2090	-0.0078	0.0500	-0.0500	in/out	
Z	0.0000	0.0000	0.0000	0.0500	-0.0500	in/out	

X:	157.201
Y:	15.428
Z:	-0.022

Camera and Lighting Interface

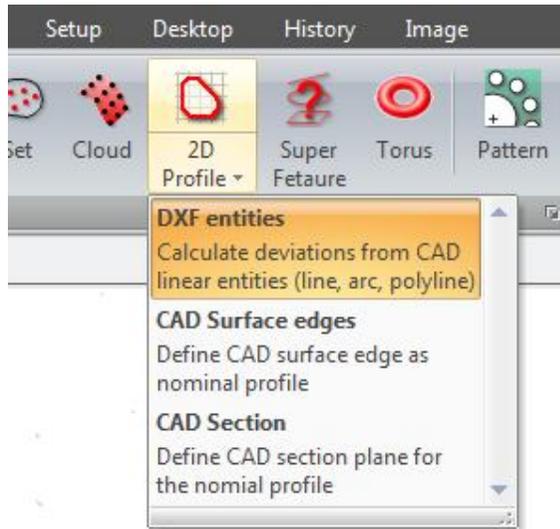
Camera Device Drivers	Comments
Windows Direct Show drivers	Standard USB cameras USB analog Composite/Svideo capture devices OCI analog Composite/Svideo and digital capture cards HD webcams and cameras USB Microscopes
Proprietary device drivers	Deva028 camera

Lighting Device Drivers	Comments
USB and Serial interfaces	Interfaces are currently available to various commercially available LED Ring illumination

Typical Control Hardware Configurations

Device	Measuring Technologies	Hardware	Comments
MANUAL SYSTEMS			
Optical Projector	Crosshairs	ENC7480	X, Y and Z Encoder and optional foot switch inputs
Manual TP CMM	Manual touch probe	Deva001	X, Y and Z Encoder, touch probe and optional foot switch
Manual Video CMM	Camera	Deva001	X, Y, Z Encoder
AUTOMATIC SYSTEMS			
CNC TP CMM	Touch Probe	Deva004TP	Controller only or CMM System pack with Drivers and Joystick
CNC Video CMM	Camera	Deva004	
CNC TP and Video CMM	Camera and Touch Probe	Deva004TP	CMM System Pack recommended

New 2D Profiles and AutoFeature Detection **Axel**Systems



- Quick Sub-Pixel accuracy profile detection.
- Best Profile Fit of measured profile to its CAD model
- AutoFeature detection to quickly measure parts features such as lines, arcs and circles.

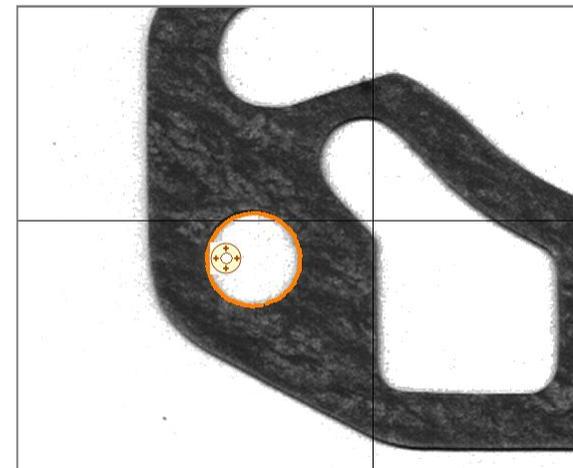
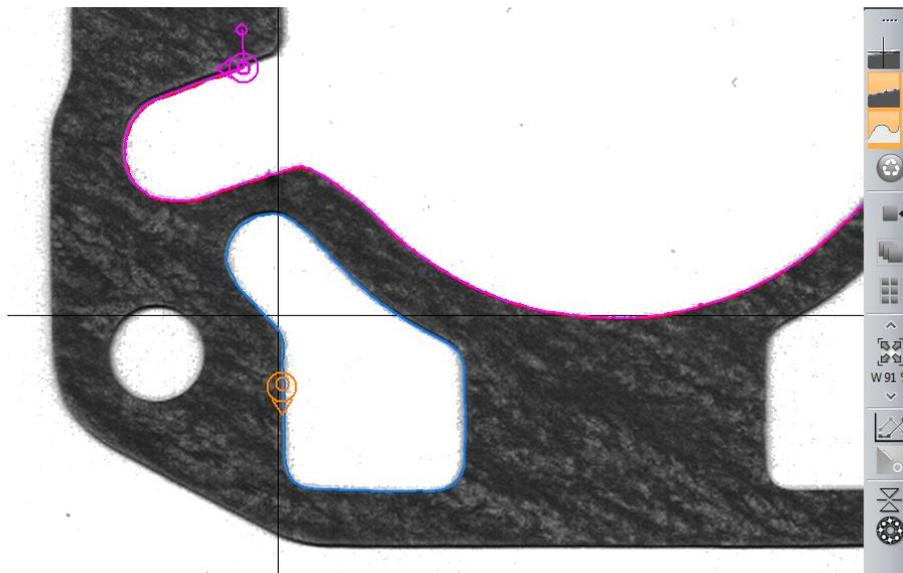
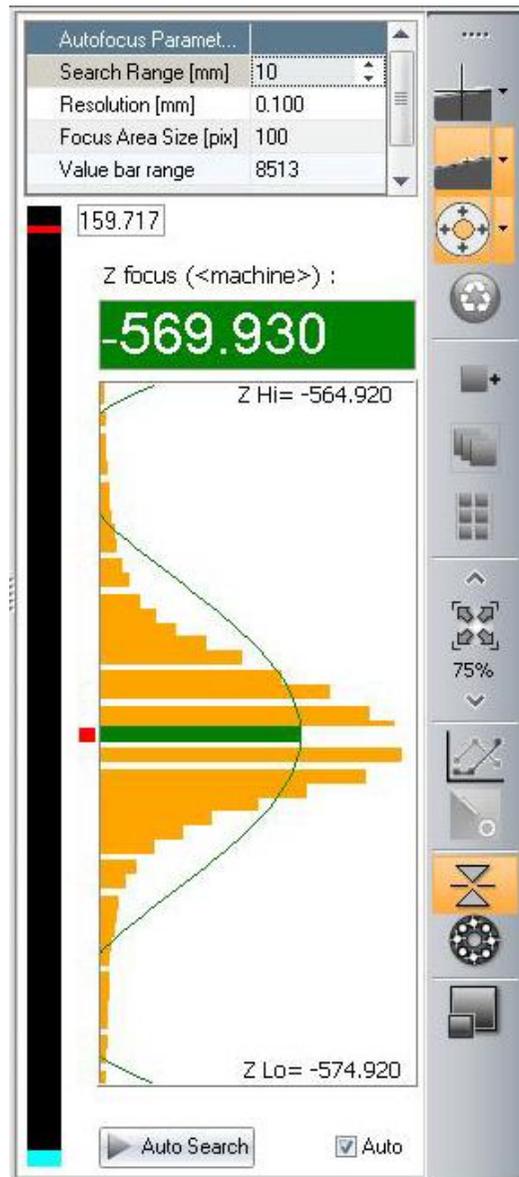


Image Auto Focus

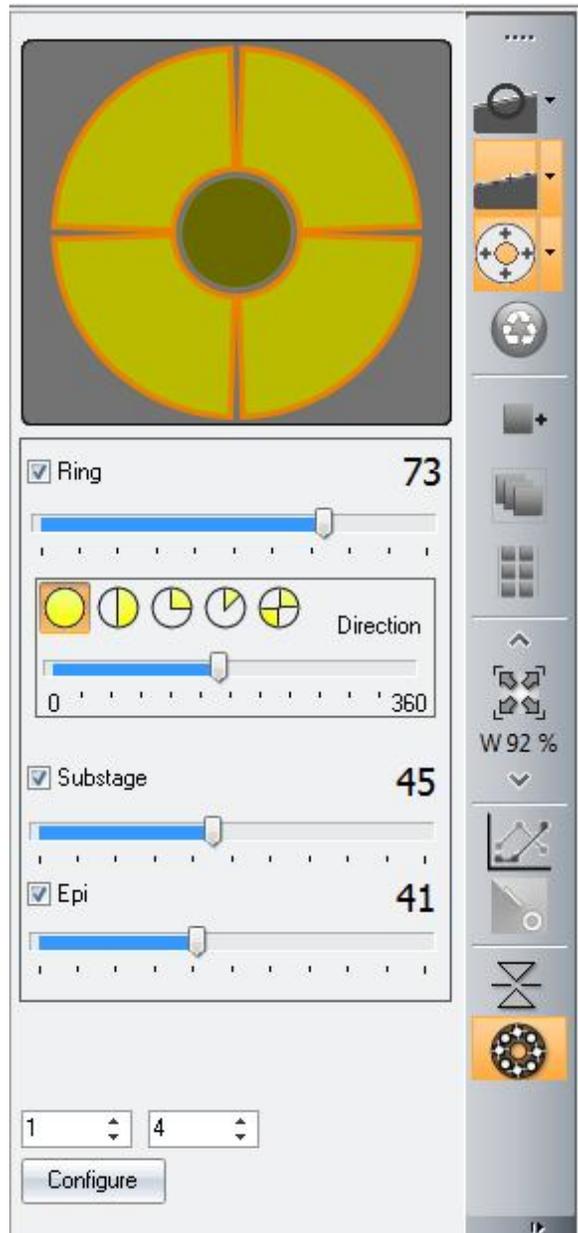


- Manual and CNC operation
- Height Inspection
- Pre-focusing while inspecting 2D features improves accuracy
- Algorithm selection for various surfaces

← Auto Focus Button opens the dialog

New Light Control Dialog

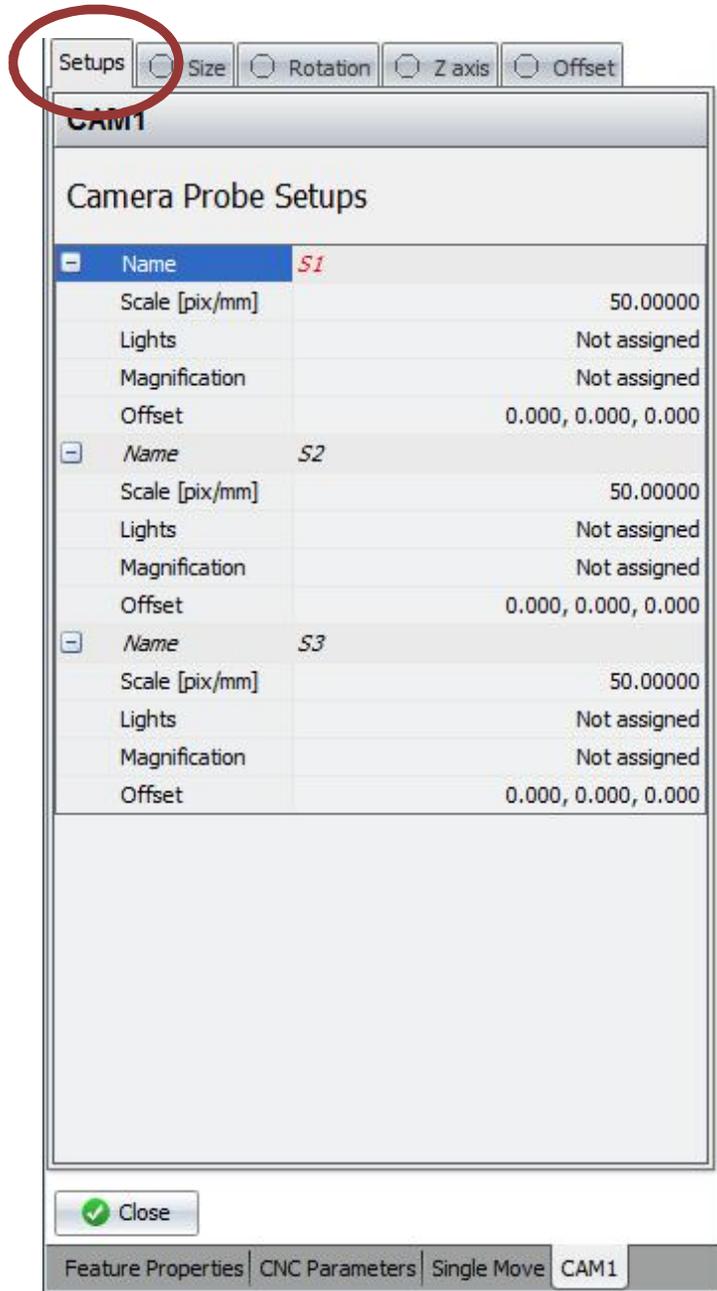
- Configurable number of rows and segments
- Supports Ring, Sub-stage and EPI light
- Interfaces available to various light controllers
- New interfaces under way



← Lights Control Button opens the dialog

New List of defined camera setups

The Setups tab lists all available camera setups



New Two Monitor Operation



AXEL DEMO [New]

Monitor 1

Feature Data: Arc_1

N	Name	X	Y	Z
1	DP	4.2025	2.2451	0.00
2	DP	4.0711	2.0723	0.00
3	DP	3.9450	1.9131	0.00
4	DP	3.8267	1.7546	0.00
5	DP	3.7075	1.6132	0.00
6	DP	3.5658	1.4545	0.00

Arc_1 DP: 50/50 Datum: machine Probe: CAM1[51] Cont: 0 / Ins Prop: XY of machine...

Rad	Measured	Nominal	Deviation	Up-Tol	Lo-Tol	In-Tol	Out-Tol
X	4.9379	4.9400	-0.0022	0.1000	-0.1000	in-tol	
Y	0.0607	0.0600	0.0007	0.0500	-0.0500	in-tol	
Z	4.9258	4.9400	0.0042	0.0500	-0.0500	in-tol	
Ang	0.0000	0.0000	0.0000	0.0500	-0.0500	in-tol	
Radius	113.2761	113.2900	-0.0139	0.2000	-0.1000	in-tol	
				0.2500		in-tol	

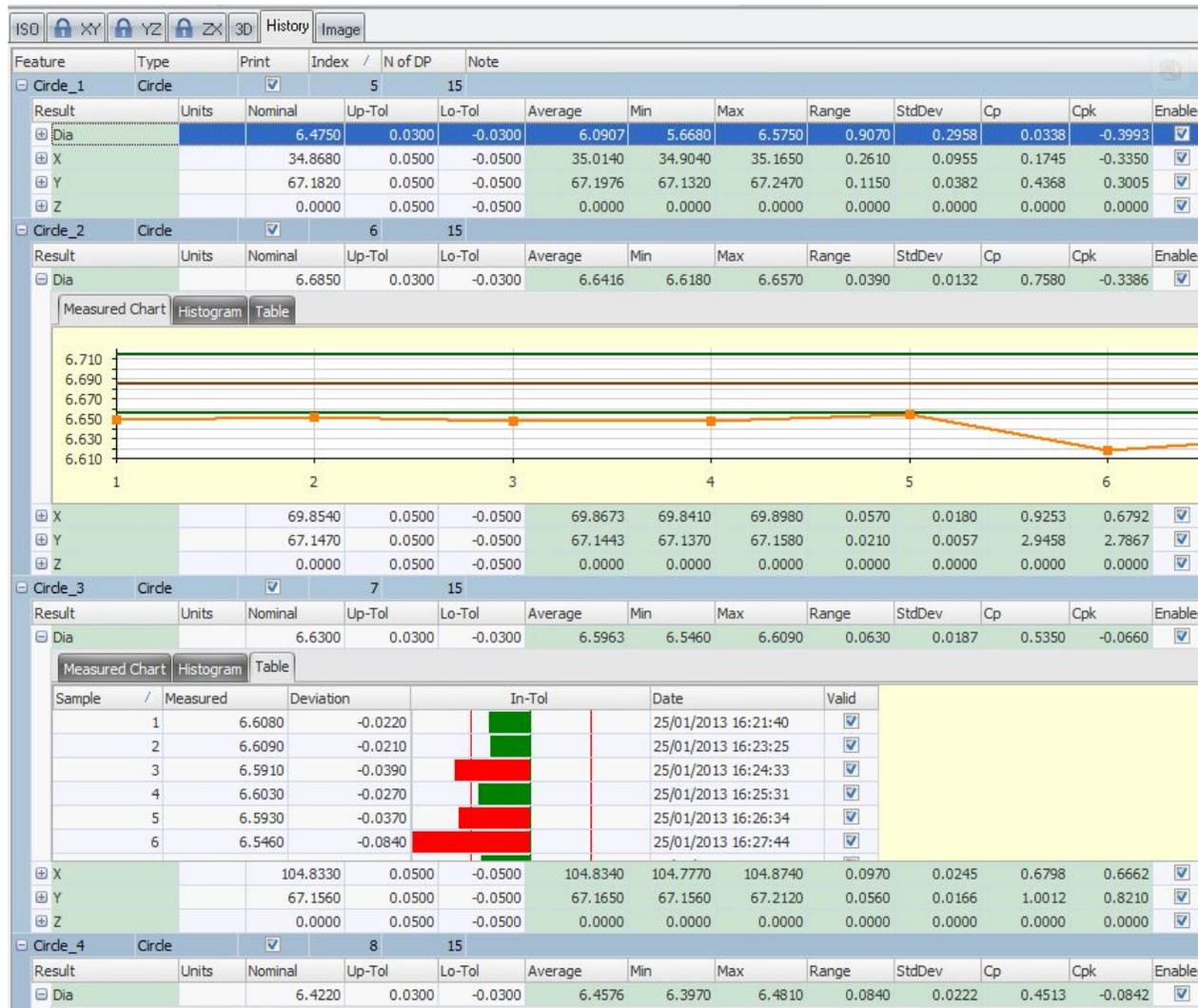
Data Points Deviation: (StdDev = 0.0003)

Monitor 1 displays a CAD model of a circular feature with a grid overlay. A small inset image shows a close-up of the feature. The bottom panel shows a data table for 'Arc_1' and a graph of 'Data Points Deviation'.

Monitor 2

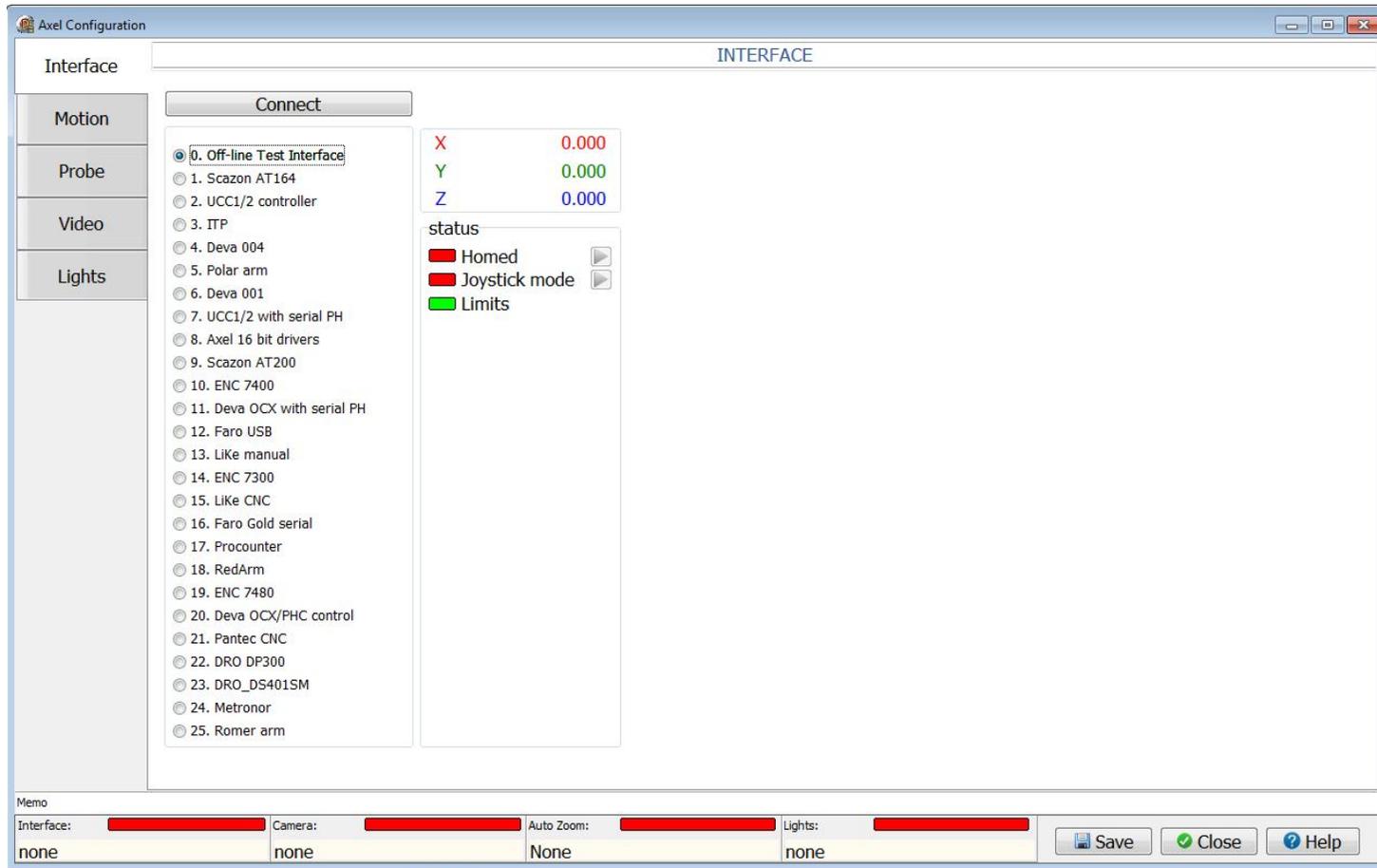
Monitor 2 displays a live video feed of the circular feature. A pink arc is drawn over the feature, and an orange arc is drawn over the feature. The right side of the monitor shows a control panel with various settings and a 'Configure' button.

New Inspection History



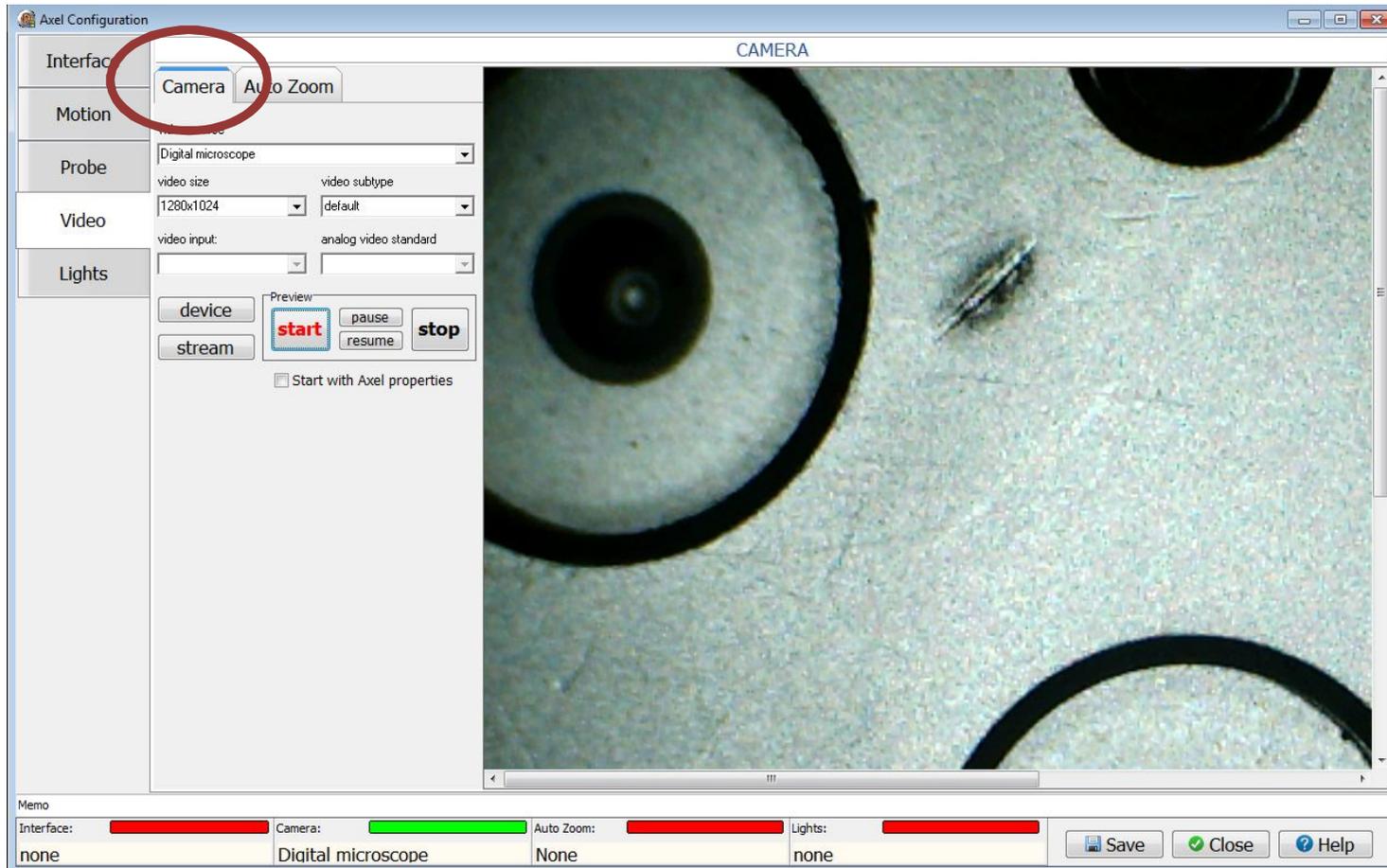
- Inspection History results
- Charts, histograms and results tables
- History , Single and Chart views

New Axel Configuration Utility



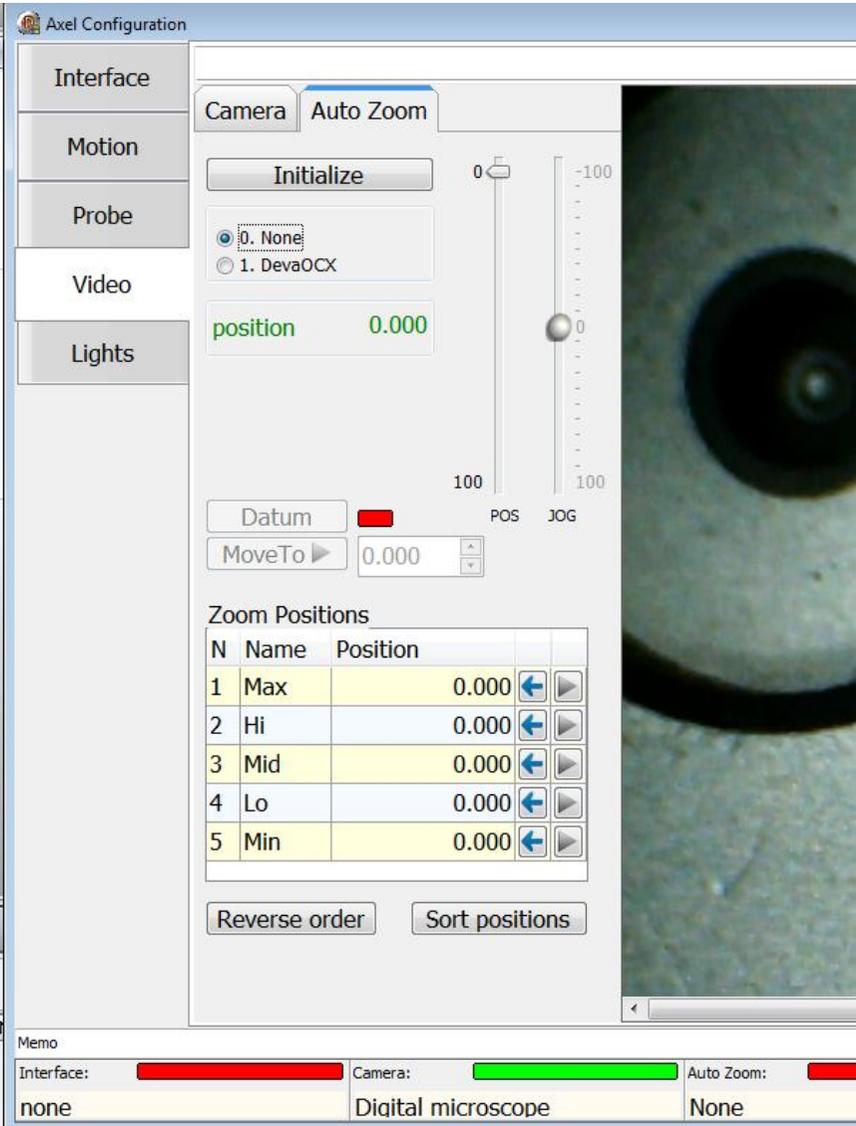
New Axel Configuration utility is used for setting up the video system components such as camera configuration, autozoom, lighting unit.

New Camera Setup



Select camera type and setup. Test it.

New AutoZoom Utility



Define AutoZoom position to be used in Axel program
Camera Home
Move to selected home positions
Configuration is used by Axel program