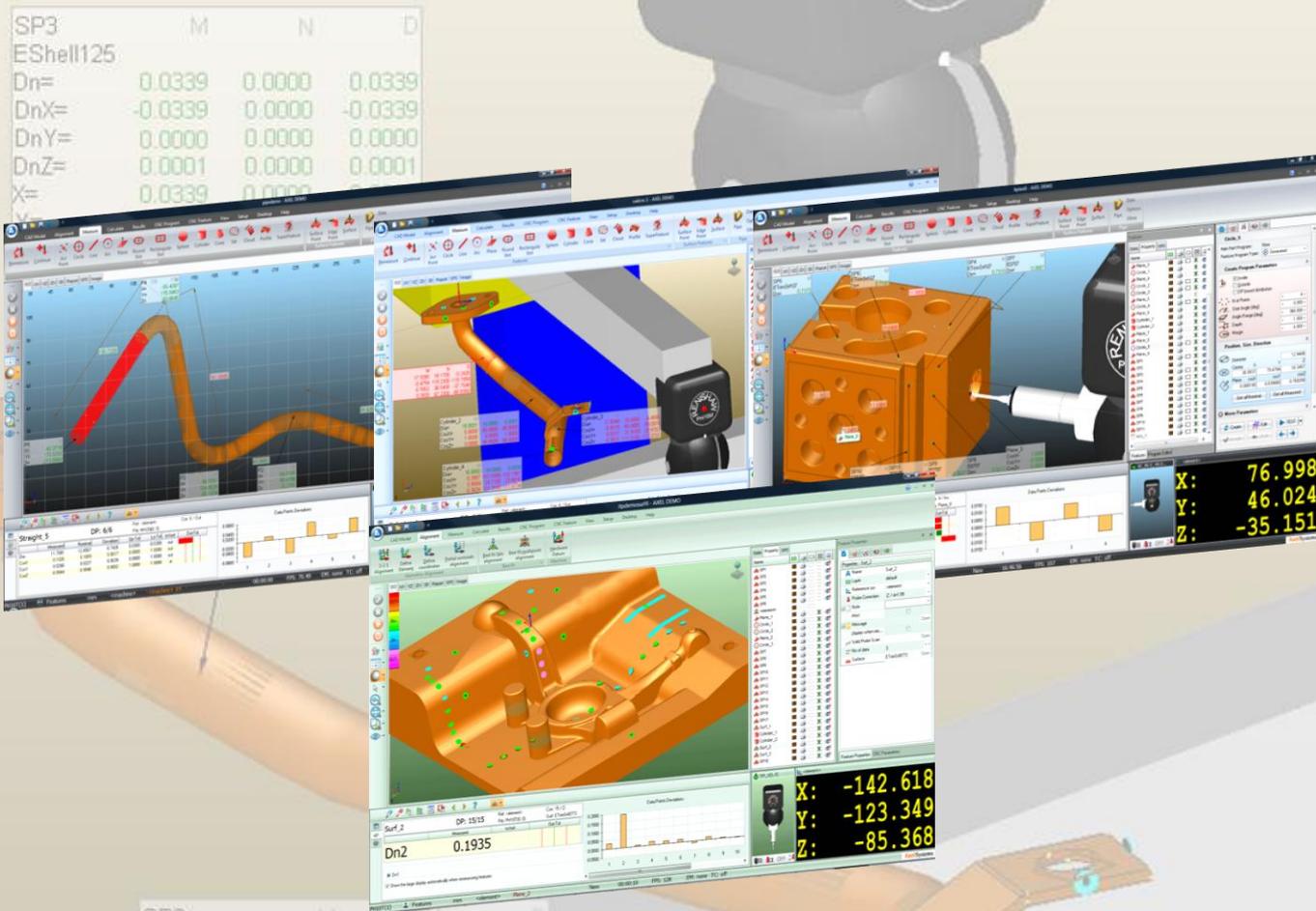


AxelSystems



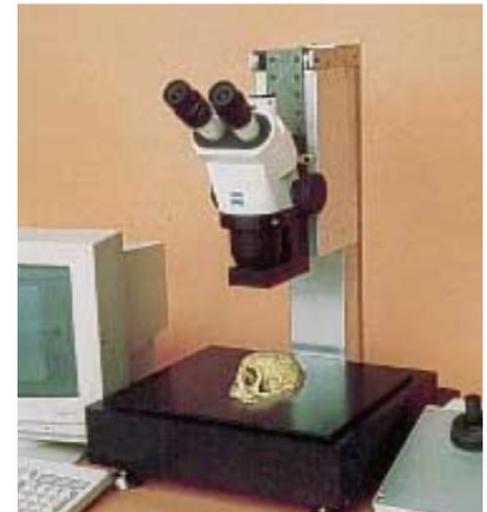
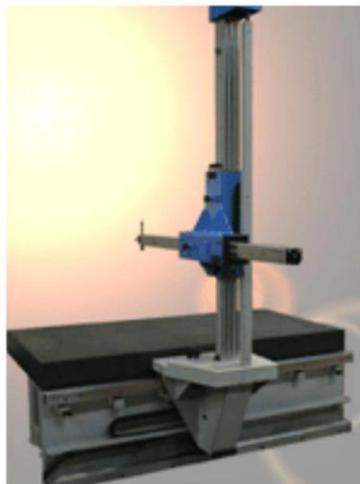
AXEL7

Integrated Metrology Suite for Effort Free Measurement

Applications



- ❑ Manual, Motorized and CNC CMMs
- ❑ Articulated Measuring Arms
- ❑ Non-Contact & Contact CMMs
- ❑ Measuring Microscopes



Integrated Measuring Environment

All **geometrical, surface and pipe** measurements are made from within
Uniform User Interface .



**Geometric,
Surface
and Pipe
Inspection**

Interfaces

SPC Interface

HTML, Excel Templates

Import CAD templates (Catia, Pro-Eng, Step ...)

DXF and IGES import/export

Pipe Benders

DDE data exchange

Axel Window Overview

Ribbon User Interface

Measure Window

Feature List & Feature Property

Name	Calc	N	
SP1	OK	1	<elem...
SP2	OK	1	<elem...
SP3	OK	1	<elem...
SP4	OK	1	<elem...
SP5	OK	1	<elem...
SP6	OK	1	<elem...
<element>	OK	6	<mach...
Plane_1	OK	4	<elem...
Circle_1	OK	4	<elem...
Plane_2	OK	4	<elem...
SP7	OK	1	<elem...
SP8	OK	1	<elem...
SP11	err	0	<elem...
SP12	OK	1	<elem...
SP13	OK	1	<elem...
SP14	OK	1	<elem...
SP15	OK	1	<elem...
SP16	OK	1	<elem...
SP17	OK	1	<elem...
Surf_1	OK	30	<elem...
Cylinder_1	OK	6	<elem...
Cylinder_2	OK	6	<elem...
Surf_2	OK	15	<elem...
Surf_3	OK	10	<elem...

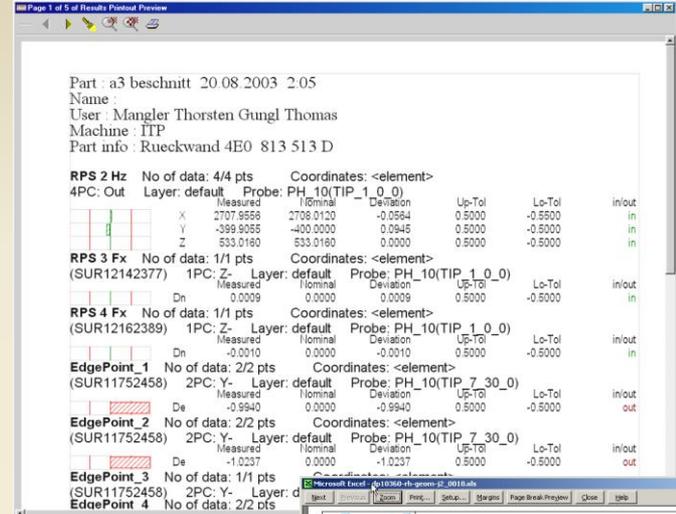
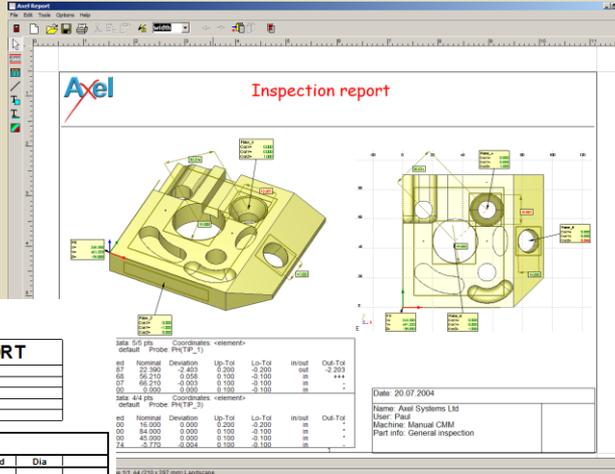
Measured	Nominal	Deviation							
Dn1	0.0312	0.0000	0.0312						
Dn2	0.1935	0.0000	0.1935						
Dn3	0.0079	0.0000	0.0079						
Dn4	0.0203	0.0000	0.0203						
Dn5	0.0154	0.0000	0.0154	0.5000	-0.5000	in			
Dn6	0.0151	0.0000	0.0151	0.5000	-0.5000	in			
Dn7	-0.0103	0.0000	-0.0103	0.5000	-0.5000	in			
Dn8	0.0167	0.0000	0.0167	0.5000	-0.5000	in			
Dn9	0.0049	0.0000	0.0049	0.5000	-0.5000	in			

Results Window

X: 378.513
Y: -660.753
Z: 218.597

PH10T(1) Features mm <element> Plane_2 New 16:46:56 FPS: 2.89 EM: none TC: off AxelSystems

Reporting



AxelSystems

TUBE INSPECTION REPORT

Part name	ppssidemo
Part info	BlackPipe0201
User name	Axel Systems Ltd
Machine	HA-213
Modified by	Ed

Pipe_1 (nominals)
 Coordinates: <machine> Layer: default Probe: Red Arm(TIP_1)

	X	Y	Z	Y(mm)	B°	C°	Bend	Dia
0	0.00	0.00	0.00					
1	72.73	0.00	0.00	41.03	80.70	36.00	116.4	
2	84.31	90.78	0.00	43.17	88.81	37.27	36.00	116.4
3	100.43	133.60	-6.826	27.51	93.72	36.00	36.00	116.4
4	-89.69	176.84	-43.619	91.96	-149.19	80.80	36.00	116.4
5	-42.51	179.87	-21.589	84.80				116.4

Pipe_1 (deviations)
 Coordinates: <machine> Layer: default Probe: Red Arm(TIP_1)

	dX	dY	dZ	Env1	Env2	Y(mm)	B°	C°	Dir°
0	0.00	0.00	-0.21						
1	0.17	0.12	-0.03	0.27	0.16	-0.21	0.00	0.00	0.19
2	-0.00	0.31	0.27	0.10	0.44	-0.43	-0.16	0.98	0.48
3	0.12	-0.00	-0.10	0.27	0.39	-0.00	1.24	0.65	1.08
4	-0.28	0.10	0.17	0.28	0.12	0.30	-0.43	0.21	0.10
5	-0.14	-0.08	0.21	0.23	0.12	-0.16			0.00

Reference bend: 2.00 mm (R400)
 Total length of measured tube: 438.68 mm
 Total length of nominal tube: 493.33 mm
 Tangent length: 136.80 mm
 Tangent length nominal: 136.44 mm
 Distance between centres of end faces measured: 392.90 mm
 Distance between centres of end faces nominal: 392.53 mm
 Total twist: 315.87°
 Total rotation: 343.96°

W31 44.010 x 287 mm Landings

INSPECTION REPORT

Part name	itpsts5
Part info	
User name	Axel Systems Ltd
Machine	Manual CMM
Modified by	Ed

Surface points

Name	X	Y	Z	DnX	DnY	DnZ	Dn	Up-Tol	Lo-Tol
SP1	49.9817	91.9138	-25.1279	0.0001	0.0876	0.0004	-0.0876	1.5000	-1.5000
SP2	64.4875	78.6293	-9.0081	-0.0001	-0.3068	-0.3725	0.4845	1.5000	-1.5000
SP3	9.0733	72.7792	-4.1994	0.0002	-0.2069	-0.3497	0.4549	1.5000	-1.5000
SP4	63.3952	38.9640	0.7310	0.0004	-0.0001	-0.7310	0.7310	1.5000	-1.5000
SP5	21.4184	15.3407	0.7173	-0.0002	-0.0002	-0.7173	0.7173	1.5000	-1.5000
SP6	56.5594	7.5677	0.7147	-0.0001	0.0004	-0.7147	0.7147	1.5000	-1.5000
SP7	72.6723	16.0000	-6.4704	-0.0003	0.0887	-0.0002	0.0687	1.5000	-1.5000
SP8	70.2975	16.0015	-19.5362	0.0000	0.0212	-0.0001	0.0212	1.5000	-1.5000
SP9	79.6221	16.0153	-42.7569	0.0002	-0.0627	0.0002	-0.0627	1.5000	-1.5000
SP10	62.6096	5.9694	-43.0434	-0.0002	0.0712	0.0001	0.0712	1.5000	-1.5000
SP11	62.4685	5.9617	-9.7421	-0.0001	0.0597	0.0001	0.0597	1.5000	-1.5000

Plane_1

No of data: 0/0 pts. Coordinates: <machine> OPC: Z- Layer: default Probe: PH10(TIP_1)

Measured	Nominal	Deviation	Up-Tol	Lo-Tol	In/out	Out-Tol

Line_1

No of data: 0/0 pts. Coordinates: <machine> OPC: Y- Layer: default Probe: PH10(TIP_1)

Measured	Nominal	Deviation	Up-Tol	Lo-Tol	In/out	Out-Tol

Line_2

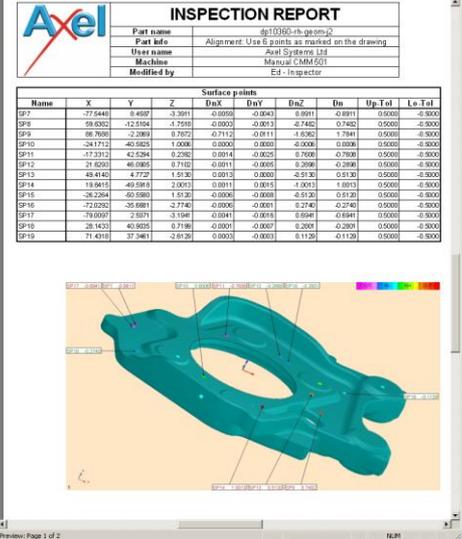
No of data: 0/0 pts. Coordinates: <machine> OPC: X- Layer: default Probe: PH10(TIP_1)

Measured	Nominal	Deviation	Up-Tol	Lo-Tol	In/out	Out-Tol

Plane_2

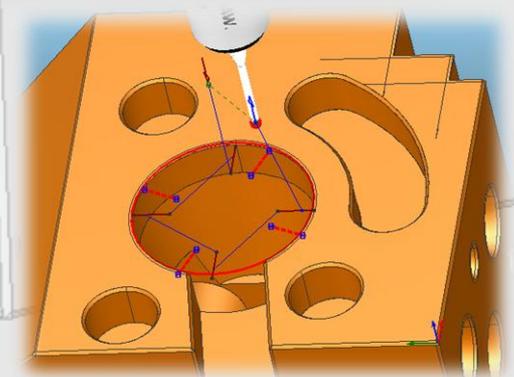
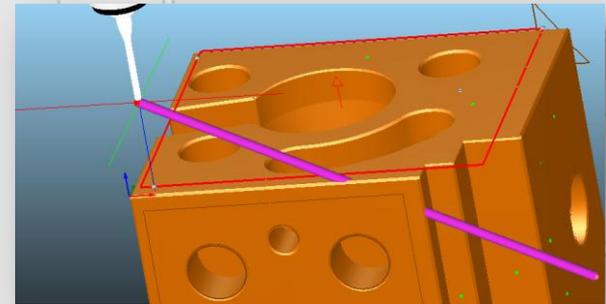
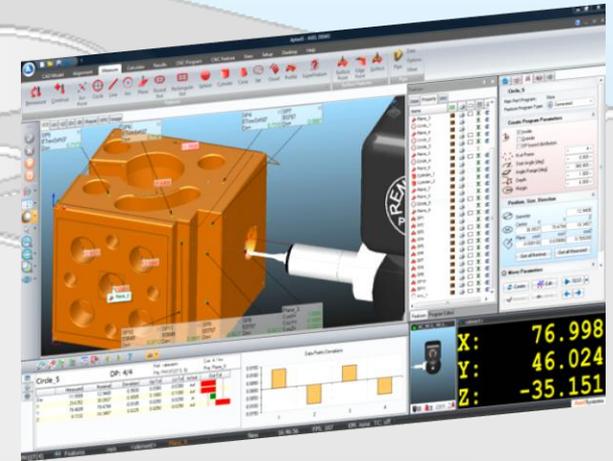
No of data: 4/4 pts. Coordinates: <element> OPC: Z- Layer: default Probe: PH10(TIP_1)

Measured	Nominal	Deviation	Up-Tol	Lo-Tol	In/out	Out-Tol	
X	35.3880	51.0521	-15.6641	0.1000	-0.1000	out	-15.6641



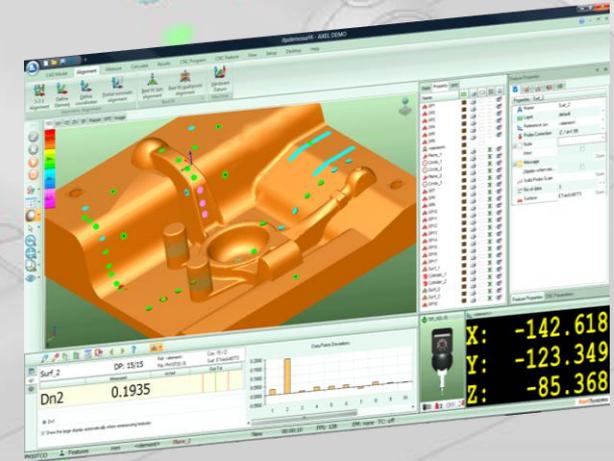
Axel CNC

- ❑ Click and Measure functionality. Axel Suite strikes perfect balance between power and ease of use. Majority of applications can be handled with Click and Measure functionality whereas for those special tough jobs
- ❑ Automatic collision avoidance strategies find the best route between measured features
- ❑ CAD initial alignment to place the CAD model within CMM envelope
- ❑ Graphical program editing to quickly introduce program changes
- ❑ Automatic selection of Renishaw probe positions with automatic CNC probe calibration
- ❑ DMIS / Text Program import / export



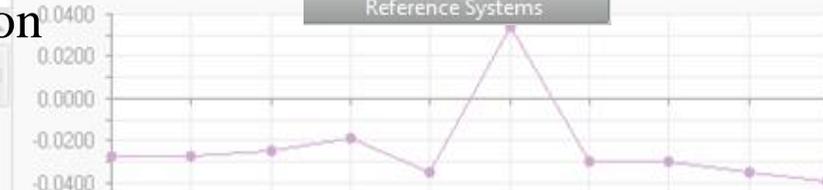
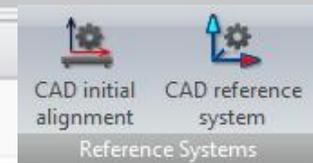
Axel Surface

- ❑ Part inspected against nominal CAD data
- ❑ Part alignment with 3D best-fit method, multi-entity or Reference Point System (RPS)
- ❑ Interfaces available to various CAD formats – DXF / IGES / CATIA v4 & 5 / ProEngineer / STEP / VDA
- ❑ Surface Point, Surface Edge & Surface Block inspection
- ❑ Metal thickness compensation
- ❑ CAD transformation
- ❑ Extensive CAD feature extraction methods
- ❑ Label / vector / colour-coded representation of surface errors



- ❑ Adjustable search range & error magnification

Surf_1	DP: 30/30	Ref: <element>	Corr: 30 / Z-
Dn1	-0.0406	0.0000	-0.0406
Dn2	-0.0354	0.0000	-0.0354
Dn3	-0.0502	0.0000	-0.0502
Dn4	-0.0379	0.0000	-0.0379
Dn5	-0.0285	0.0000	-0.0285



Axel PIPE

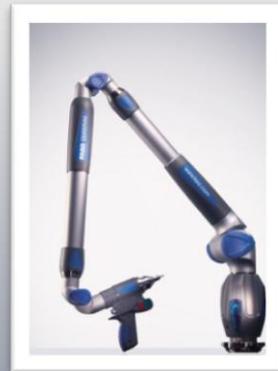
- ❑ Fully integrated with existing measurement functions allowing tube, geometric and CAD features to be measured in the same operation
- ❑ Rapid inspection of pipe fixtures with respect to pipe nominal data
- ❑ Automatic generation of 3D pipe graphic from nominal data
- ❑ Automatic generation of pipe inspection sequence
- ❑ Pipe line / car line / aircraft line data entry
- ❑ Pipe inspection against nominal model with comprehensive selectable fit on start points / intersection points & brackets
- ❑ Custom designed graphical reports & measured pipe summary
- ❑ Data manipulation allowing rotation of tube into a 'flat' orientation allowing efficient fixture design
- ❑ Bracket / end fitting / additional feature measurement
- ❑ Interface to pipe benders via serial link or network



Setting Up for Recording



Inspect Fixtures and Tubes



Axel interfaces with articulated arms and CMMs

Setting Up for Recording



Tube Inspection Reports

AxelSystems

TUBE INSPECTION REPORT

Part name: *pipedemo*
 Part info: *Emp_Pipe001*
 User name: *Axel_Sys_Mark_Lib*
 Machine: *106-213*
 Modified by: *ES*

Layer	X	Y	Z	Y(mm)	B'	C'	Bend	Dia
0	0.00	0.00	0.00					
1	92.70	0.00	0.00	41.00	62.70	0.00	11.64	
2	84.31	80.78	0.00	49.00	62.70	0.00	11.64	
3	100.43	103.30	48.20	27.81	62.70	0.00	11.64	
4	-48.48	-178.84	-102.00	81.00	-148.70	0.00	11.64	
5	-42.81	-176.87	-103.00	84.00				

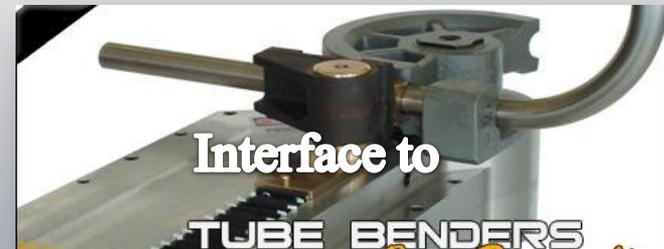
Pipe_1 (nominals) Coordinates: <machine>
 Layer: default Probe: Red Arm(TP_1)

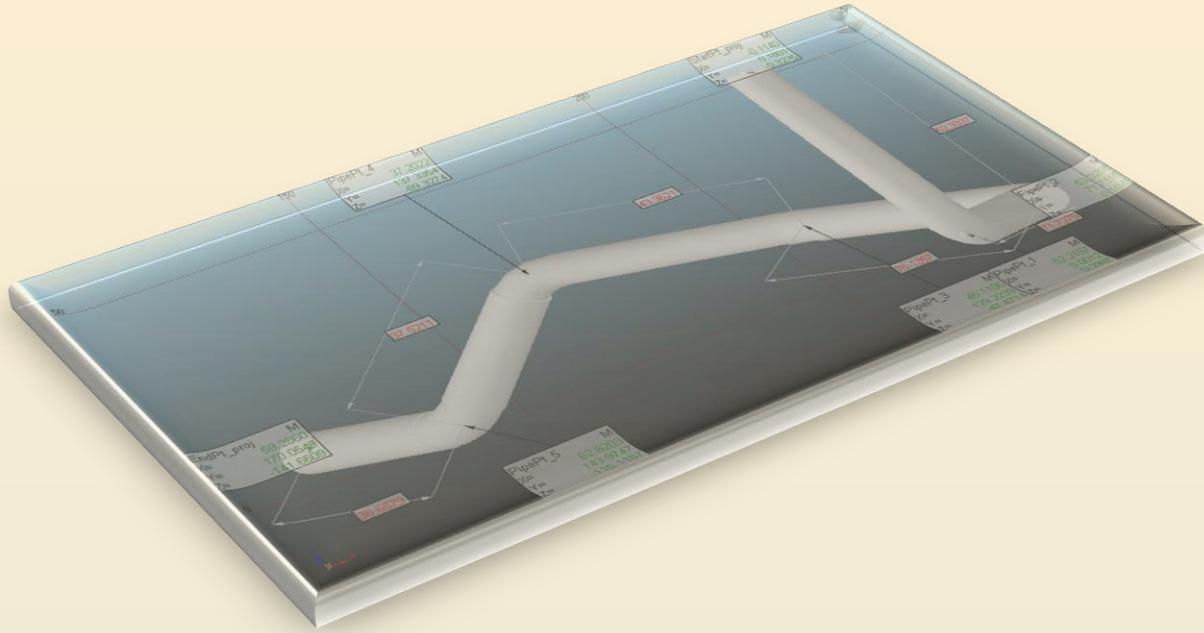
Layer	dx	dy	dz	Envt	Envz	Y(mm)	B'	C'	Dia'
0	0.00	0.00	0.00						
1	72.73	0.00	0.00	41.00	62.70	36.00	11.64		
2	84.31	80.78	0.00	49.00	62.70	36.00	11.64		
3	100.43	103.30	48.20	27.81	62.70	36.00	11.64		
4	-55.69	178.84	-101.89	81.00	-148.70	36.00	11.64		
5	-42.81	179.87	-103.00	84.00					

Pipe_1 (elevations) Coordinates: BestFit_coord
 Layer: default Probe: Red Arm(TP_1)

Layer	dx	dy	dz	Envt	Envz	Y(mm)	B'	C'	Dia'
0	0.00	0.00	0.00						
1	0.17	0.12	-0.27	0.27	0.19	-0.23	-1.10	0.99	0.19
2	-0.00	0.30	-0.27	0.16	0.46	-0.45	-1.10	0.98	0.48
3	0.72	0.30	-0.27	0.27	0.26	-0.82	-1.24	0.95	1.06
4	-2.00	0.70	0.17	0.26	0.10	0.36	-0.43	0.21	0.16
5	-0.14	-0.06	0.21	0.23	0.12	0.16	-0.43	0.21	0.09

Tolerance band: 2.00 mm (P40)
 Total length of measured tube: 480.00 mm
 Total length of nominal tube: 435.35 mm
 Tangent length: 298.00 mm
 Tangent length nominal: 395.48 mm
 Distance between centres of end faces measured: 382.30 mm
 Distance between centres of end faces nominal: 282.53 mm
 Total twist: 315.90°
 Total rotation: 343.85°





The Axel Software is currently available in the following languages



For sales information telephone: 044-208-579-7013 or email sales@axelsystems.co.uk