XYZ Based Structures (XYZBS) in PLS-CADD

Structures can now be station based structures (SBS) or XYZ based structures (XYZBS). SBS have existed since PLS-CADD was created and the interface for working with them is unchanged.

How to create an XYZBS structure:

1) Select "Add Structure at XY" from left click menu presented by "View/Entity/Info" while snapping to an entity with known XYZ coordinates (XYZ points, DXF entities...)



2) Type or copy/paste desired XYZ coordinates and structure file names into empty "XYZ Locked" rows displayed at bottom "Lines/Reports/Staking Table"

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	Struct	ure Station	Height	Offset	rientatio	X	Ÿ	Centerline 2	TIN Z	Åhead	Line	Transverse	Structure	Structure	Struct.	Embedded	Structure	Counter	Automatic	<u>^</u>
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4	2	1677.431				1677.431	0.000	1472.191	0.000	789.619	0.0000	180.0000	ruct\m1\demtan1.120	DOUBLE CIRCUIT	120.000	0.000	Edit		'All', 'No DE'.	
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6	4	3339.880				2467.054	-872.830	1408.473	1408.474	748.860	0.0000	269.9998	ruct\m4\demtan2.tow	TANGENT TOWER J	109.000	0.000	Edit		'All', 'No DE'.	
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12	8	7084.180				4696.190	-2388.000	1291.817	1291.817	943.570	0.0000	180.0000	ruct\m1\demtan1.130	DOUBLE CIRCUIT	130.000	0.000	Edit		'All', 'No DE'.	
13	9	8027.750				5639.760	-2388.000	1291.307	0.000	1083.140	0.0000	180.0000	ruct\m4\demtan3.pol	EDF MUGUET TYPI	132.244	0.000	Edit		'All', 'No DE'.	
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3) Type or copy/paste desired XYZ coordinates and structure file names into "File/Import/Staking Table". The text at the top of the "Import Staking Table" dialog lists some special codes to enter in the "Line Angle" field when working with XYBS. Set the "Line Angle" to 500 to create an XYZBS. There are other codes you can use if you want to create a PI on the current alignment or a PI on a new alignment at the XYZBS structure (501 and 502)

Import S	port Staking Table																	
Use of Structs PI poin To spo 500 fo 501 fo 502 fo When	pp/paste commi res should be in to are created to 8 structures by X or structure and F or structure and F structure and F spotting by XY y	ands to import di order of increas ir records with nr Y rather than sta 1 1 1 on new alignm you should enter	ata from a spread ing station ni zero line angle dion use followin ent the desired struc	isheet or databas e (angle value ign g codes in the lin sture base elevat	e. ored and need n e angle field: ion in the 'Centerl	ot be correct). U ineZ Elevation' o	te a line angle of	999 to start a new align	nent. is measured cloch	kwise from the Y	avis.							
	Structure	Station	Height	Offset	rientatio	х	Y	Centerline Z	TIN Z	Ahead	Line	Transverse	Structure	Structure	Structure	Counter	Structure	^
	Number		Adjust.	Adjust.	Angle	Easting	Northing	Elevation	Elevation	Span	Angle	Axis	Name	Description	Specific	Weights	Comment	
												Azimuth			Material		1	
		(ft)	(ft)	(ft)	(deg)	(ft)	(ft)	(ft)	(ft)	(ft)	(deg)	(deg)				(lbs)		
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All 3 methods of adding an XYZBS structure provide an "Orientation Angle" input. Orientation angle is the counterclockwise angle between the structures transverse axis and the X axis. A value of has the transverse axis pointing East (Northbound line). A value of 90 has the transverse axis pointing South (Eastbound line). "Sections/Add Graphical" has a "Attempt to rotate structures affixed to an XY coordinate... so transverse axis bisects angle" to assist in setting the orientation angle.

How do I recognize XYZBS structures:

XYZBS structures are identified by an "XY Locked" visible in the Structure/Modify and the Lines/Reports/Staking Table dialogs. XYBS structures are identified with a "Station" of "NA" in reports like the "Structure List Report" and the "Structure Coordinates Report". When exported (Table View, XML export...) the "NA" in these reports will be changed to a -9999 since programs that read our exported data want a number and might reject "NA".

Structure #1		Structure Comm	ents		Set Counter
Line angle (deg) 0.00	1				Weight (lbs)
de.100	2			1	
Station (ft) XY Locked	3			2	
Height adjust. (ft) 0.000	-9				
Offset adjust. [ft] XY Locked	5				
Orientation (deg) 0	6		-		

staning	ng rave																			
	Structure	Station	Height	Offset	rientatio	х	Y	Centerline Z	TIN Z	Ahead	Line	Transverse	Structure	Structure	Struct.	Embedded	Structure	Counter	Automatic	<u>^</u>
	Number		Adjust.	Adjust.	Angle	Easting	Northing	Elevation	Elevation	Span	Angle	Axis	Name	Description	Height	Length	Specific	Weights	Structure	5 E
												Azimuth					Material		Group	
		(ft)	(ft)	(ft)	(deg)	(ft)	(ft)	(ft)	(ft)	(ft)	(deg)	(deg)			(ft)	(ft)		(lbs)	Membership	н
1	1	XY Locked		XY Locked					4.000	1000.000	0.0000	90.0000	s_cadd\cross\de.100	DE	100.000	0.000	Edit		'All', 'Has DE'	
2	2	XY Locked		XY Locked		1000.000			16.667	0.000	0.0000	90.0000	s_cadd\cross\de.100	DE	100.000	0.000	Edit		'All', 'Has DE'	
3	3	XY Locked		XY Locked		400.000	-500.000		8.817	1019.804	0.0000	90.0000	s_cadd\cross\de.100	DE	100.000	0.000	Edit		'All', 'Has DE'	
4	4	XY Locked		XY Locked	600.0000	600.000	500.000		11.683	0.000	0.0000	330.0000	s_cadd\cross\de.100	DE	100.000	0.000	Edit		'All', 'Has DE'	
5	5	XY Looked		XY Locked		782.569	-38.532		13.816	0.000	0.0000	90.0000	uct\m4\demdead3.tow	STRAIN TOWER B	106.000	0.000	Edit		'All', 'Has DE'	
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Structu	ture List Report													
	Struct.	Station	Line	Ahead	Height	Offset	Orient	Name/Description/Comments/Material						
	Number		Angle	Span	Adjust	Adjust	Angle							
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3	2	-9999.00	0.00	0.00	0.00	0.00	0.00	c:\eric\test\pls_cadd\cross\de.100						
4	2	-9999.00	0.00	0.00	0.00	0.00	0.00	DE						
5	3	-9999.00	0.00	1019.80	0.00	0.00	0.00	c:\eric\test\pls_cadd\cross\de.100						
6	3	-9999.00	0.00	1019.80	0.00	0.00	0.00	DE						
7	4	-9999.00	0.00	0.00	0.00	0.00	600.00	c:\eric\test\pls_cadd\cross\de.100						
8	4	-9999.00	0.00	0.00	0.00	0.00	600.00	DE						
9	5	-9999.00	0.00	0.00	0.00	0.00	0.00	c:\users\public\documents\pls\pls_cadd\examples\struct\m4\demdead3.tow						
10	5	-9999.00	0.00	0.00	0.00	0.00	0.00	STRAIN TOWER B						
								Done						

How does XYZBS affect my profile and sheets view:

Profile views and sheet views can only be displayed if you create an alignment. XYZBS structures that are within the "Terrain/Terrain Widths" max offset for profile view will be visible in the profile view and the profile portion of the sheets view.

If you do not have an alignment you can still create a profile like view using "View/Pan Zoom & Rotate/Virtual Profile" and defining a virtual alignment connecting two structures or XYZ coordinates. This command can also be reached via the "View/Entity Info" middle click menu which displays a "Show Virtual Profile for Selected Span" option when snapping to a wire and the "Show Virtual Profile for Selected Alignment Segment" when snapping to a PI or alignment. You can also create a virtual profile along any desired line segment via the "View/Measure Distance between Entities" middle click menu "Show Virtual Profile Along Selected Line Segment" command.

	ified structure centers				
From structure	1	To Structure	2 -		
Alignment segment a	PI# 1 , Alignment# 1				
C Line between specifi	ed XY coordinates (manually er	ntered or via View/M	easure Distance/Betwee	en Entities)	
x1 (ft) 0.000	Y1 (ft) 0.000	Z1 (ft) 0.000			
x2 (ft) 0.000	Y2 (ft) 0.000	Z2 (ft) 0.000			
Options					
Elevation axis scale fact	or (aspect ratio)	1			

What happens to the station and offset columns reported in terrain and wire clearance reports?

Station & offset for minimum clearance points have traditionally been defined relative to the closest alignment segment. This is possible if an alignment exists but the alignment is optional when working with XYBS structures. If the alignment doesn't exist we will instead report a span relative station where station and offset are relative to a line connecting the back and ahead structure bases. Span relative stations are identified in reports by the presence of a "SPAN_RELATIVE" comment at the end of the line (see Section Clearance Report and Terrain Clearances by Survey Point image below). If you want to force the program to report span relative stations and offsets for spans connecting XYBS structures even in the presence of an alignment you can do so via an option in "File/Preferences".



PLS-CADD - xy based structures.xyz - [Section Clearances]												
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plation & offset relative to alignment center line unless notes specify SPAN_KELATIVE indicating relative to line connecting structure bases.												
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1 2 1 500.07 -0.00 500.07 3 1 1 509.92 0.00 509.92 Left Left 5.90 OK SPAN_RELATIVE												
Terrain Clearances by Survey Point Report												
Station & offset relative to alignment center line unless notes specify SPAN_RELATIVE indicating relative to line connecting structure bases.												
Point Feature Station Offset Z HeightClearance OK Comment												
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Description Vert. Horiz.												
(ft) (ft) (ft) (ft) (ft) (ft)												
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1 points with clearance violations NG												
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Ngint click to view the results in a table, export them to Xint. Of a database, or customize table formatting including showing or inding columns.	at											

What happens to Line Angle?

With station based structures we determine line angle based on the alignment looking at the PI before the structure, the PI next to the structure and the PI after the structure. We can't do this with XY based structures because there is no alignment. But if there are wires connected to the structures we can create virtual alignments connecting the bases of structures that are connected by wires. By default the program computes the line angle as the largest angle turned between any of these virtual alignments. Hence a 90 degree tap off a structure that otherwise has no line angle results in it being considered a 90 degree line angle. After some discussions as to whether or not a tap should impact the line angle of the main line we added the ability to exclude certain sets from the line angle calculation (tap set can be excluded). Sets can be excluded through the "Lines/Reports/Staking Table" "Sets In XY Structure Line Angle Calculation" column and we output the list of these sets in "Lines/Reports/Summary/Structure Coordinates Report".