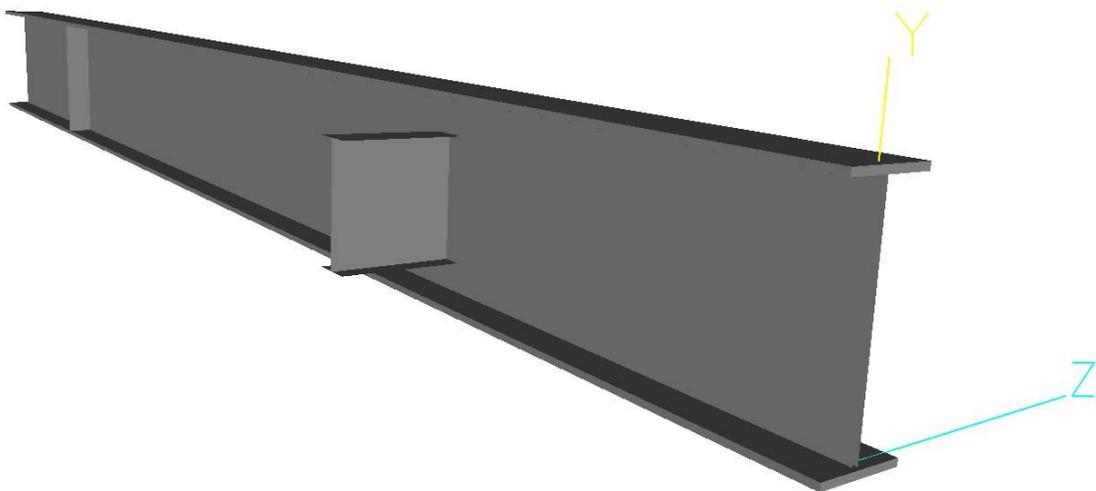




## V-STARS E3X Demonstration



OCT 2003

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## Object Measured

One object was measured as part of the V-STARS E3X demonstration. The object was a long beam section (9m). A photo and a model of the object are shown on the cover of this report.

## Equipment Used

1. V-STARS E3X Camera System
2. Various targets
3. Scale Bar

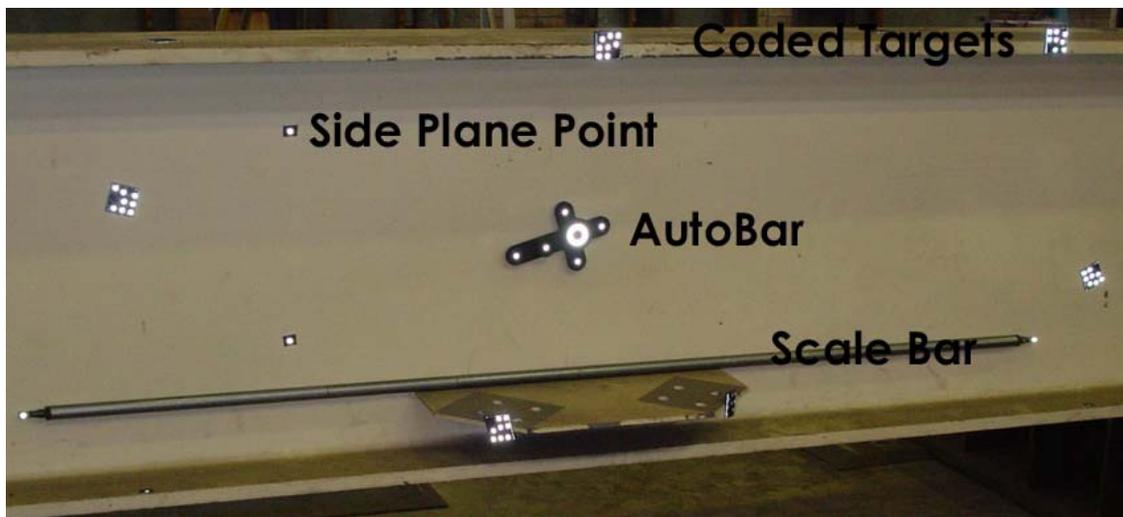
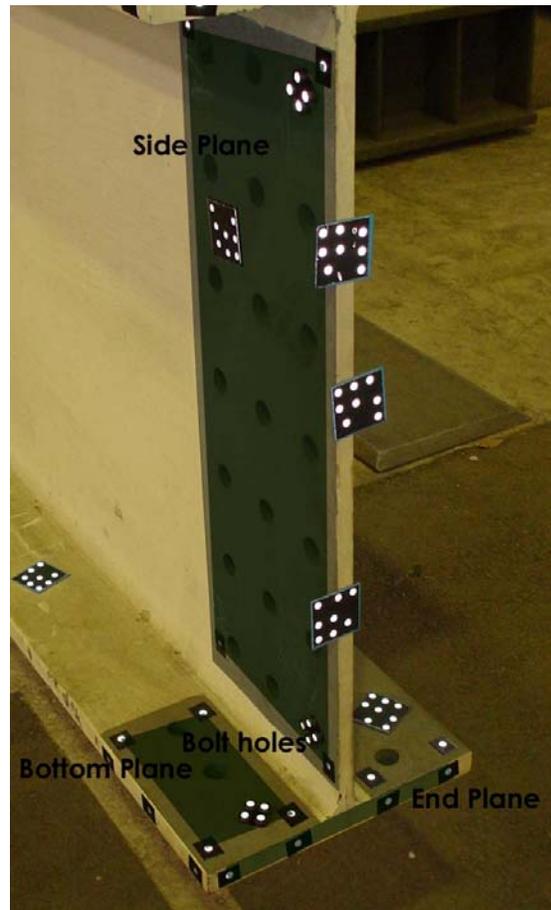


## Objectives

1. Demonstrate camera use and object targeting
2. Calculate key dimensions
3. Determine angular relationships between planes

## Targeting

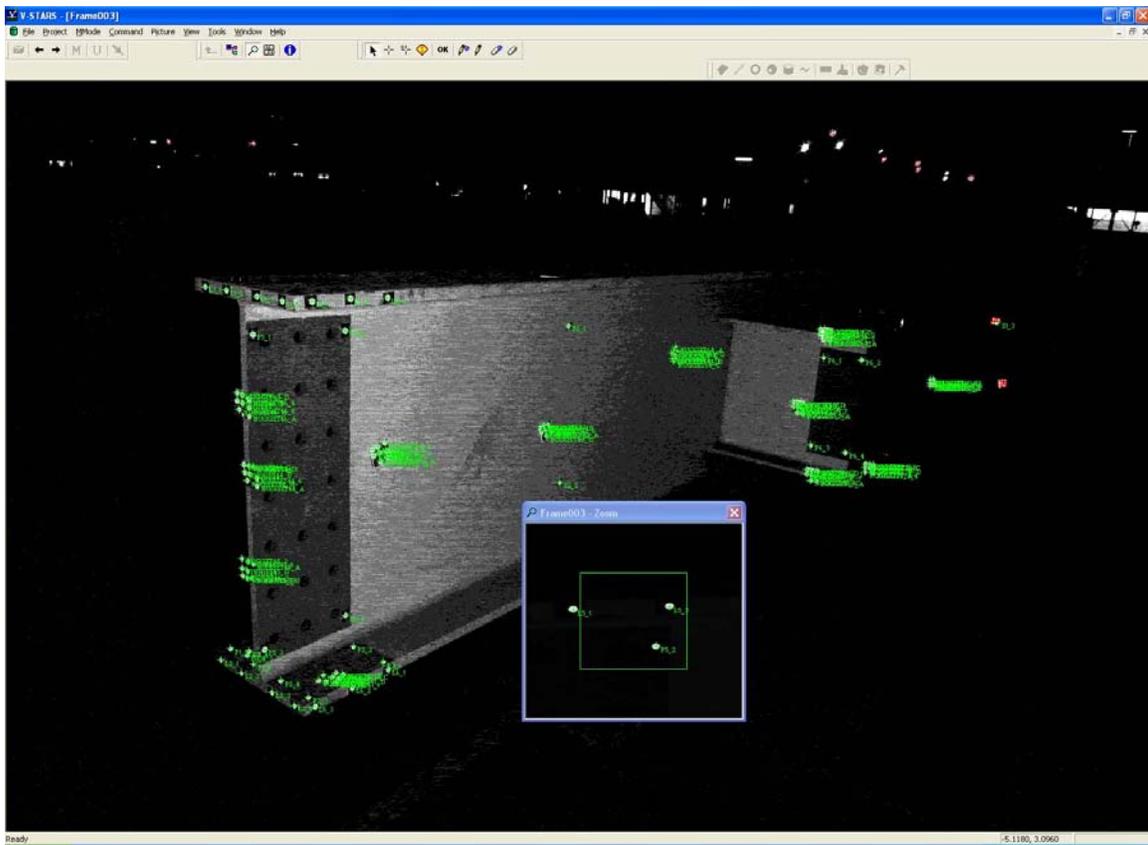
1. AutoBar for initial coordinate system
2. Coded targets to tie photography together
3. Targets on key planes
4. Edge targets on key bolt holes
5. Two scale bars



## Measurement Statistics

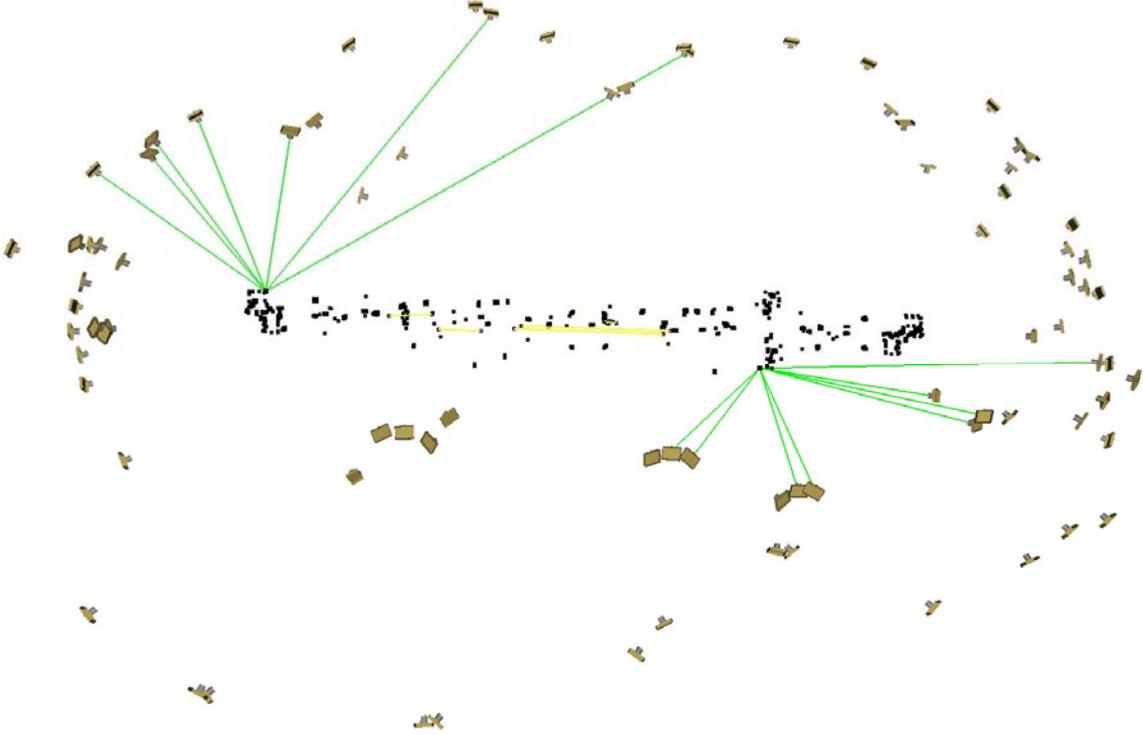
### Network

No. of photos	84
No. of points	8-4
Accuracy RMS X,Y,Z	X 0.042
	Y 0.036
	Z 0.053

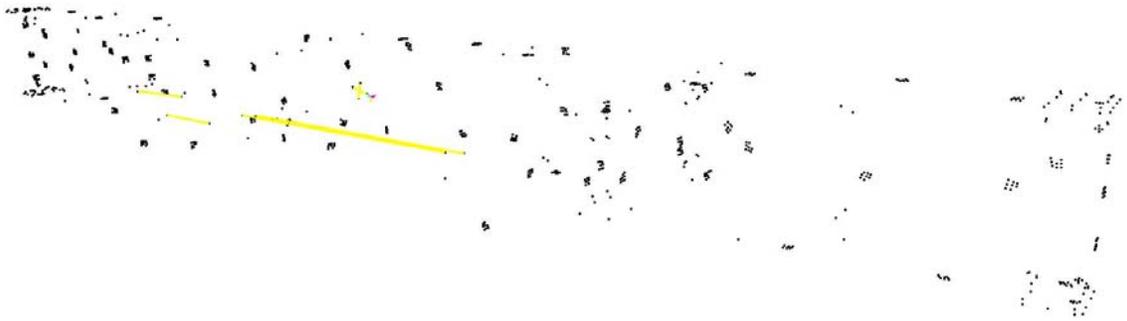


*Typical V-STARS measurement image*

The diagram below illustrates the geometry used to create the point cloud. Two points have been highlighted to show the measurement observations (rays) used to determine its XYZ coordinate.



The final V-STARS point cloud is shown in the images below:



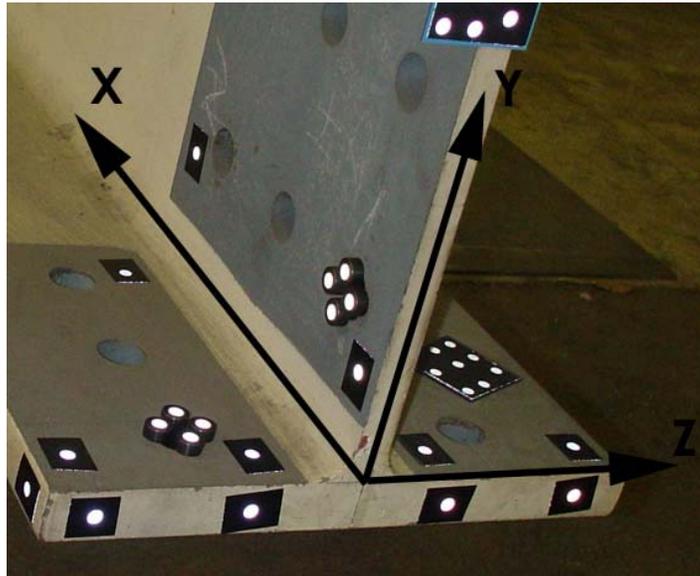
*Side View*



*Top View*

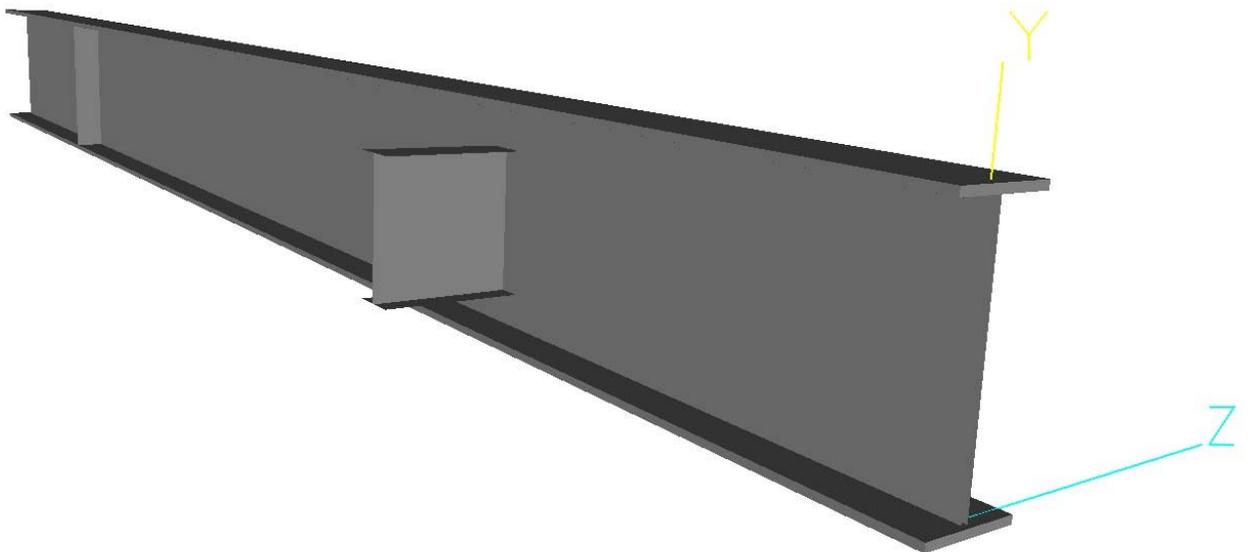
## Alignment

A simple axis alignment was used on the part. The coordinate axis directions and origin are shown in the adjacent image.

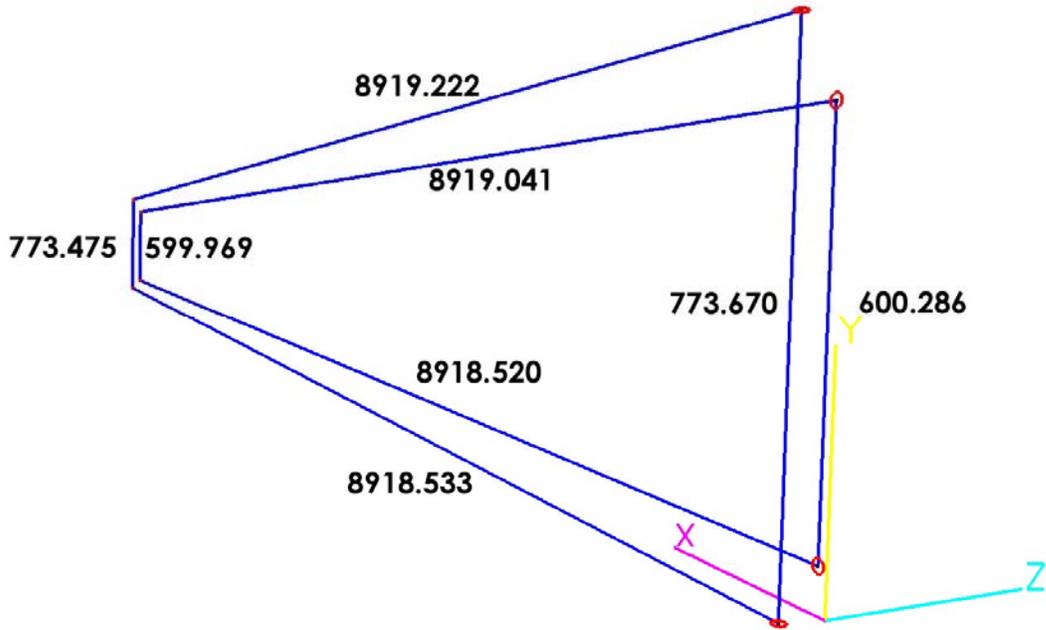


## Analysis

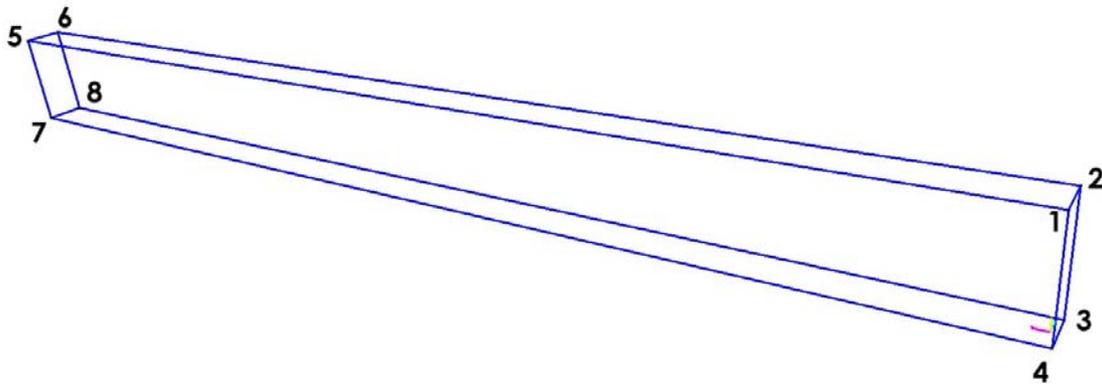
The data was used to create best fit planes, lines, and bolt circles. These objects were used to calculate dimensions and angles of intersection where applicable. The model that was created is shown below.



The point to point distances for the bolt holes were computed using the derived center points. The results are displayed graphically below.

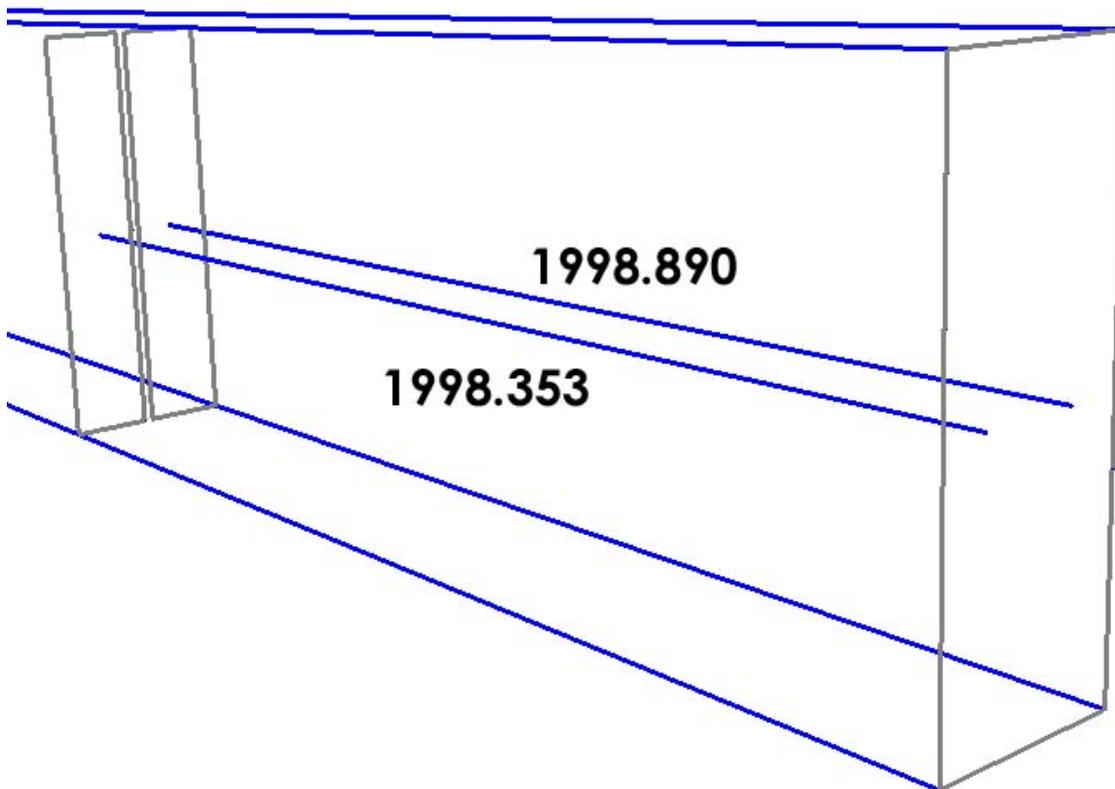
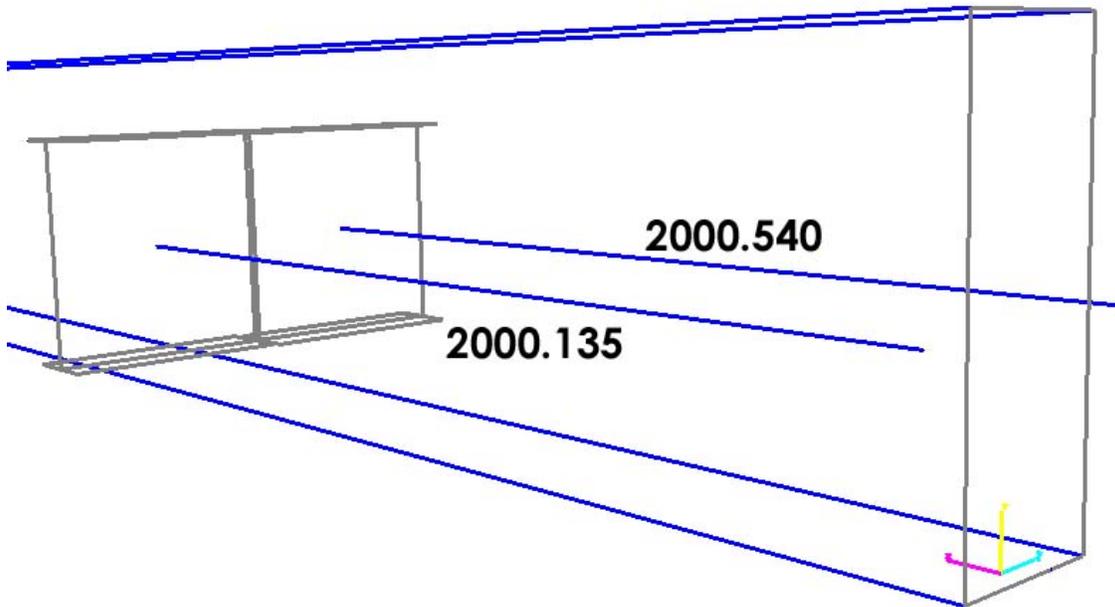


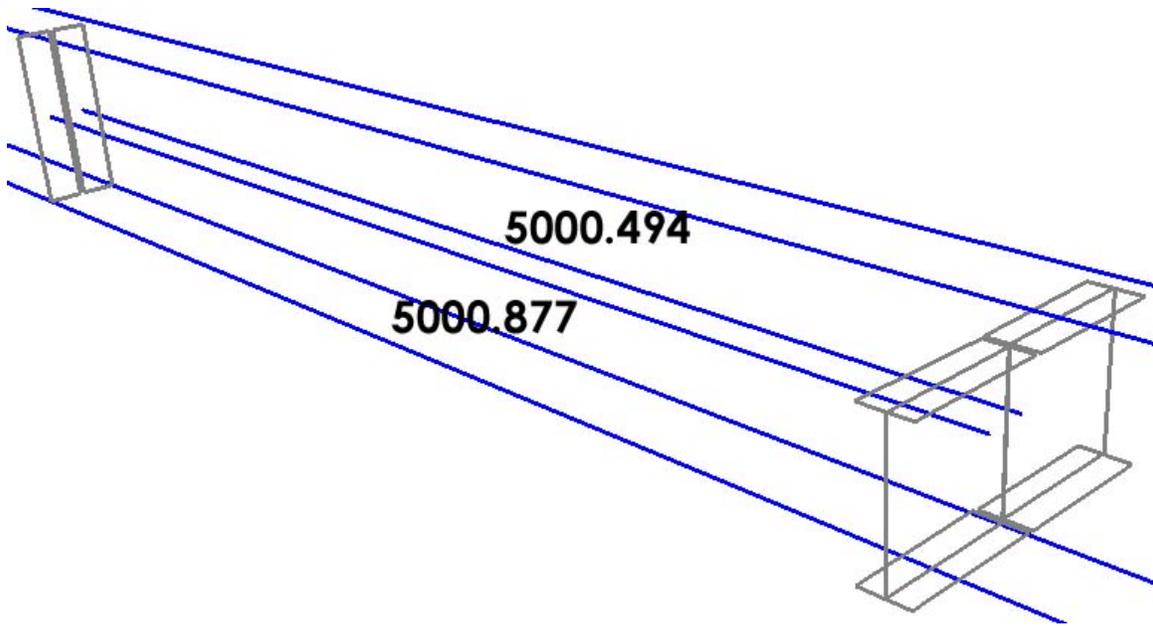
The planes were used to compute the corner locations. These were then used to compute the corner to corner dimensions. These results are displayed below.



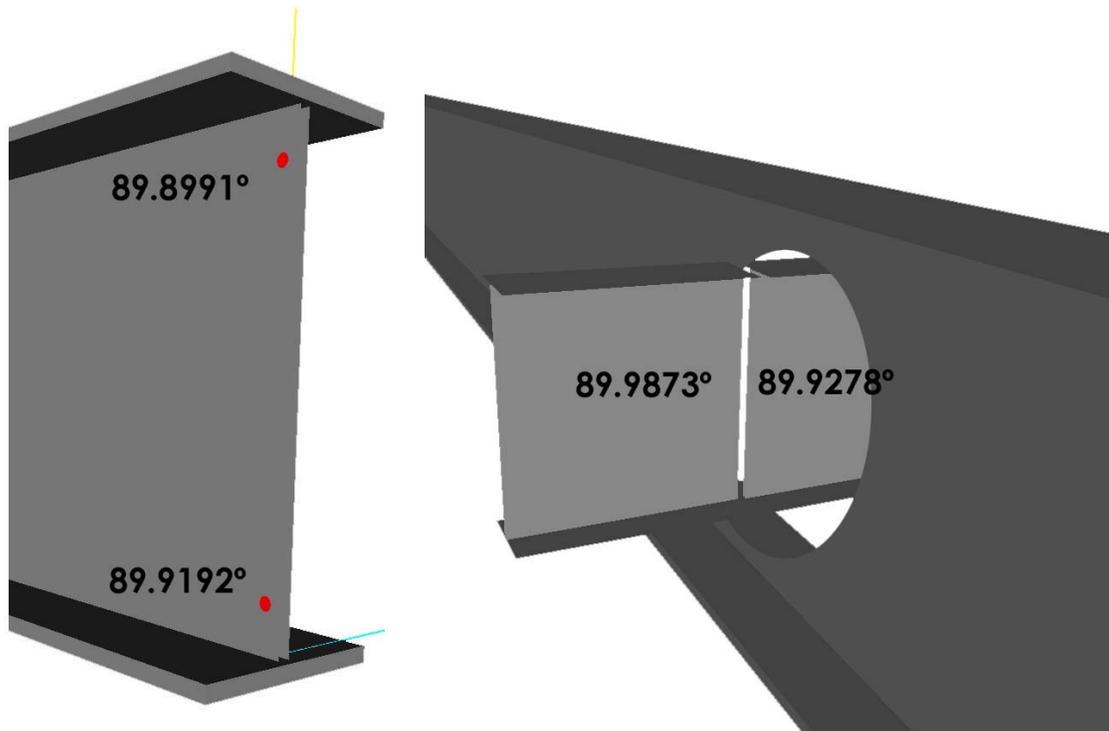
From	To	Distance	Nominal	Difference
1	2	300.454	300.000	0.454
2	3	773.469	775.000	-1.531
3	4	299.568	300.000	-0.432
4	1	774.363	775.000	-0.637
5	6	301.335	300.000	1.335
6	7	773.211	775.000	-1.789
7	8	300.171	300.000	0.171
8	5	774.221	775.000	-0.779
1	5	9000.335	9000.000	0.335
2	6	8999.686	9000.000	-0.314
3	7	8999.073	9000.000	-0.927
4	8	8999.805	9000.000	-0.195

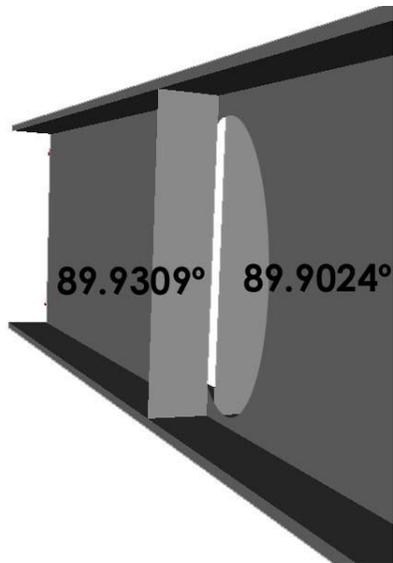
The data was also used to compute the distances between the steel plates along the beam to the end planes. These distances are shown in the images below.





The planes were also used to calculate the angle between adjacent perpendicular planes. The results are shown below.





## Time Summary

Initial Investigation	5 minutes
Targeting	20 minutes
Photography	10 minutes
Processing	15 minutes
Data Analysis	30 minutes
<b>Total</b>	<b>80 minutes</b>

## Concluding Remarks

The measurement undertaken has shown that V-STARS with the E3X system can be a very powerful measurement tool. The results of the measurement undertaken were very accurate and more importantly were produced quickly.