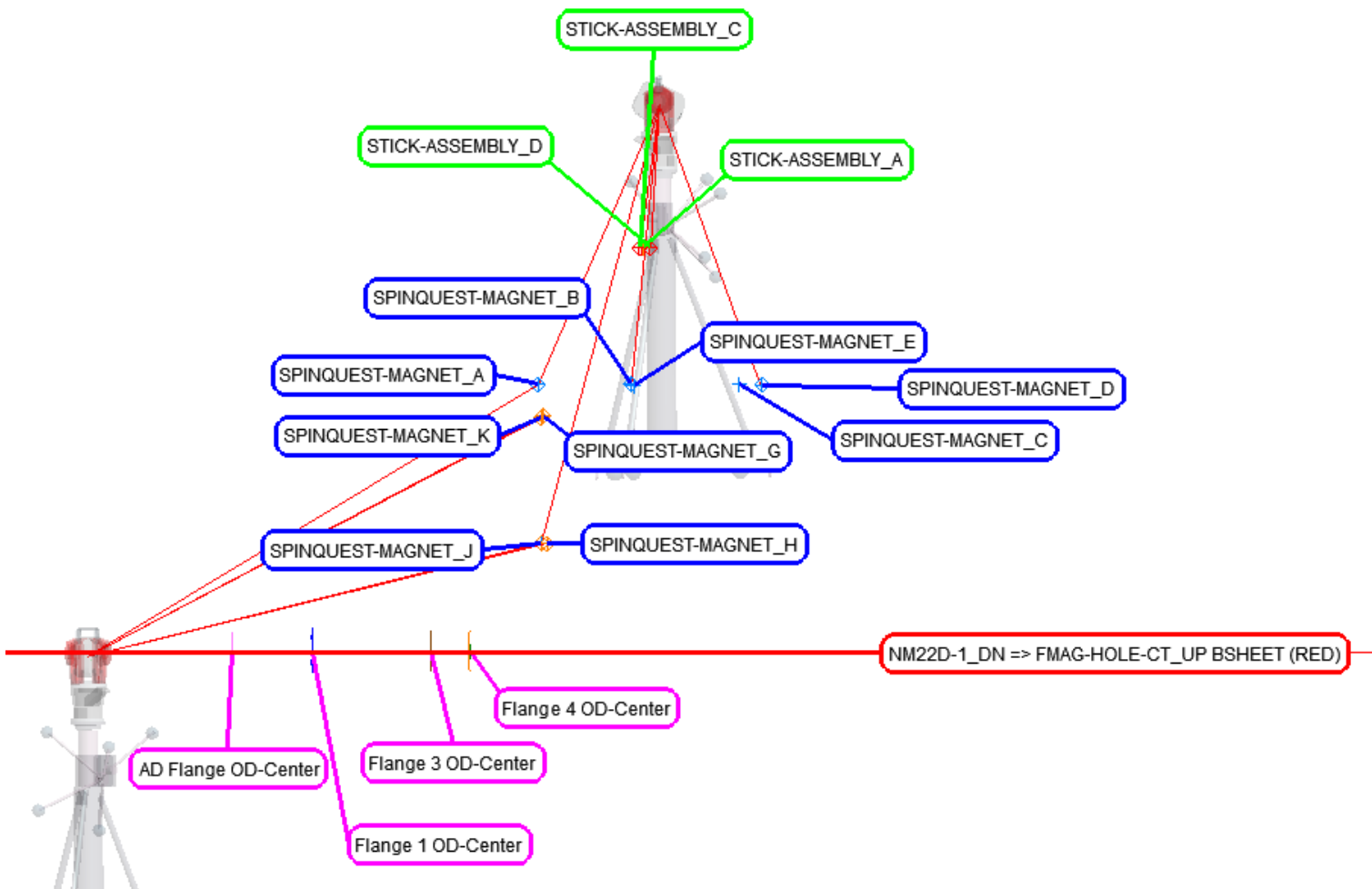


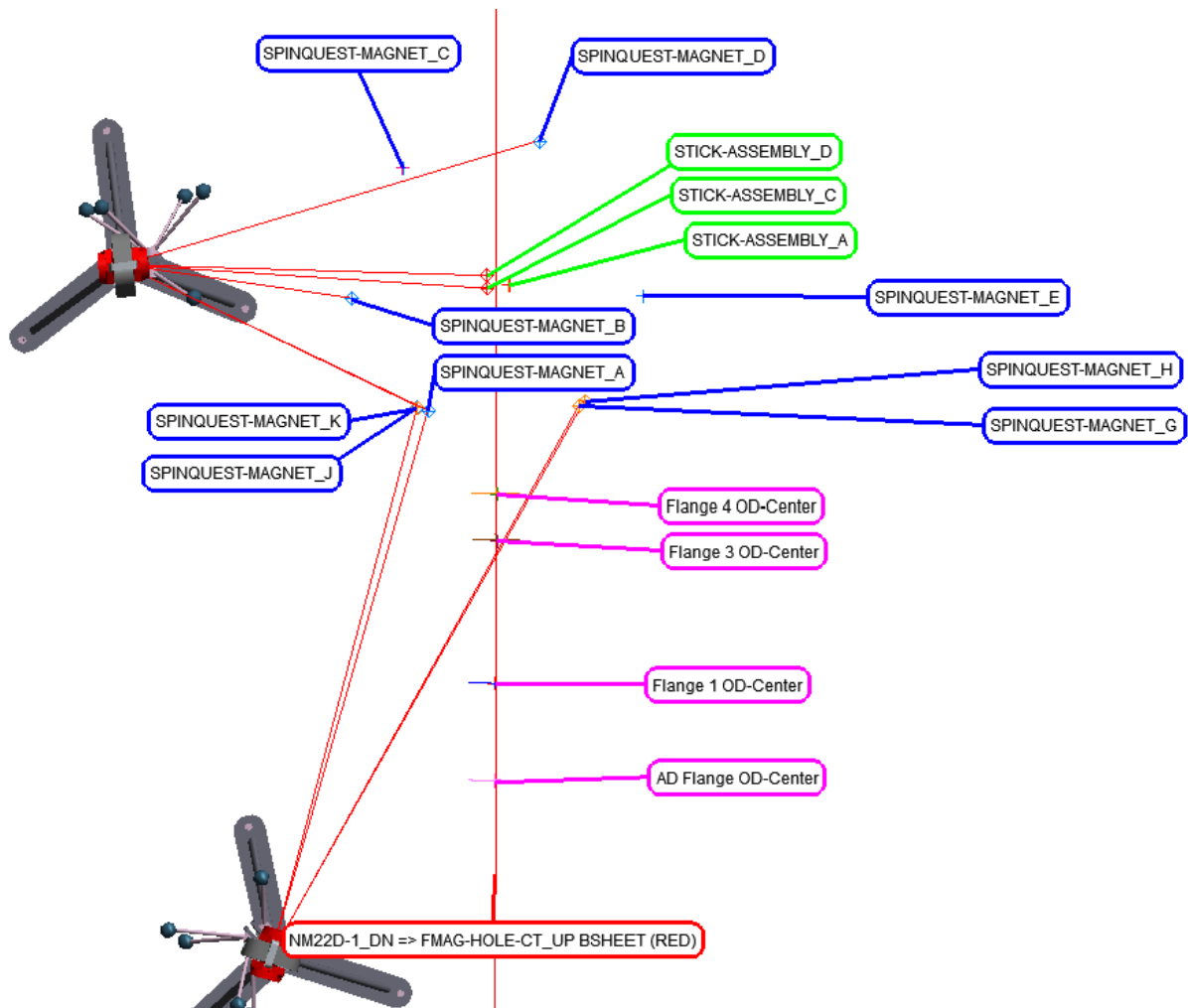
The above pictures were taken at time of Reference.



I do not have pictures of the Stick Assembly inserted into the vessel. The pictures above are from the initial inspection.



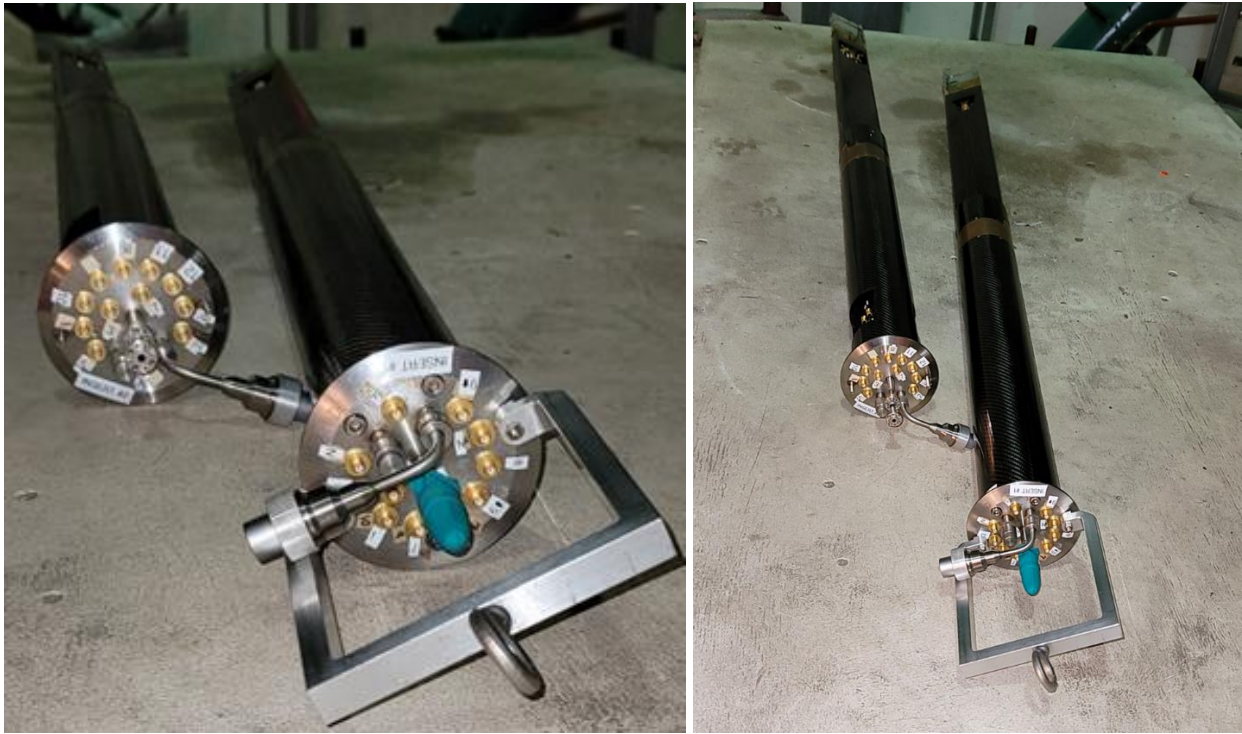
As-Found Measurements of Fiducials (Side View)



As-Found Measurements of Fiducials (Top View)



Stick Assembly Reference



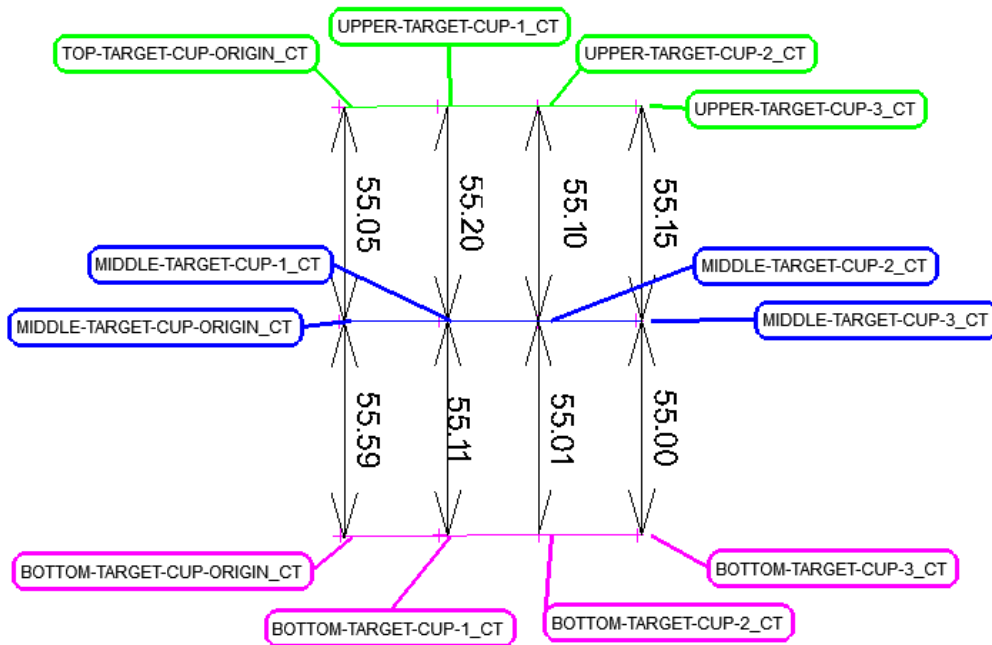
Stick Assembly's located in the Field.

Note: Only Insert #1 was referenced by Alignment.

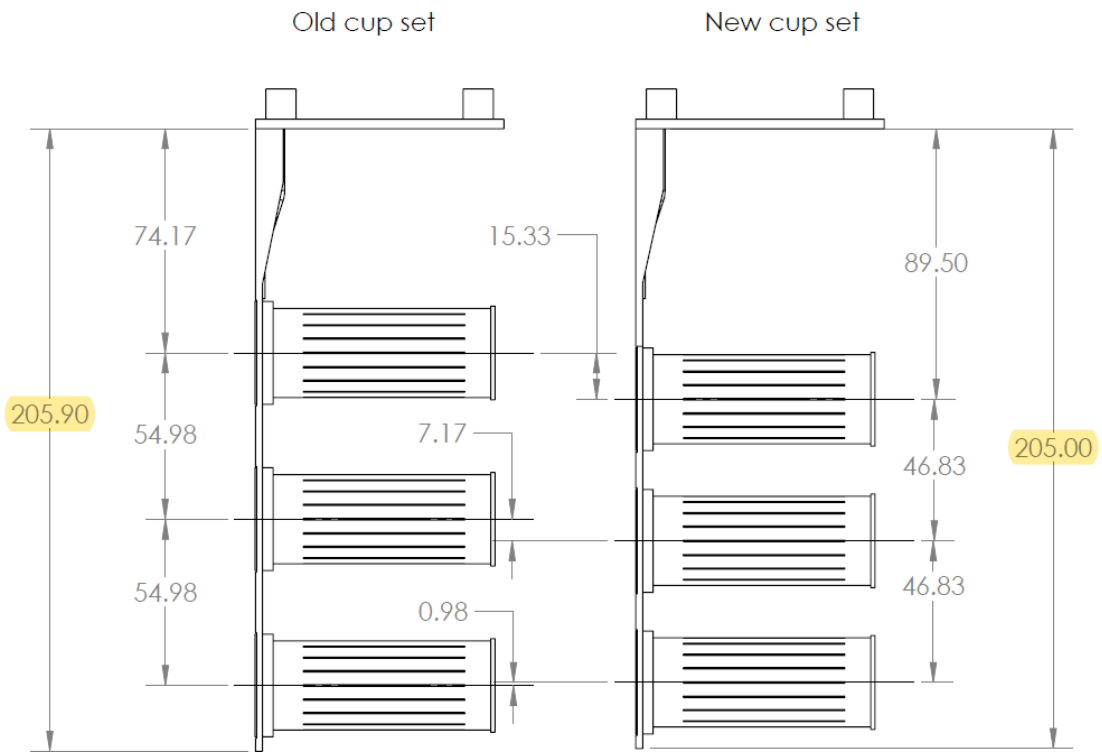
Came to our attention that the Insert #1 was modified. Spacing between target cups were changed. Alignment has no information about Insert #2.

Modified original reference of "Old Cup Set" to reflect the "New Cup Set". Modified vertical only.

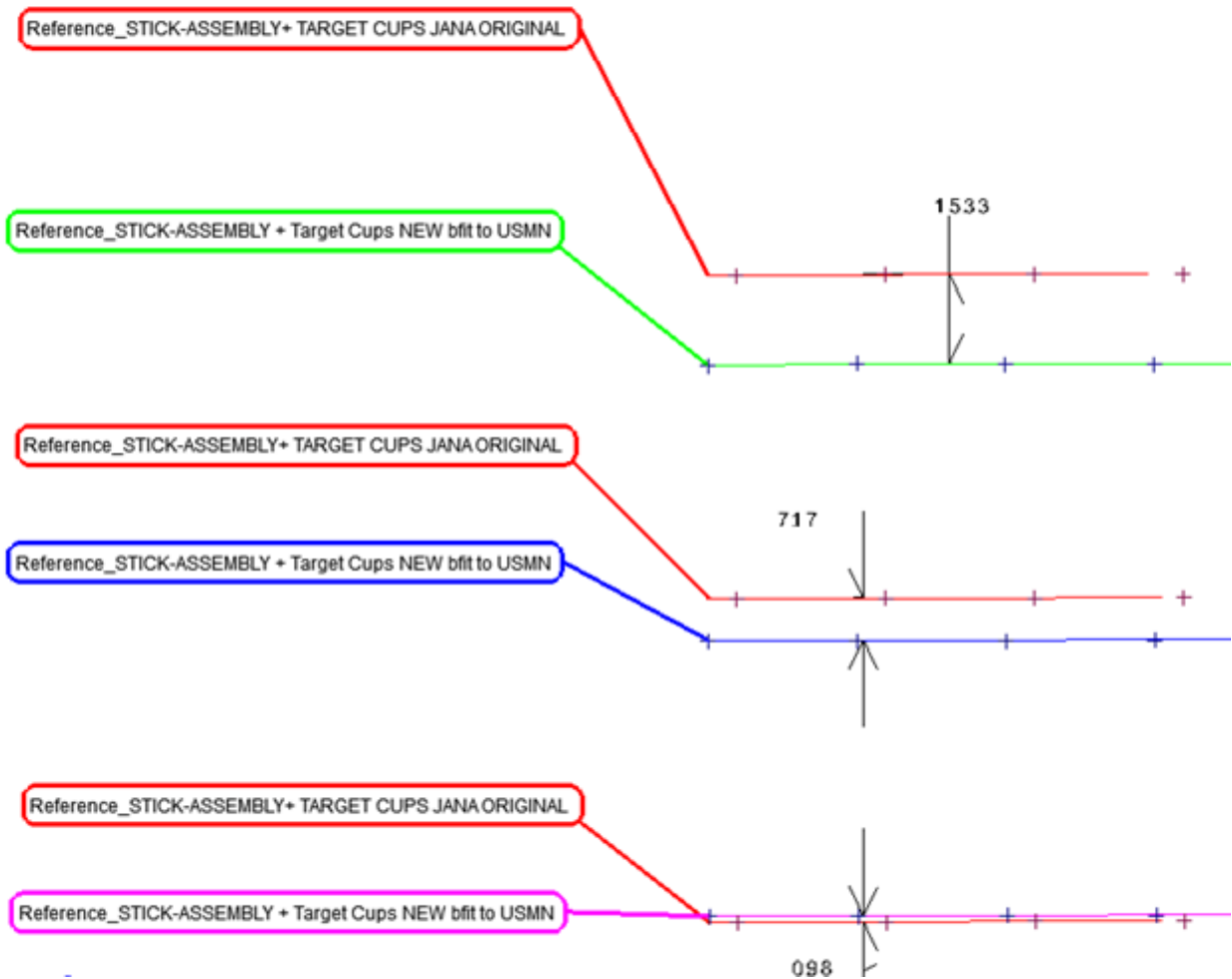
Units: (mm)

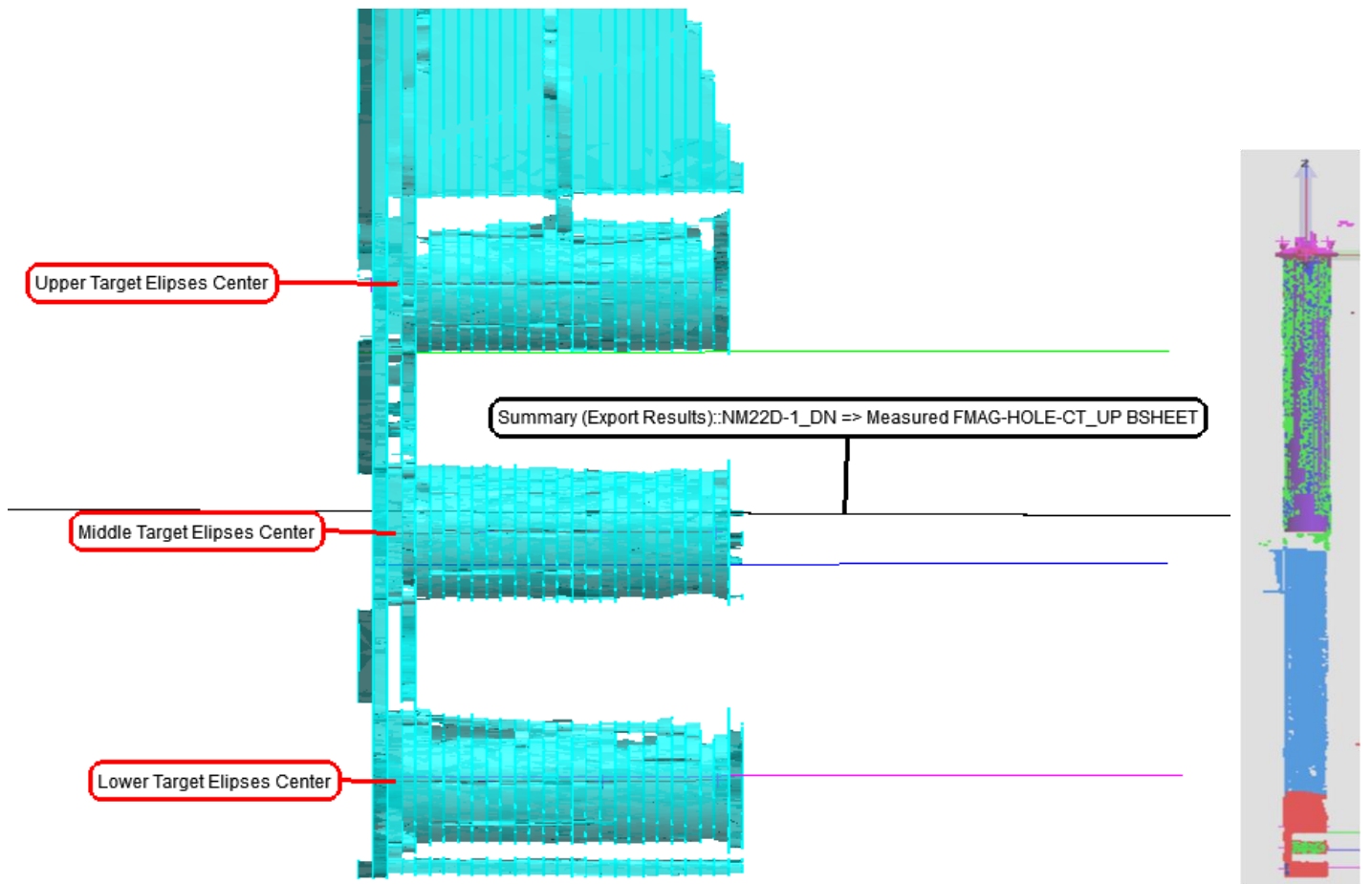


Original Reference Values of Sick Assembly (Old Cup Set)



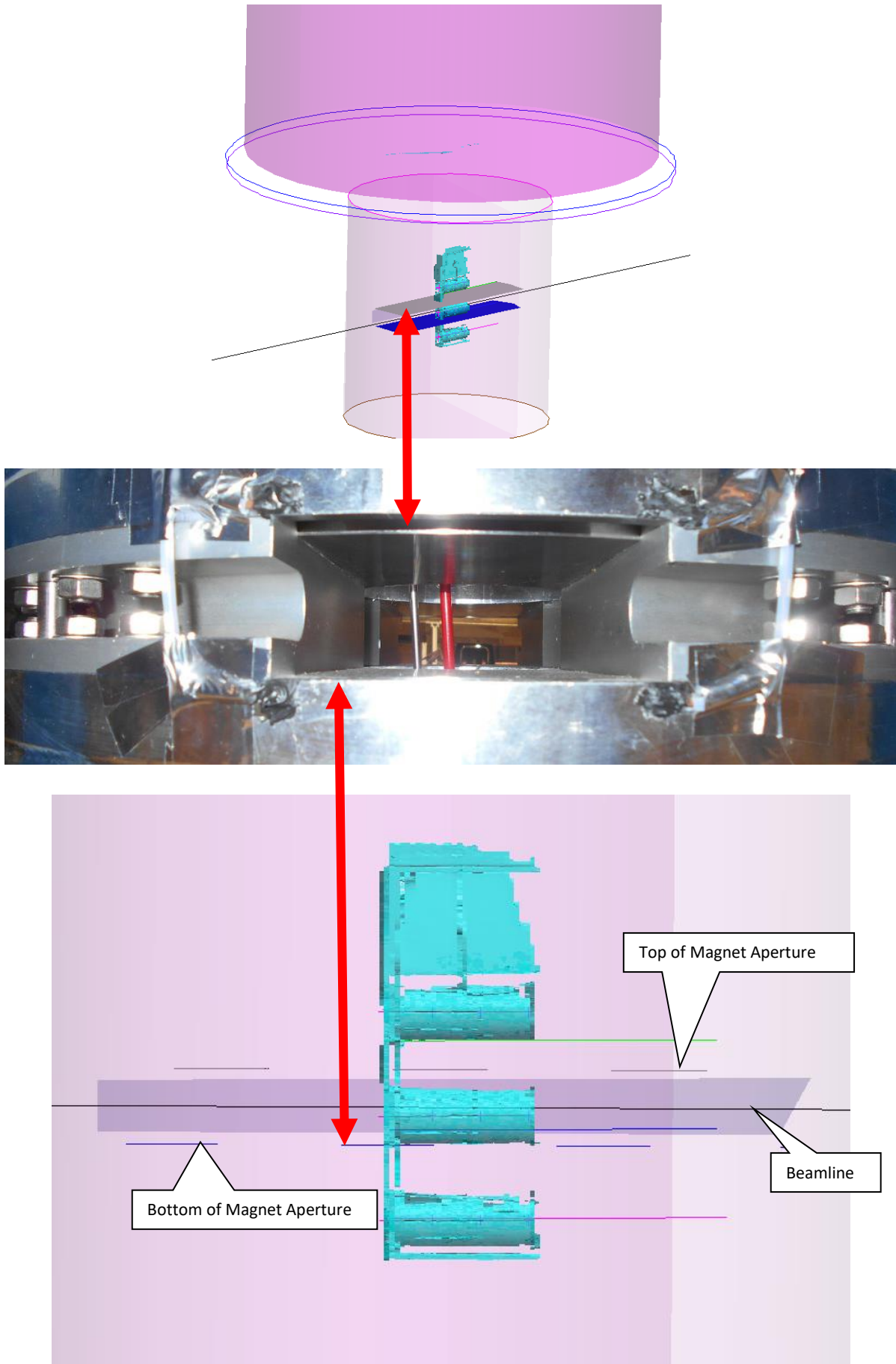
Red callouts below are the original "Old Cup Set" reference positions. Green, Blue and Magenta are the "New Cup Set".



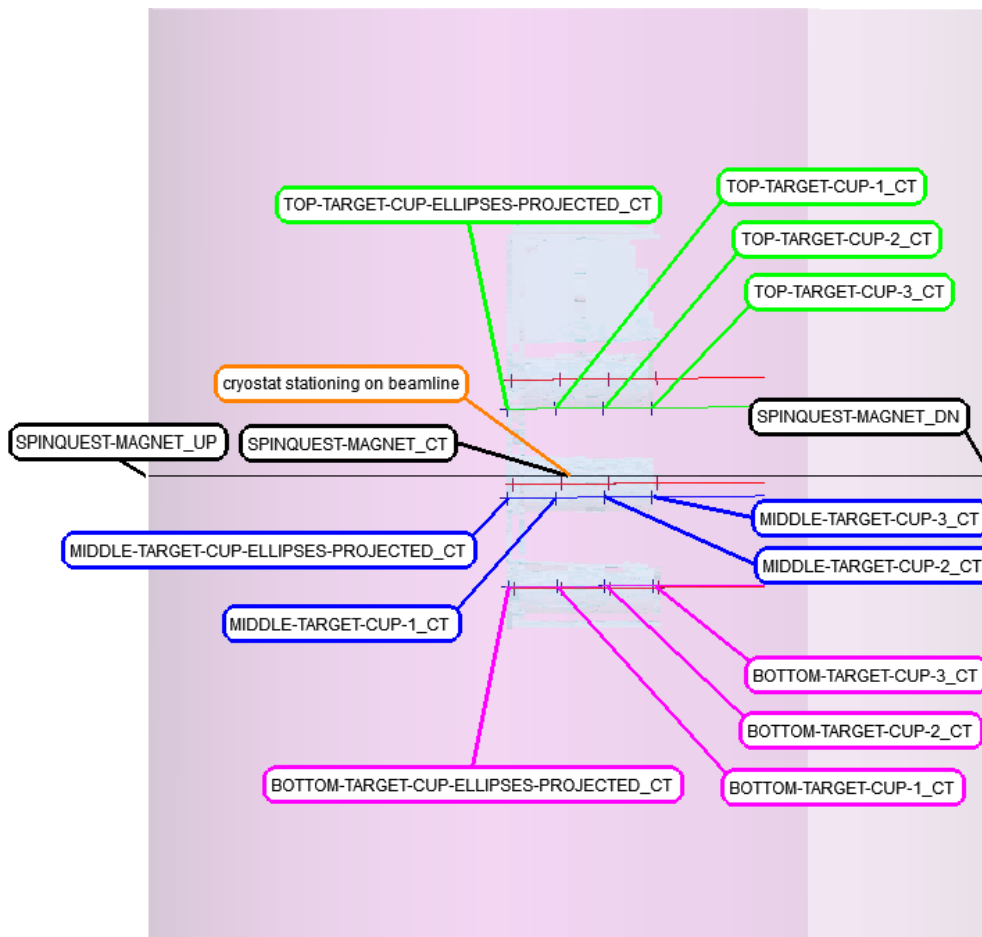
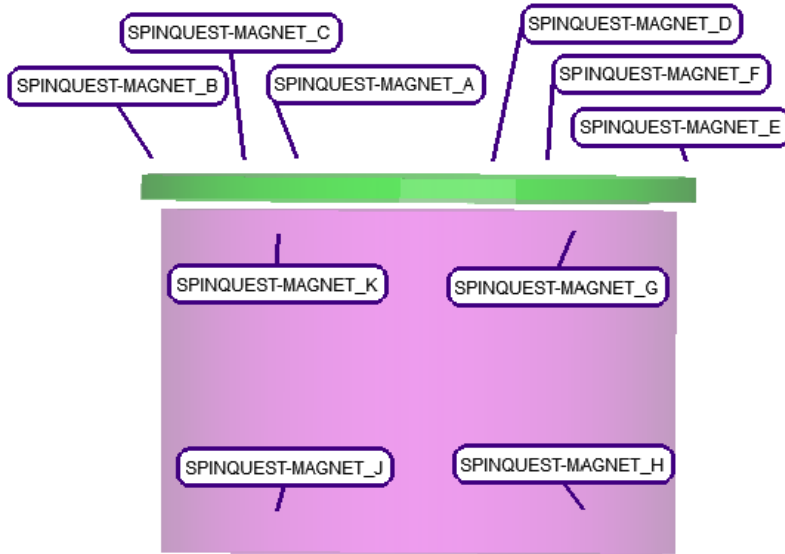
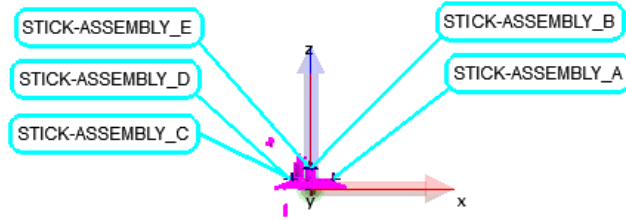


Scan of Referenced Target in Office

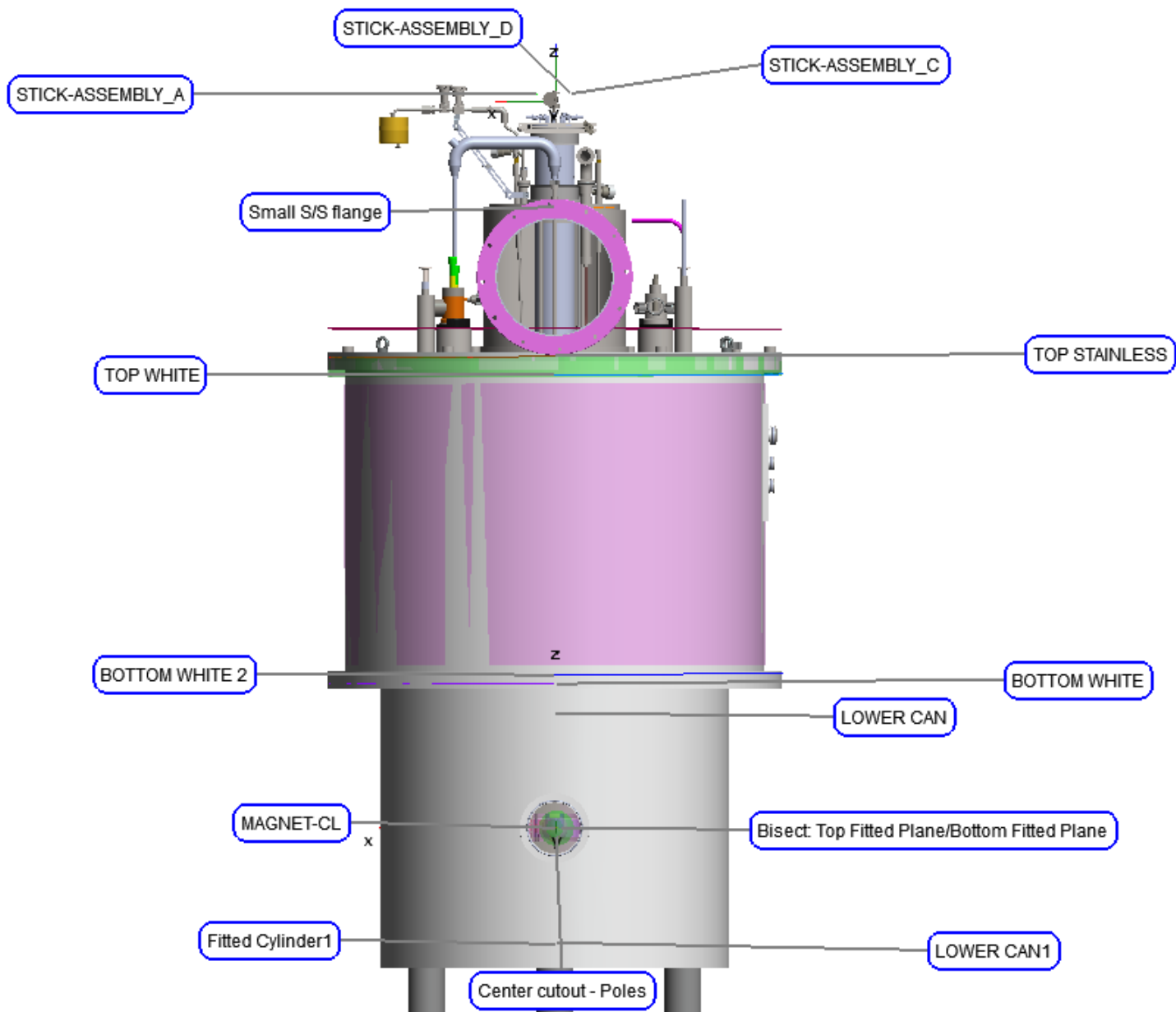
Location of originally referenced “Old Cup Set” (Red Callouts) in the Beamline. Black callout is the Beamline. Green, Blue and Magenta lines are “New Cup Set” positions.



**Current magnet aperture position and scanned "Old Cup Set" reference position.
Green, Blue and Magenta lines are "New Cup Set" positions.**

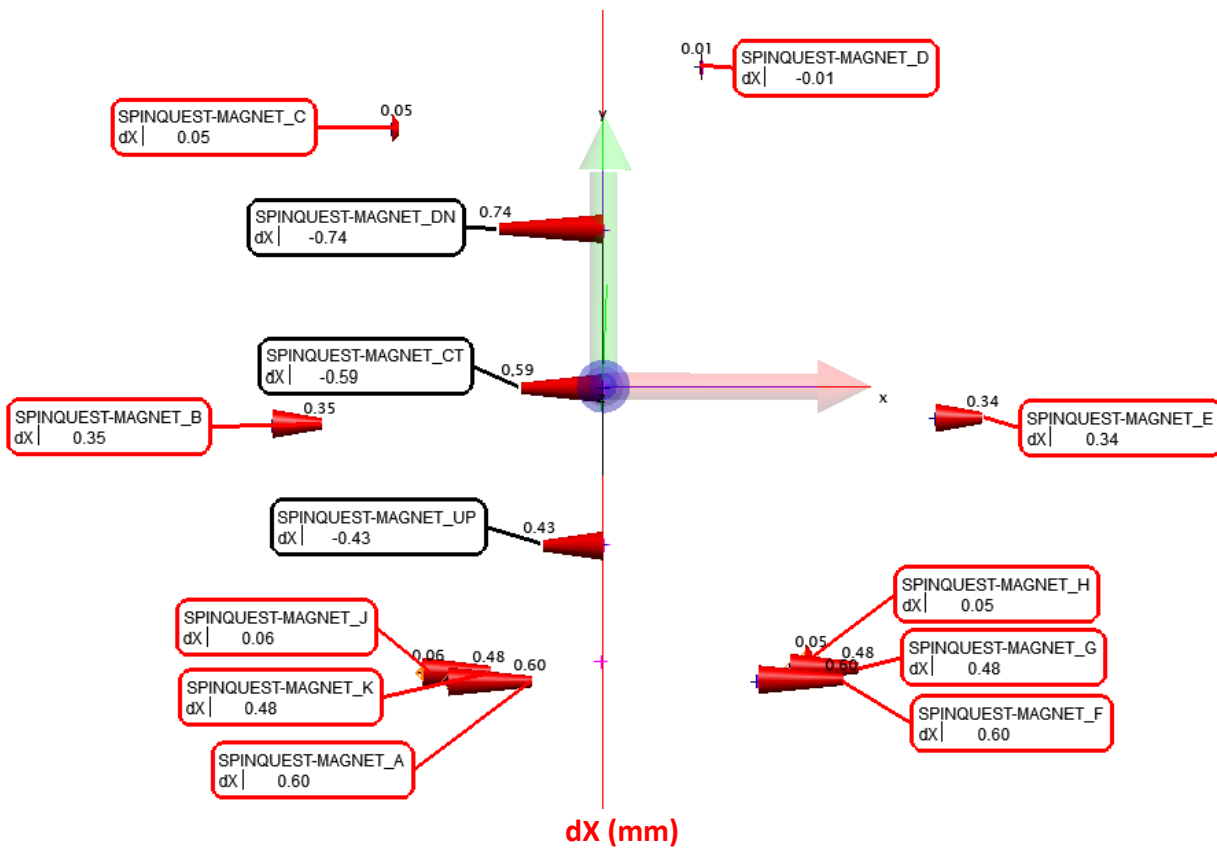
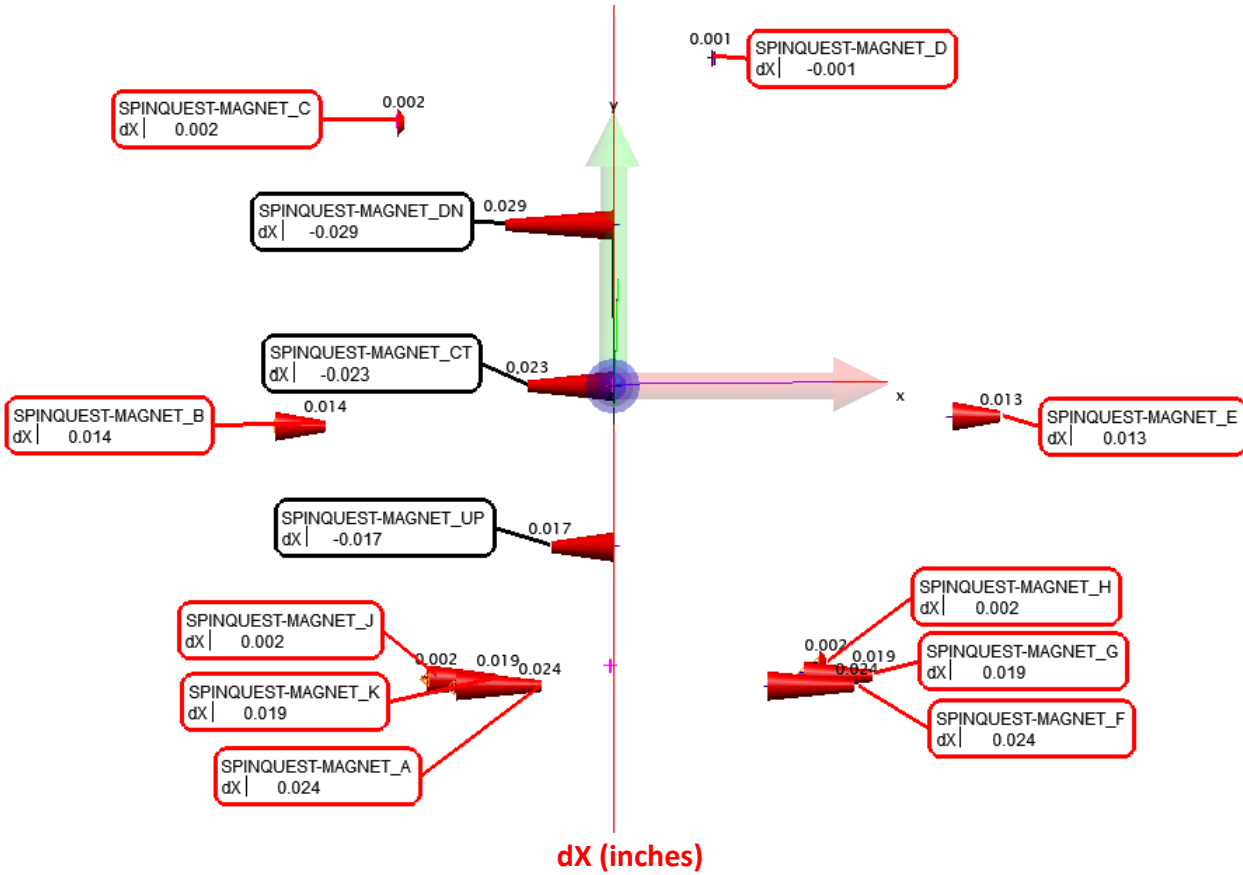


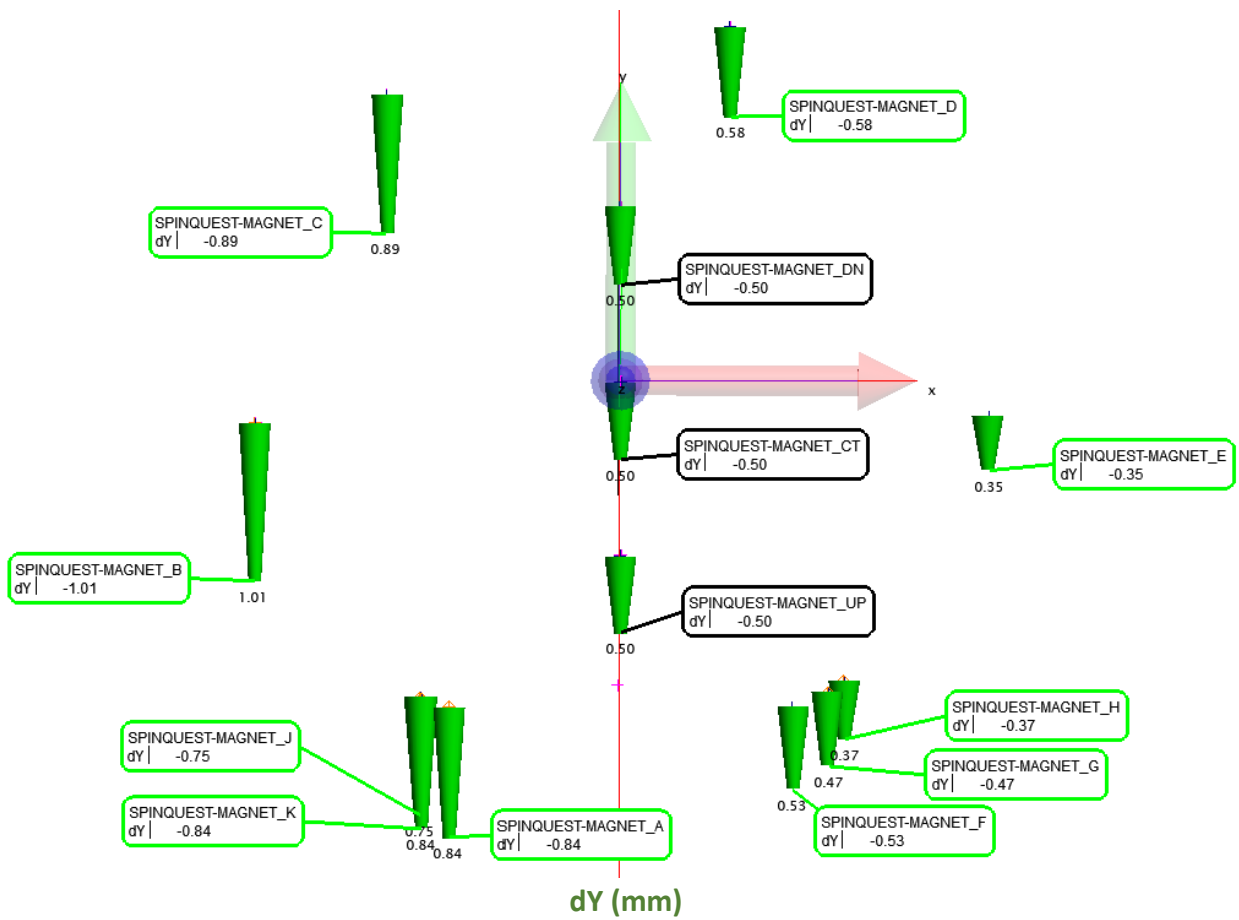
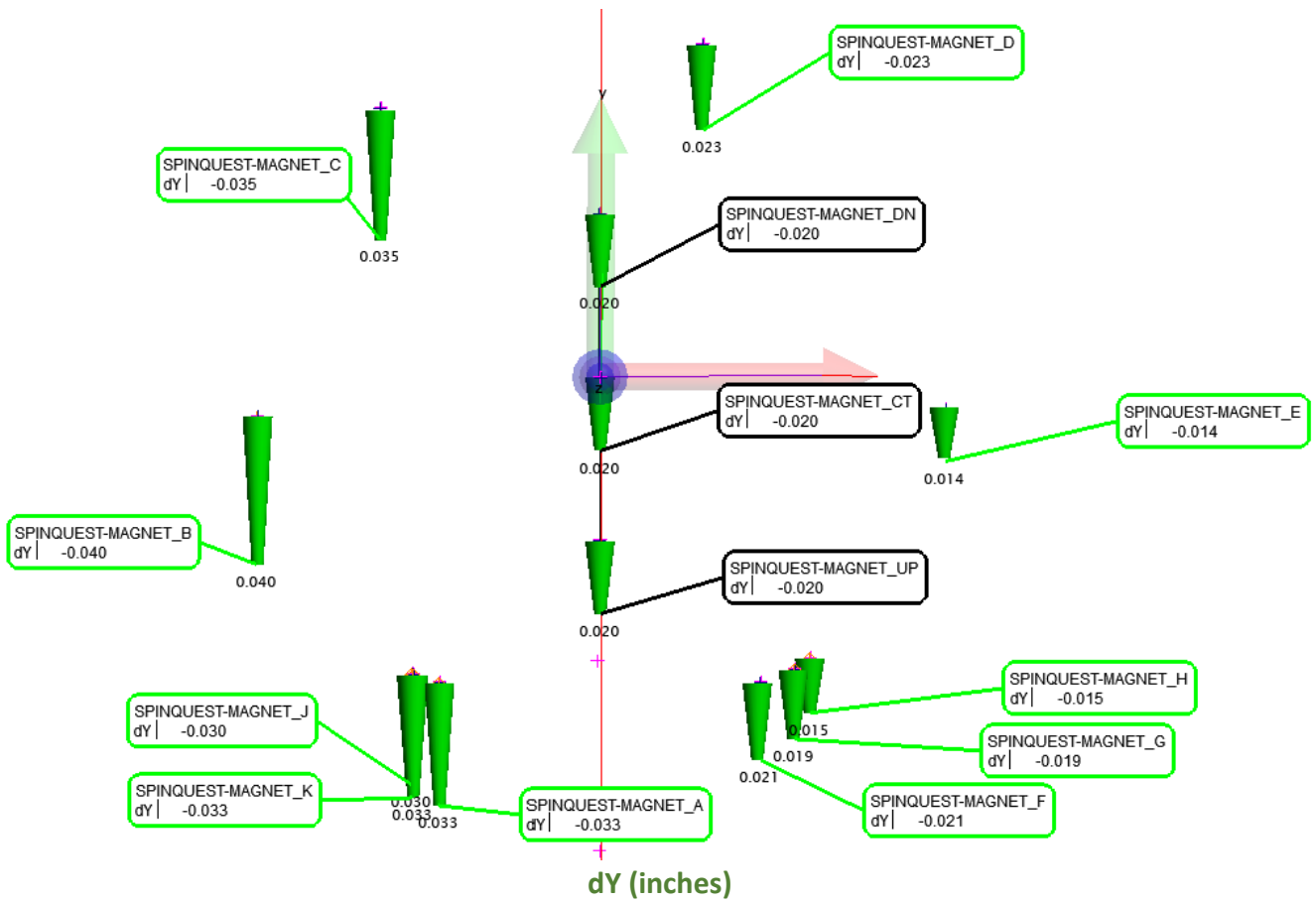
Fiducials and New Cup Set Locations (Green, Blue and Magenta)

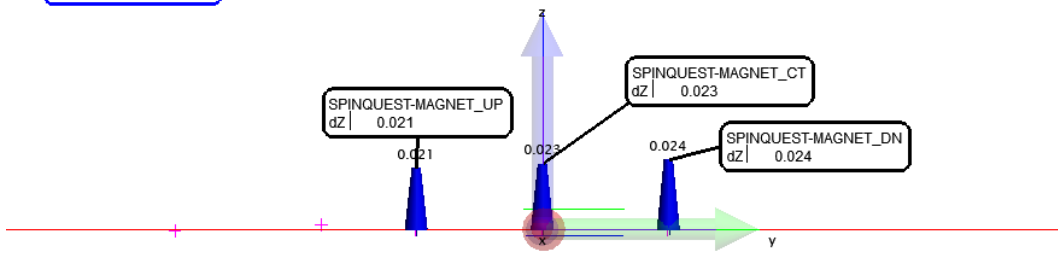
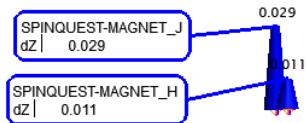
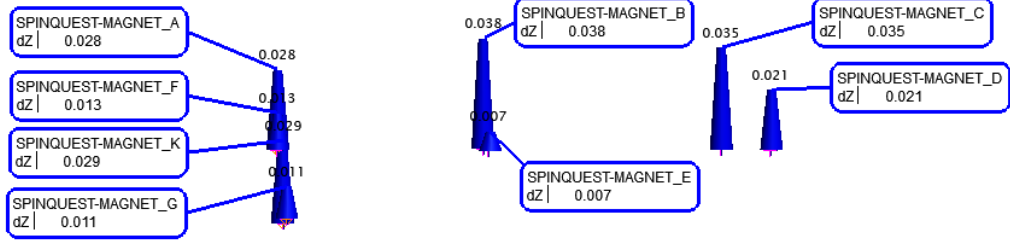


General Overview

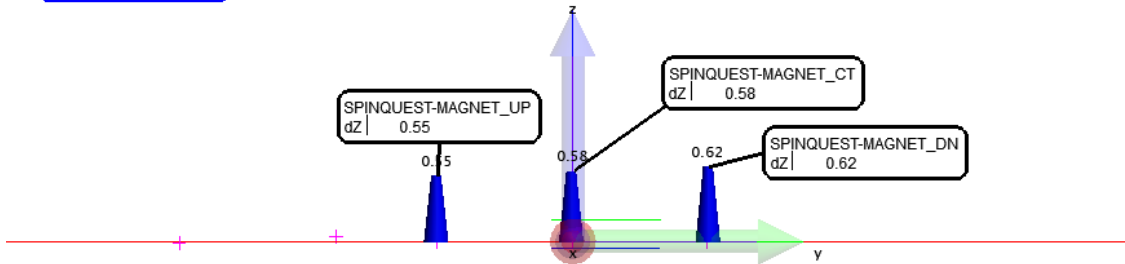
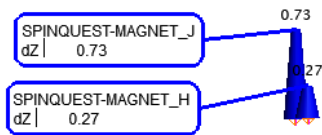
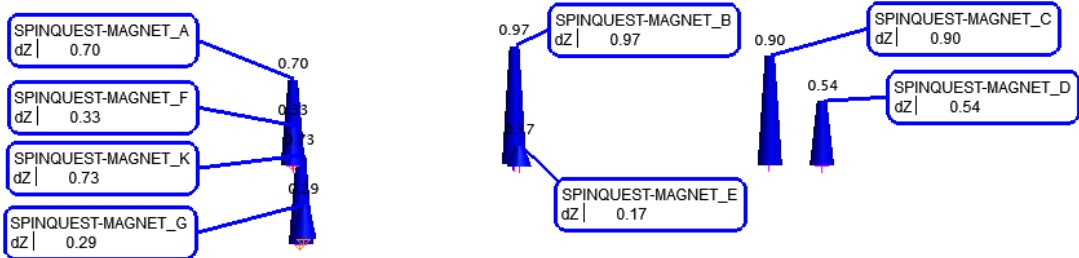
The following pictures indicate how much the Cryostat and Magnet moved with respect to the original alignment on 17-Mar-20 (Prog 3906 Req 8155 Align SpinQuest Target).







dZ (inches)



dZ (mm)

Vector Container Report

Show Delta and Magnitude
 Show i, j, k, and Magnitude
 Print
Excel Export
Done

Vector Name	Begin [Inches]			End [Inches]			Delta [Inches]		
	X	Y	Z	X	Y	Z	X	Y	Z
Part Aligned 3906_8156 17mar20-Magnet bfit to USMN only (WC Summary (Export Results)::Cryostat center on beamline station)									
SPINQUEST-MAGNET_F	8.591	-16.416	40.877	8.615	-16.437	40.889	0.024	-0.021	0.013
SPINQUEST-MAGNET_A	-8.653	-16.414	40.927	-8.630	-16.447	40.954	0.024	-0.033	0.028
SPINQUEST-MAGNET_K	-10.029	-15.963	35.798	-10.010	-15.996	35.827	0.019	-0.033	0.029
SPINQUEST-MAGNET_J	-10.081	-15.941	16.612	-10.078	-15.971	16.641	0.002	-0.030	0.029
SPINQUEST-MAGNET_G	10.431	-15.715	36.116	10.450	-15.734	36.128	0.019	-0.019	0.011
SPINQUEST-MAGNET_H	11.260	-15.125	16.645	11.262	-15.139	16.656	0.002	-0.015	0.011
SPINQUEST-MAGNET_UP	-0.015	-8.794	-0.023	-0.032	-8.814	-0.001	-0.017	-0.020	0.021
SPINQUEST-MAGNET_B	-18.403	-2.127	40.965	-18.390	-2.167	41.003	0.014	-0.040	0.038
SPINQUEST-MAGNET_E	18.532	-1.791	40.837	18.545	-1.805	40.844	0.013	-0.014	0.007
SPINQUEST-MAGNET_ROLL	-0.026	-0.047	99.978	0.037	-0.085	100.001	0.063	-0.037	0.023
SPINQUEST-MAGNET_CT	-0.014	-0.043	-0.022	-0.037	-0.063	0.001	-0.023	-0.020	0.023
SPINQUEST-MAGNET_DN	-0.012	8.708	-0.022	-0.041	8.689	0.003	-0.029	-0.020	0.024
SPINQUEST-MAGNET_C	-11.800	14.382	40.939	-11.798	14.347	40.974	0.002	-0.035	0.035
SPINQUEST-MAGNET_D	5.513	17.806	40.877	5.512	17.783	40.899	-0.001	-0.023	0.021

dX, dY, dZ (inches)

Vector Container Report

Show Delta and Magnitude
 Show i, j, k, and Magnitude
 Print
Excel Export
Done

Vector Name	Begin [Millimeters]			End [Millimeters]			Delta [Millimeters]		
	X	Y	Z	X	Y	Z	X	Y	Z
Part Aligned 3906_8156 17mar20-Magnet bfit to USMN only (WC Summary (Export Results)::Cryostat center on beamline station)									
SPINQUEST-MAGNET_F	218.22	-416.96	1038.26	218.82	-417.49	1038.59	0.60	-0.53	0.33
SPINQUEST-MAGNET_A	-219.80	-416.91	1039.54	-219.19	-417.75	1040.24	0.60	-0.84	0.70
SPINQUEST-MAGNET_K	-254.73	-405.46	909.28	-254.25	-406.29	910.01	0.48	-0.84	0.73
SPINQUEST-MAGNET_J	-256.05	-404.90	421.95	-255.98	-405.65	422.68	0.06	-0.75	0.73
SPINQUEST-MAGNET_G	264.95	-399.16	917.36	265.44	-399.63	917.64	0.48	-0.47	0.29
SPINQUEST-MAGNET_H	286.01	-384.17	422.80	286.05	-384.54	423.07	0.05	-0.37	0.27
SPINQUEST-MAGNET_UP	-0.39	-223.38	-0.58	-0.82	-223.87	-0.03	-0.43	-0.50	0.55
SPINQUEST-MAGNET_B	-467.44	-54.03	1040.50	-467.10	-55.04	1041.47	0.35	-1.01	0.97
SPINQUEST-MAGNET_E	470.71	-45.49	1037.27	471.04	-45.84	1037.44	0.34	-0.35	0.17
SPINQUEST-MAGNET_ROLL	-0.66	-1.20	2539.44	0.93	-2.15	2540.02	1.60	-0.95	0.58
SPINQUEST-MAGNET_CT	-0.34	-1.10	-0.56	-0.93	-1.59	0.02	-0.59	-0.50	0.58
SPINQUEST-MAGNET_DN	-0.30	221.19	-0.55	-1.04	220.69	0.07	-0.74	-0.50	0.62
SPINQUEST-MAGNET_C	-299.71	365.31	1039.84	-299.66	364.42	1040.74	0.05	-0.89	0.90
SPINQUEST-MAGNET_D	140.02	452.26	1038.29	140.01	451.68	1038.82	-0.01	-0.58	0.54

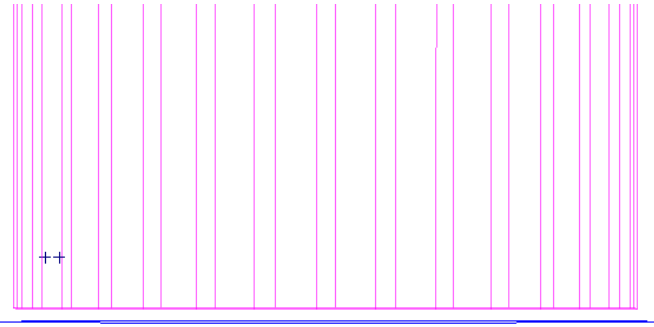
dX, dY, dZ (mm)

Cryostat stationing was determined by using a vertical best-fit line through the vessel.

Current location of Cryostat, Magnet and “New Cup Set” with respect to a local coordinate frame (Cryostat stationing on Beamline)

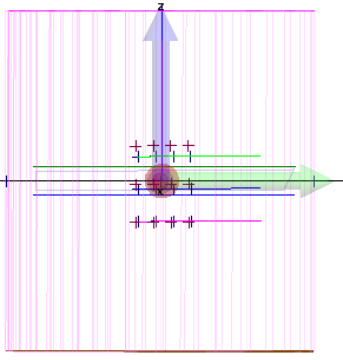
Cryostat stationing on Beamline				Cryostat stationing on Beamline			
	X (inches)	Y (inches)	Z (inches)	X (mm)	Y (mm)	Z (mm)	
NM2D1-1_DN	0.000	-7148.661	0.000	0.00	-181575.99	0.00	
FMAG-HOLE-CT_UP	0.000	116.841	0.000	0.00	2967.77	0.00	
NM3-CU-COLLIMATOR-BEAMPIPE-1	-0.140	-63.251	-0.287	-3.56	-1606.58	-7.30	
NM3-CU-COLLIMATOR-BEAMPIPE-2	-0.137	-50.993	0.190	-3.45	-1268.84	4.81	
NM3-CU-COLLIMATOR-BEAMPIPE-3	-0.136	-49.954	0.189	-3.48	-1295.21	4.82	
NM3-CU-COLLIMATOR-BEAMPIPE-4	0.039	-32.777	0.186	0.98	-832.55	4.73	
NM3-CU-COLLIMATOR-BEAMPIPE-5	-0.030	-27.211	0.206	-0.76	-691.15	5.22	
STICK-ASSEMBLY_ORIGIN	0.065	-0.031	61.264	1.65	-0.80	1556.11	
cryostat stationing on beamline	0.000	0.000	0.000	0.00	0.00	0.00	
TOP-TARGET-CUP-ELLIPSES-PROJECTED_CT	-0.030	-1.324	1.376	-0.77	-33.62	34.95	
TOP-TARGET-CUP-1_CT	-0.012	-0.324	1.393	-0.30	-8.23	35.38	
TOP-TARGET-CUP-2_CT	0.010	0.676	1.395	0.26	17.17	35.43	
TOP-TARGET-CUP-3_CT	0.032	1.676	1.403	0.82	42.56	35.62	
SPINQUEST-MAGNET_UP	-0.032	-8.814	-0.001	-0.82	-223.87	-0.03	
SPINQUEST-MAGNET_CT	-0.037	-0.063	0.001	-0.93	-1.59	0.02	
SPINQUEST-MAGNET_DN	-0.041	8.689	0.003	-1.04	220.69	0.07	
MIDDLE-TARGET-CUP-ELLIPSES-PROJECTED_CT	-0.036	-1.309	-0.472	-0.92	-33.26	-11.98	
MIDDLE-TARGET-CUP-1_CT	-0.014	-0.310	-0.459	-0.34	-7.86	-11.65	
MIDDLE-TARGET-CUP-2_CT	0.009	0.690	-0.453	0.24	17.53	-11.52	
MIDDLE-TARGET-CUP-3_CT	0.031	1.690	-0.447	0.79	42.92	-11.36	
BOTTOM-TARGET-CUP-1_CT	-0.016	-0.291	-2.307	-1.07	-32.79	-58.84	
BOTTOM-TARGET-CUP-2_CT	0.006	0.708	-2.298	-0.39	-7.40	-58.60	
BOTTOM-TARGET-CUP-3_CT	0.027	1.708	-2.292	0.15	17.99	-58.38	
BOTTOM-TARGET-CUP-ELLIPSES-PROJECTED_CT	-0.042	-1.291	-2.317	0.67	43.39	-58.21	

The following shows a Frame-to-Frame comparison between Cryostat stationing on Beamline Frame (Beamsheet) and the "New Cup Set" along with the magnet.



Frame to Frame Relationship			
Frames: Cryostat stationing on Beamline to TOP TARGET CUP (GREEN)			
	Frame A	Frame B	Delta
X	0.000	-0.030	-0.030
Y	0.000	-1.324	-1.324
Z	0.000	1.376	1.376
Rx	0.0	8.1	8.1
Ry	-0.0	0.0	0.0
Rz	-0.0	-21.0	-21.0

Units: (inches) (mrad)



Frame to Frame Relationship			
Frames: Cryostat stationing on Beamline to MIDDLE TARGET CUP (BLUE)			
	Frame A	Frame B	Delta
X	0.000	-0.036	-0.036
Y	0.000	-1.309	-1.309
Z	0.000	-0.472	-0.472
Rx	0.0	7.8	7.8
Ry	-0.0	0.0	0.0
Rz	-0.0	-22.5	-22.5

Units: (inches) (mrad)

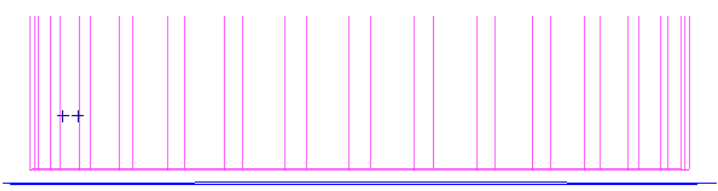
Frame to Frame Relationship			
Frames: Cryostat stationing on Beamline to SPINQUEST-MAGNET (BLACK)			
	Frame A	Frame B	Delta
X	0.000	-0.037	-0.037
Y	0.000	-0.063	-0.063
Z	0.000	0.001	0.001
Rx	0.0	0.2	0.2
Ry	-0.0	-0.0	-0.0
Rz	-0.0	0.5	0.5

Units: (inches) (mrad)

Frame to Frame Relationship			
Frames: Cryostat stationing on Beamline to BOTTOM TARGET CUP (MAGENTA)			
	Frame A	Frame B	Delta
X	0.000	-0.042	-0.042
Y	0.000	-1.291	-1.291
Z	0.000	-2.317	-2.317
Rx	0.0	8.4	8.4
Ry	-0.0	0.0	0.0
Rz	-0.0	-22.7	-22.7

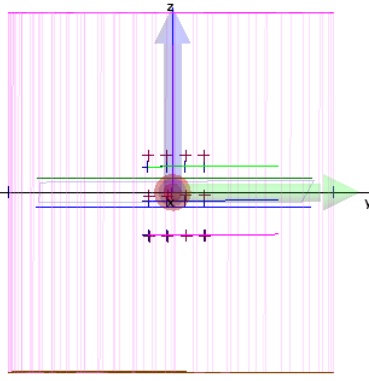
Units: (inches) (mrad)

dX, dY, dZ (inches) Rx, Ry, Rz (mrad)



Frame to Frame Relationship			
Frames: Cryostat stationing on Beamline to TOP TARGET CUP (GREEN)			
	Frame A	Frame B	Delta
X	0.00	-0.77	-0.77
Y	0.00	-33.62	-33.62
Z	0.00	34.95	34.95
Rx	0.0	8.1	8.1
Ry	-0.0	0.0	0.0
Rz	-0.0	-21.0	-21.0

Units: (mm) (mrad)



Frame to Frame Relationship			
Frames: Cryostat stationing on Beamline to MIDDLE TARGET CUP (BLUE)			
	Frame A	Frame B	Delta
X	0.00	-0.92	-0.92
Y	0.00	-33.26	-33.26
Z	0.00	-11.98	-11.98
Rx	0.0	7.8	7.8
Ry	-0.0	0.0	0.0
Rz	-0.0	-22.5	-22.5

Units: (mm) (mrad)

Frame to Frame Relationship			
Frames: Cryostat stationing on Beamline to SPINQUEST-MAGNET (BLACK)			
	Frame A	Frame B	Delta
X	0.00	-0.93	-0.93
Y	0.00	-1.59	-1.59
Z	0.00	0.02	0.02
Rx	0.0	0.2	0.2
Ry	-0.0	-0.0	-0.0
Rz	-0.0	0.5	0.5

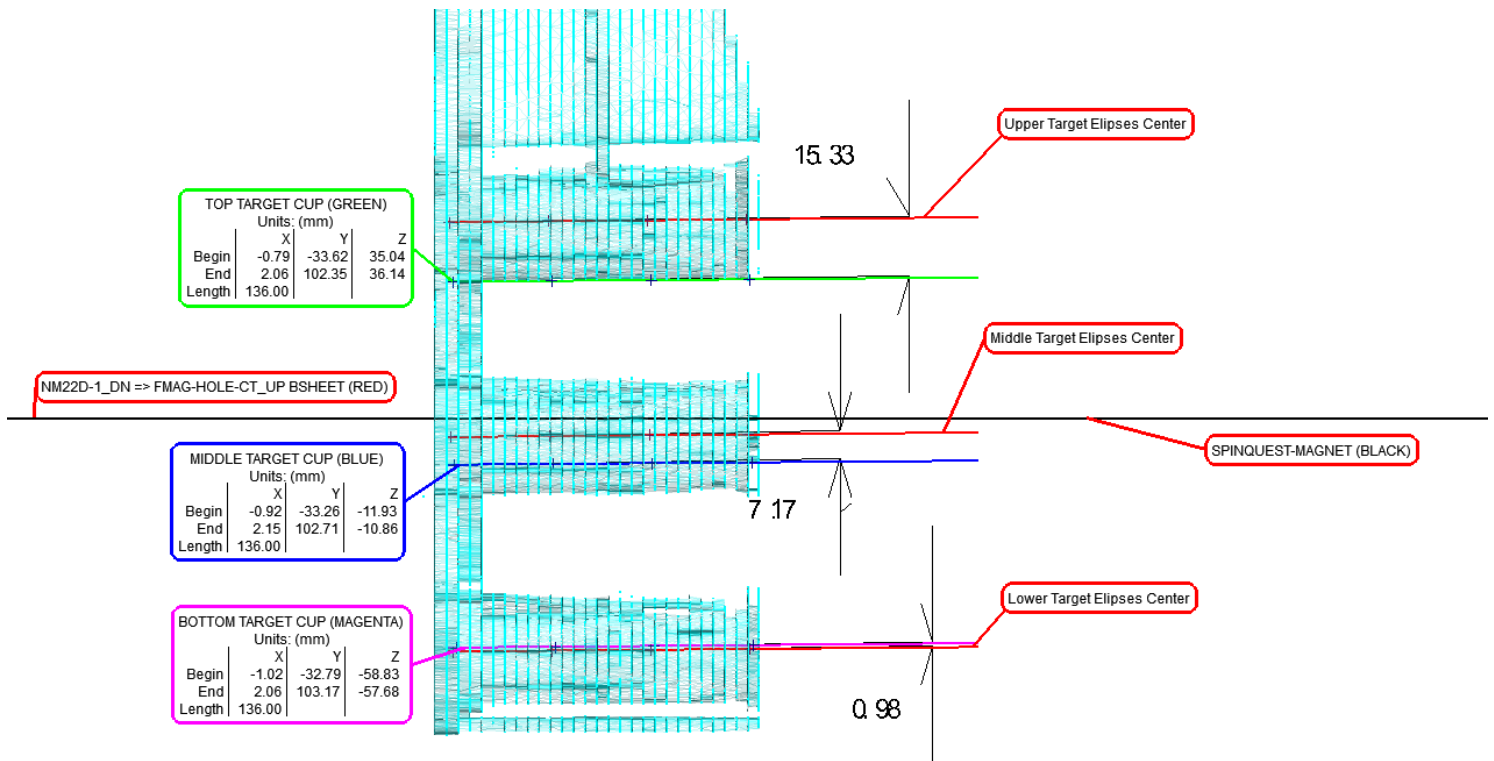
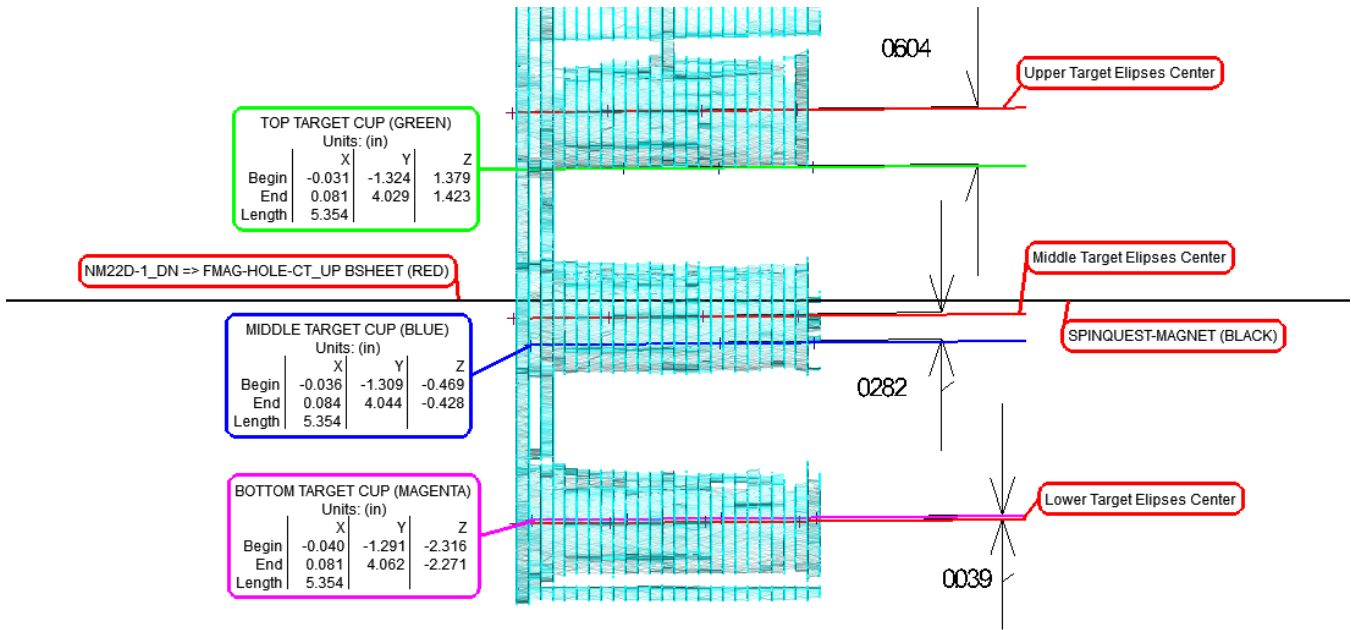
Units: (mm) (mrad)

Frame to Frame Relationship			
Frames: Cryostat stationing on Beamline to BOTTOM TARGET CUP (MAGENTA)			
	Frame A	Frame B	Delta
X	0.00	-1.07	-1.07
Y	0.00	-32.79	-32.79
Z	0.00	-58.84	-58.84
Rx	0.0	8.4	8.4
Ry	-0.0	0.0	0.0
Rz	-0.0	-22.7	-22.7

Units: (mm) (mrad)

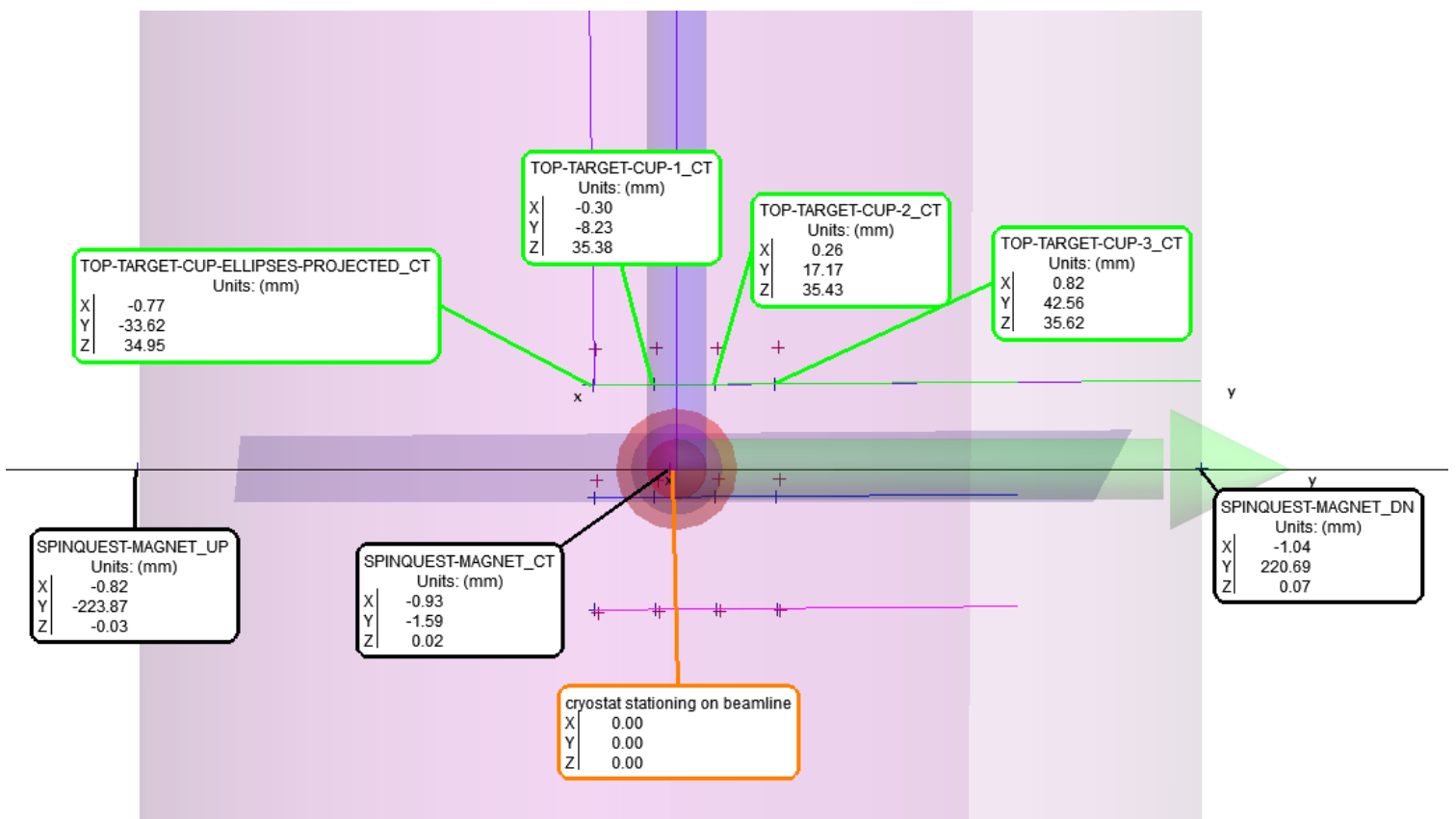
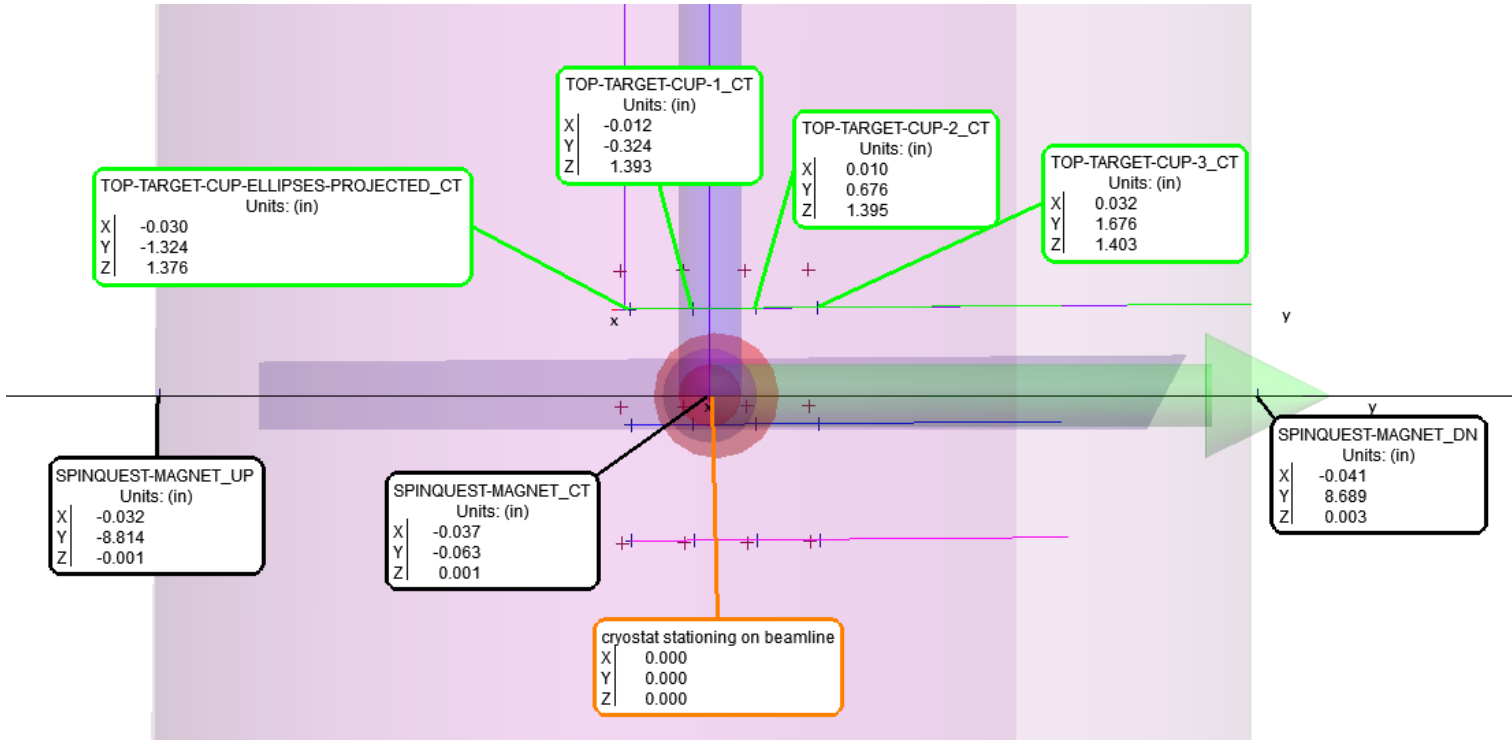
dX, dY, dZ (mm) Rx, Ry, Rz (mrad)

The following shows the centerlines of the “Old Cup Set” and the “New Cup Set” along with their vertical correction values (dZ).

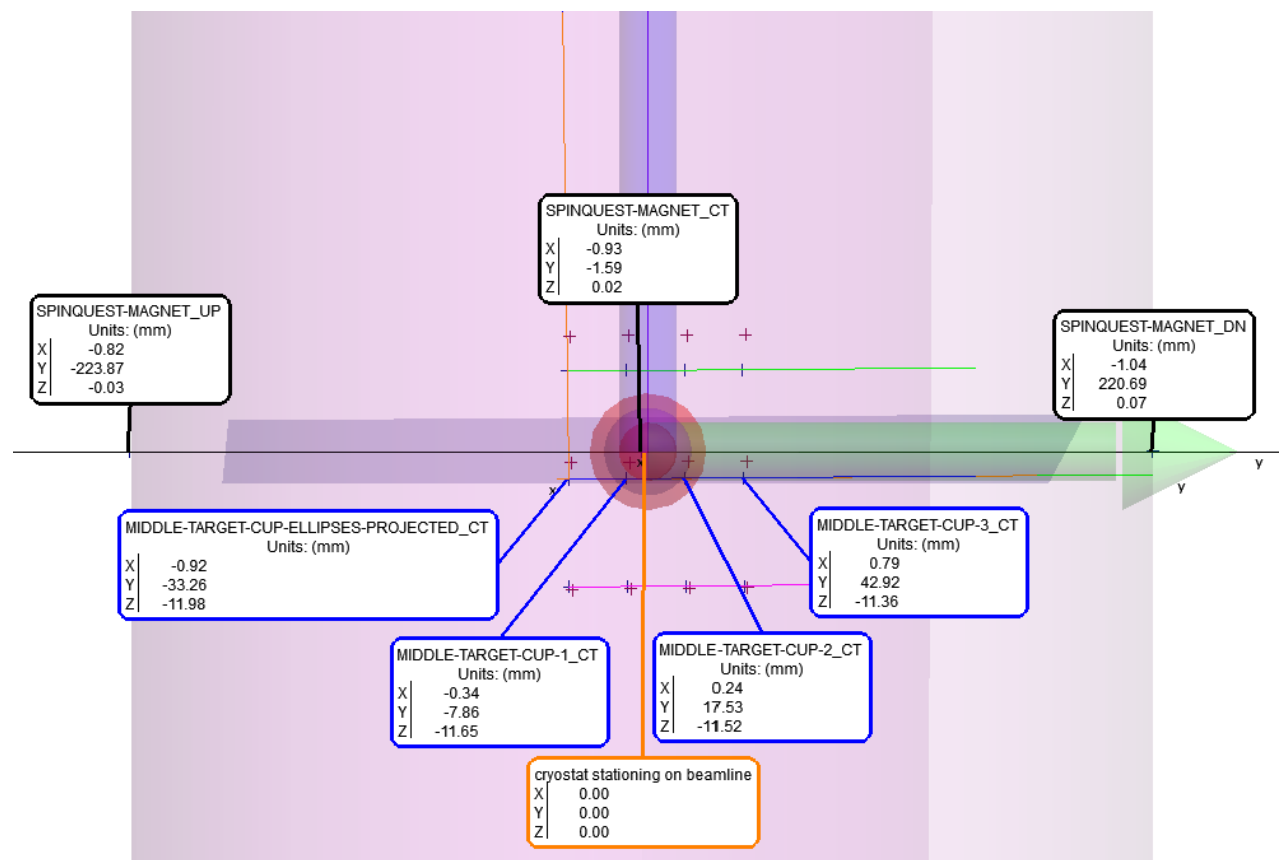
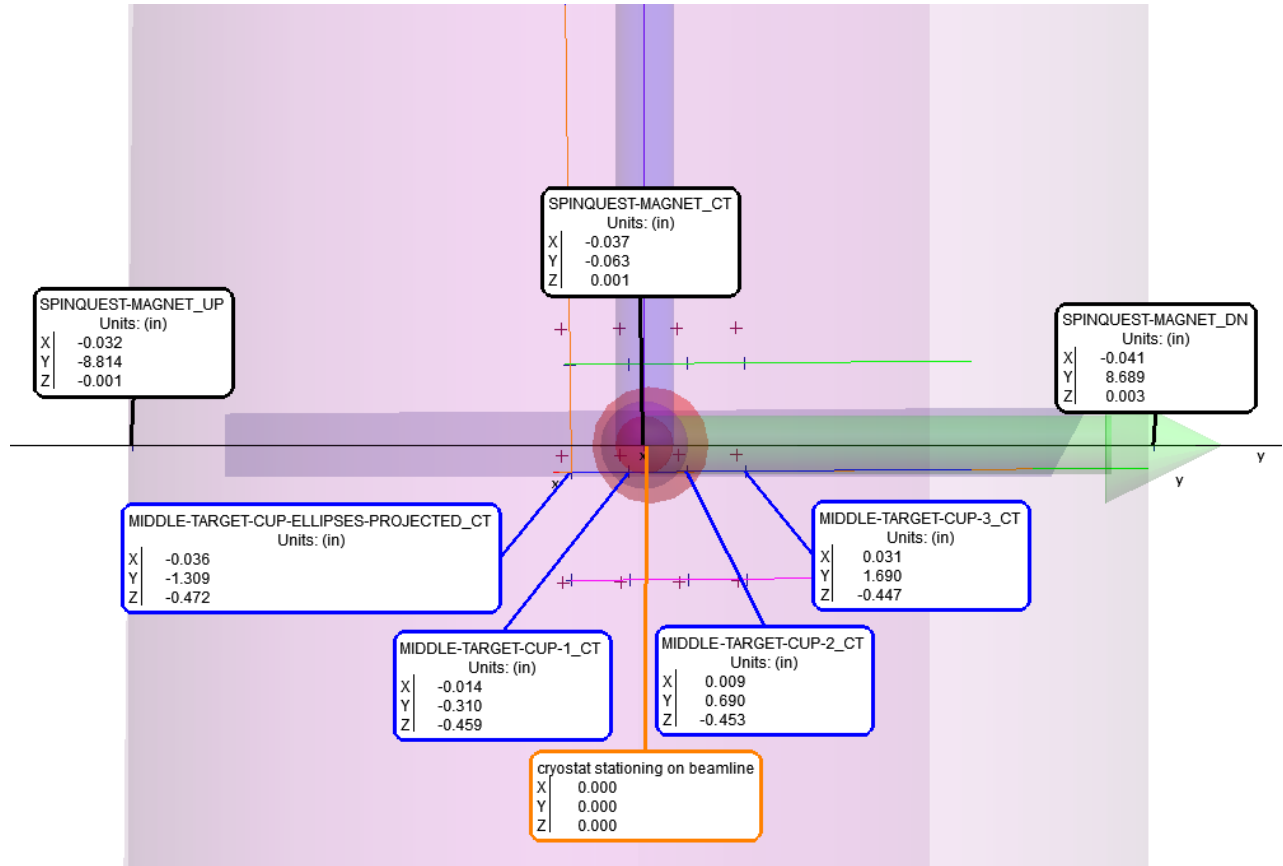


Green, Blue and Magenta lines are “New Cup Set” positions.

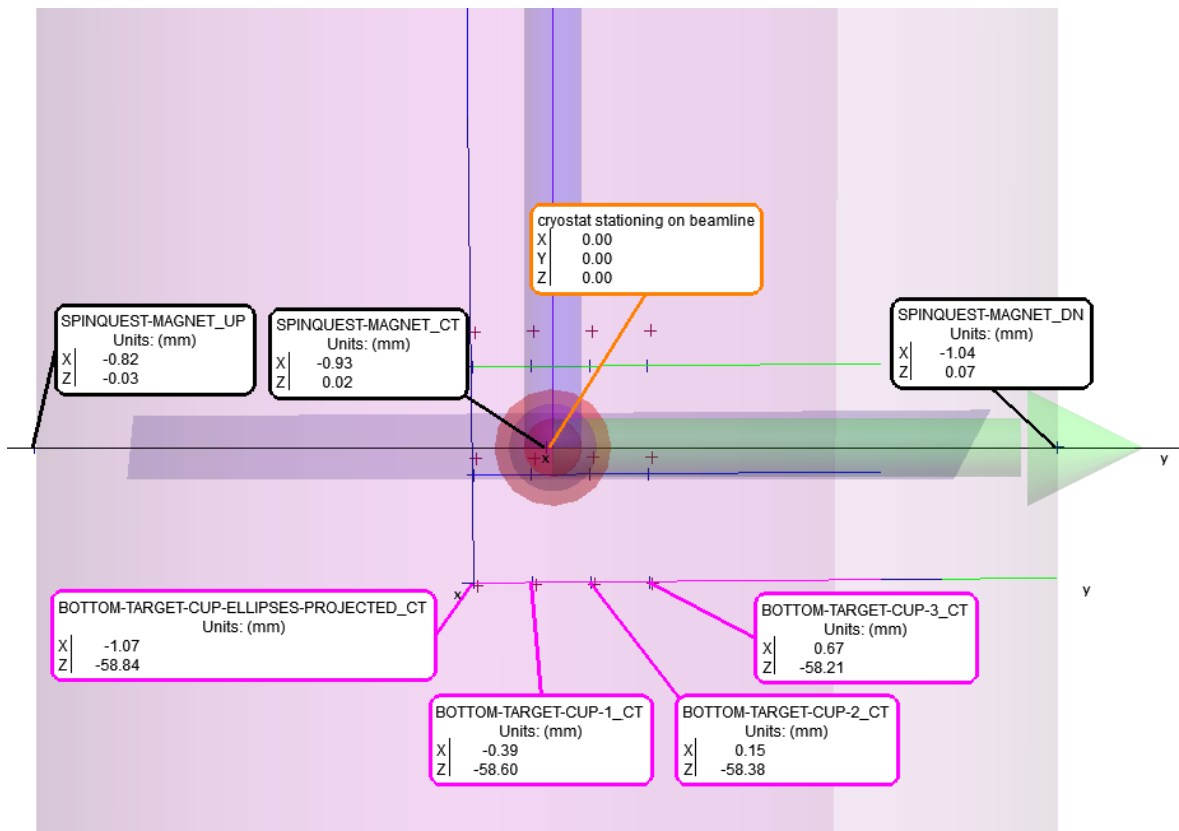
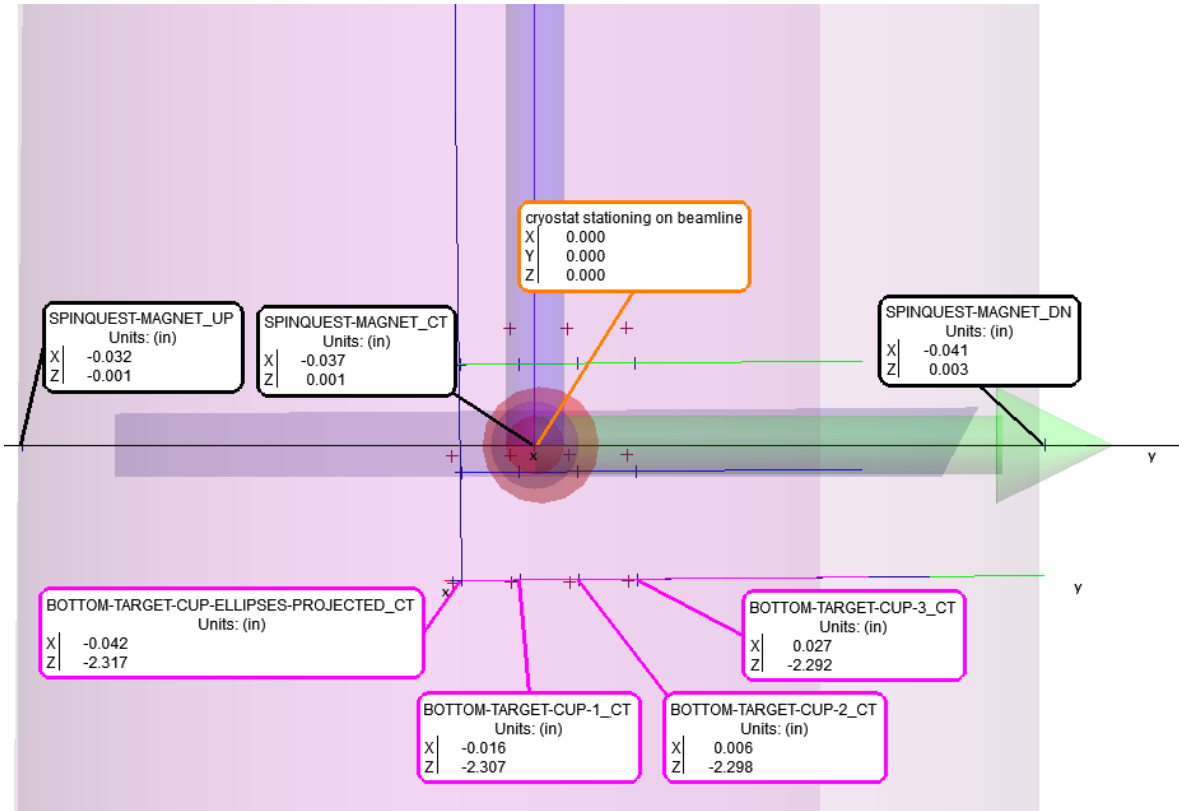
Cryostat stationing on Beamline Frame vs Top-Target-Cup Frame (Side Views)



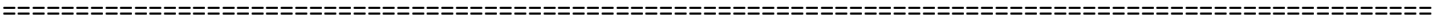
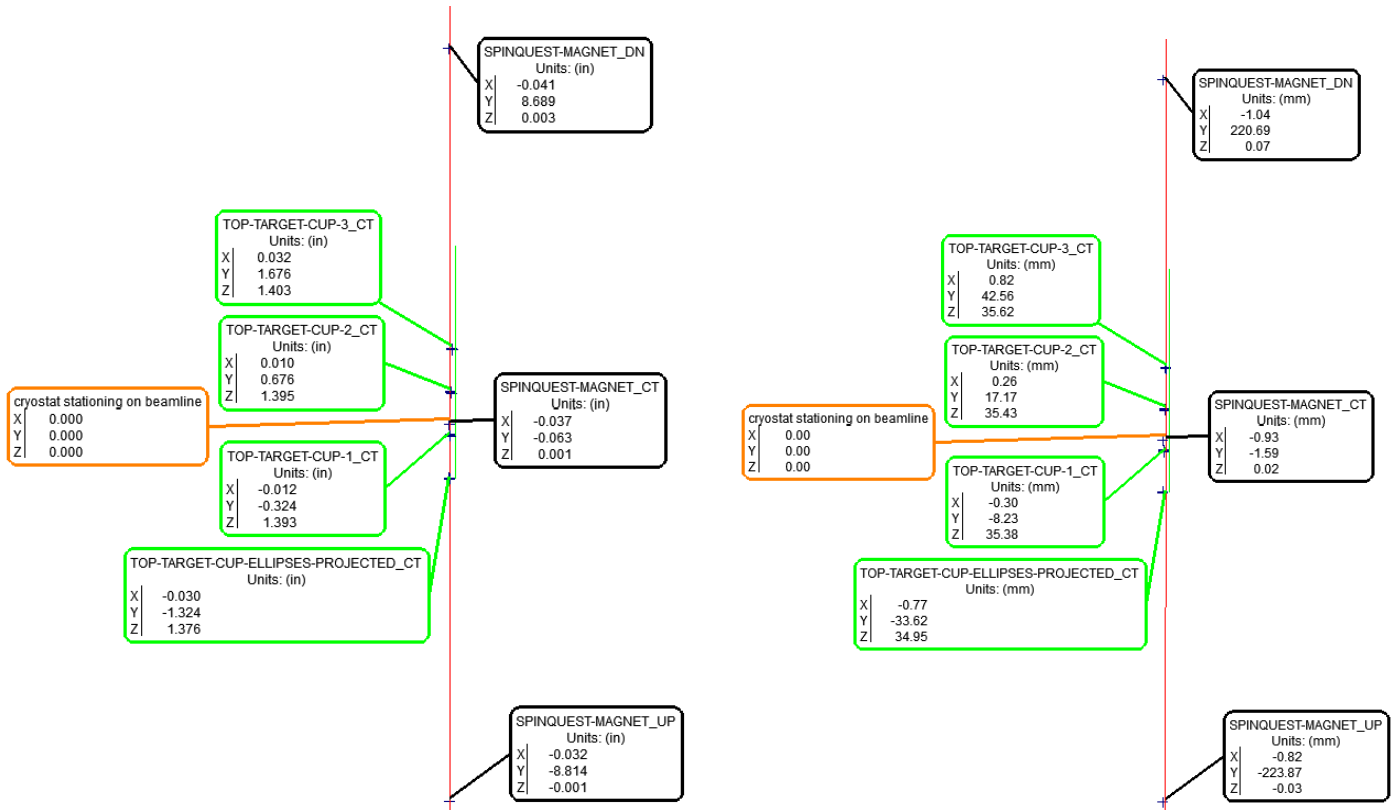
Cryostat stationing on Beamline Frame vs Middle-Target-Cup Frame (Side Views)

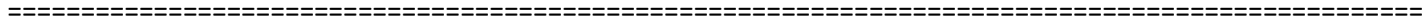
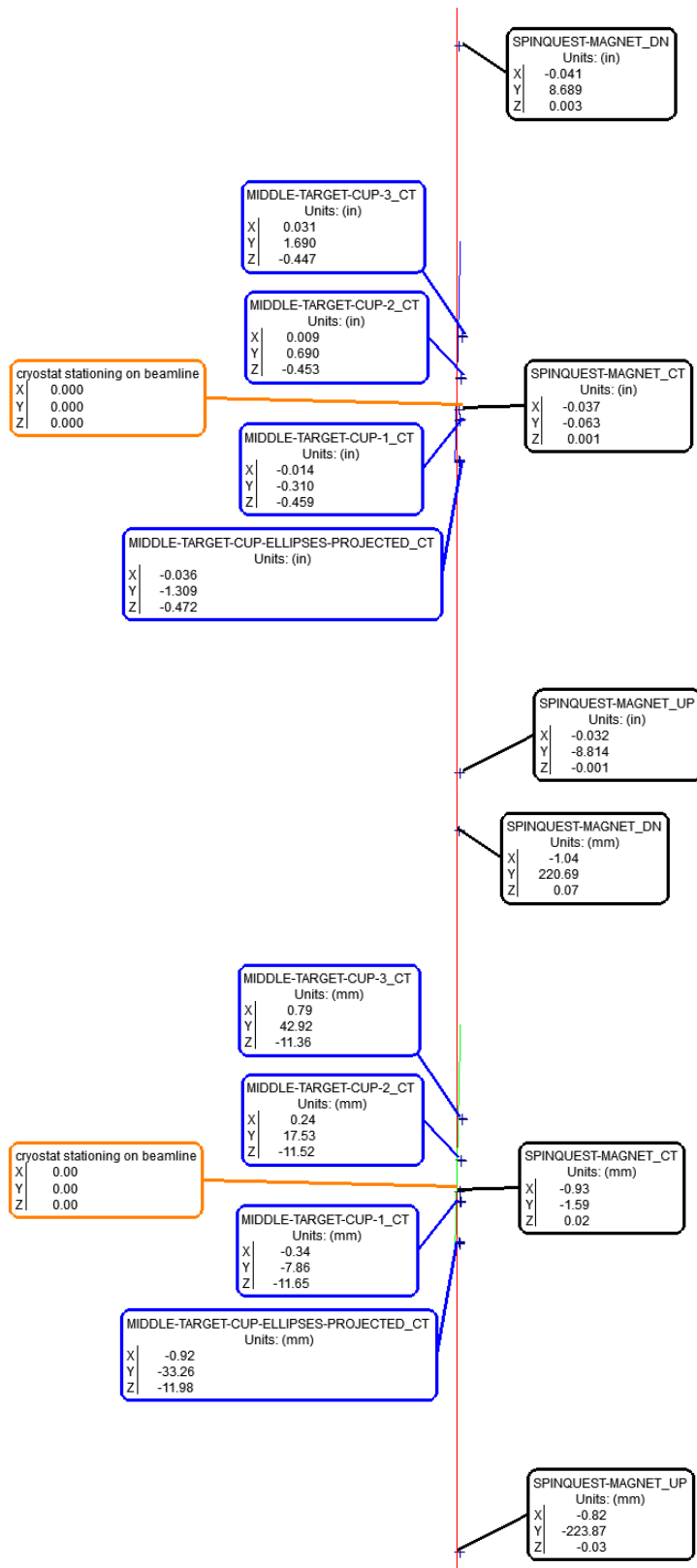


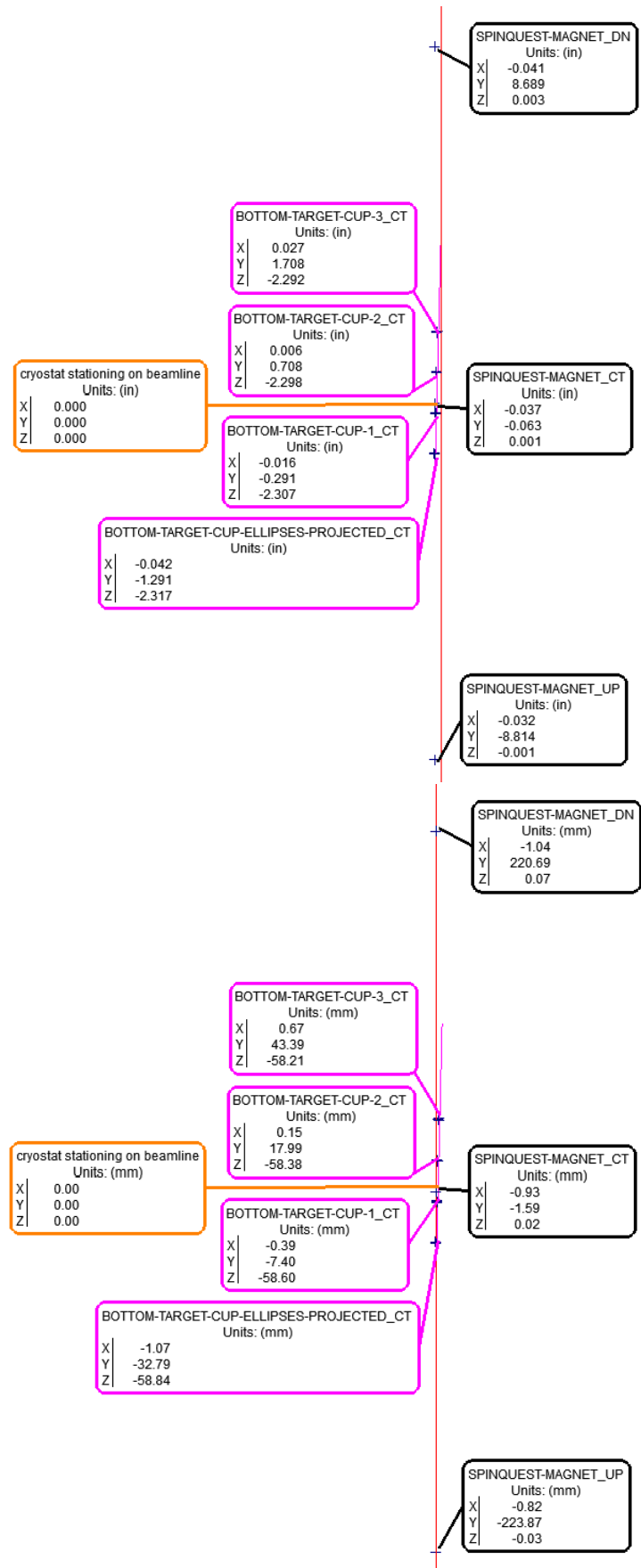
Cryostat stationing on Beamline Frame vs Bottom-Target-Cup Frame (Side Views)



Cryostat stationing on Beamline (Top View)







Work Request:

Request #: 8652 Requisition Date: 02-JUN-23
Project #: 3906
WBS: 40A.E1039.12
Task Manager: JOHN KYLE
Starting Date: 12-JUN-23 Completion Date: 16-JUN-23
Request By: KUN LIU
Expt/Beamline: E1039
Devices need to be moved or realigned:
None
Description:
Survey of the E1039 polarized target system, it is located in NM3.

Contact for the job
Fermi ID#: V15878 Name: KUN LIU
Extension: E-Mail: LIUK.PKU@GMAIL.COM
Mail Stop: 122 Pager/Cell:

Hazard Assessor: RICK TESAREK

EJulie / Dig permit: No

Crew report:

=====

Request # : 8652 Date : 08-AUG-23
Project # : 3906 Crew # : 6
Area : NM3
Log Book # :
Page # :
Filename : 3906_08Aug23_LT
Job Completion (Y/N) : N
Estimate remaining time to finish the request in hour : 5

Comments
Started As Found of E1039 polarized target system at NM3.

Request # : 8652 Date : 09-AUG-23
Project # : 3906 Crew # : 6
Area : NM3
Log Book # :
Page # :
Filename : 3906_08Aug23_LT
Job Completion (Y/N) : Y
Estimate remaining time to finish the request in hour : 0

Comments
Finished survey of the E1039 polarized target system and pulled equipment at NM3.