Jefferson Lab Alignment Group

Data Transmittal

TO: D. Gaskel, B. Sawatzky, M. Jones		**DATE:** 06/14/2017
FROM: Kelly Tremblay	**Checked:** (seh)	**# :** C1796r

DETAILS: data: aalign\shms\s170608

Below are the results from the survey of SHMS spectrometer on June 9th and 12th, 2017. The SHMS fiducial points were observed from both the left and right side to see the difference in the resulting angles

.

The horizontal pointing value shows how much the central axis of the spectrometer misses the ideal target. This value is perpendicular to the spectrometer axis, not along the beam line. For the vertical pointing, a positive value indicates that the spectrometer is pointing above the target.

========== RESULTS Both Sides observed ========== S060817

The central ray of the spectrometer is at 23.321 degrees

FOR SHMS REPORTING angle is : 20.3209 degrees

The central ray is missing the defined target center by 0.57 [mm] Downstream
and 0.27 mm vertically [positive value is up]

Bender RotZ (roll) = -0.00263 degrees
Bender RotX (pitch) = 0.03493 degrees
Bender RotY (yaw) = 120.60582 degrees
Bender Rotation wrt Hall C Zero Azimuth = 21.87850 degrees
Bender Calc A posteriori value= 0.167 millimenters

9 Par A posteriori value : 0.15 (mm)

========== RESULTS Observing from left side of spectrometer ========== S060817

The central ray of the spectrometer is at 23.321 degrees

FOR SHMS REPORTING angle is : 20.3211 degrees

The central ray is missing the defined target center by 0.65 [mm] Downstream
and 0.09 mm vertically [positive value is up]

Bender RotZ (roll) = -0.01638 degrees
Bender RotX (pitch) = 0.02001 degrees
Bender RotY (yaw) = 120.62809 degrees
Bender Rotation wrt Hall C Zero Azimuth = 21.85623 degrees
Bender Calc A posteriori value= 0.063 millimenters

9 Par A posteriori value : 0.14 (mm)

========== RESULTS Observing from right side of spectrometer ========== S060817

The central ray of the spectrometer is at -23.320 degrees

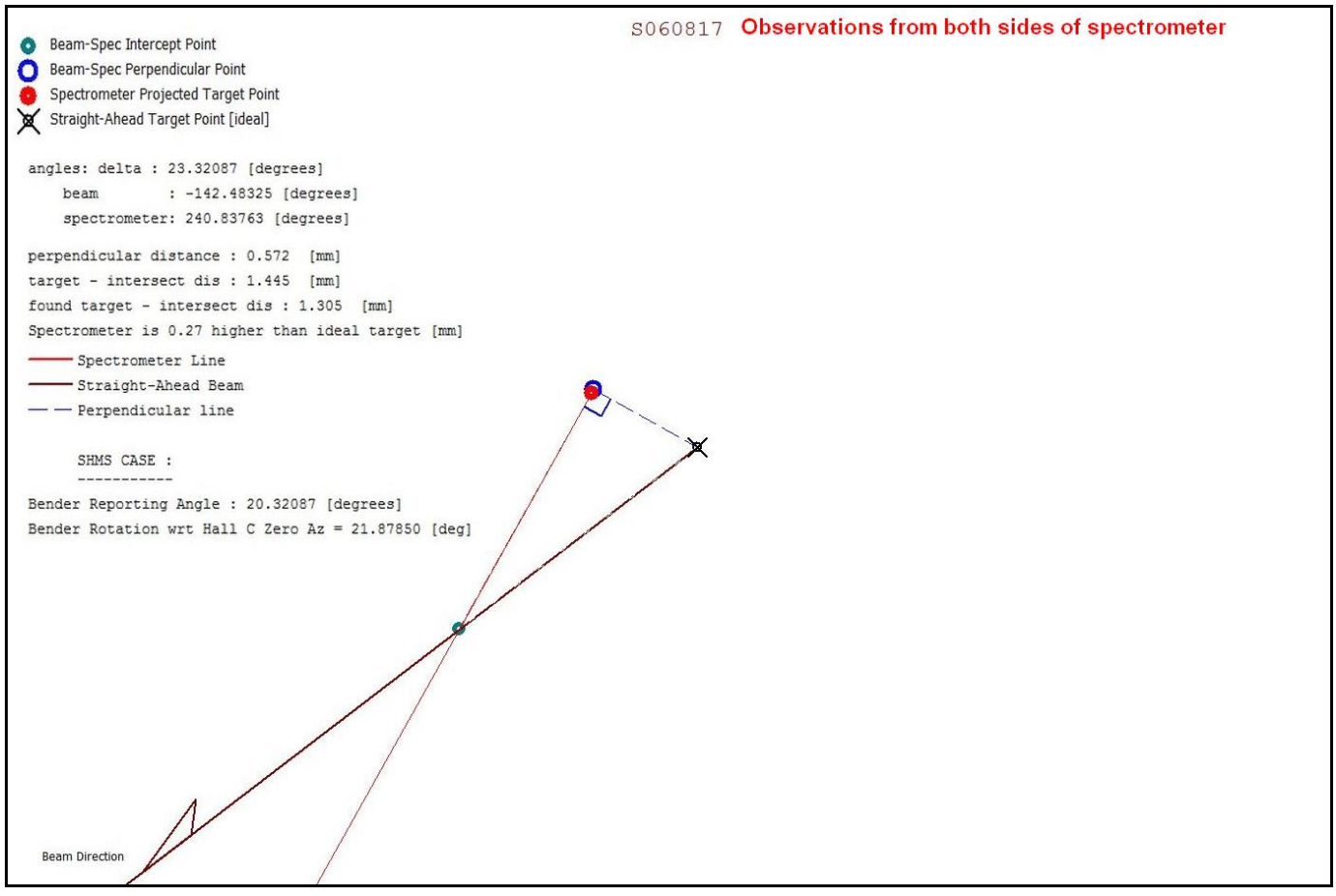
FOR SHMS REPORTING angle is : 20.3204 degrees

The central ray is missing the defined target center by 0.47 [mm] Downstream
and 0.45 mm vertically [positive value is up]

Bender RotZ (roll) = 0.00207 degrees
Bender RotX (pitch) = 0.02718 degrees
Bender RotY (yaw) = 120.59072 degrees
Bender Rotation wrt Hall C Zero Azimuth = 21.89360 degrees
Bender Calc A posteriori value= 0.026 millimenters

9 Par A posteriori value : 0.15 (mm)

The sketches below illustrate the errors for the combination survey, the left side data and the right side data



S060817

Beam-Spec Intercept Point
Beam-Spec Perpendicular Point
Spectrometer Projected Target Point
Straight-Ahead Target Point [ideal]

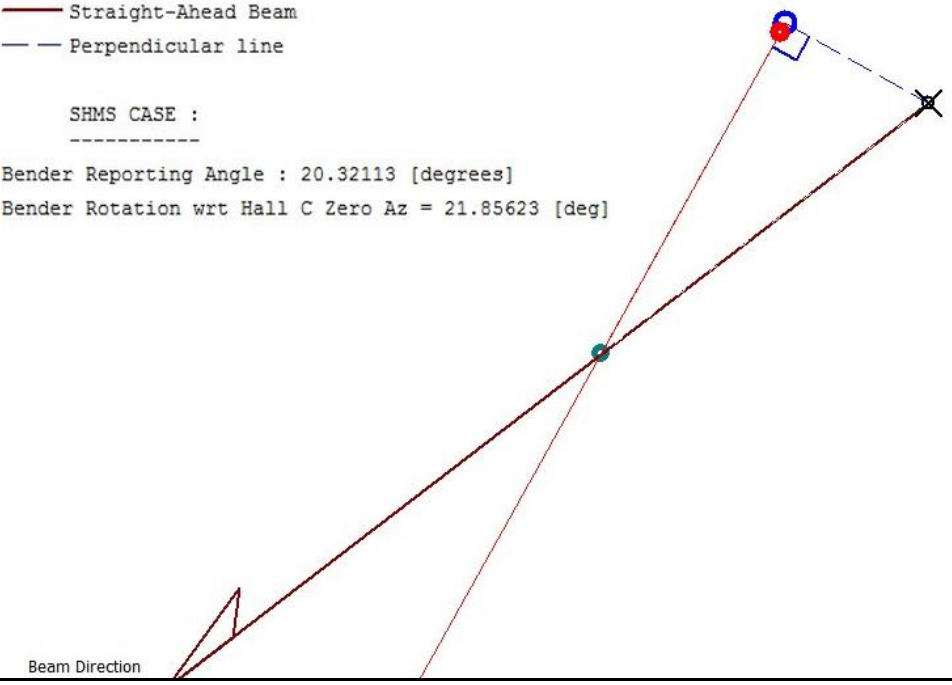
Observations from left side of spectrometer

```
angles: delta : 23.32113 [degrees]
    beam        : -142.48325 [degrees]
    spectrometer: 240.83788 [degrees]

perpendicular distance : 0.652  [mm]
target - intersect dis : 1.646  [mm]
found target - intersect dis : 1.469  [mm]
Spectrometer is 0.09 higher than ideal target [mm]
```

Spectrometer Line
Straight-Ahead Beam
Perpendicular line

```
     SHMS CASE :
     -----------
Bender Reporting Angle : 20.32113 [degrees]
Bender Rotation wrt Hall C Zero Az = 21.85623 [deg]
```



Beam Direction

S060817

Beam-Spec Intercept Point
Beam-Spec Perpendicular Point
Spectrometer Projected Target Point
Straight-Ahead Target Point [ideal]

Observations from right side of spectrometer

```
angles: delta : 23.32045 [degrees]
    beam        : -142.48325 [degrees]
    spectrometer: 240.83720 [degrees]

perpendicular distance : 0.469  [mm]
target - intersect dis : 1.185  [mm]
found target - intersect dis : 1.067  [mm]
Spectrometer is 0.45 higher than ideal target [mm]
```

Spectrometer Line
Straight-Ahead Beam
Perpendicular line

```
     SHMS CASE :
     -----------
Bender Reporting Angle : 20.32045 [degrees]
Bender Rotation wrt Hall C Zero Az = 21.89360 [deg]
```