

Beam size at Distributor and SMV under the effect of Quadrupole error

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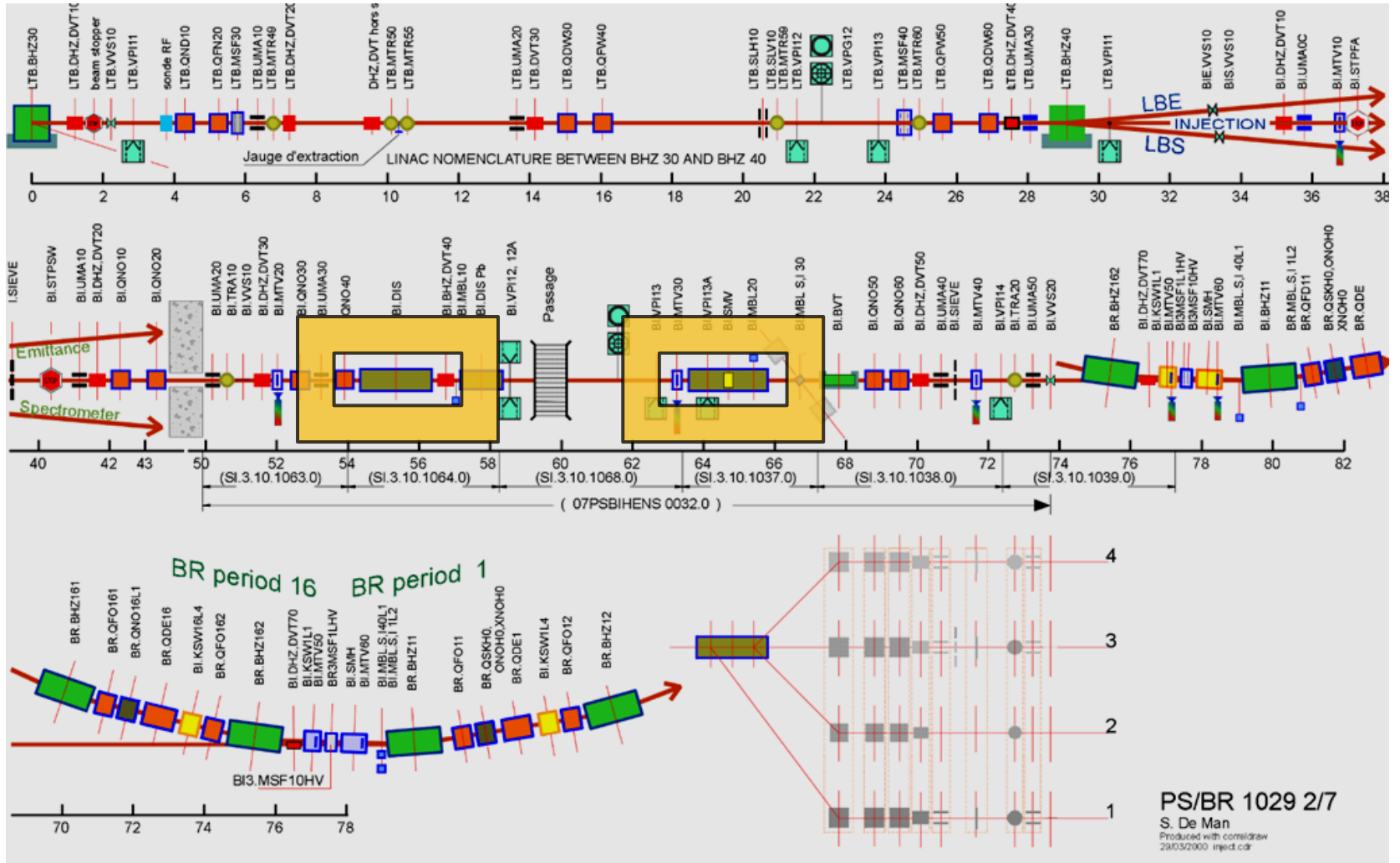
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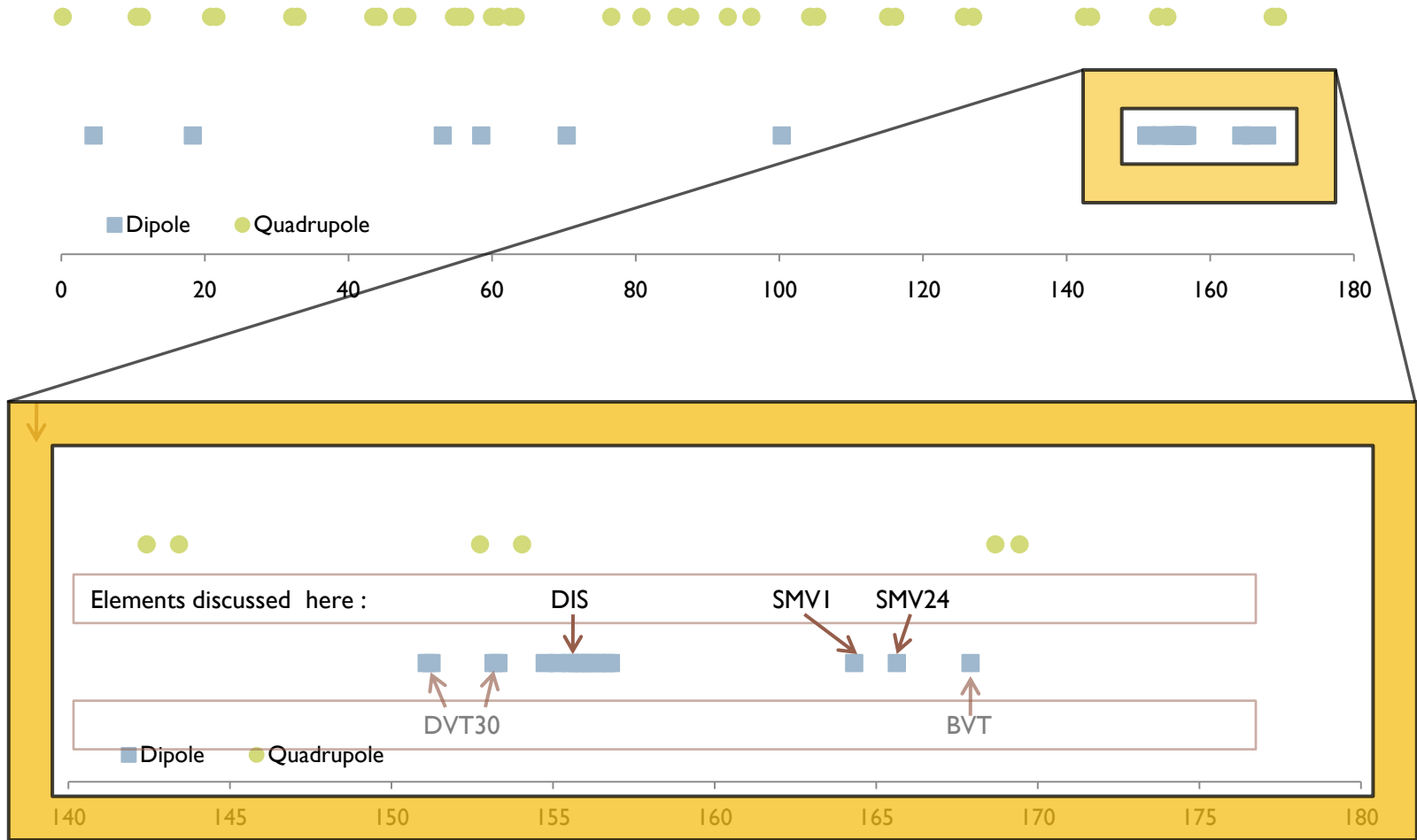
Applied Error(s)!

- ▶ Beam center jitter can be corrected,
- ▶ The beam size variation due to error in gradients of quadrupoles has to be studied.
- ▶ An error of 0.5% was applied on the gradients of all the quadrupoles in the transfer-line, with uniform distribution.

Where we look?



Where we look!



Distributor Input

Aperture*

Horizontal: 50 mm

Vertical : 98 mm

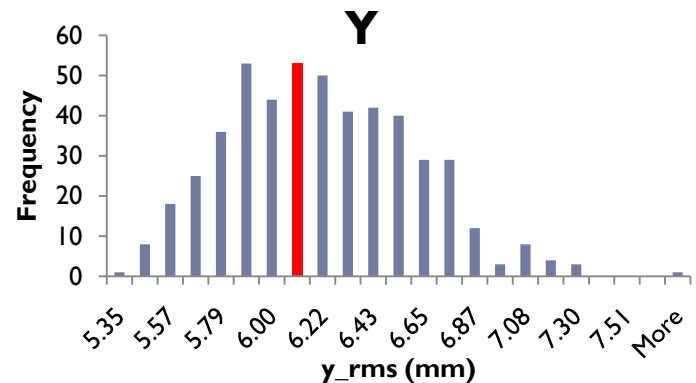
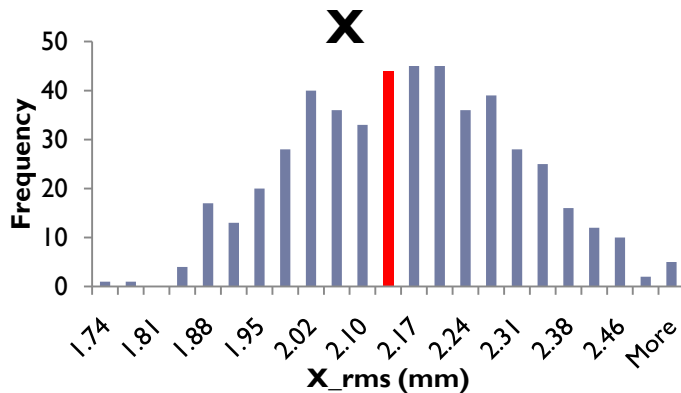
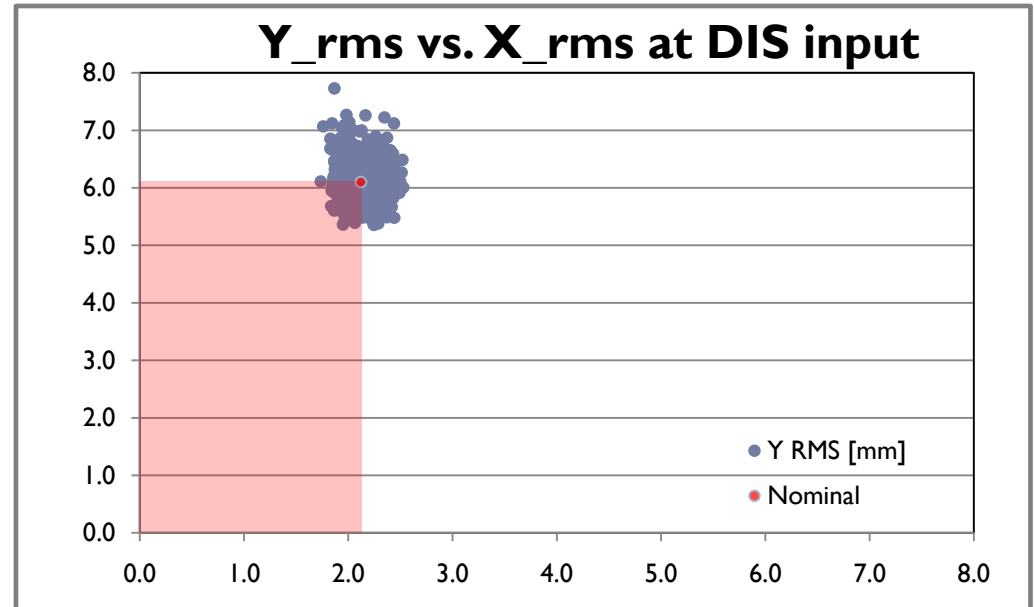
Min / **Nom**(Aperture/RMS)

Horizontal: 19.8 / **23.6**

Vertical : 12.7 / **16.1**

*Apertures are taken from:

http://ab-div-bt.web.cern.ch/ab-div-bt/Sections/TL/organization/PSB-BI/physical_available_beam_aperture.htm



Distributor Output

Aperture

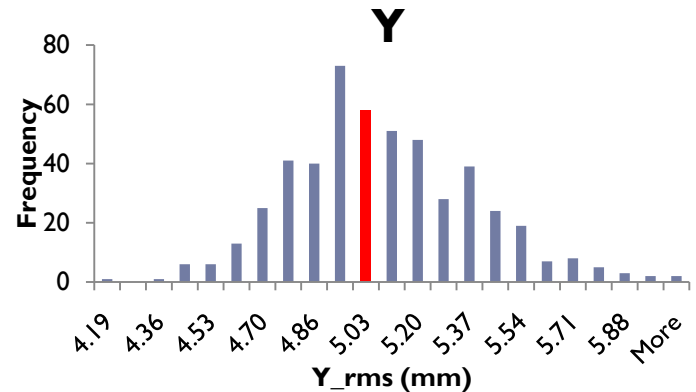
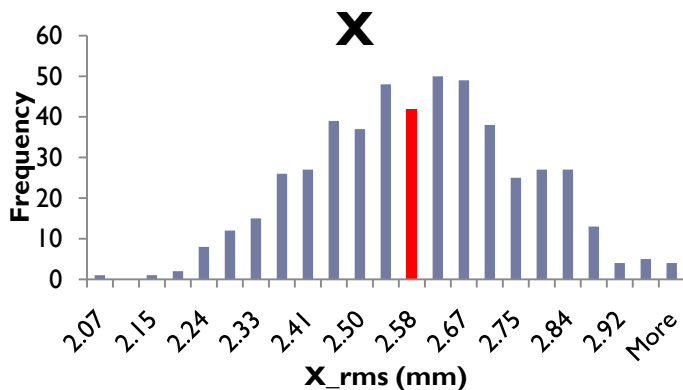
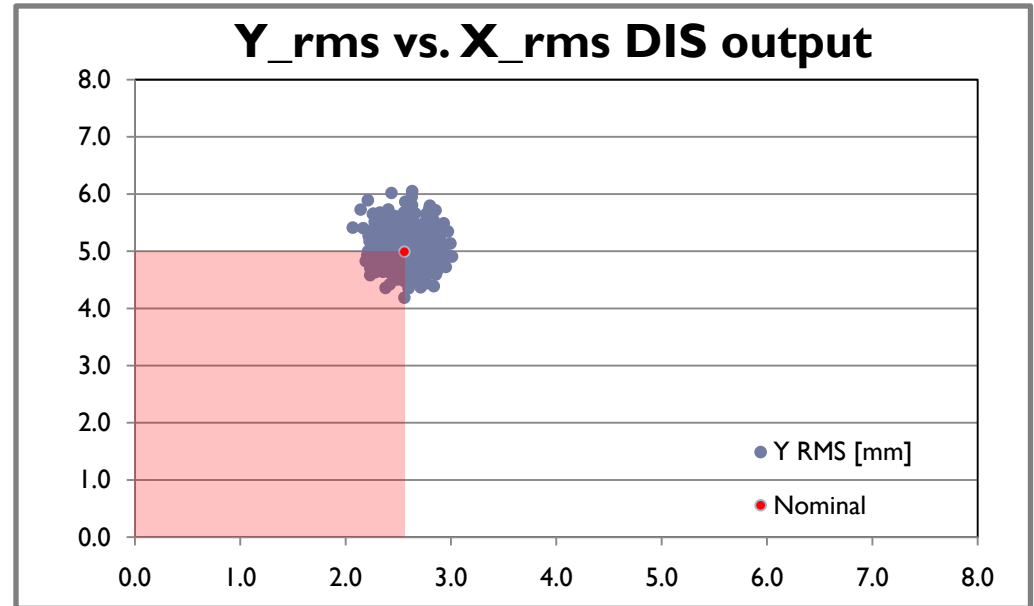
Horizontal: 50 mm

Vertical : 98 mm

Min / **Nom**(Aperture/RMS)

Horizontal: 16.6 / **19.5**

Vertical : 16.2 / **19.6**



SMV1 Input

Aperture

Horizontal: 68 mm

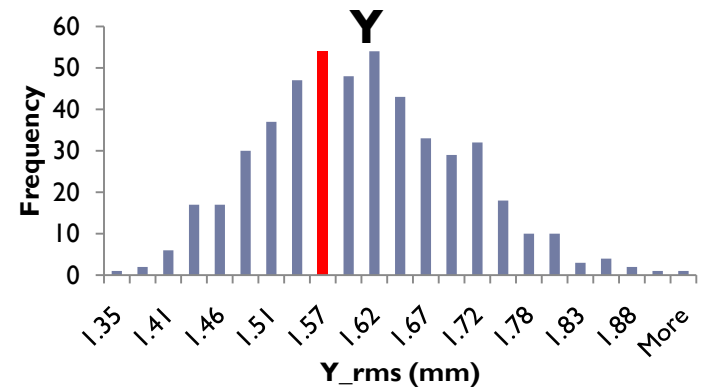
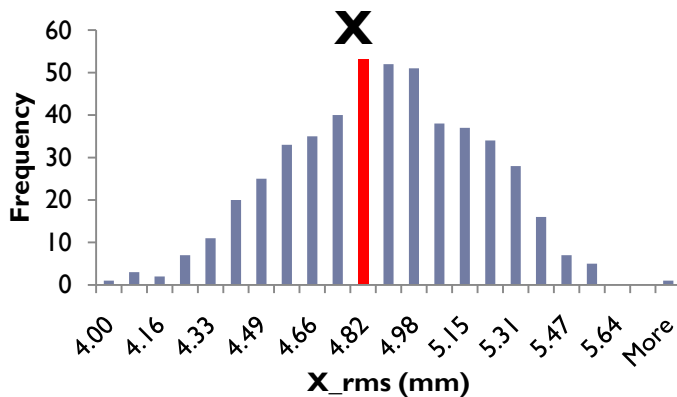
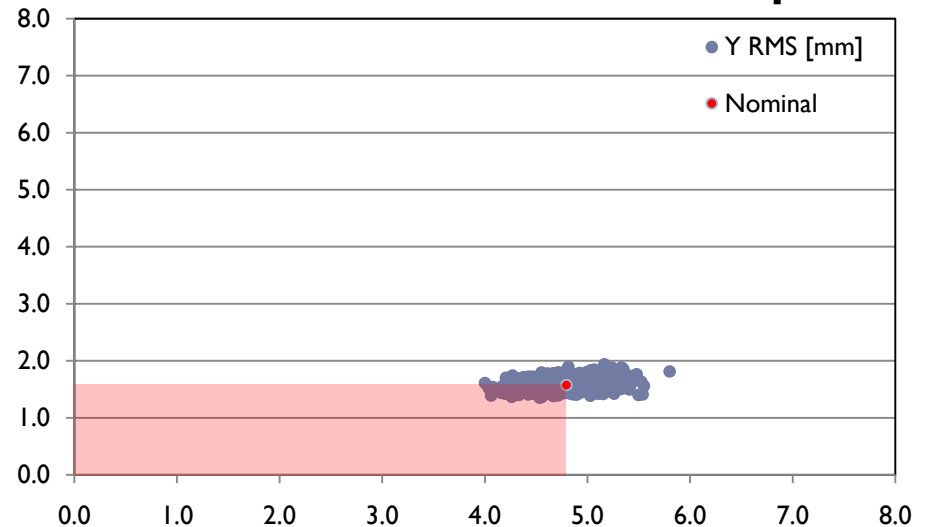
Vertical : 25 mm

Min / **Nom**(Aperture/RMS)

Horizontal: 11.7 / **14.2**

Vertical : 12.9 / **15.9**

Y_rms vs. X_rms SMVI Input



SMV1 Output

Aperture

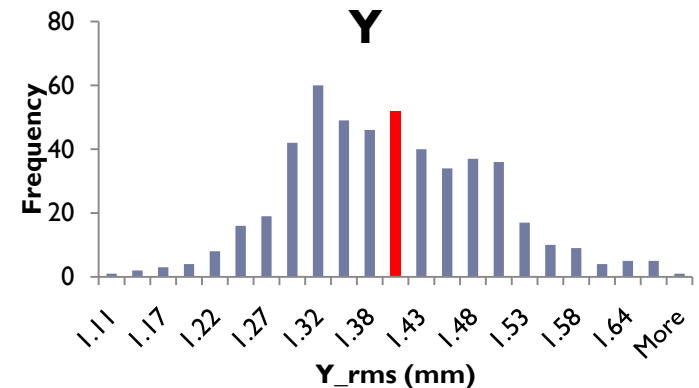
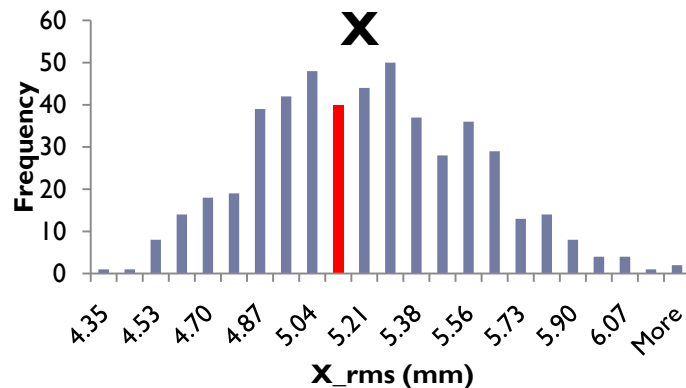
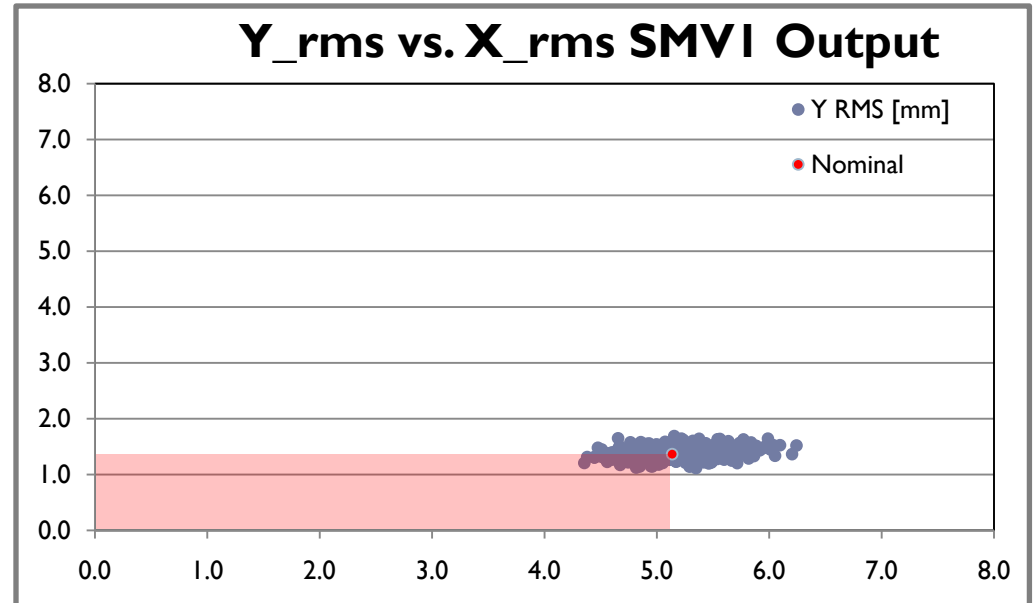
Horizontal: 68 mm

Vertical : 25 mm

Min / **Nom**(Aperture/RMS)

Horizontal: 10.9 / **13.2**

Vertical : 14.8 / **18.3**



SMV24 Input

Aperture

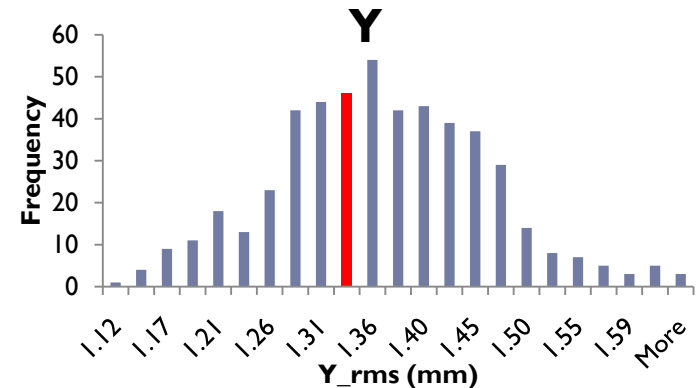
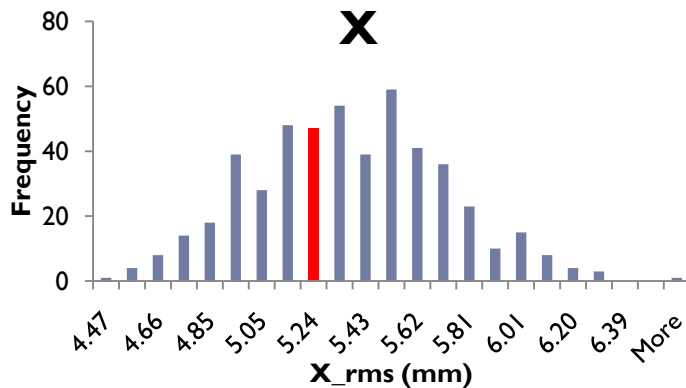
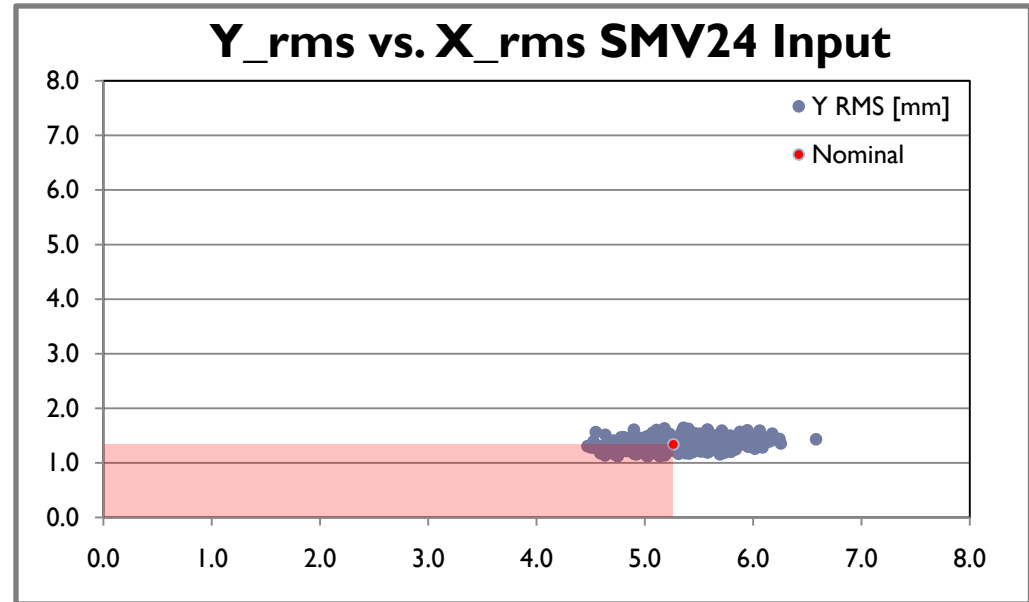
Horizontal: 68 mm

Vertical : 25 mm

Min / **Nom**(Aperture/RMS)

Horizontal: 10.3 / **12.9**

Vertical : 15.2 / **18.7**



SMV24 Output

Aperture

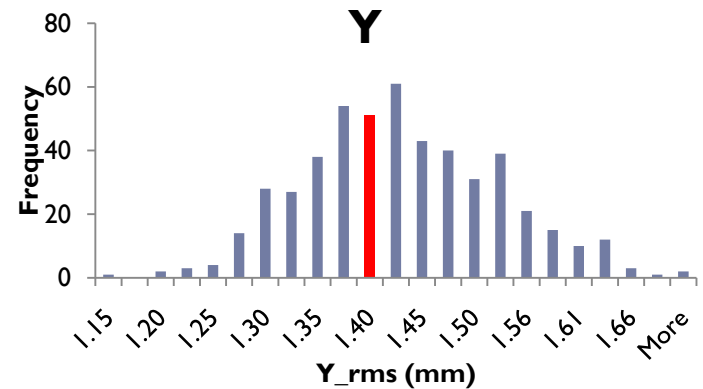
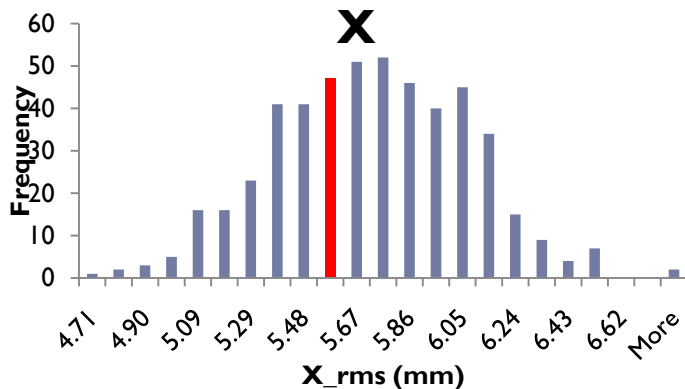
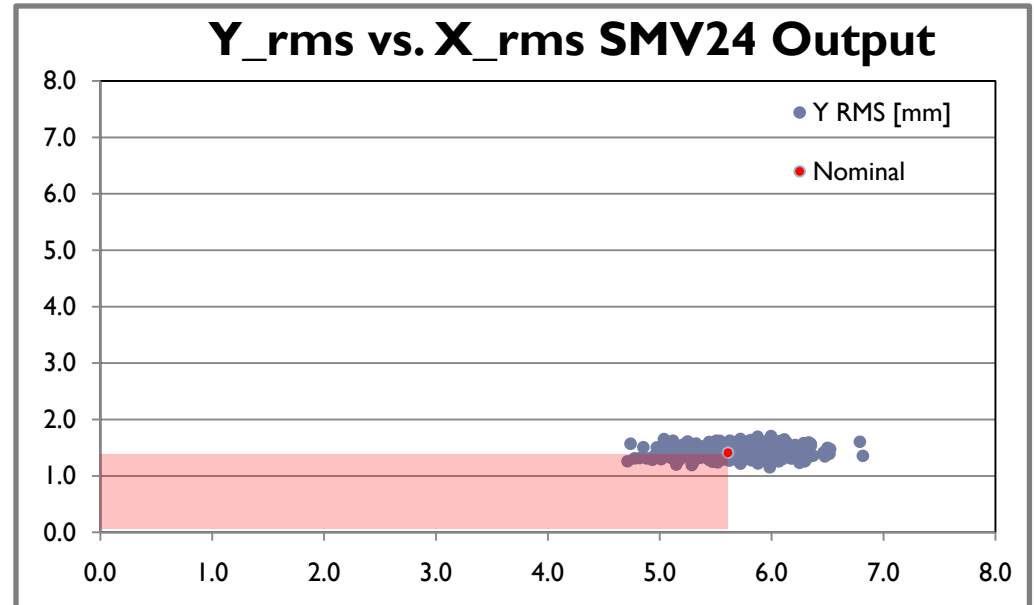
Horizontal: 68 mm

Vertical : 25 mm

Min / **Nom**(Aperture/RMS)

Horizontal: 10.0 / **12.1**

Vertical : 14.6 / **17.7**



Conclusion

- ▶ 500 statistic runs were performed to evaluate the effect of quadrupole filed errors at entrance and exit of Distributor and SMV1 and SMV24.
- ▶ The RMS values increase by a maximum of 20% under the effect of errors
- ▶ $\text{MIN}(\text{Aperture}/\text{RMS beam size})$ decreases at max by 21%, but the ratio always stays beyond 10.