

# Effective Control Limits for Predictive Maintenance of Accelerator Beam Uniformity

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Wake Forest Predictive Maintenance Team

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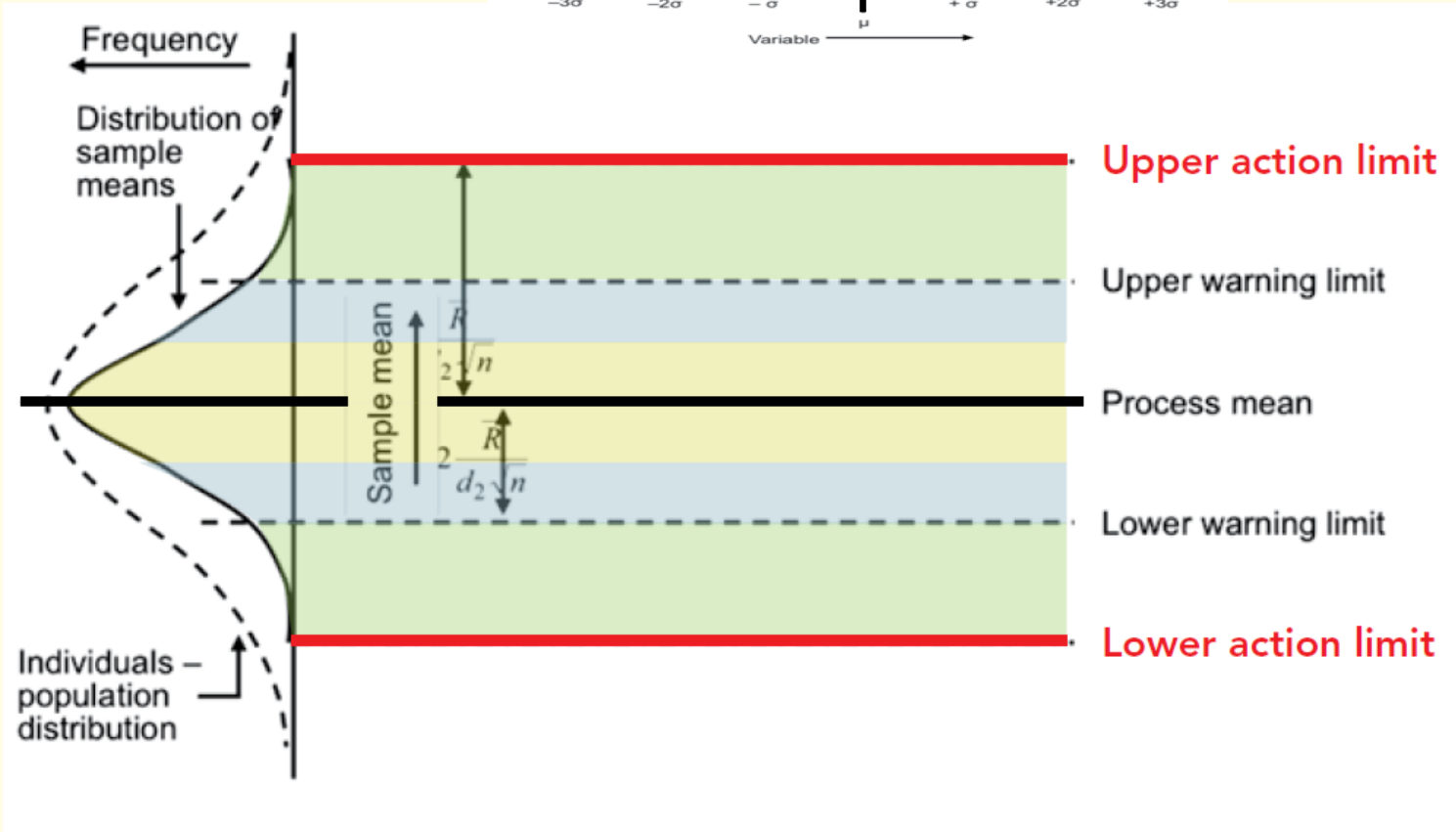
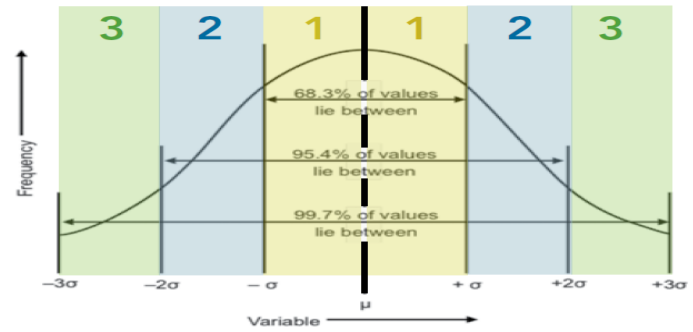
August 4, 2013

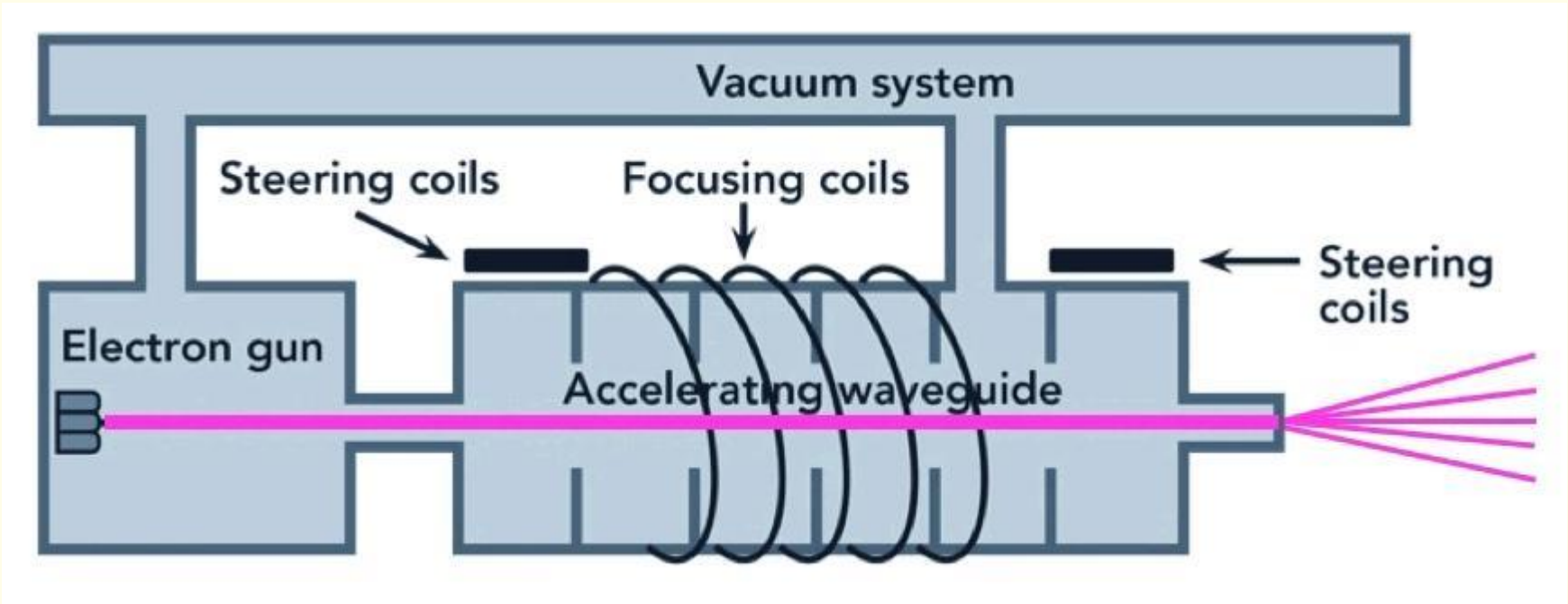
AAPM Meeting, Indianapolis, IN

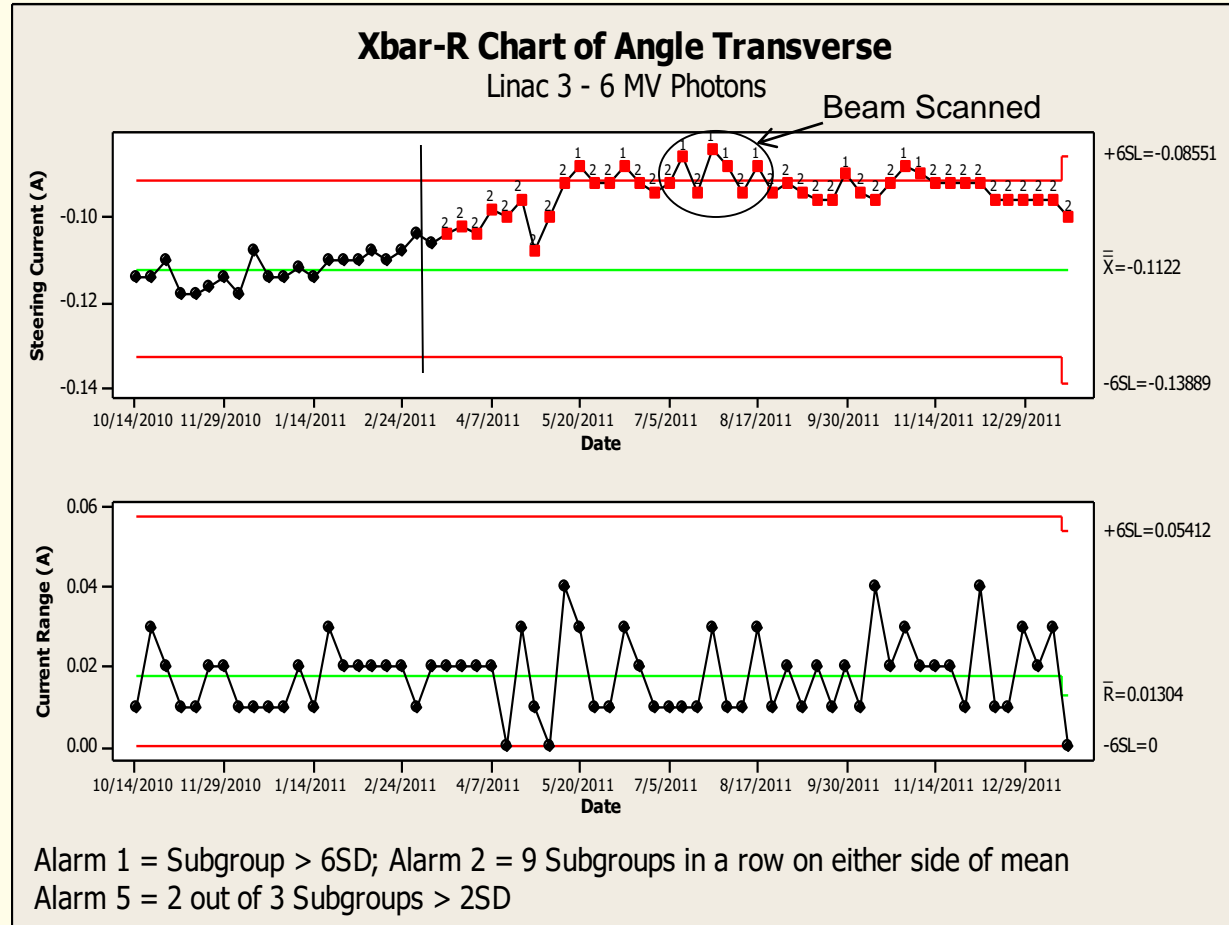


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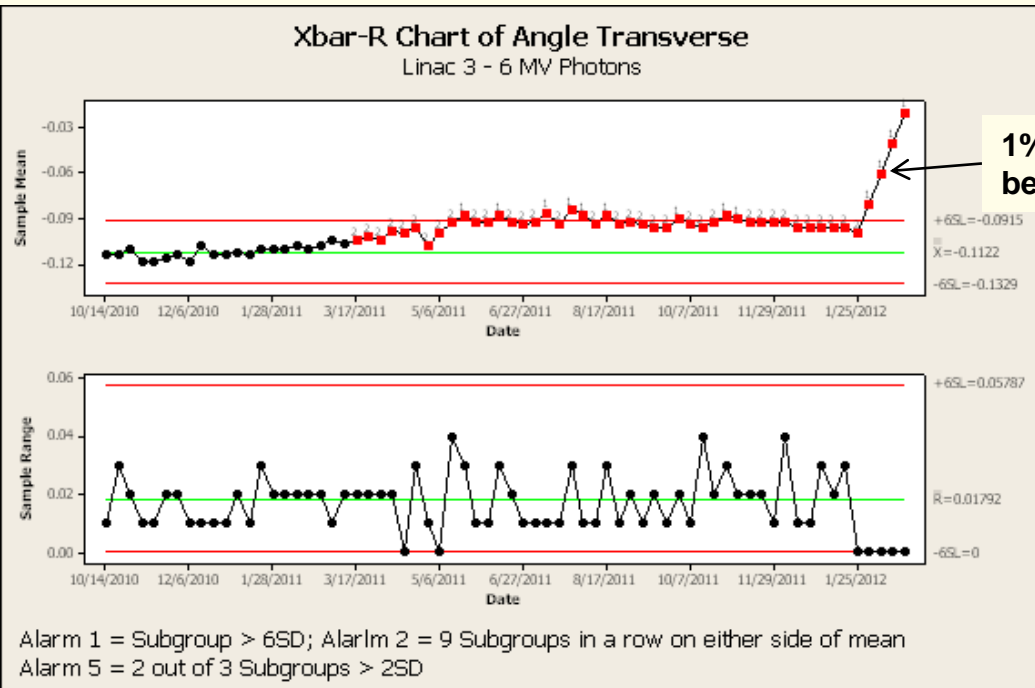




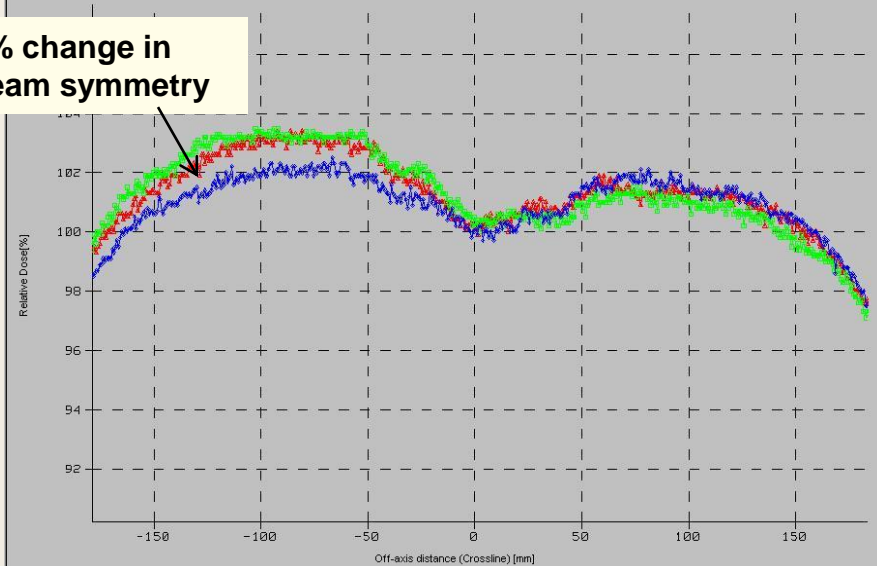
- 3 Linacs were tracked for >15 months

- Mock intervention was initiated after SCC exceeded control limit

- Overall, results ranged from minimal change to no measurable change in beam uniformity

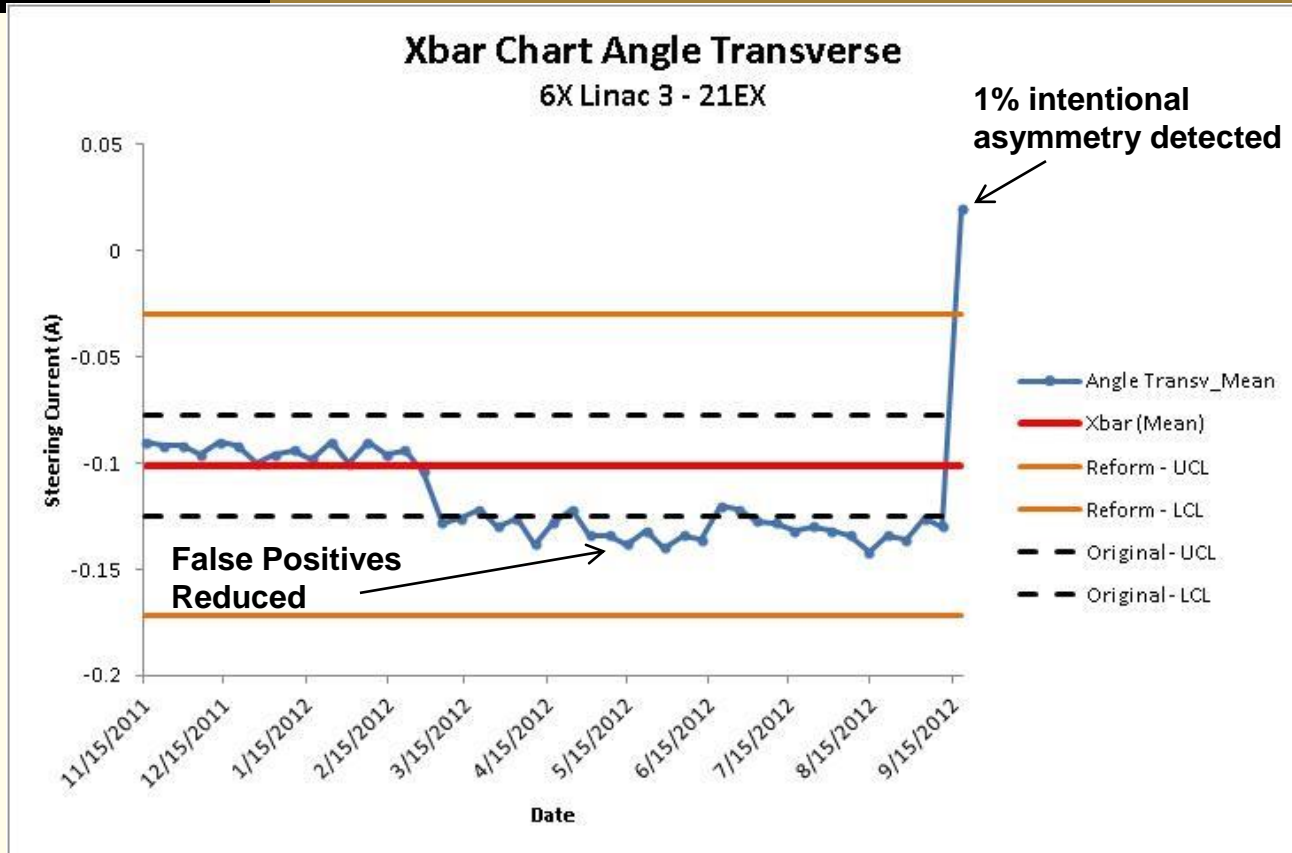


1% change in  
beam symmetry

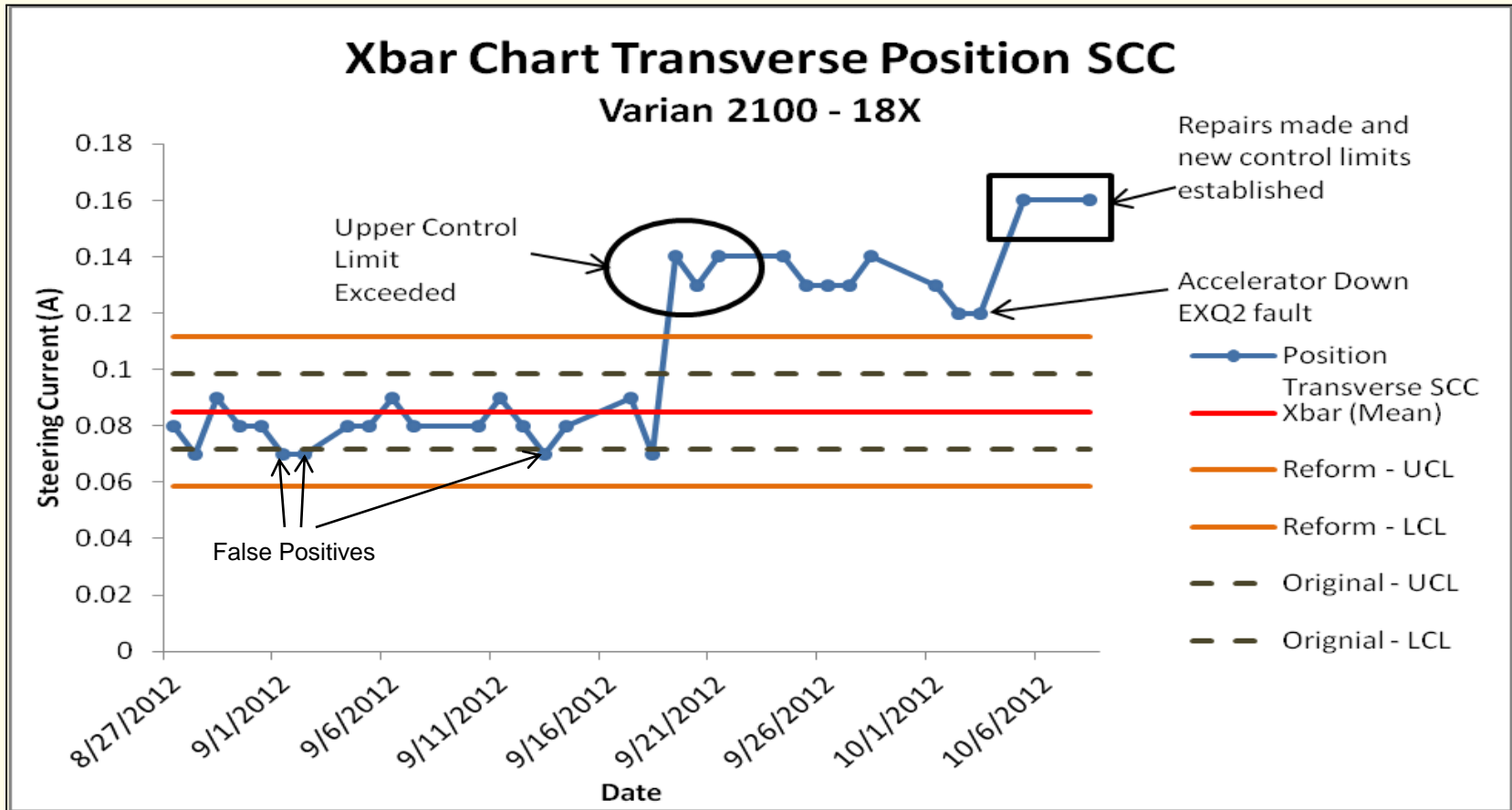


- Based on experimental observations the control limits were reformulated
- Goal was to reduce false positive rate but ensure detection of 1% change in beam uniformity

# Comparison of Original Limits & Reformulated Limits



- 3 Linacs tracked for another 8 months with no limits exceeded
- Beam scanning confirmed no change in beam uniformity
- 1% intentional asymmetry results in control limit alarm



The reformulated upper control limit was exceeded on Sept 19 but the accelerator did not go down until Oct 3.



**We are in the process of developing first generation software for a TrueBeam predictive maintenance program.**

**We plan to deploy software to a limited number TrueBeam sites in 2014.**

**Thank You!**

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