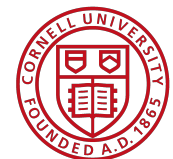




Cryomodule Cryogenic Valves

Joshua Kaluzny
January 25, 2018



Outline

- Incoming QC
- Flow Regulation – valve bullet
- Valve Sticking
- Schedule

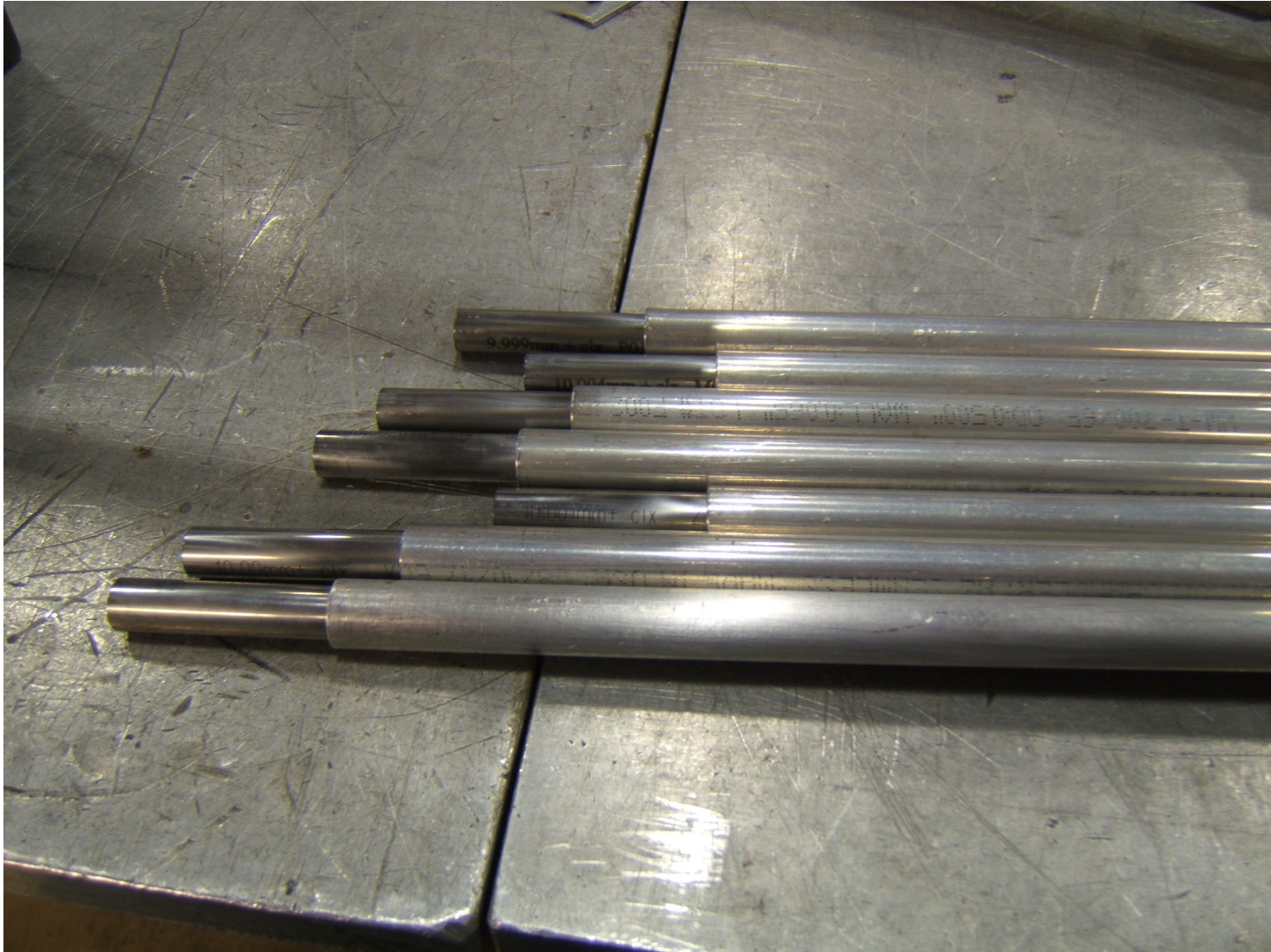
Incoming QC

- Measurements Performed
 - Visual inspection
 - Verify valve stroke
 - Positioner stability (BCR being prepared)
 - Leak check
- Modifications Performed
 - Ream upper weld
 - Install 4 wipers
- Measurements Performed
 - Wiper dimensional check
 - Wiper placement dimensional check
 - Banding end alignment
 - Wiper seating between banding
 - Stem fit test
 - Stem pressure decay test
 - Seat leak test (BCR)
 - Final inspection

Incoming QC

DN10 WEKA Stem Modification QA Report			
	JT	CD	
Valve Type	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Serial No.	<input type="text" value="222138-1110-3"/>		
Test	Pass	Fail	Comment
Visual Inspection	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Verification of Valve Stroke	<input checked="" type="checkbox"/>	<input type="checkbox"/>	JT = 10 mm, CD = 15 mm
Initial Leak Test	<input checked="" type="checkbox"/>	<input type="checkbox"/>	$\leq 10^{-9}$ Torr L/S Actual Test Value 4.8x10-10
Bonnet Weld Ream	<input checked="" type="checkbox"/>	<input type="checkbox"/>	0.628 Inch
Valve seat measurement	<input checked="" type="checkbox"/>	<input type="checkbox"/>	+5 μ m Largest go-no go pin that goes completely through 2 mm Distance next larger pin inserts 1 mm Distance next larger pin inserts
Bonnet Weld Leak Test	<input checked="" type="checkbox"/>	<input type="checkbox"/>	$\leq 10^{-9}$ Torr L/S Actual Test Value 1.2x10-9
Wiper Dimensional Checks Reference: F10088731	<input checked="" type="checkbox"/>	<input type="checkbox"/>	± 0.005 Inch
Longitudinal Wiper Placement Reference: F10088841	<input checked="" type="checkbox"/>	<input type="checkbox"/>	± 1 mm
Band End Alignment	<input checked="" type="checkbox"/>	<input type="checkbox"/>	End of bands properly aligned to valve stem
Wiper Seating Between Bands	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Does PEEK wiper properly fit between Stainless Bands
Stem Test Fit to Bonnet	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Does stem fit into bonnet with minimal friction
Pressure Decay Test	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Decay Torr per 4 hours Start Value [Torr] .001 torr Finish Value [Torr] .360 torr
Final Inspection	<input checked="" type="checkbox"/>	<input type="checkbox"/>	All valve parts properly reassembled
Inspector	Date		
W. Hughes	Dec 5th 2017		

Valve Seat Diameter Measurement



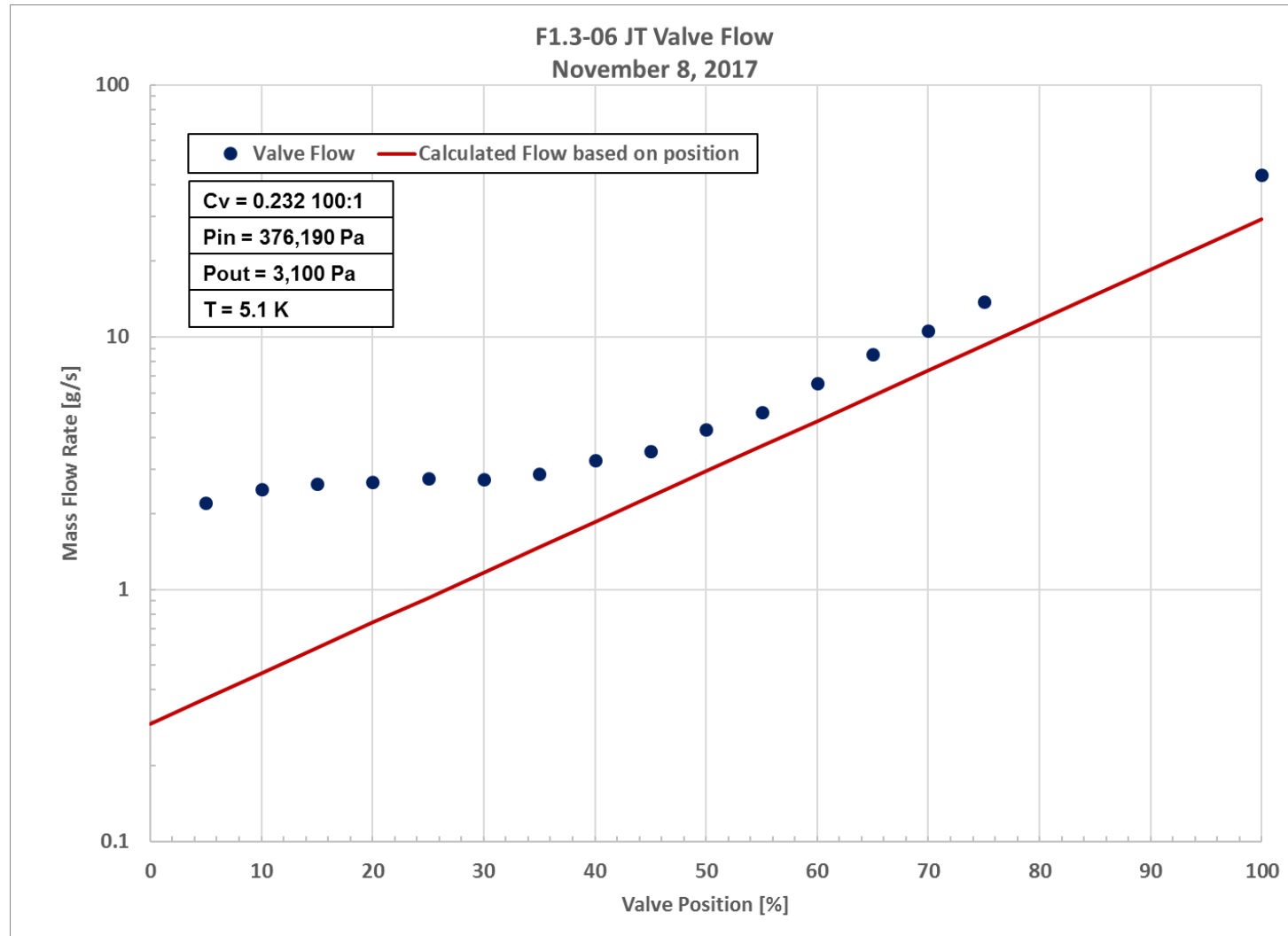
Valve Wiper Installation



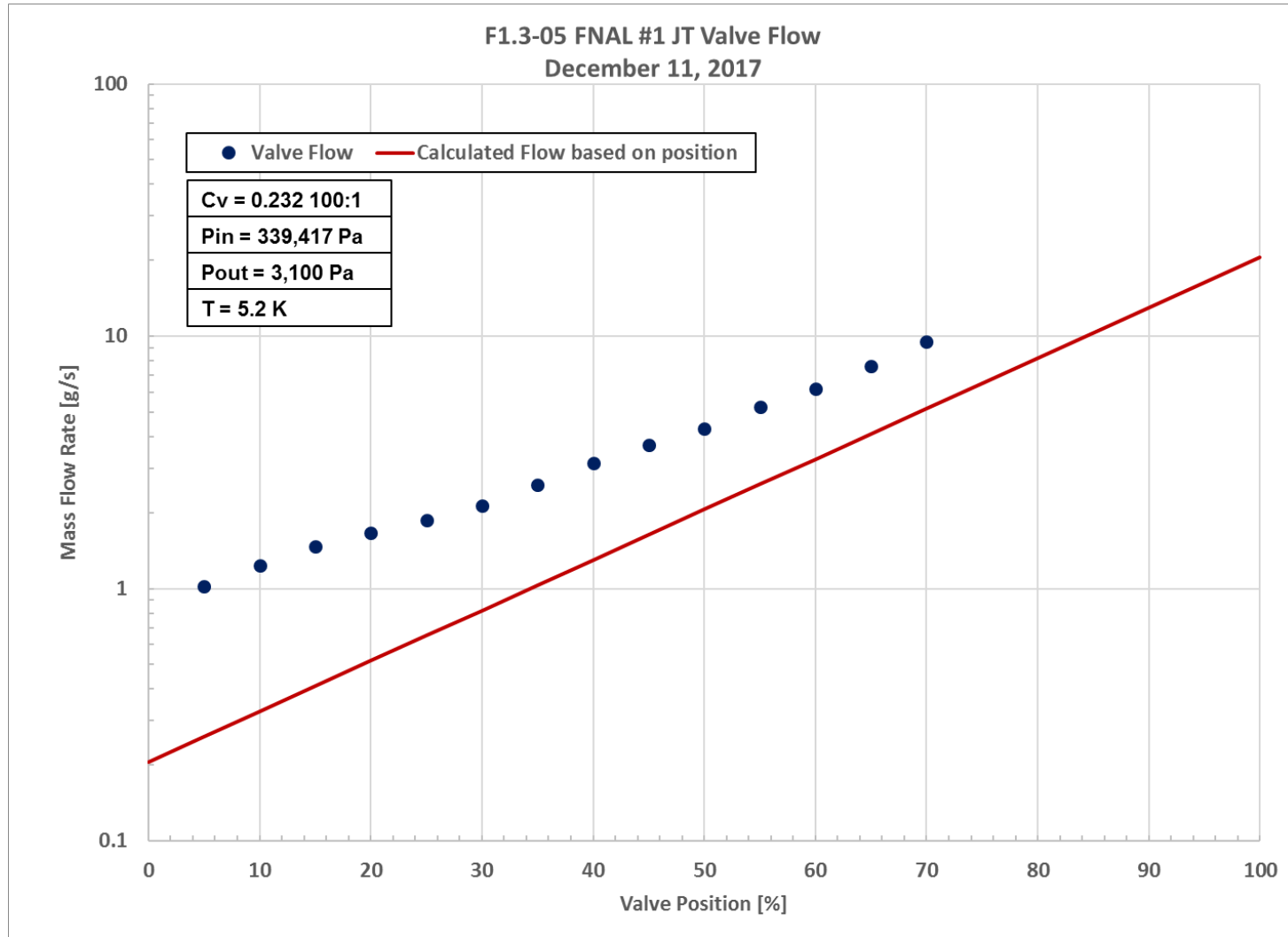
Flow Regulation

- The WEKA bullet showed little to no flow regulation below 40%
- Fermilab machined a bullet that has continuous regulation
- The Fermilab machined bullet will be used on the test stand
- The WEKA bullet will be installed back into the valve before shipment to SLAC

Original Weka Bullet



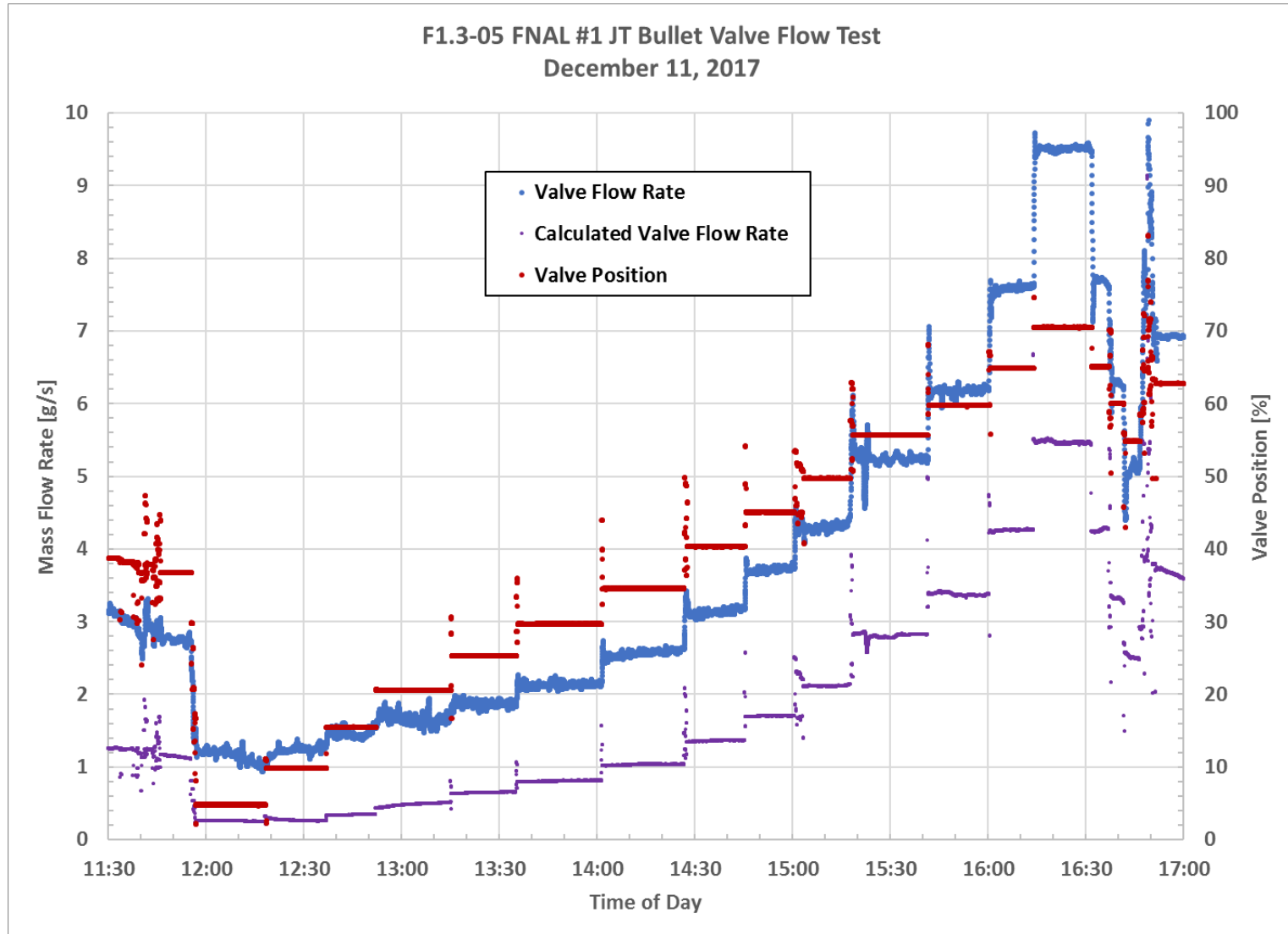
Fermilab Machined Bullet



Valve Sticking

- The tighter fitting bullet that was machined at Fermilab showed signs of sticking when the valve was actuated
- The bullet was removed and the valve retested to eliminate the possibility of the wipers causing the sticking

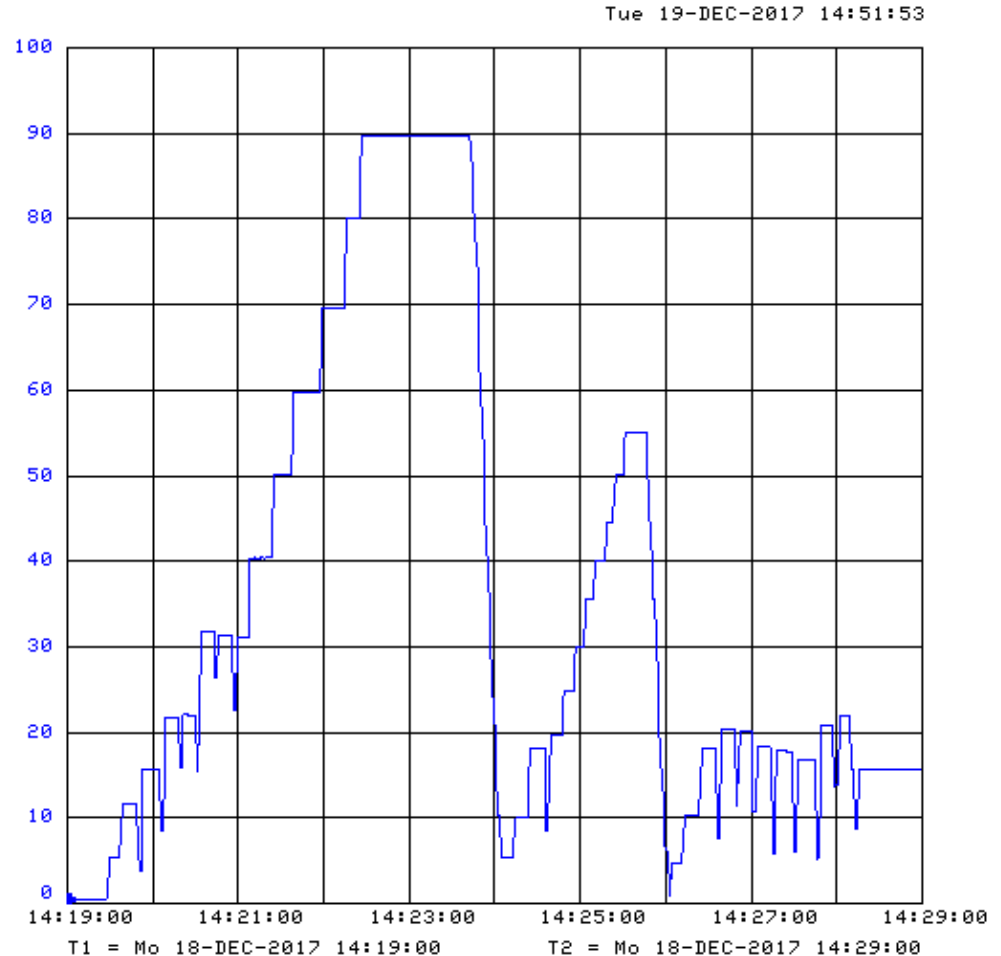
Valve Sticking – CM5 Cold



Valve Sticking – CM5 Warm

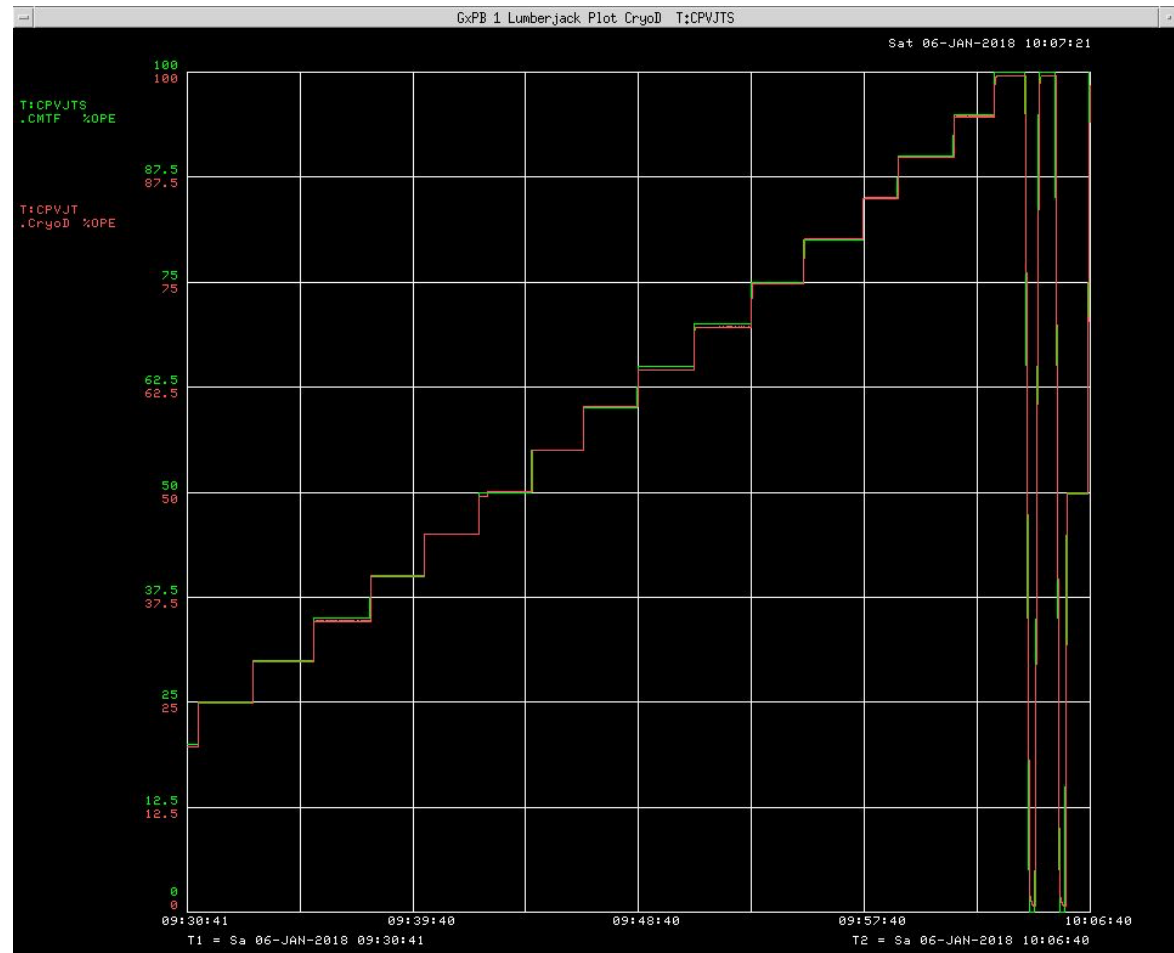
After the cryomodule was warm, it was found that the stickiness remained, and was now limited to valve positions less than 40% open

T: CPVJT
+CMTF %OPE



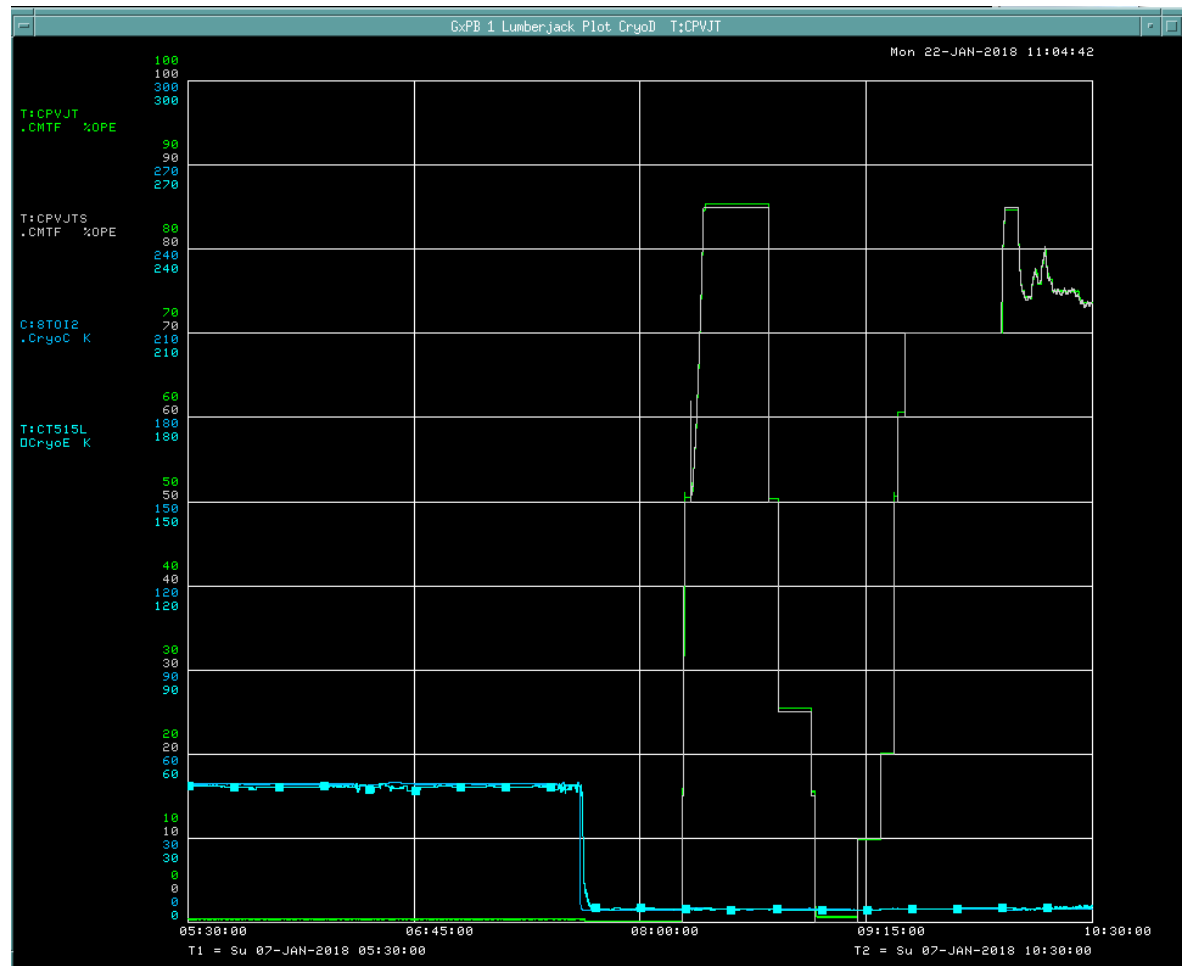
Valve Sticking – CM7 130K

- No evidence of sticking
- Same bullet as CM5



Valve Sticking – CM7 Cold

- No evidence of sticking
- Same bullet as CM5



Schedule

Ship date of February 28th

One week for shipping

One week for QC and wiper installation

A few days to ship to JLab (mid-March)

Conclusion

- Thermal acoustic oscillations in the valves have been taken care of with the valve reversal and wipers
- Incoming QC reduces the chance of issues on the test stand
- A special bullet will be used on the test stand for low flow operation

Thank you

Questions?

Thanks to Jay Theilacker, Bill Hughes, Greg Johnson, Joe Hurd, Ben Hansen and others who contributed information for these slides