



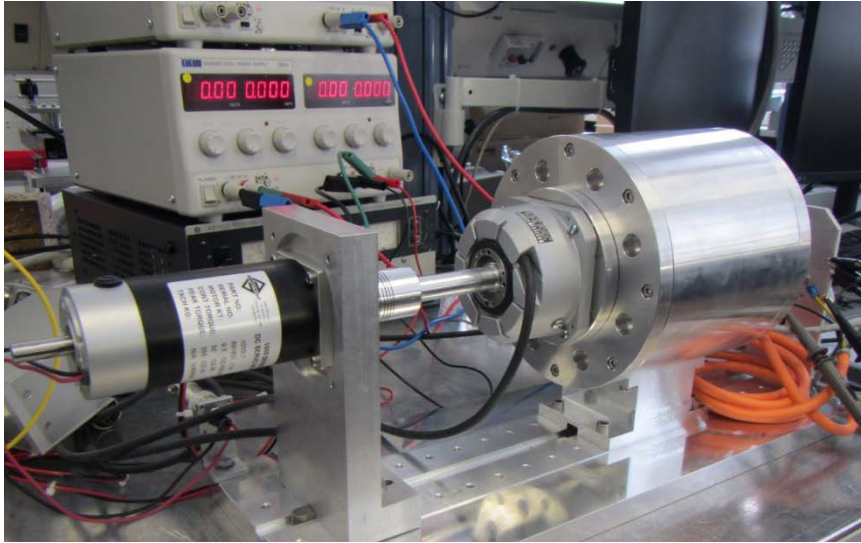
BWS Alxion motor test

13.07.2016

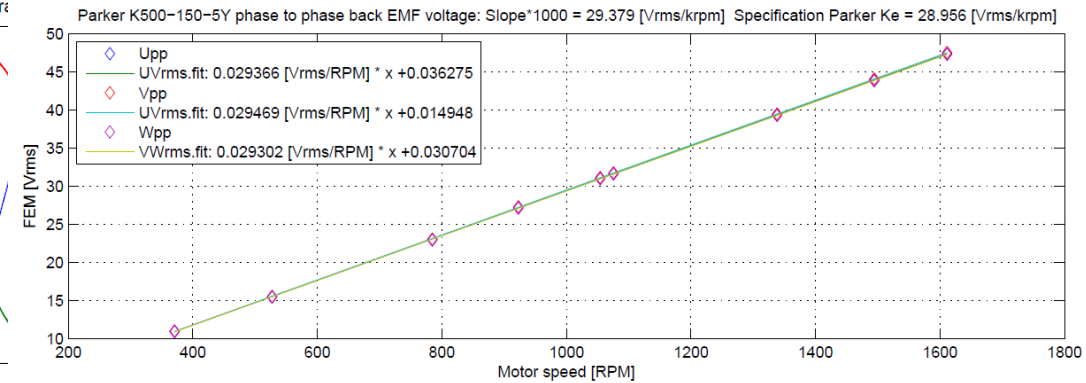
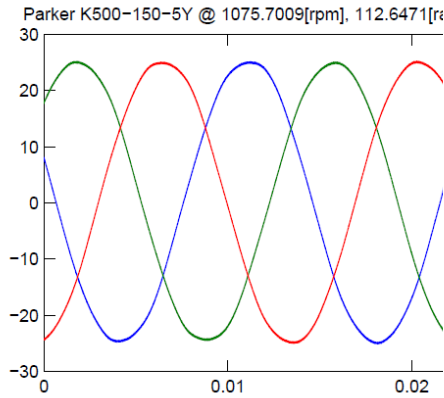
J. Emery & P. Andersson



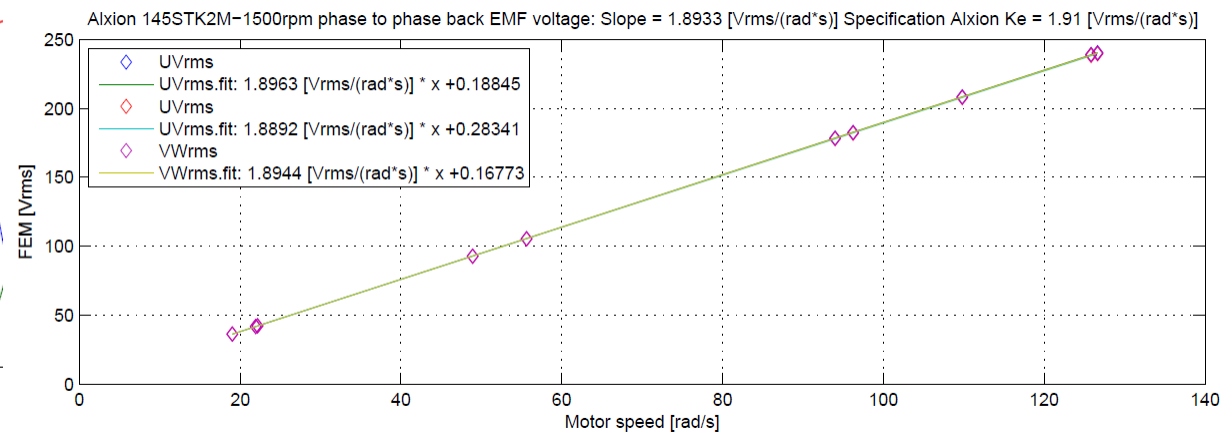
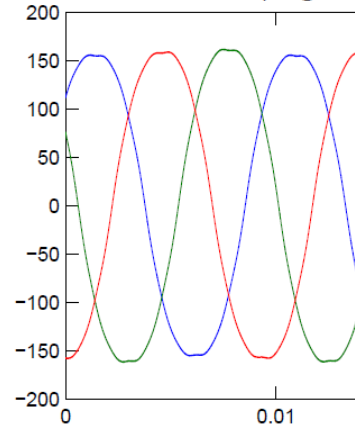
Motors validation: Back EMF comparison (March 2016)



Very good results:
K500-150-5Y => 1.5% from spec.
145STK2M => 1% from spec.

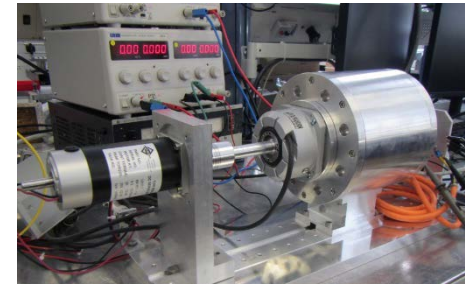


Alxiom 145STK2M-1500rpm @ 1048.5927[rpm], 109.8084[rad/s] 20160229-16V-8A.mat Tensions induites U=311.6916 V=324.0077 W=317.6464

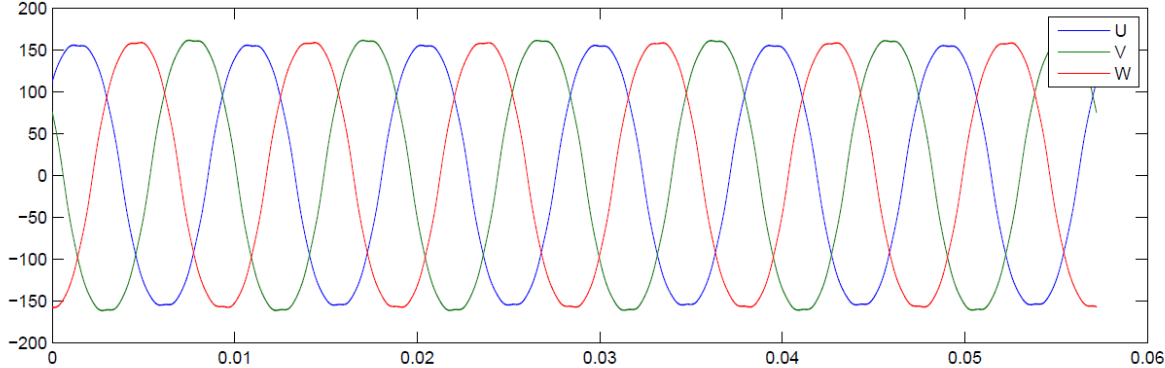




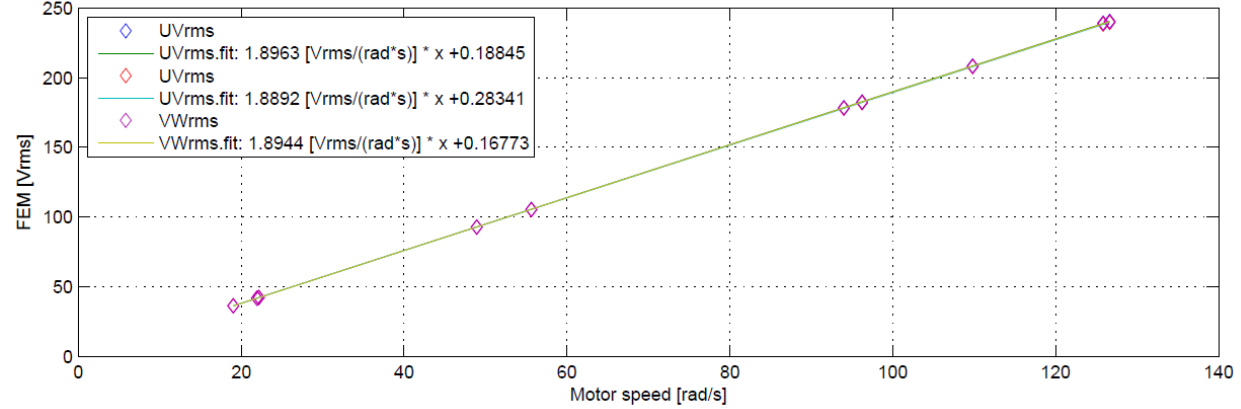
Motor validation: Back EMF measures on Alxion motor 145STK2M023



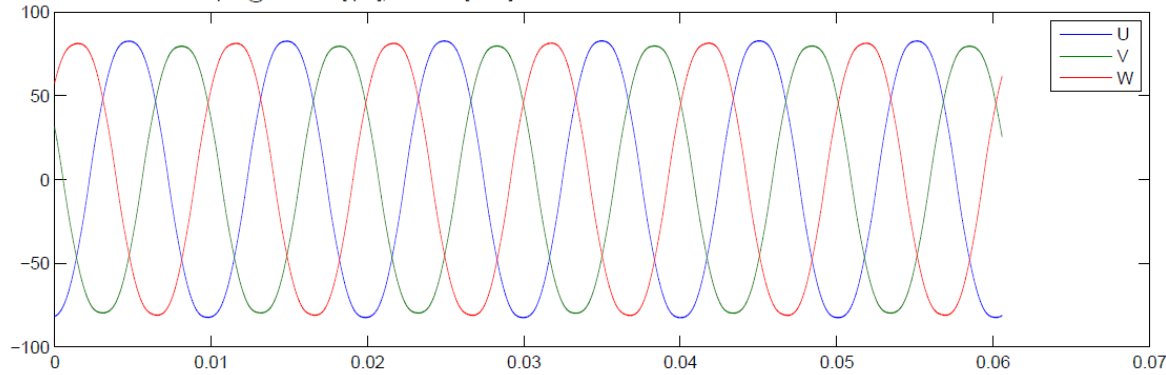
Alxion 145STK2M-1500rpm @ 1048.5927[rpm], 109.8084[rad/s] 20160229-16V-8A.mat Tensions induites U=311.6916 V=324.0077 W=317.6464



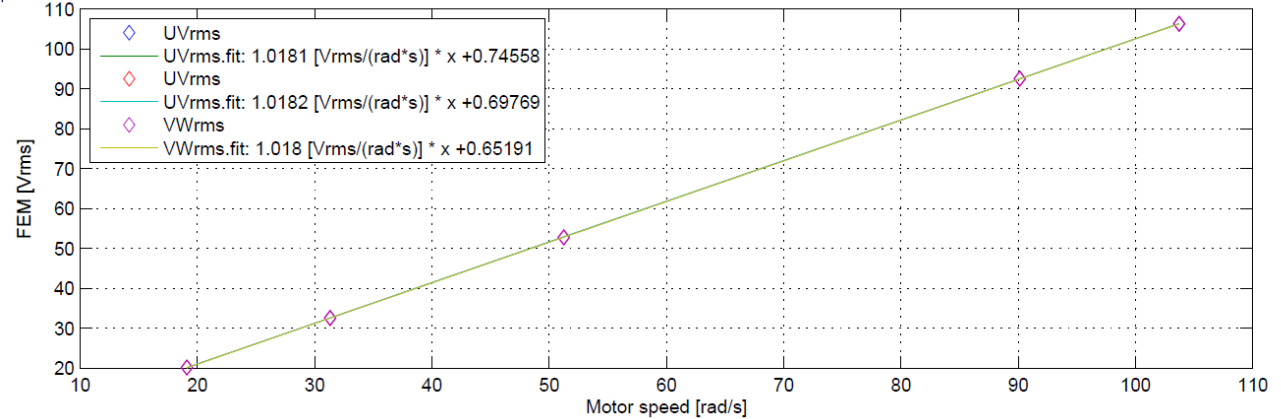
Alxion 145STK2M-1500rpm phase to phase back EMF voltage: Slope = 1.8933 [Vrms/(rad*s)] Specification Alxion Ke = 1.91 [Vrms/(rad*s)]



Alxion 145STK2M023-1500rpm @ 990.4395[rpm], 103.7186[rad/s] 20160616-16V-9V2-1MS.mat Tensions induites U=165.8791 V=160.2106 W=163.1



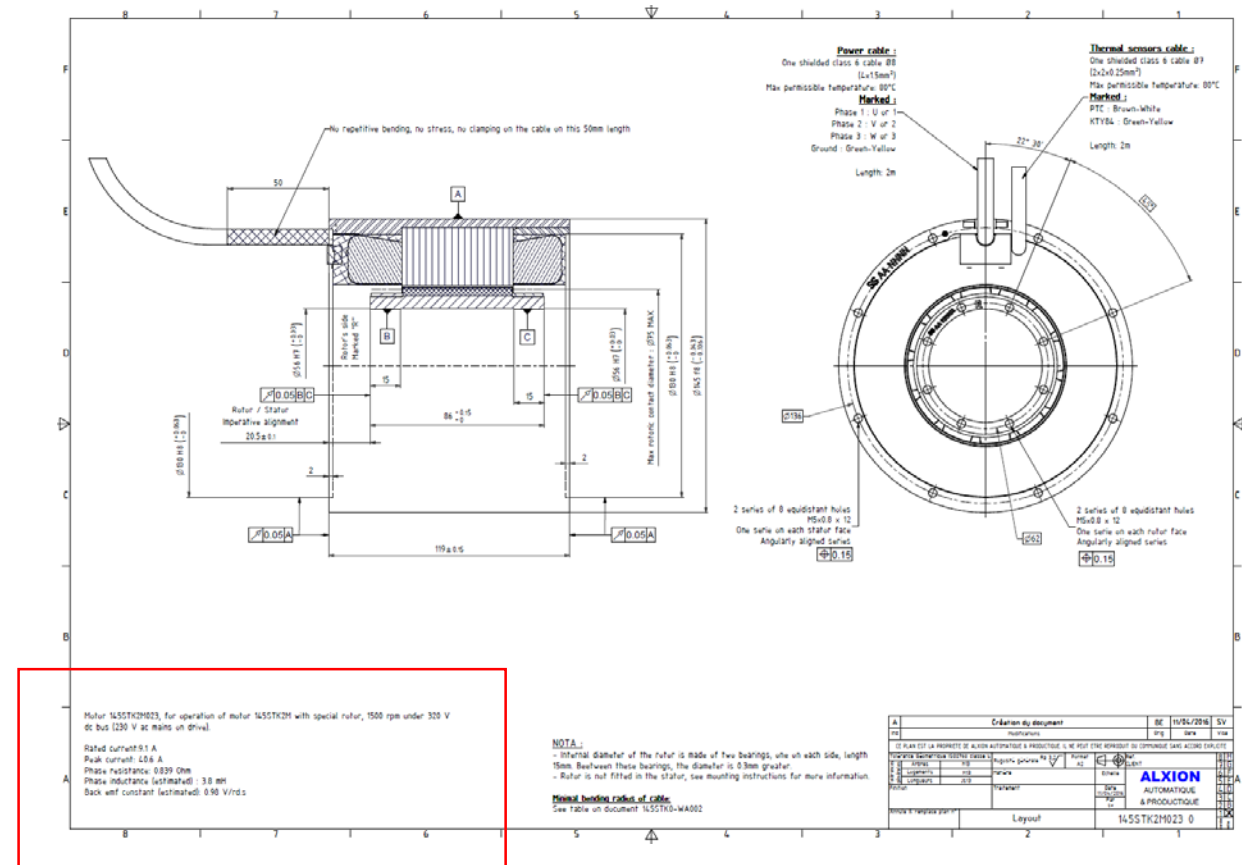
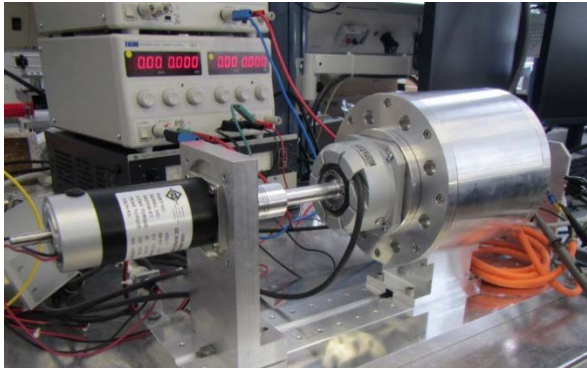
Alxion 145STK2M023 320V 1500rpm (modified rotor) P to P back EMF: Slope=1.0181 [Vrms/(rad*s)] Spec. standard rotor = 1.09, modified rotor = 0.98



Good results:
145STK2M23 => 4% from (estimated) Alxion specification



Motor validation: Back EMF Alxion motor 145STK2M023



Motor 145STK2M023, for operation of motor 145STK2M with special rotor, 1500 rpm under 320 V dc bus (230 V ac mains on drive).

Rated current: 9.1 A

Peak current: 40.6 A

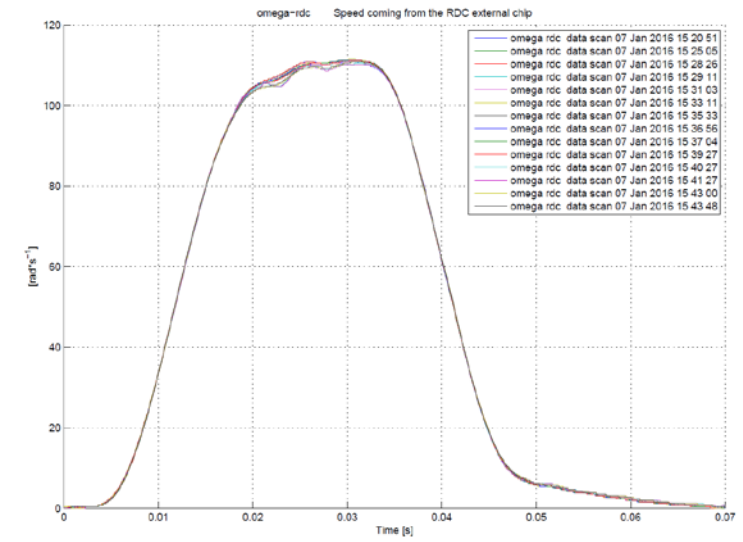
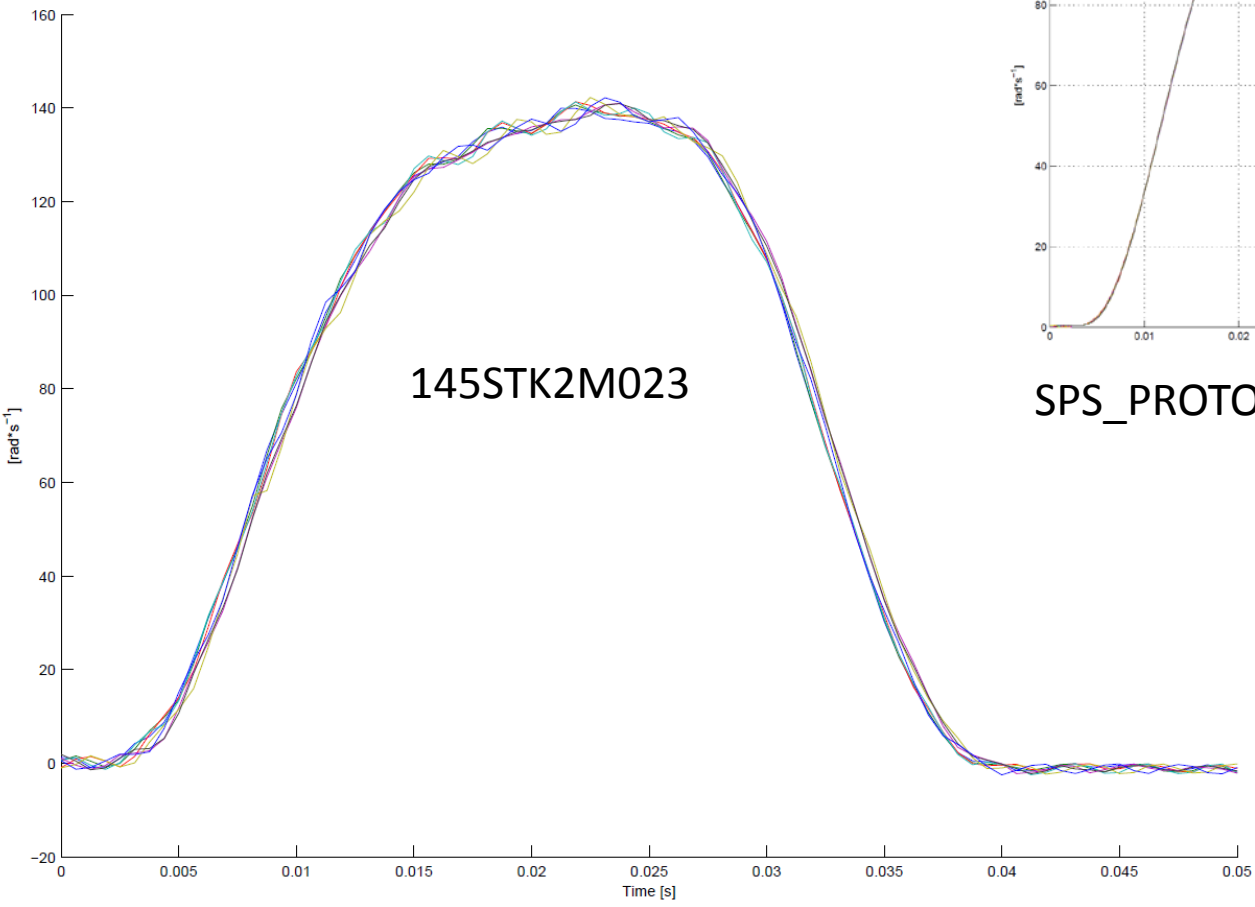
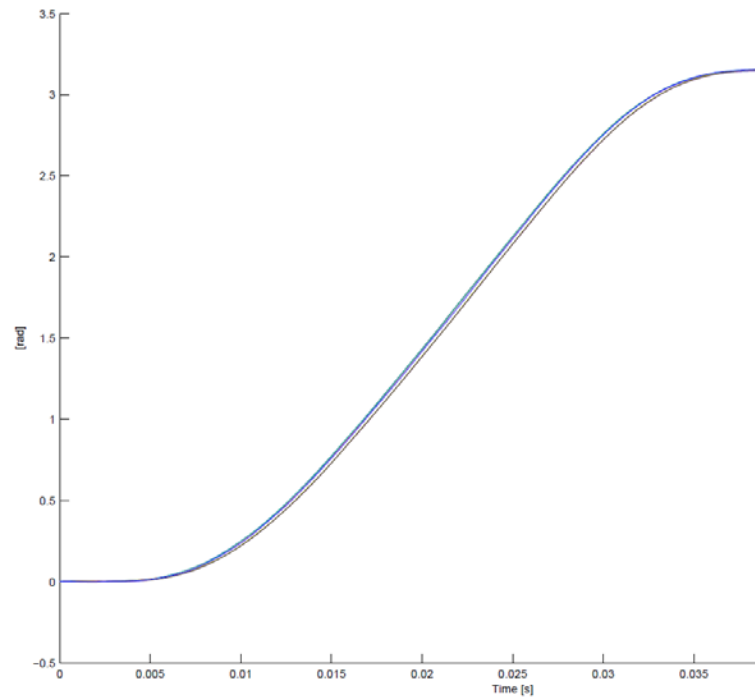
Phase resistance: 0.839 Ohm

Phase inductance (estimated) : 3.8 mH

Back emf constant (estimated): 0.98 V/rds



Position-speed-current ctrl (with inertia)



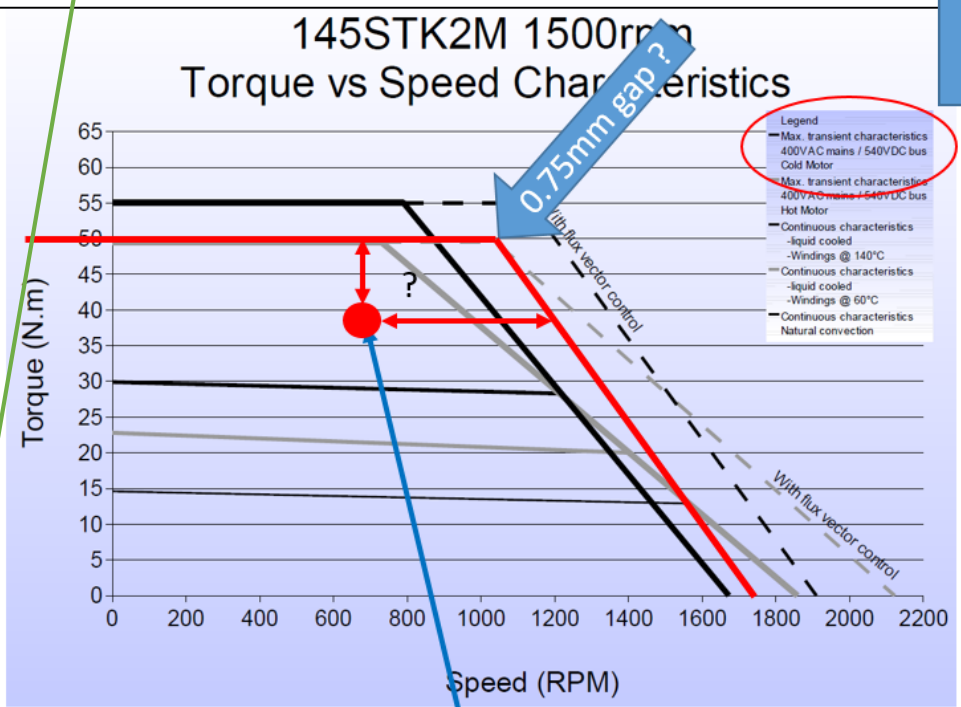
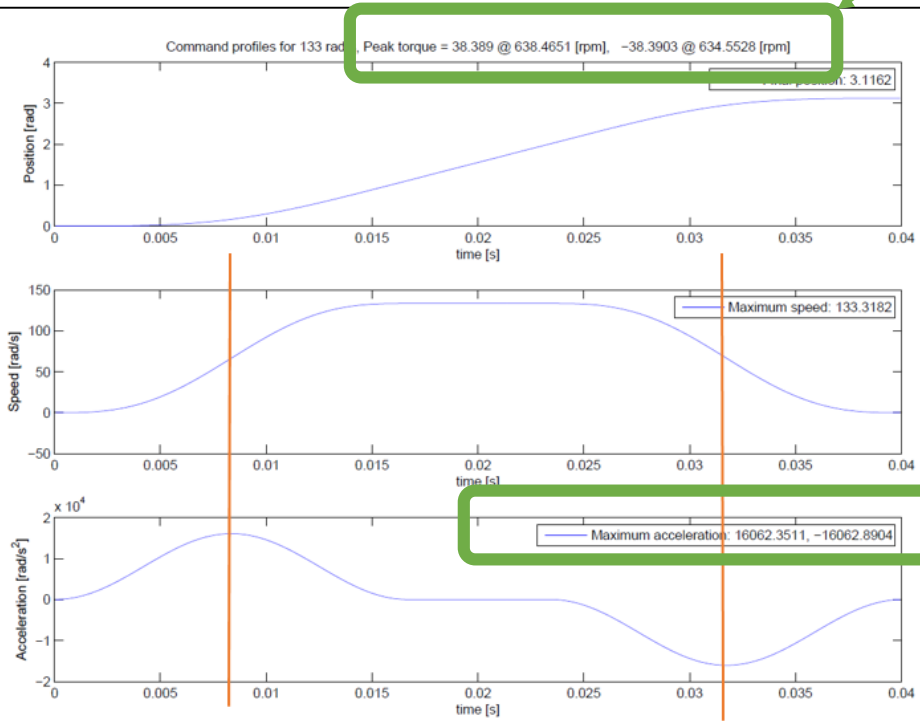
Use of a disk on the shaft to simulate the scanner inertia



Position-speed-current ctrl (with inertia)

Theoretical values of the movement

BWS Electronic design and system validation (17 March 2016)

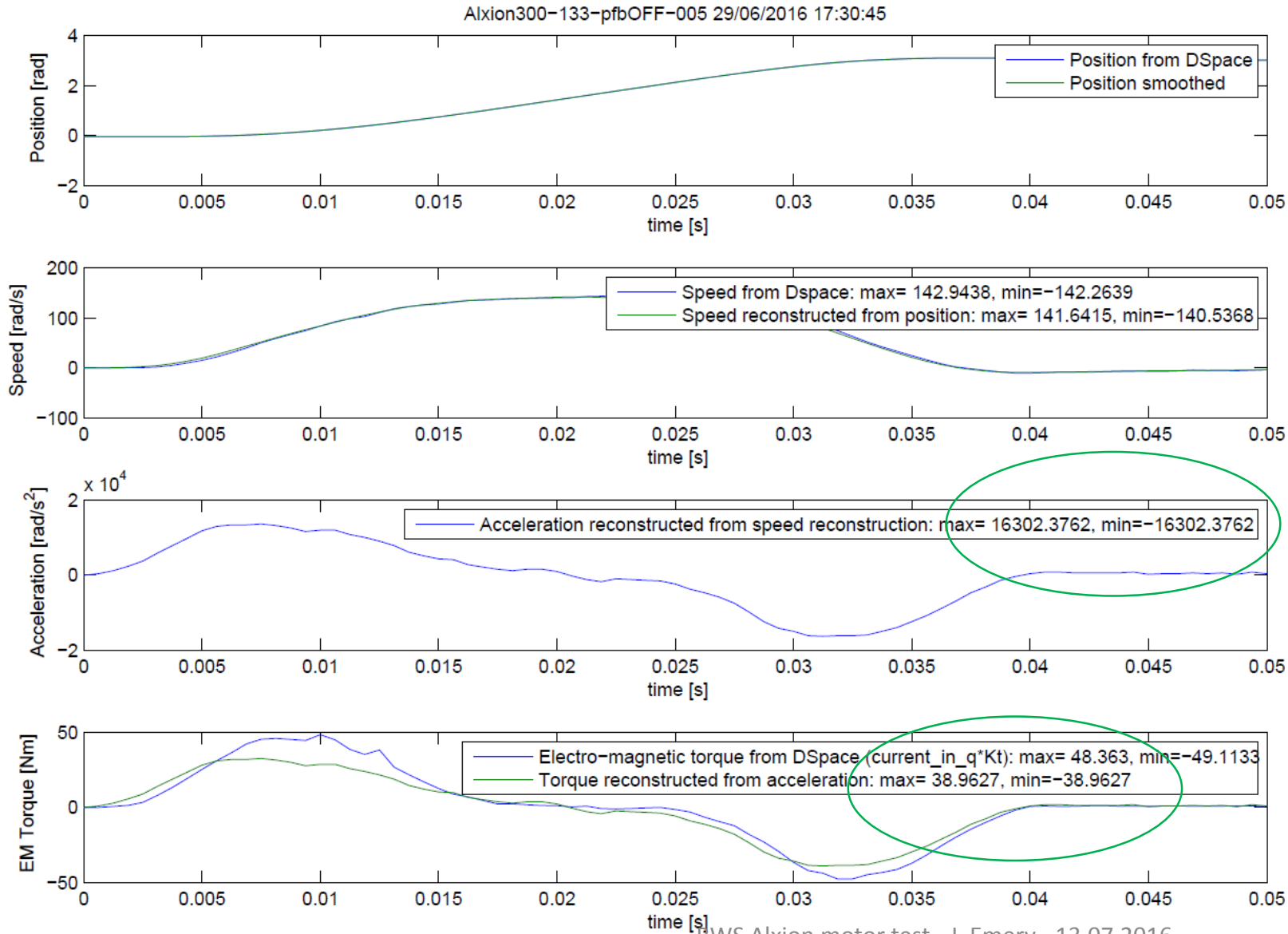


Radiation effect to material:

- Type of magnets, loss in magnetisation over time? => PS experience large difference over time!!!
- Windings isolation (vernis) => Kapton or other version possible?



Position-speed-current ctrl (with inertia)



System dynamics shows that we are extremely close to the Expected behaviour:

Peak acceleration & torque:
1.5% difference only!

Differences comes from system behaviour variations integrated during the whole movement.

Motors validation: Issue after validation

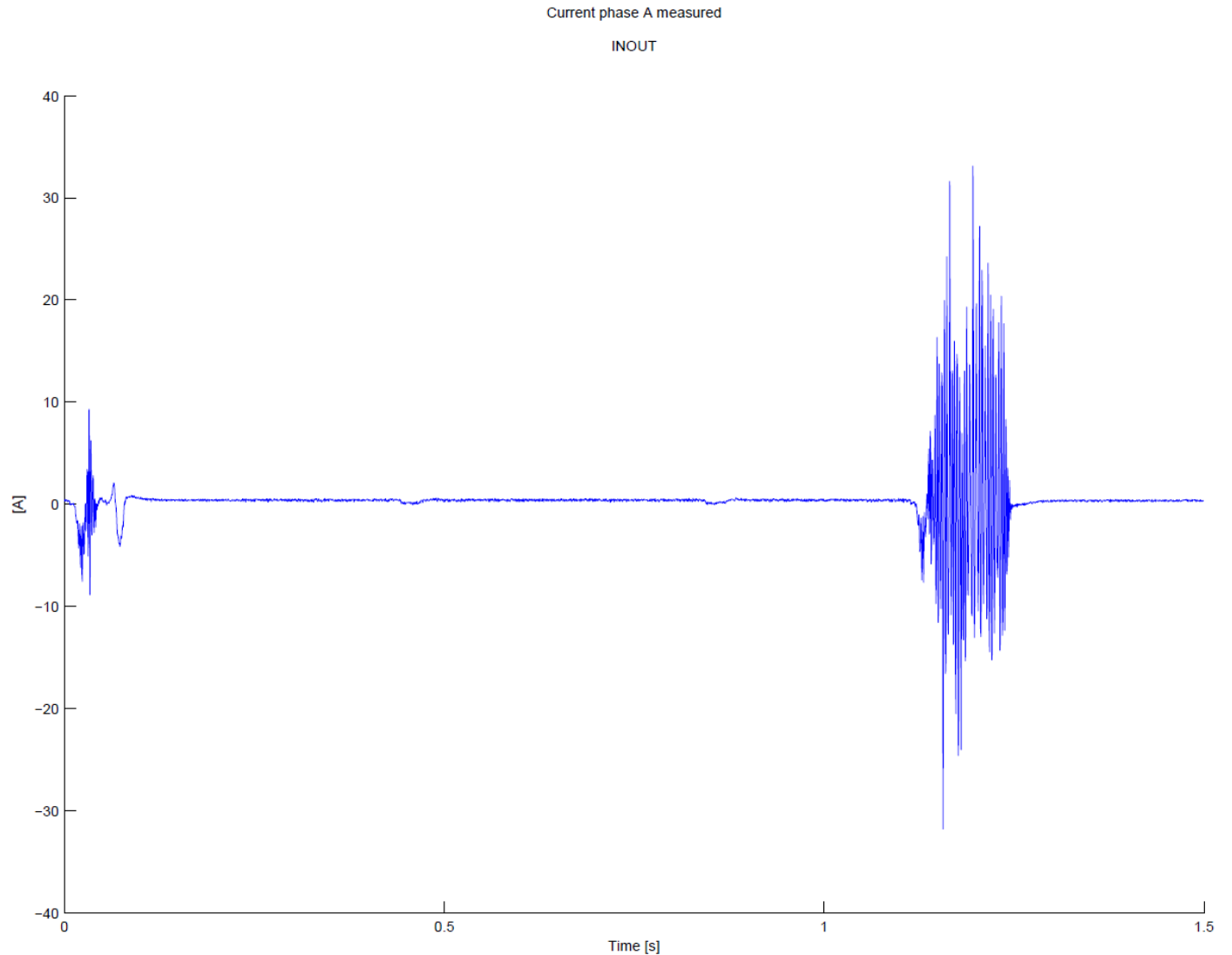
- Few days after finalisation of these measurements, one problem appeared (after the weekend of the 2-3 July).





Motors validation: Issue after validation

- Few days after finalisation of these measurements, one problem appeared (after the weekend of the 2-3 July).



Motors validation: Issue after validation

- During movement, the currents are getting crazy, **none symmetrical behaviour** between IN and OUT.
- Visual motor inspection by Dmitry => **No signs of problem**
- Test with Older compiled code (working) => **Still the same problem**
- Test with Parker motor using same electronics => **No signs of problem**
- Isolation measurements=> **No signs of problem**



Motors validation: Issue after validation

New test in Generator mode yesterday evening:

⇒ **Outputs voltage ok**

Next steps:

- Install standard Alxion motor => tests
- Install another Alxion stator 300V => tests
- Install standard rotor => tests

