

# Update on 2 Octupoles procurement for ATF2 Final Focus Systems

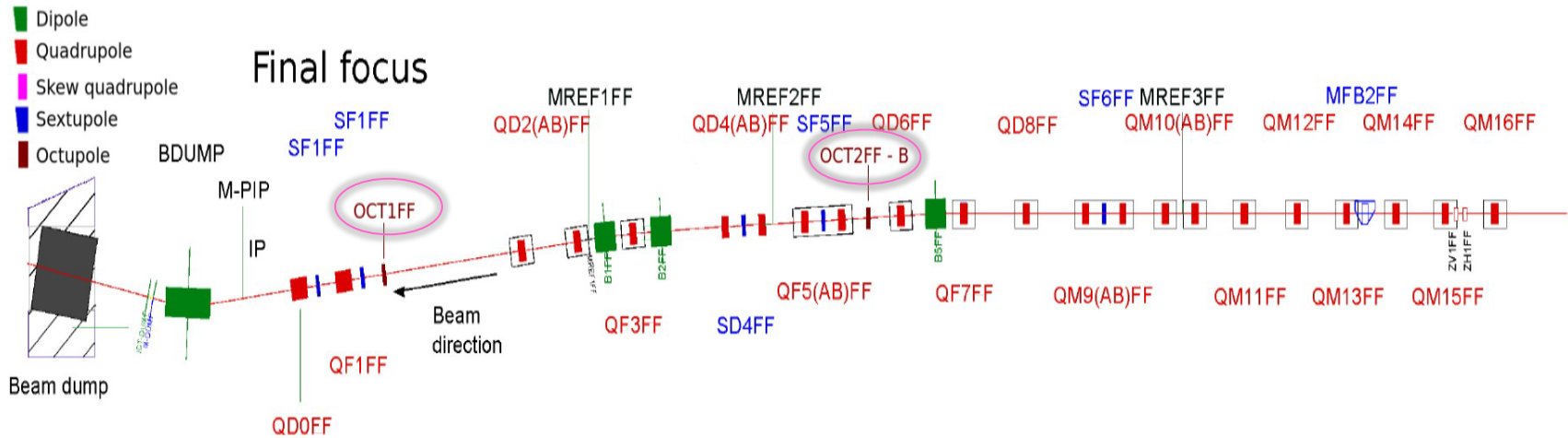
*M. Modena - CERN*

- *After the CERN/ATF2 Midterm Collaboration proposal presented in May 2014 and its approval on August 2014, we focus on the final definition of magnet parameters.*
- *MAGNETIC REQUIREMENTS were finalized:*
  - *In the first discussions (2013) requirement were for two identical octupoles with a nominal gradient of **5284 T/m<sup>3</sup>***
  - *The 2014 final requirements are:*
    - ***OCT1** with a nominal gradient of 708 T/m<sup>3</sup>*
    - ***OCT2** with a nominal gradient of 6820 T/m<sup>3</sup>*

*(Please refer to Note SLAC-TN-14-019: “Specifications of the octupole magnets required for the ATF2 ultra-low lattice“ by E. Marin et al.)*

- *In a September 2014 Meeting with KEK (remotely), the major integration details (magnet positions, supporting, etc.) for the 2 octupoles were discussed and agreed*

*(Please refer also at the presentation of M.Patecki: “Ultra-low Beta study” at CLIC Workshop 2015).*

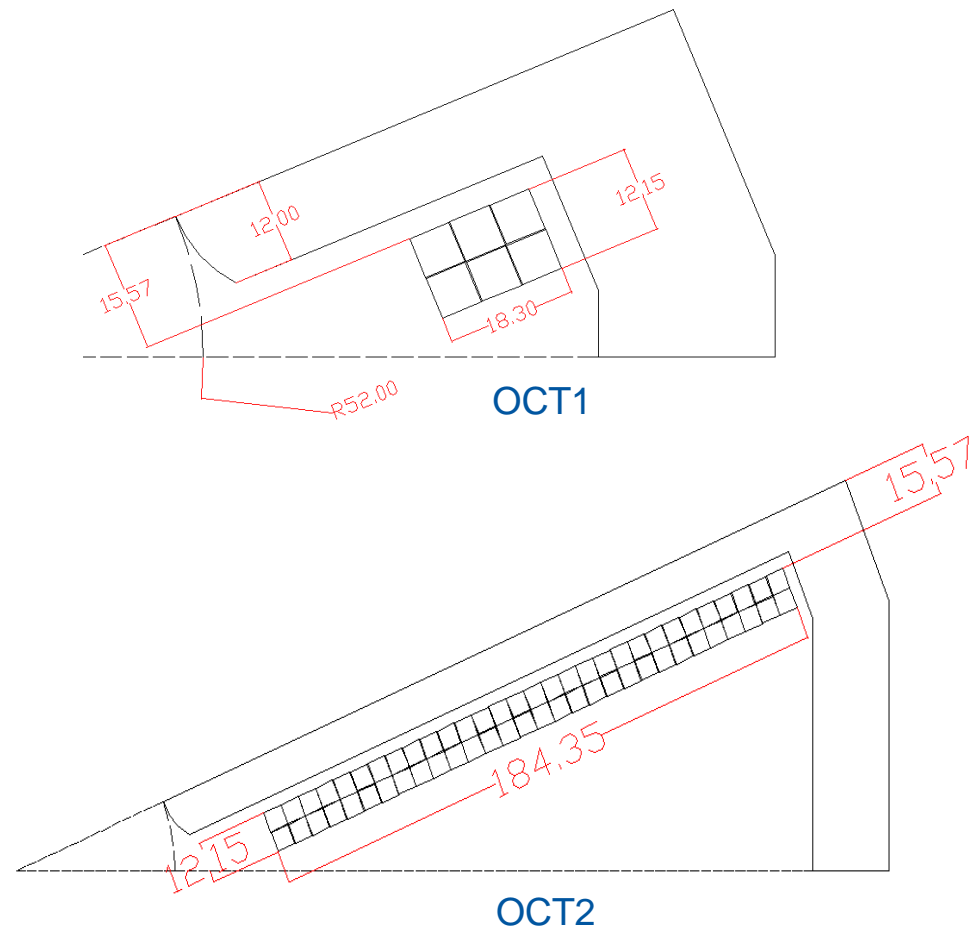


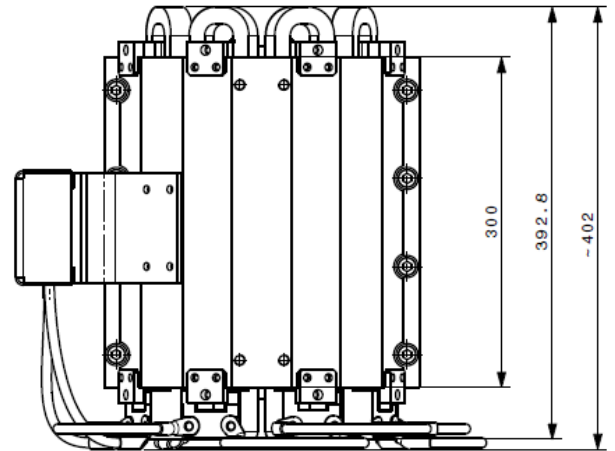
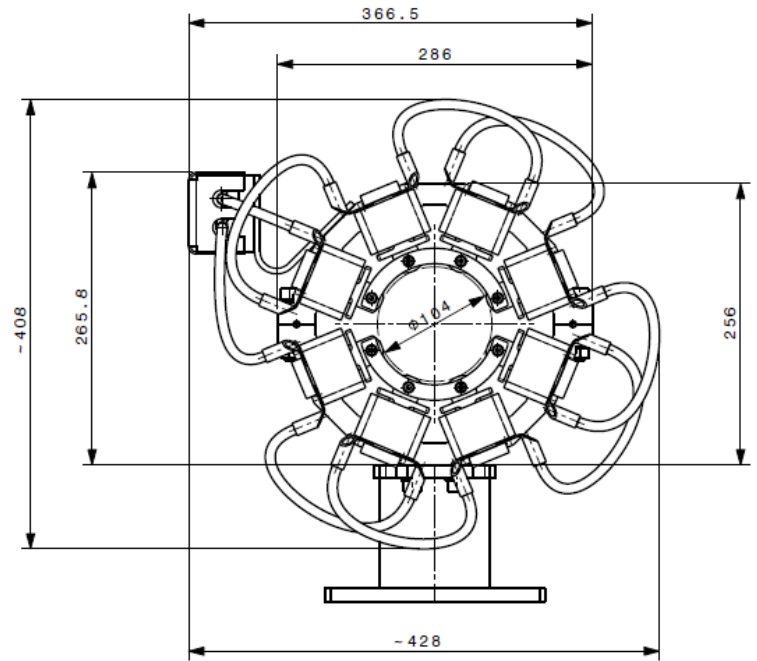
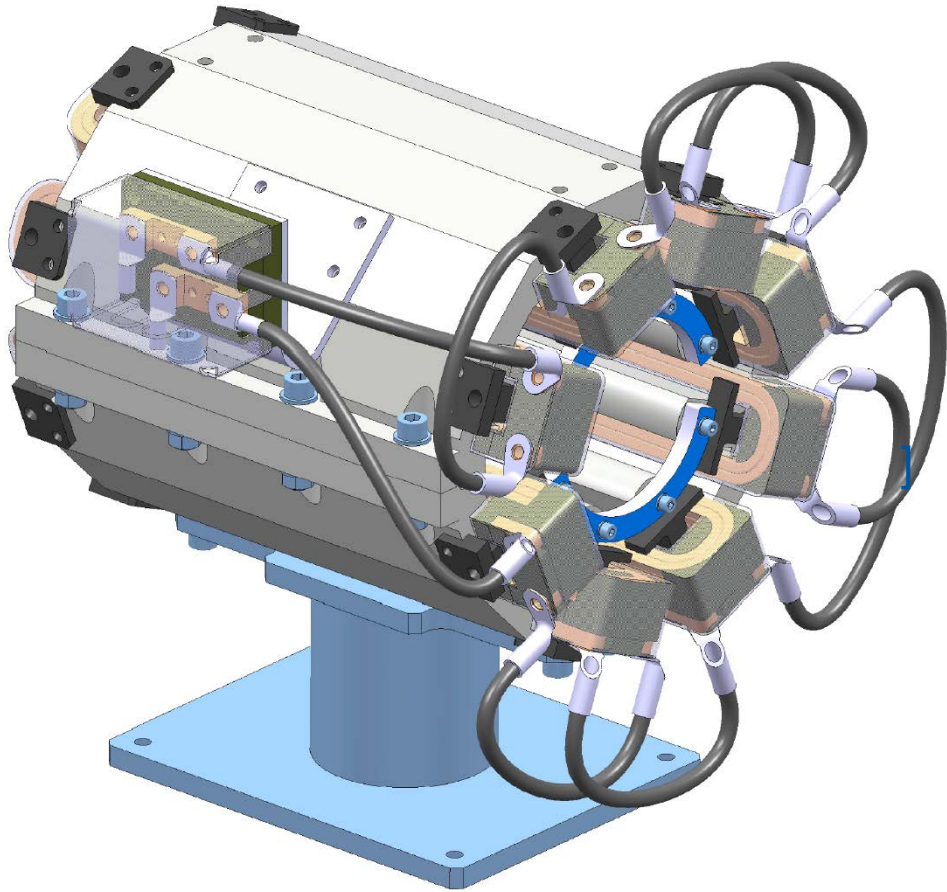
- *OCT1 will be place on an micrometric stage for final tuning (stage available at KEK).*
- *OCT2 will be fix (so needing a very precise alignment). The support will be in responsibility of KEK colleagues.*
- *Fiducialization and alignment details to be discussed at this meeting*

	OCTU1	OCTU2
Integrated gradient [T/m <sup>2</sup> ]	177*120%	1705*120%
Gradient [T/m <sup>3</sup> ]	708	6820
Tunability [%]	-90/+20	90/+20
Magnetic length [mm]	300	300
Aperture radius [mm]	52	52
Ampere-turns [A] (per coil)	180	1800
Number or turns (per coil)	6	60
Current [A]	30	30
Voltage [V]	0.51	5.1
Max Current density [A/mm <sup>2</sup> ]	0.9	0.9
Max. Power [W]	15.2	152
Min/Max Pole field [Gauss]	13/166	134/1600
Resistance [mOhm]	17	170
Conductor length [m]	35	350
Conductor mass [kg]	11	110
Total magnet mass [kg]	78	320
Max. magnet length [mm]	360	360
Max. outer radius [mm]	135	300

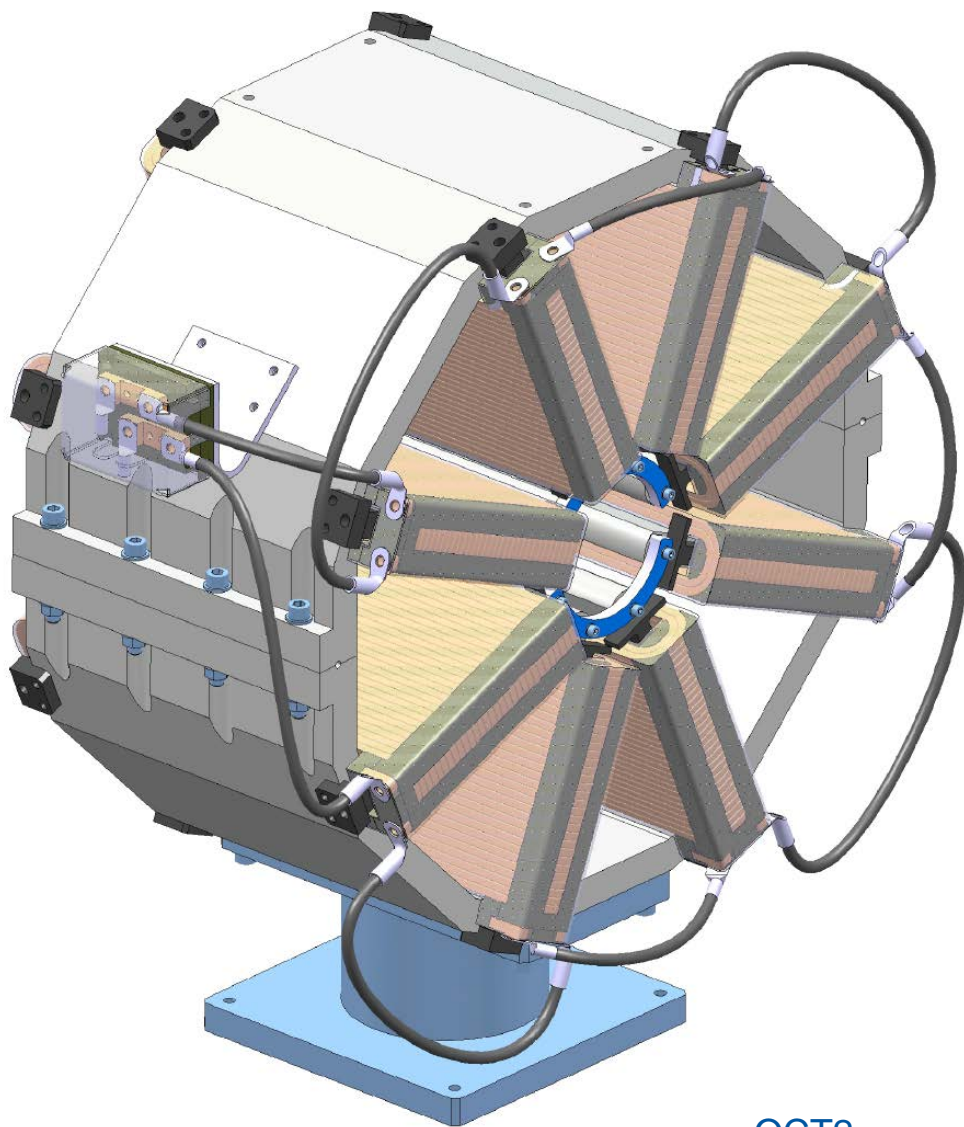
## Driving design aspects:

- Easy and “transparent” installation at ATF on existing beam pipe
- No active cooling (→ no vibration)
- Maximize precision (→ field quality)

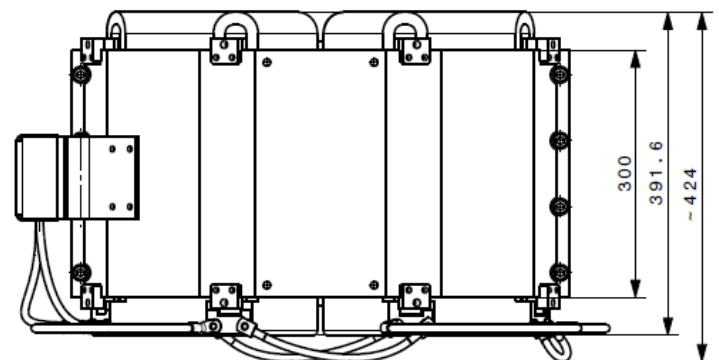
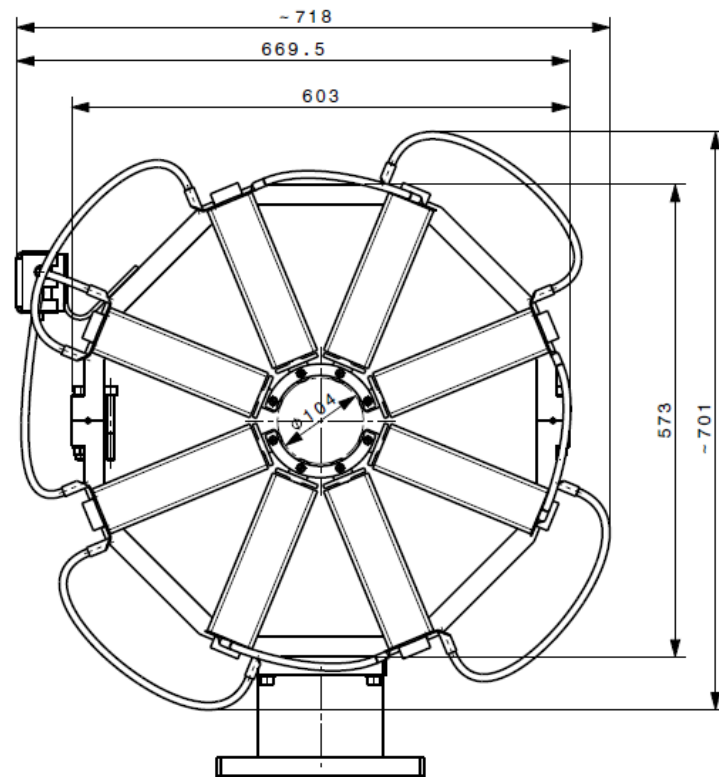


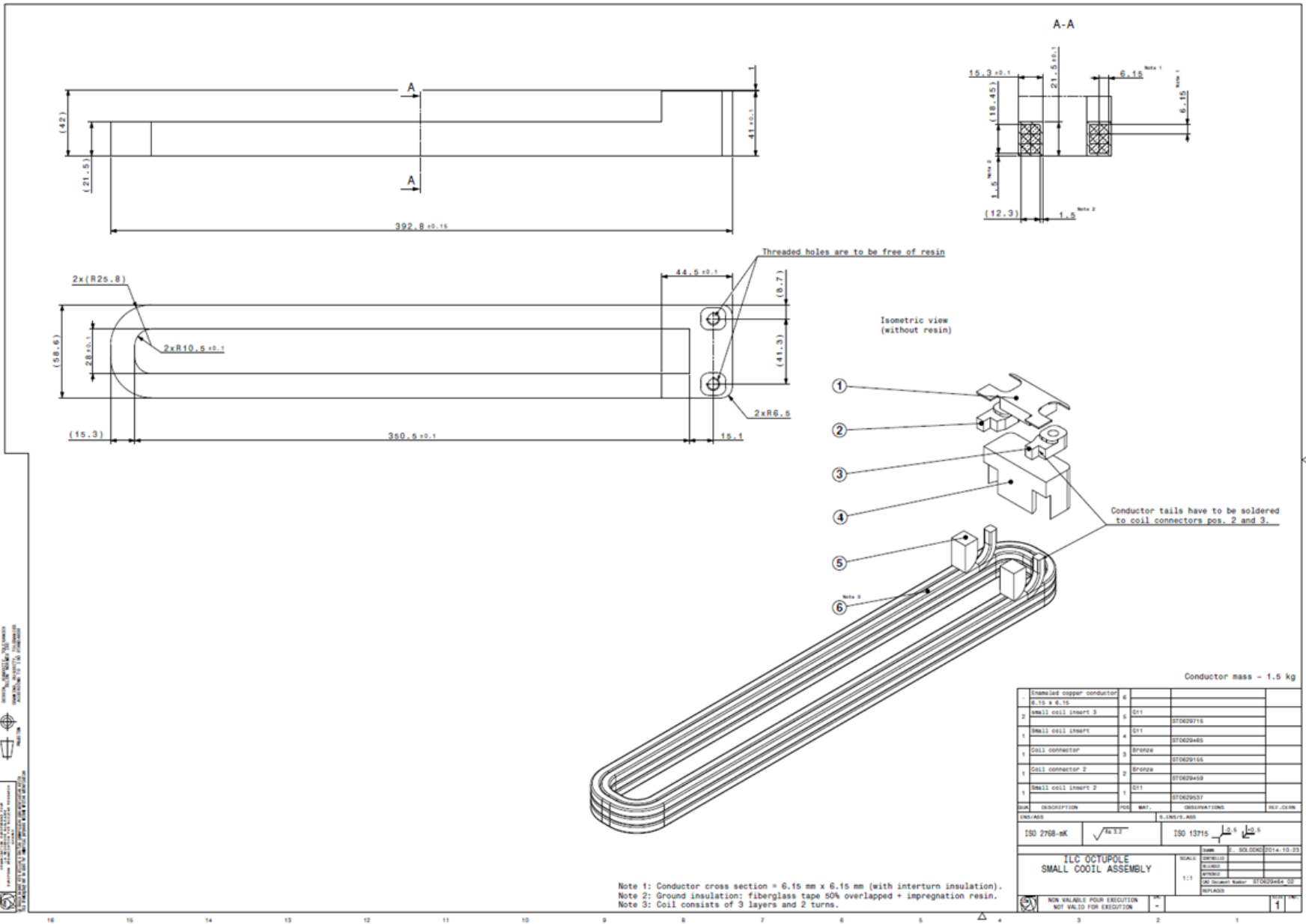


OCT1



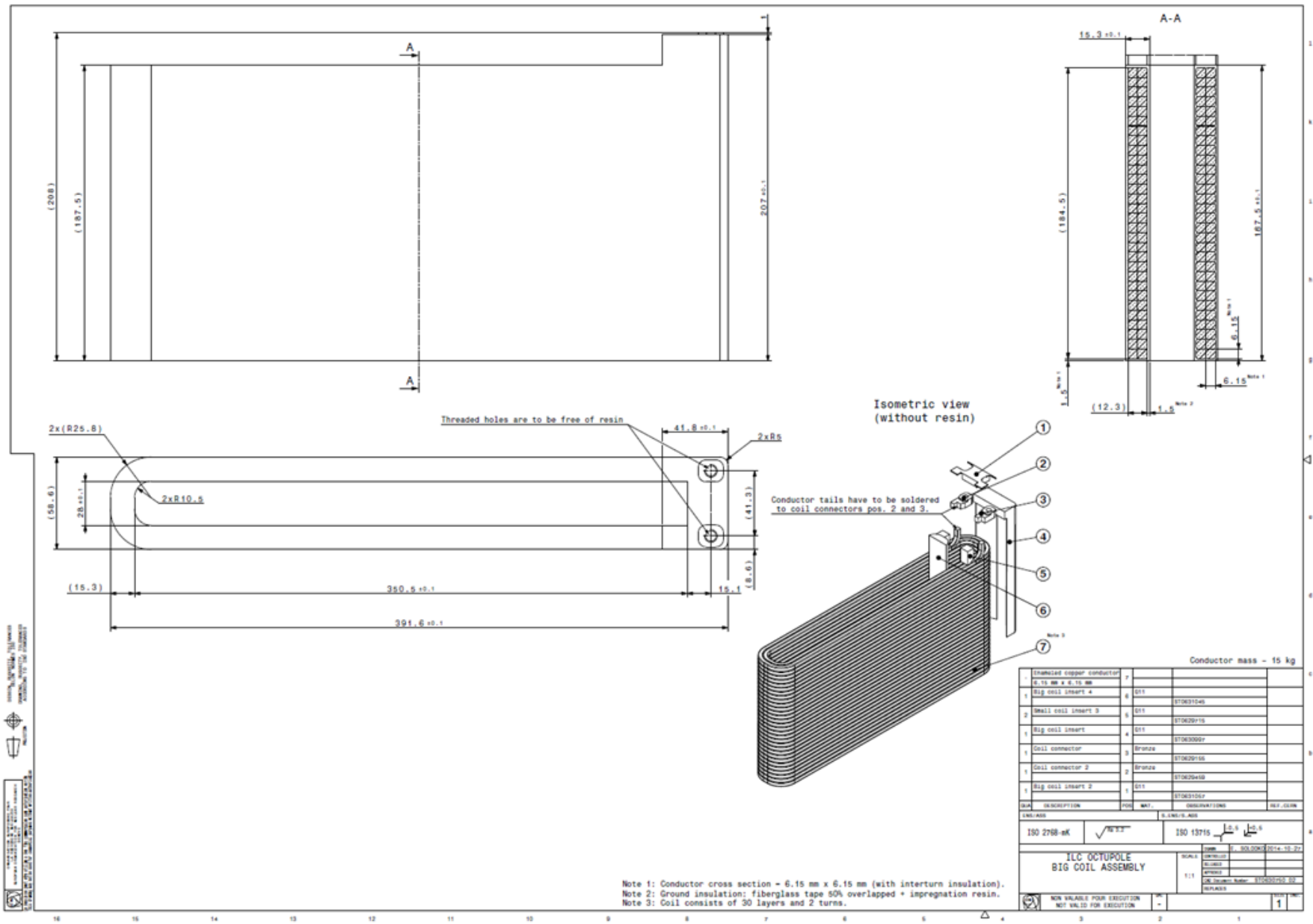
OCT2





QTY	DESCRIPTION	POS	MAT.	QTY	DESCRIPTION	POS	MAT.	QTY	DESCRIPTION	POS	MAT.	QTY	DESCRIPTION	POS	MAT.
6	[enameled copper conductor 6.15 x 6.15]	6													
2	small coil insert 3	6	ES1		ST0629115										
1	small coil insert	4	ES1		ST0629465										
1	coil connector	3	SPR030		ST0629165										
1	coil connector 2	2	SPR030		ST0629469										
1	small coil insert 2	1	ES1		ST0629537										
	<b>SUM</b>	<b>DESCRIPTION</b>	<b>POS</b>	<b>MAT.</b>	<b>QTY</b>	<b>DESCRIPTION</b>	<b>POS</b>	<b>MAT.</b>	<b>QTY</b>	<b>DESCRIPTION</b>	<b>POS</b>	<b>MAT.</b>	<b>QTY</b>	<b>DESCRIPTION</b>	<b>POS</b>

Note 1: Conductor cross section = 6.15 mm x 6.15 mm (with interturn insulation).  
 Note 2: Ground insulation: fiberglass tape 50% overlapped + impregnation resin.  
 Note 3: Coil consists of 3 layers and 2 turns.





## Status for COILS procurement:

- After CERN internal discussion, we decided to proceed with an external procurement; it will be faster of what CERN Polymer lab can achieve.
- We will need 8+2 (spares) OCT1 coils and 8+2 (spares) OCT2 coils, so in total 20 coils.
- We agreed with CERN Finance Department a fast procurement procedure and the Company is already selected (SEF- Toulouse, France).
- This week we are visiting SEF to finalize the coils design (filling pieces, connections, etc.).
- We should have the 20 coils at CERN in May 2015 (to be finalized this week).

## Status for IRON YOKES procurement:

- Proceeding with the raw material purchasing.
- The 4 half-yokes (2 per magnet) will be produced by EDM technique.
- As soon as last coils design finalized, we will finalize the half-yoke dimensions too.
- We will circulate the half-yokes and final assembly drawings to **ATF** and **CERN Survey** colleagues for comments and approval.

We expect comments/requirements for the magnet fixations on support (by ATF)

We expect comments/requirements for fiducials (by CERN Survey and ATF)

## Planning:

- After final design approval, coils and half yoke production will run in parallel.
- To follow: assembly, tests, magnetic measurements and shipment to Japan (for which LAPP should have some experience).
- We target the procurement completion for next Summer, but this has to be better analyse and confirmed as soon as final design approved.

## Other procurement:

- The 2 magnets will require very low power supplies (PS), nominally 15 and 150 W.
- We don't know how much PS stability could be a concern (→to be discussed inside ATF community) and may be high stability PS for such small load already exist at KEK.
- We understand that, if needed, CERN could cover the costs of new power supplies.
- In this case CERN expert (D. Aguglia) suggest for ex. Delta Elektronika:  
<http://www.delta-elektronika.nl/en/products.html> as a well know PS supplier for such type of application.
- Evidently, any other KEK well know supplier could be propose.
- Anyway, it will be more convenient to pass an order from Japan to have PS following Japanese electrical standard and delivery directly on site.

*(Even if absent): Thanks for your attention*

*(Please send me any question/ comment by email: [michele.modena@cern.ch](mailto:michele.modena@cern.ch))*