



# Manufacturing of the first FCC-hh beam screen prototype for ANKA

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## Outline:

Beam screen configuration

Manufacturing procedure

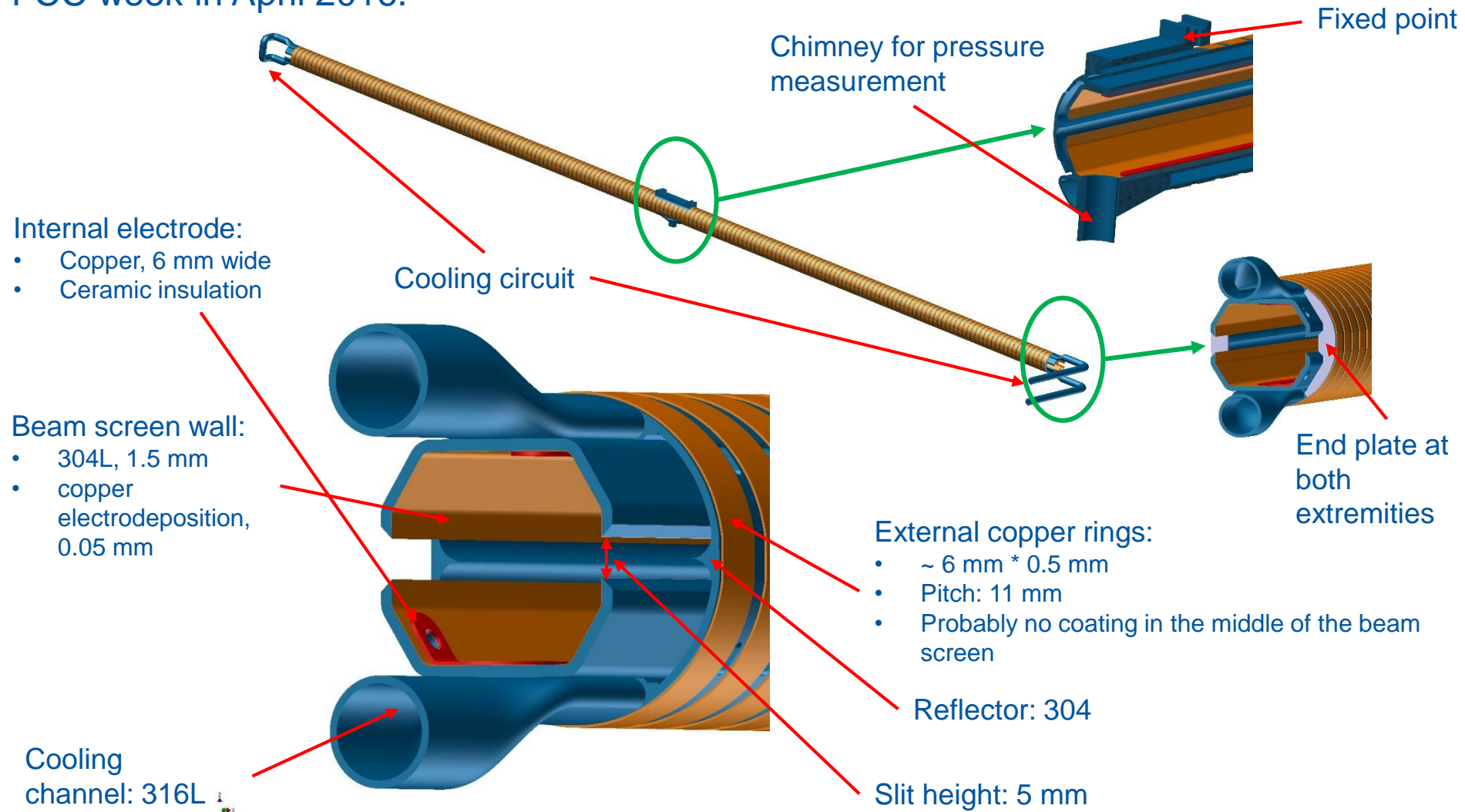
Key technologies

Status and tentative schedule

Conclusion

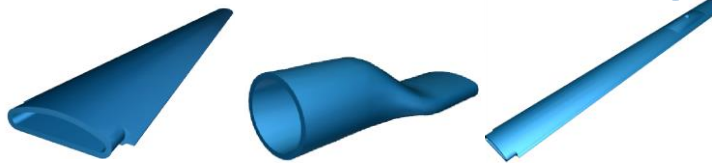
# Configuration

The retained configuration for the first prototype is based on the version presented at the FCC week in April 2016.



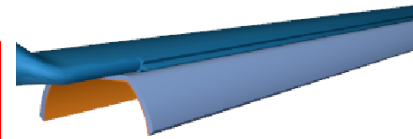
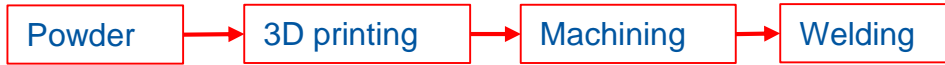
# Manufacturing procedure

Assembly:

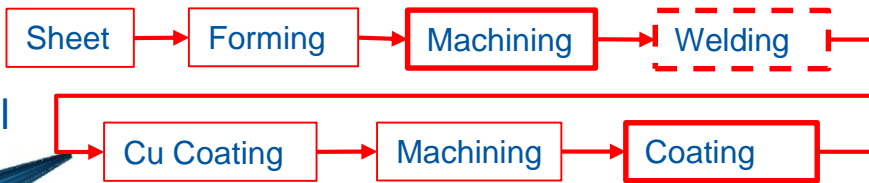


~ 40 cm long      Transition and special central pieces

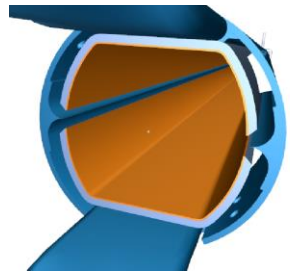
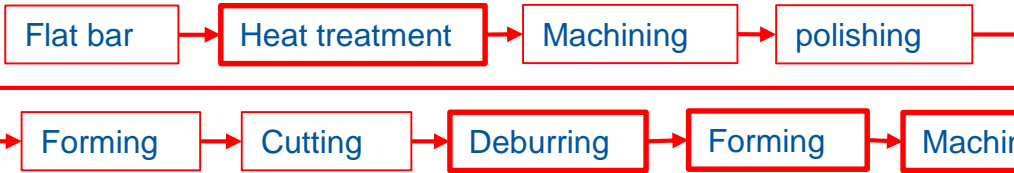
Cooling channel



Beam screen wall



Reflector



Reinforcement



End plate



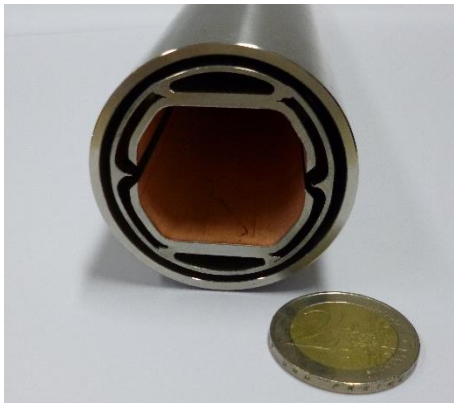
# Key technologies

Technology		Risk	Mitigation
3D printing		Leak	Leak tests of 100% of 3D printed parts
		Deformation	<ul style="list-style-type: none"> <li>Minimize the machining</li> <li>Dedicated tooling during welding</li> </ul>
Laser cutting and welding		Metal projection	Tooling
		Deformation	<ul style="list-style-type: none"> <li>Tooling</li> <li>Additional forming</li> </ul>
Sheet metal working and machining		Precision	<ul style="list-style-type: none"> <li>Heat treatment</li> <li>Dedicated tooling</li> </ul>
Coating	Electrodeposition	Peel off	Apply known procedures
	Plasma and cold spray		Tests on dedicated representative samples
			Thermal shock cycles

# Key technology validation

Main technologies have been validated by the production of two 30 cm long prototypes.

Different surface preparations have been assessed for the copper cold spray.



Production of a 30 cm prototype



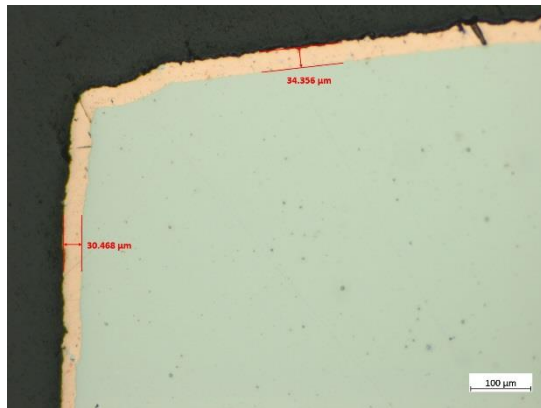
Copper cold sprayed strips on beam screen short prototype

# Key technology validation

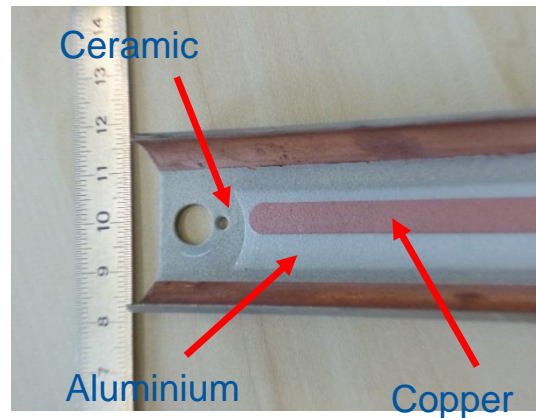
Uniformity of the copper electrodeposition has been assessed along the 2 m long prototype.

Internal electrode has been produced by plasma and cold spray coating. Electrical insulation has been validated after thermal shock cycles (77K-~400K).

All 3D printed parts for the cooling channel have been leak tested at reception.



Measurements of the electrodeposited copper thickness



Electrode obtained by plasma and cold spray



A few 3D printed parts

# Machining

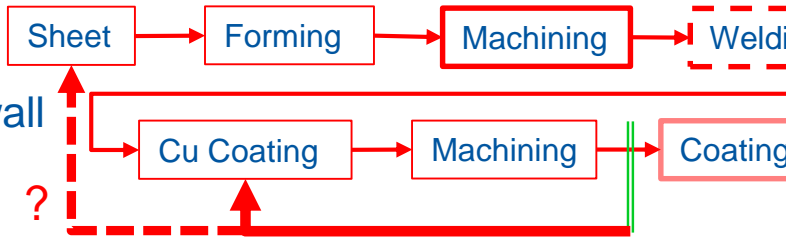


Assembly:

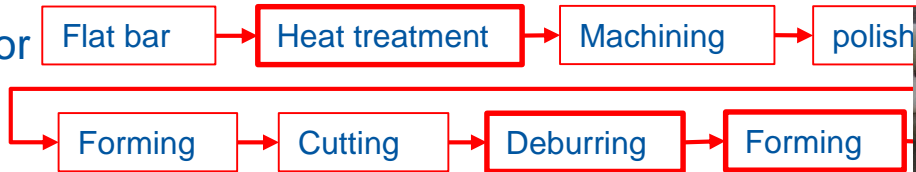
Cooling channel



Beam screen wall



Reflector



Reinforcement



End plate

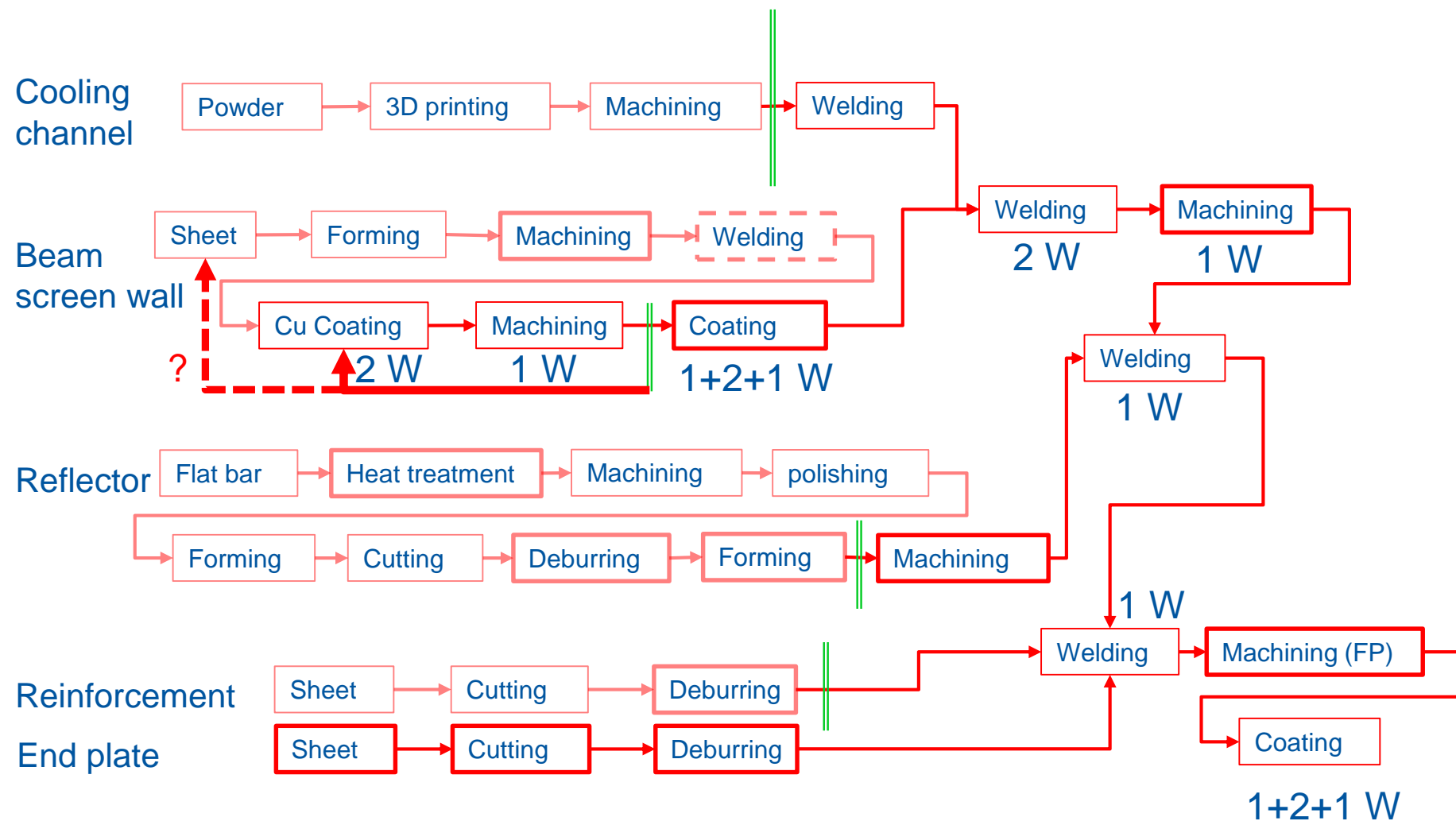


Machining (FP)

Coating



# Tentative schedule



→ Beam screen prototype should be available by mid March 2017 (indicative).

# Conclusion

Conclusions at ~~FCC week 2016, Rome:~~ EuroCircol WP4 meeting 2016, Alba:

First short prototypes, ~ 30 cm long, have been manufactured. ~~Main~~ **All** manufacturing techniques have been validated and ~~will be used for production~~ **are used for production** of ~~additional prototypes~~ **prototype**.

First 2 m long prototype, to be installed and tested at Anka, will be manufactured ~~by the end 2016.~~ **mid March 2017.**

