World-Wide Fundamental Power Coupler meeting #3

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Topics for discussion

Conclusion

List of invitees for WWFPC#4 meeting in 2018

CERN	Eric Montesinos
KEK	Eiji Kako
DESY	Denis Kostin
KEK	Yasuchika Yamamoto
RIKEN	Kazutaka Ozeki
IHEP	Tong ming Huang
LAL	Walid Kaabi
IPNO	Emmanuel Rampnoux
BNL	Wencan Xu
IBS	Ilkyoung Shin
CEA	Guillaume Devanz
CEA	Christian Arcambal
Cornell	Vadim Veshcherevich
JLAB	Mircea Stirbet
ORNL	Yoon Kang
FNAL	Sergey Kazakov
SLAC	Chris Adolphsen

WWFPC#4 meeting date

Still hosted at CERN ?

Still yearly ?

Still June ?

Mandatory to be present the two days

No remote participation

Discussion oriented, no time limitation

Experts only

On invitation only (feel free to add to the list)

Topics for discussion

Design

Maximum power per coupler ?

Multi couplers per cavity ?

Ceramic

Sputtering: TiOx – TiN ?

Control of the process ? Qualification

New ceramic without treatment ? (KEK/CERN)

Gray deposit ?

How to qualify ?

Topics for discussion

Coating

Copper plating

How to make it correct ?

Common classification of defects

Acceptance criteria ?

Discoloration of ceramic

Is superficial oxidation or discoloration a problem ?

Before and after RF processing

To gray after RF conditioning at XFEL

To yellow due to multipacting ?

To brown after X-ray ?

Topics for discussion

Specific constraints for operation reasons

No brazing-welding-soldering between liquid coolant and vacuum (proven EBW should not be on the list)

No liquid cooled couplers

Do you have the same constraints ?

Do you have statistics linked to these constraints ?

Topics for discussion

Tests

TW? SW? TW & SW ?

Test boxes in 3D printing copper plated ? Acceptable or incompatible with cleanliness requirements ?

Arcing and air cooling

Is lower pressure creates arc ?

Is N2 worse than air ?

Do we need vacuum gauge for series production FPC ?

BNL, SNS, DESY do not use DC bias, prefer a good conditioning, afraid of gas accumulation (use multipacting simulation tool in order to make a multipacting free coupler)

Amplifiers for tests

Prototype processes versus series processes

What margin do we need between pre-series and series ?

Topics for discussion

Diagnostics
R&D and prototyping
Operation in accelerators

Statistics
How to list all couplers operated in accelerators ?
Degradation of characteristic over time of operation
How to share these information ? This meeting ? Mandatory in talks ?
Make pictures of work environments !

Topics for discussion

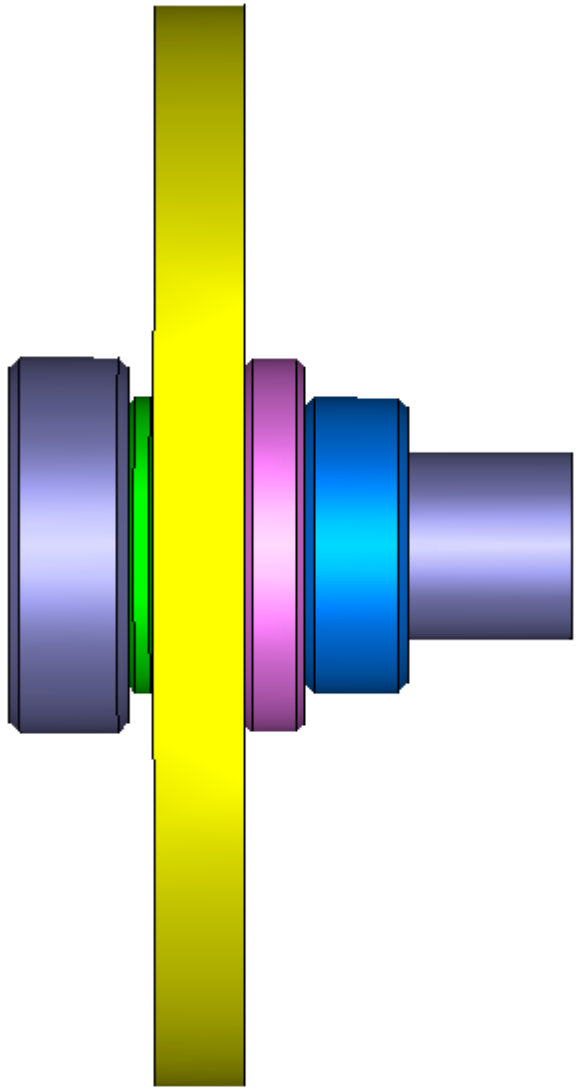
World Wide Program ?
How to organise it ?
Who can do what ?
Who want to do what ?

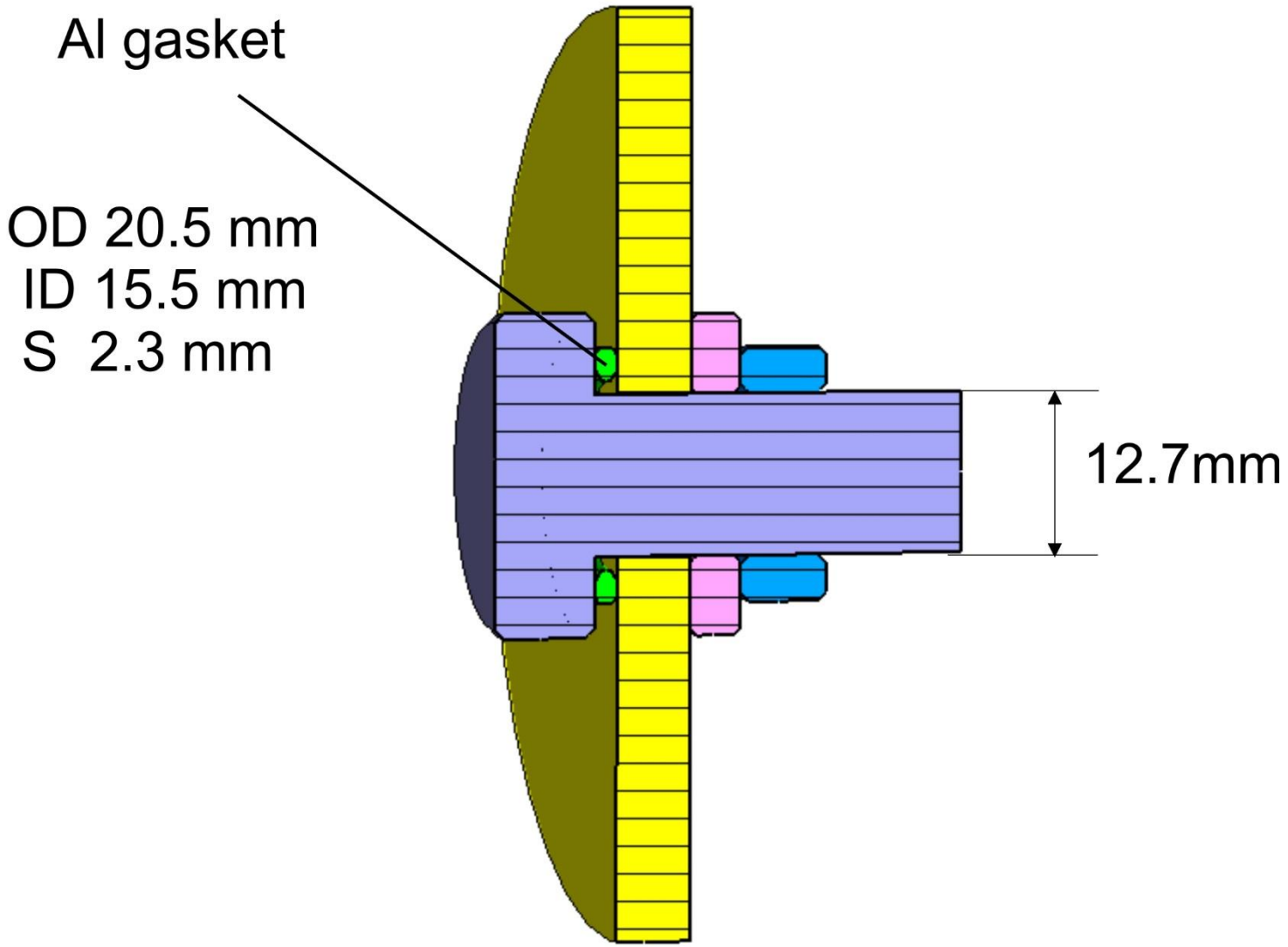
Al diamond seals for ceramic RF windows, first experiments.

S. Kazakov, D. Plant

02/24/2017

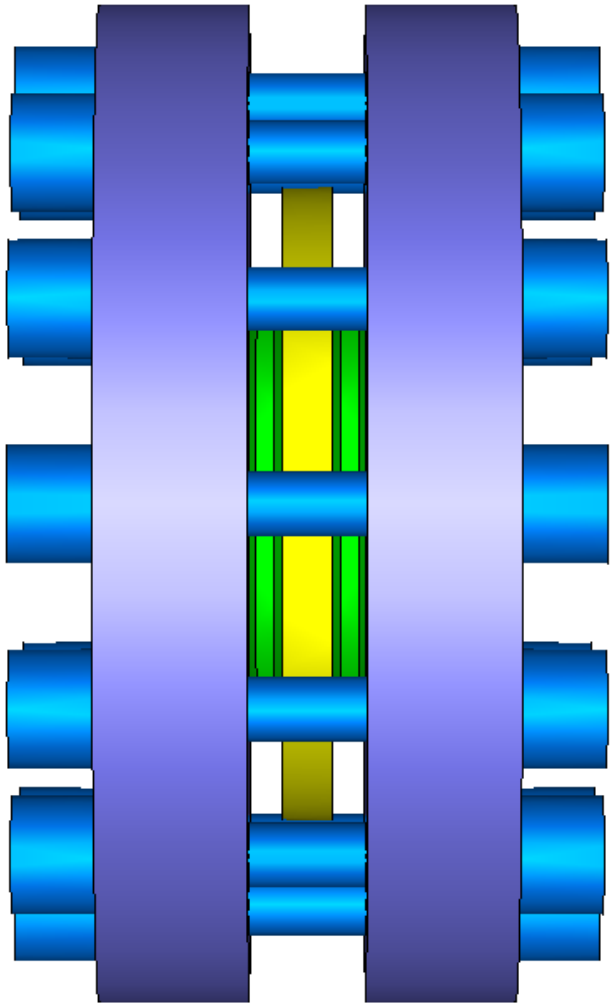
Geometry #1

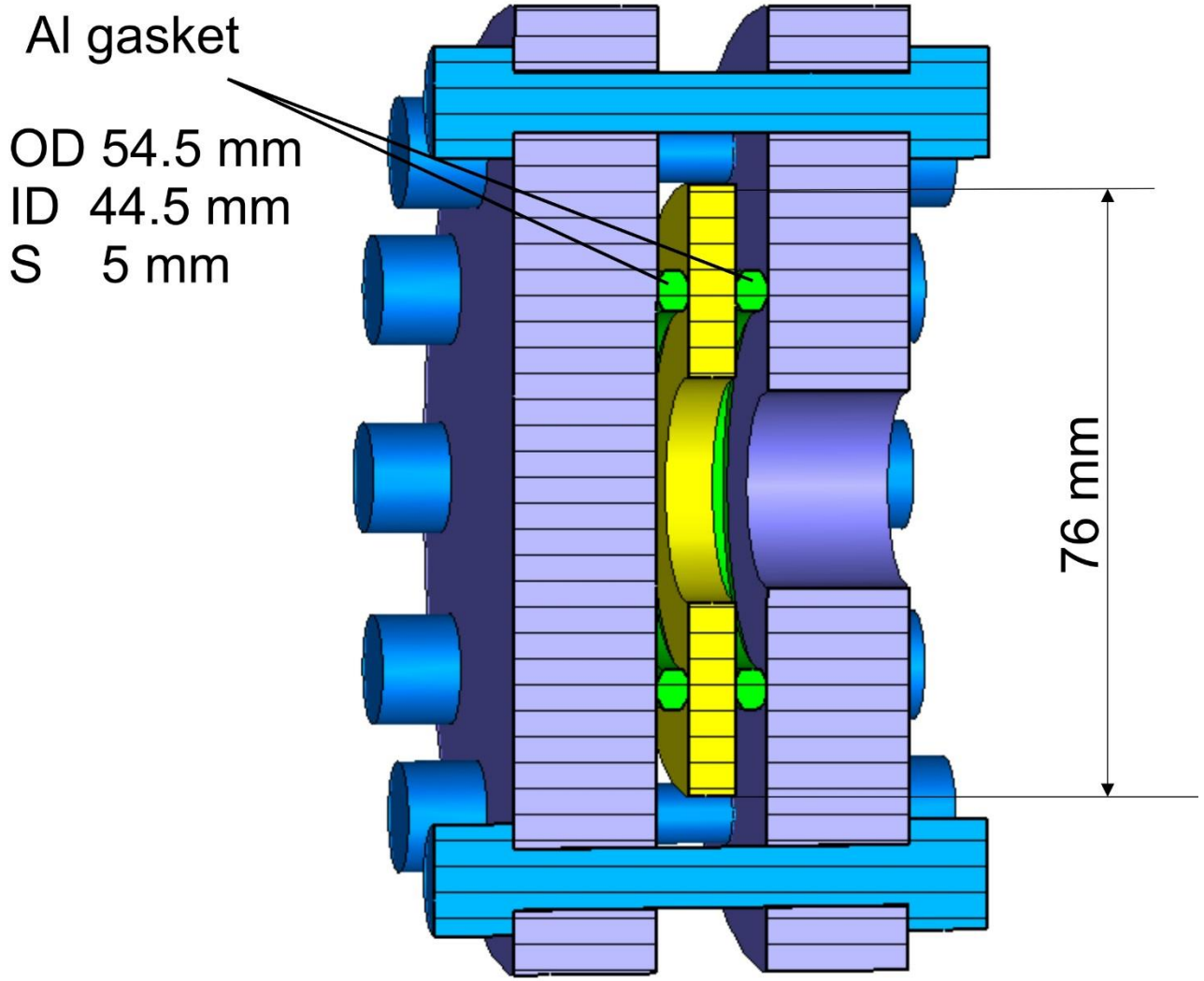


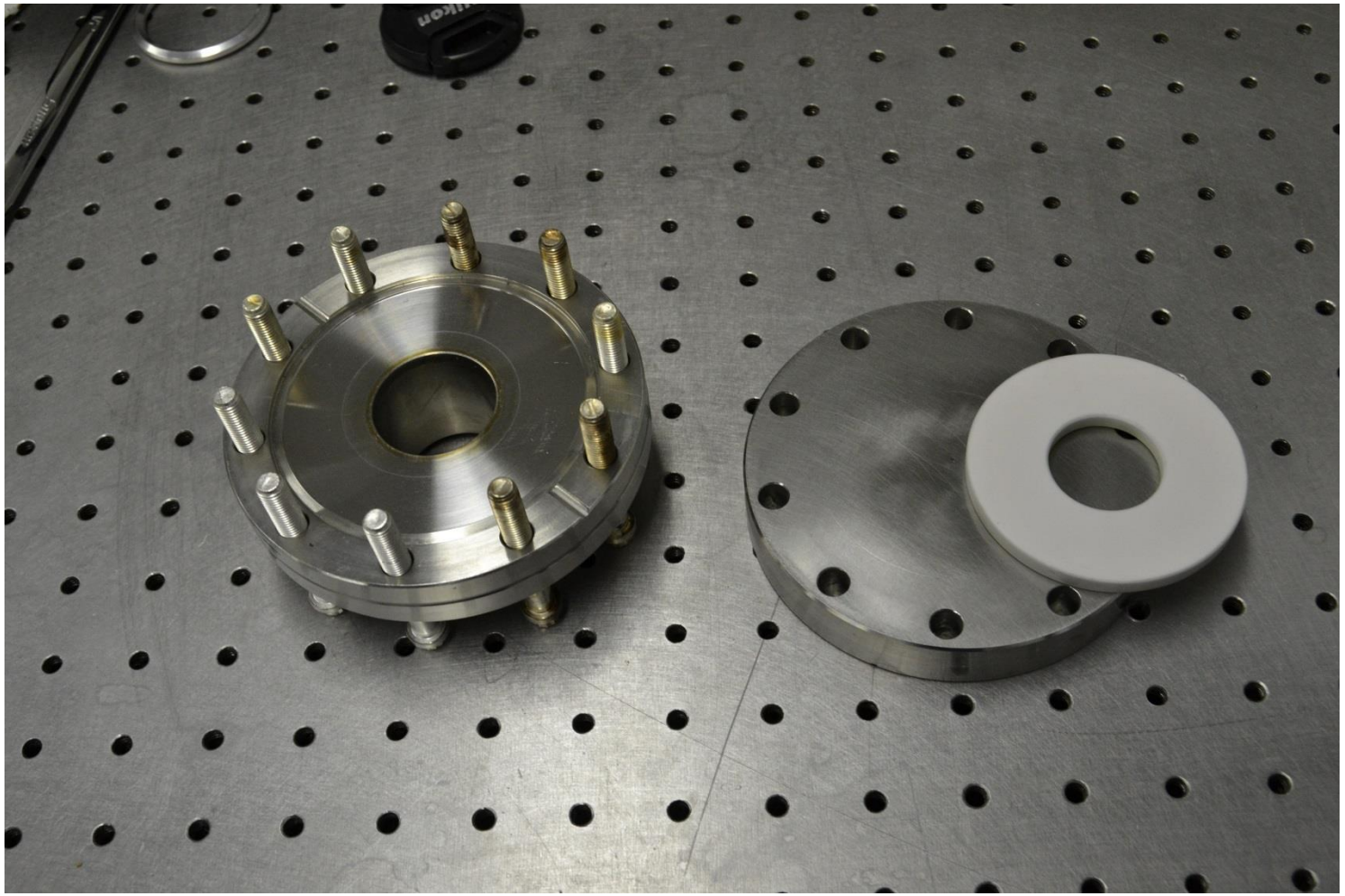


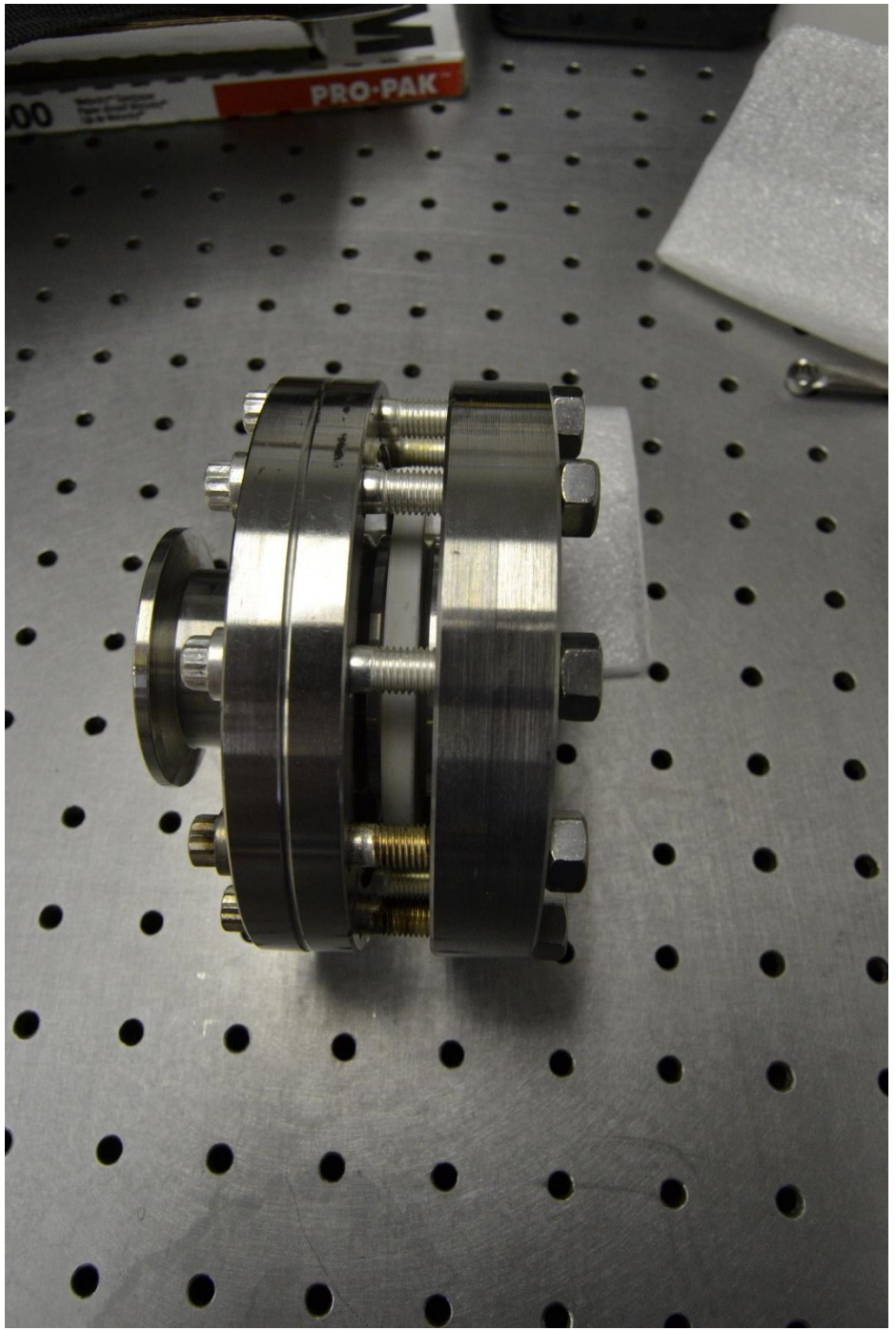
LEAK
DET.

Geometry #2








PRO-PAK

Geometry #1

Test 1:
(RT -> 0C -> RT -> 100C ->RT) x 10 times = OK (vacuum tight)

Test 2:
RT -> 70K -> RT = OK
RT -> 70K -> RT = Not OK

Bolt-nut were tightened.

Test 3:
RT -> 70K -> RT = OK
RT -> 70K -> RT = OK
RT -> 70K -> RT = ? (under the test)

Geometry #2

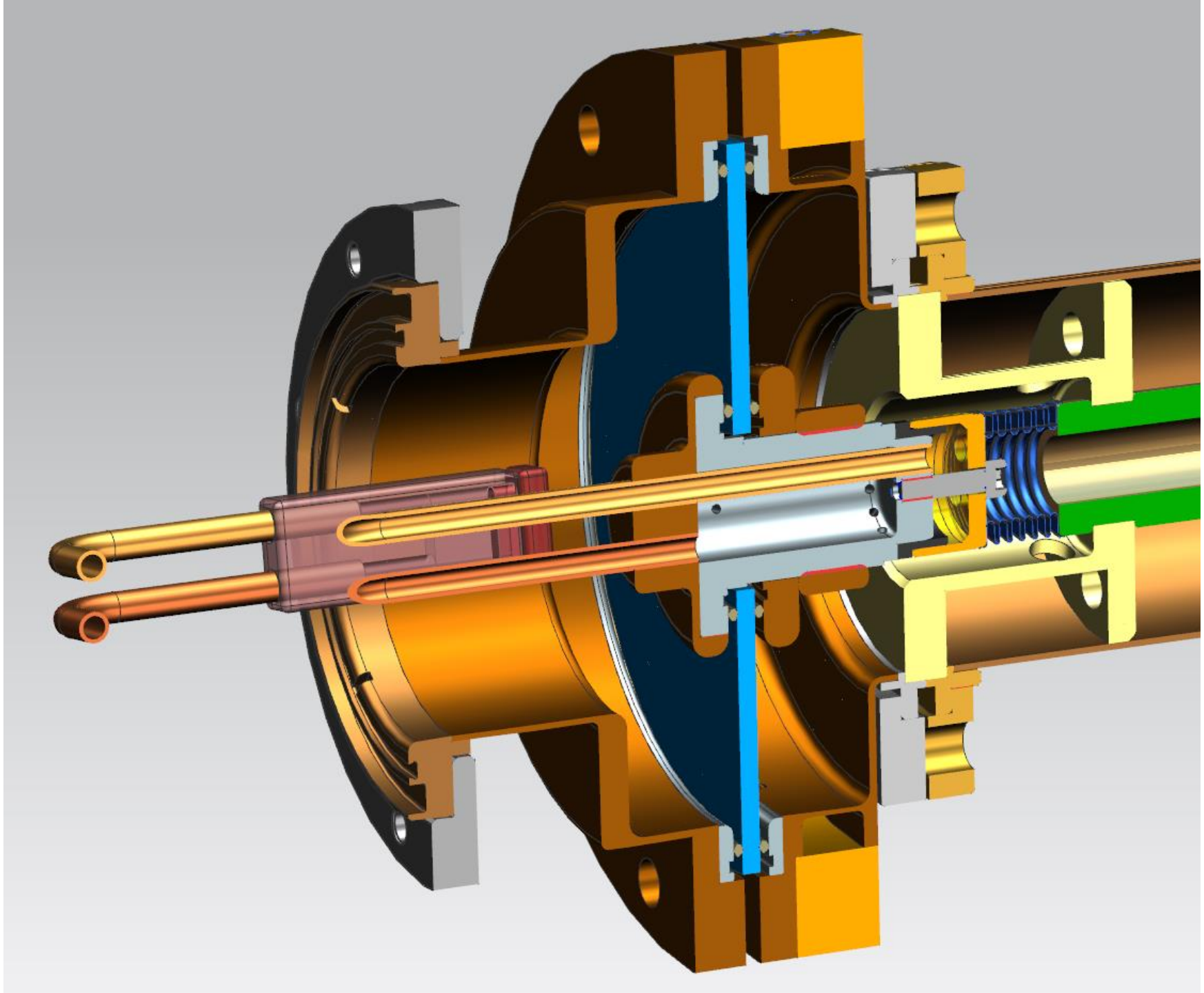
Test 1:
(RT -> 0C -> RT -> 100C ->RT) x 7 times = OK (vacuum tight)

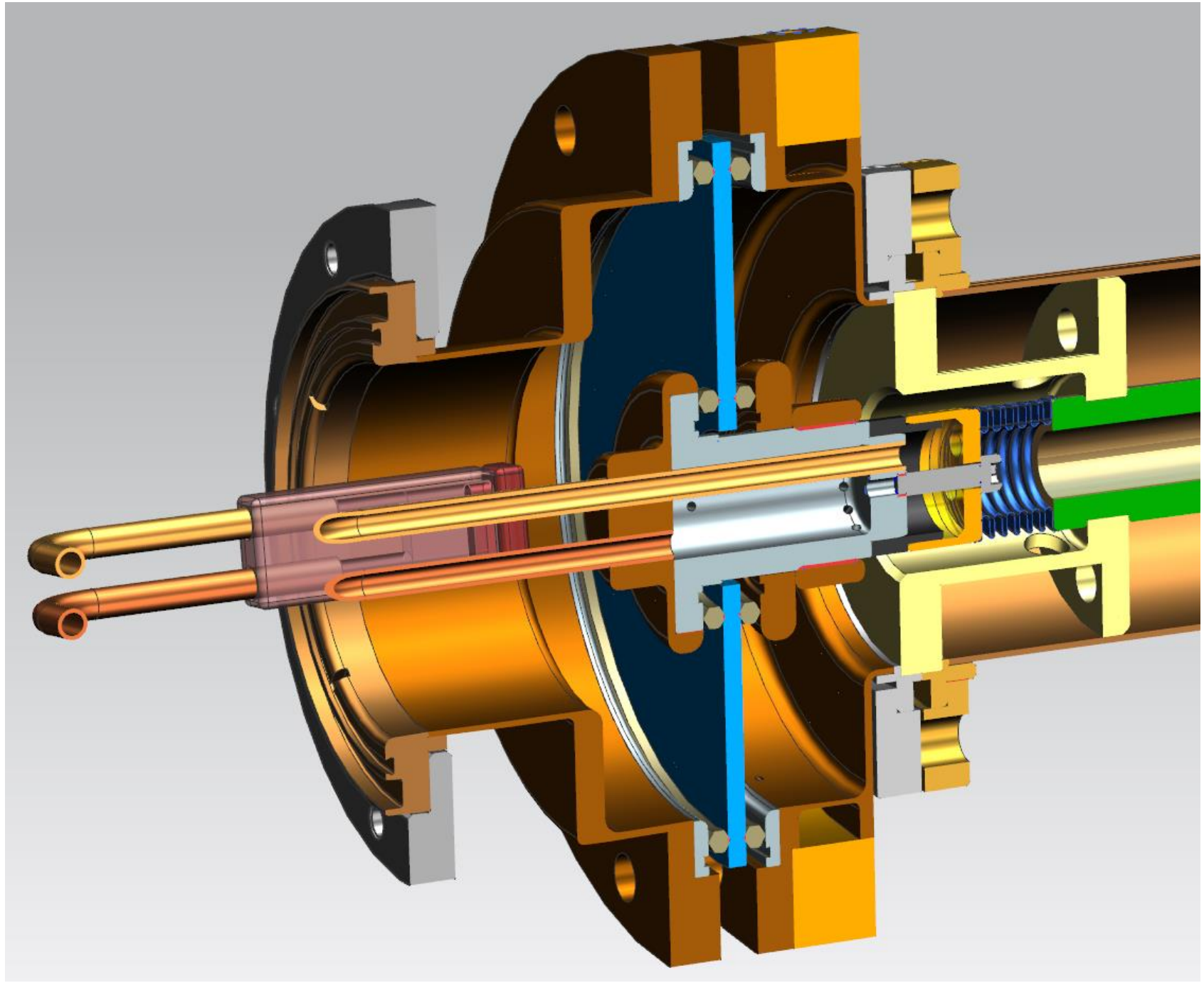
Test 2:
RT -> 70K -> RT = Not OK

Bolts-nuts were tightened.

Test 3:
RT -> 70K -> RT = OK
RT -> 70K -> RT = OK
RT -> 70K -> RT = ? (under the test)

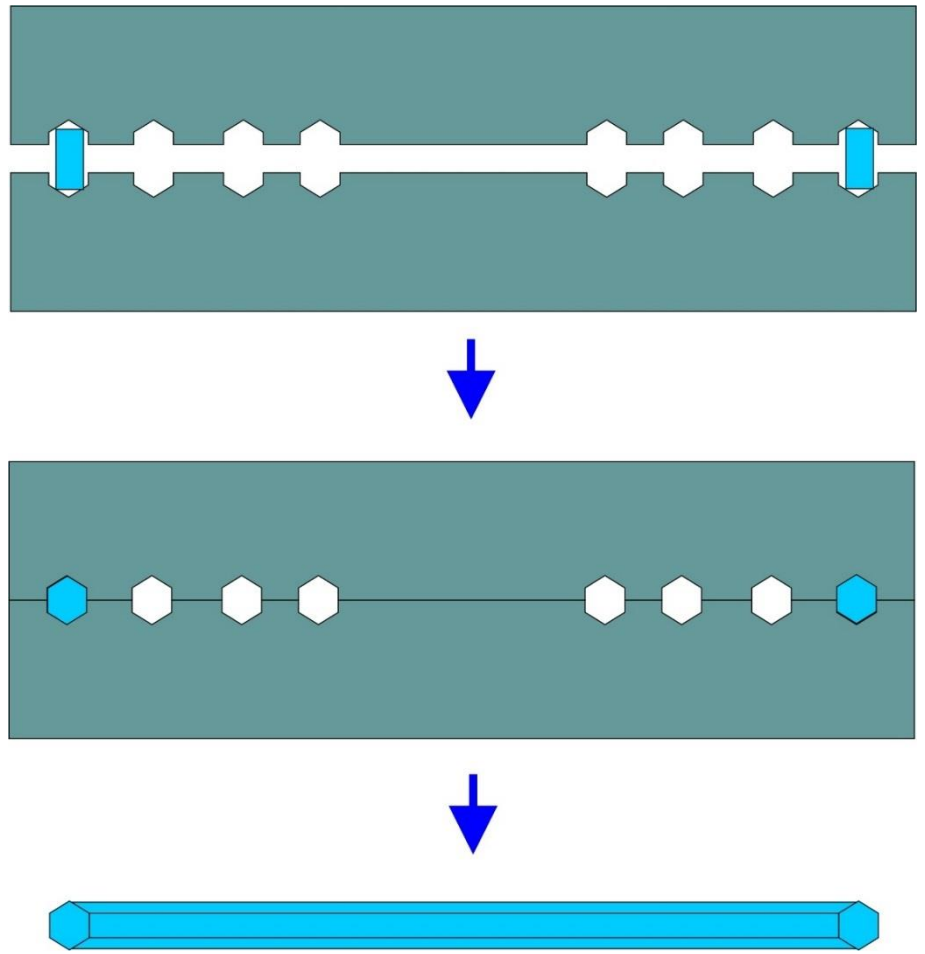
Conclusion:
Results are very promising. Window temperature operating range is 0 C < T < 100 C (not 70K)
Probably we can avoid a brazing of ceramics.





Now we buy the diamond Al seals from German company.
Price is ~$10 ~$20 per seal and 3 month delivery time.

We can try to produce seals by our self.
In this case we will have freedom in dimensions and, perhaps, materials.
Probably the most simple and practical way is stamping.



Thank you again for being here today !