# Mechanical Support for the PXD

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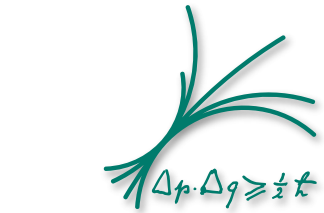
Belle II PXD/DEPFET Meeting, Prague
27 January 2010



# New Mechanical Support Scheme

Conclusions from Barcelona:

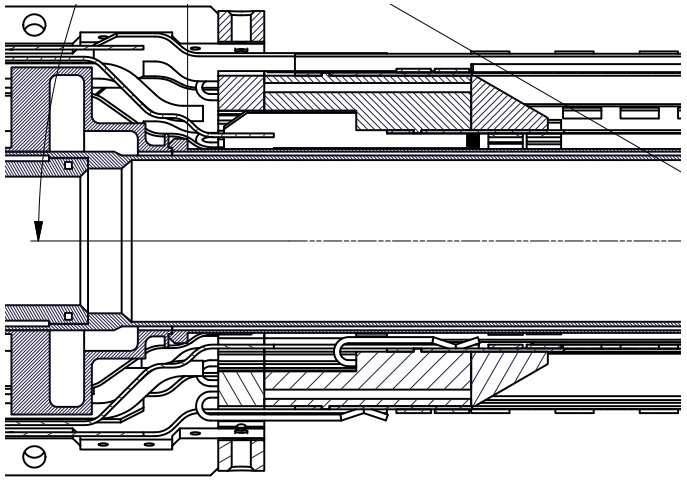
- Cooling from below sufficient
- Length of diamond problematic

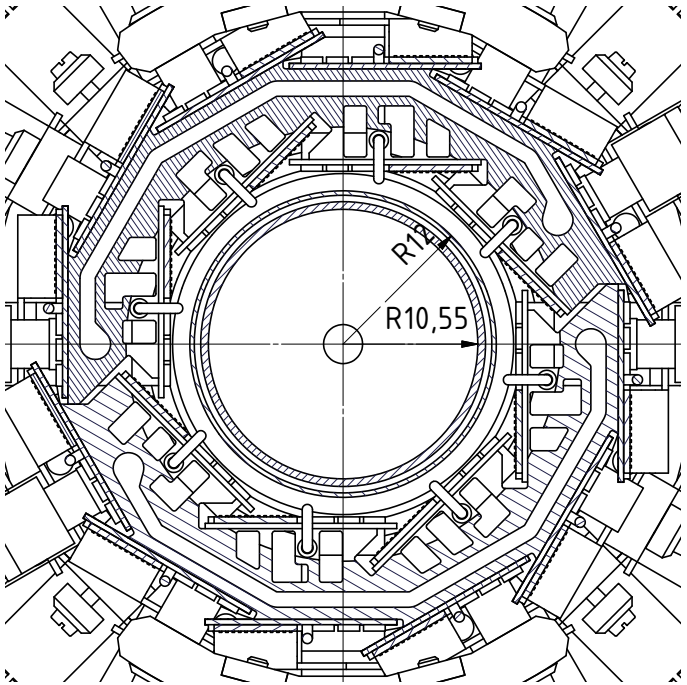
## New Support System

- integrated support and cooling structure (ISCS)
- direct contact between module and cooling

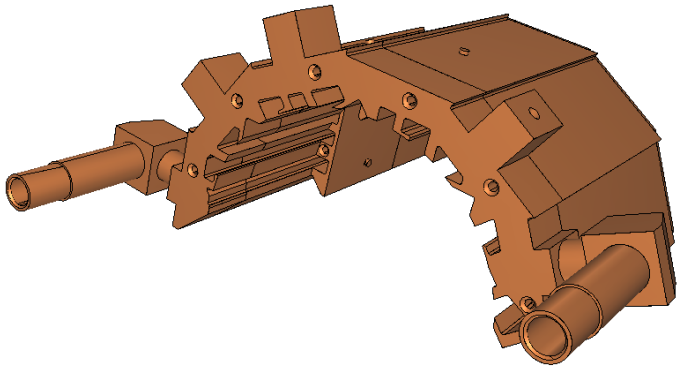
Beampipe Assumptions:

- outer radius 12 mm
- parallel to detector axis

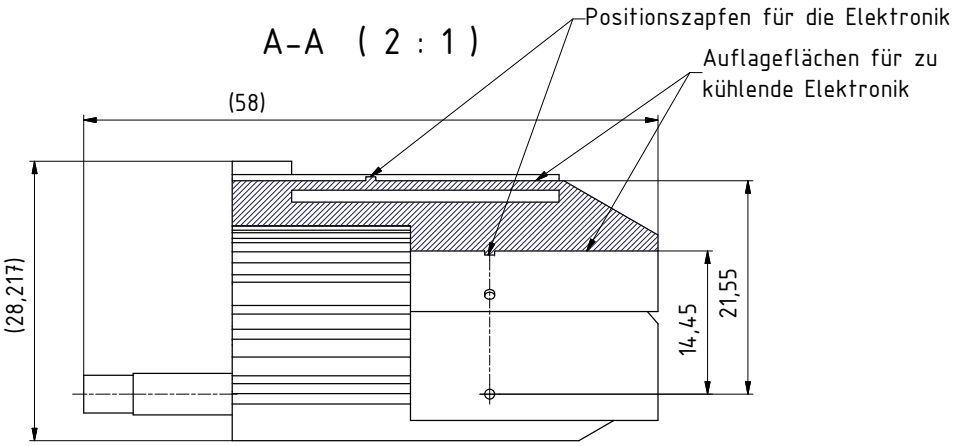


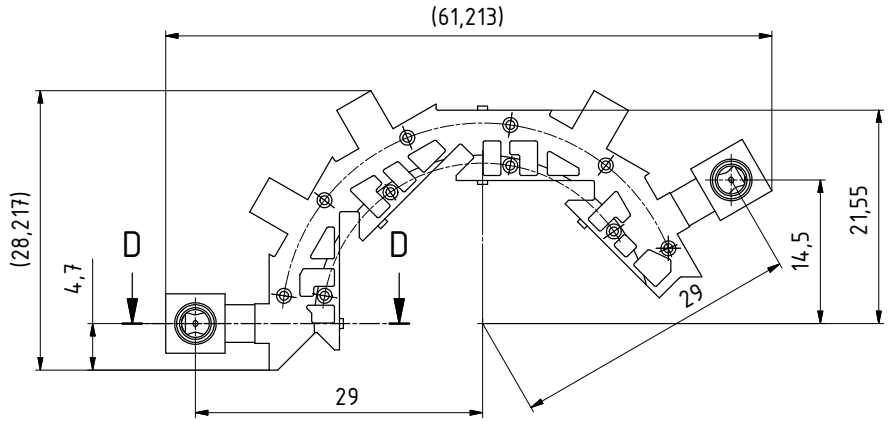


# Integrated Support and Cooling Structure



- copper support structure
- integrated cooling channel
- airflow channels



# Manufacturing

ISCS has complex geometry, currently two possibilities for manufacturing:

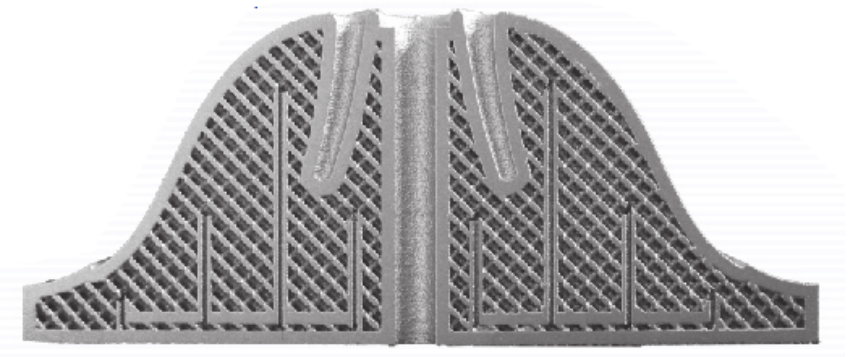
- Electronic Discharge Machining
  - high precision ($\pm 20\,\mu$m)
  - ISCS has to be manufactured in 3 pieces and soldered together
  - pure copper may be to soft
  - no complex inner structure possible
- Direct Metal Laser Sintering
  - lower precision ($\pm 50\,\mu$m)
  - production in 3D from CAD file in one piece
  - complex inner structures possible
  - currently no possibility for copper, only steel or aluminum

➡ We will pursue and evaluate both methods

# "Skin Freeze" - integrated cooling

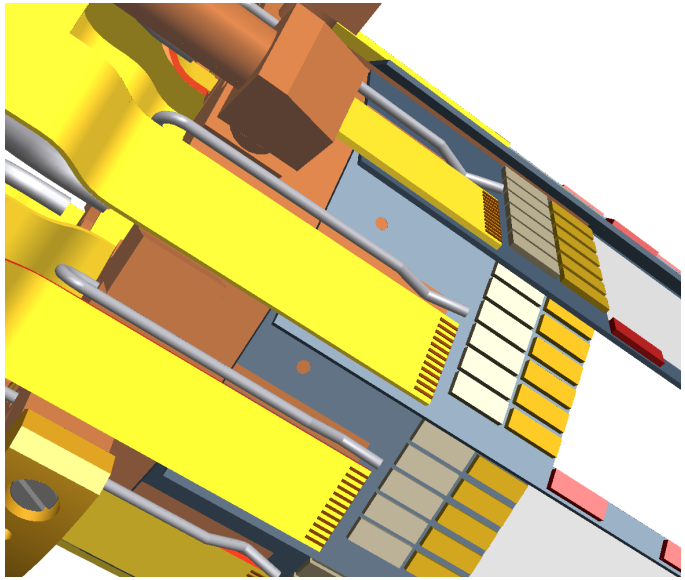
Possible cooling concept (FIT GmbH):

- DMLS support piece
- integrated micro cooling channels
- standard cooling refrigerants
- initial talks with company started

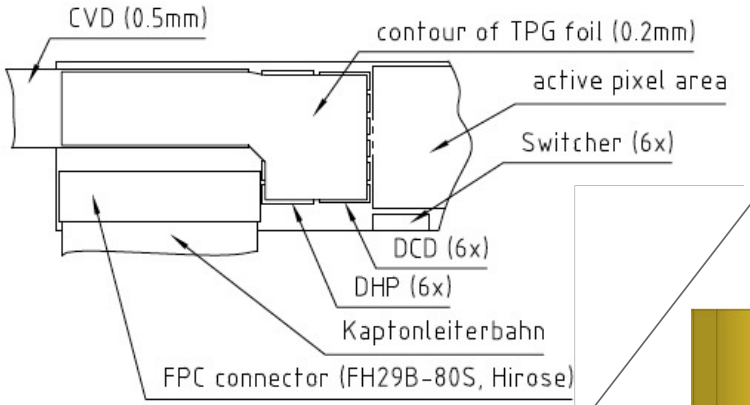


# End of Stave Layout

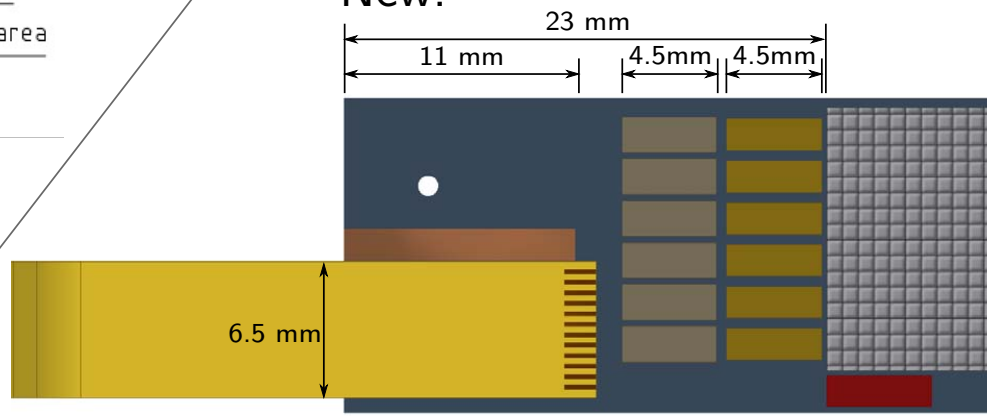
- 23 mm End of Stave
- no electronics in the last 6 mm, only support
- position fixated by Hole/Longhole
- pressure to cooling surface using spring



Old:



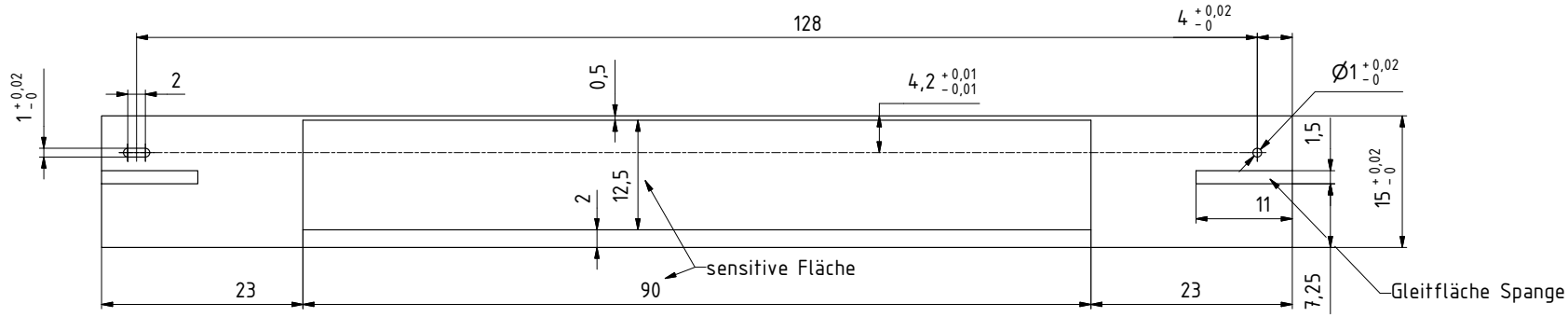

New:



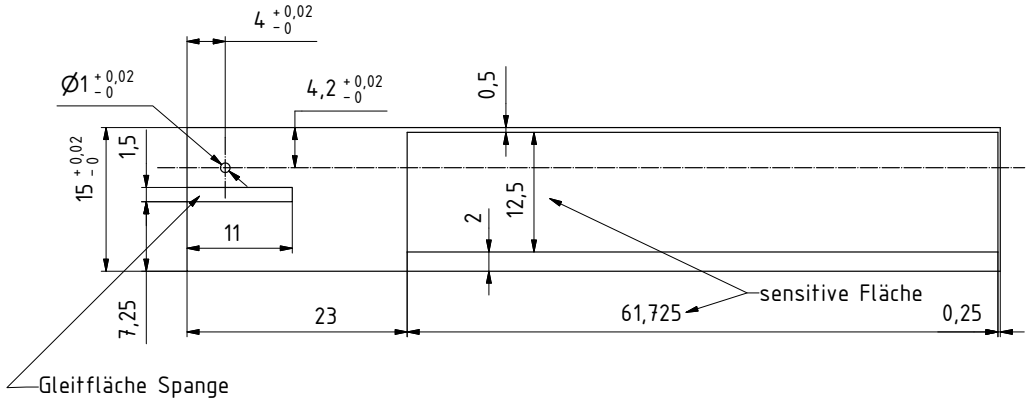
# Module Dimensions

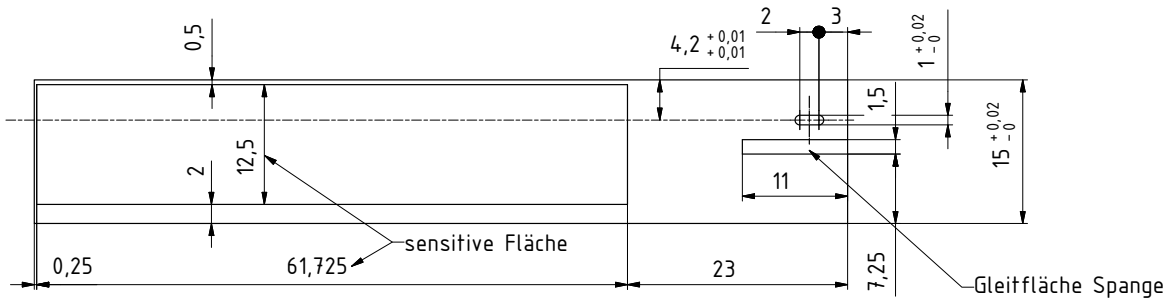
as used for dummy production

## Inner Layer

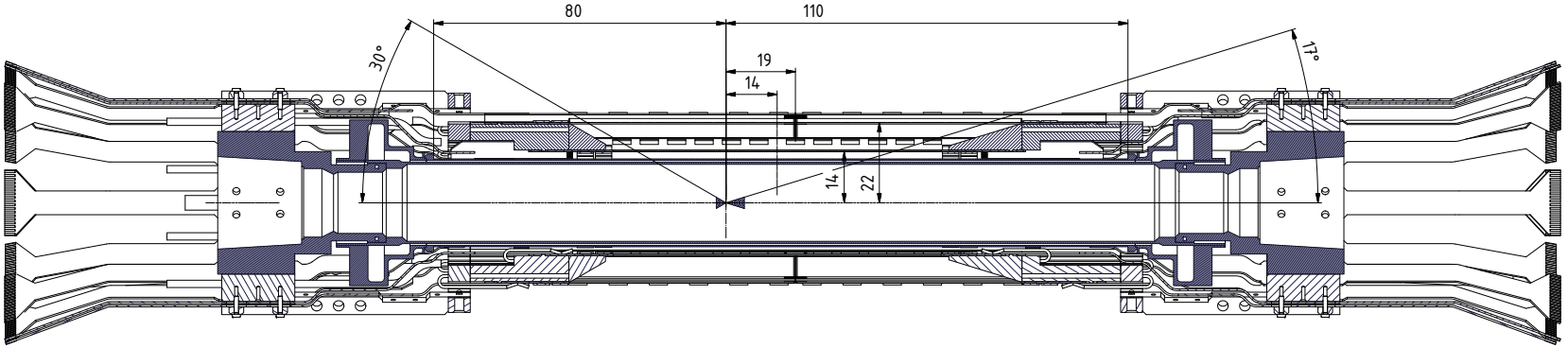


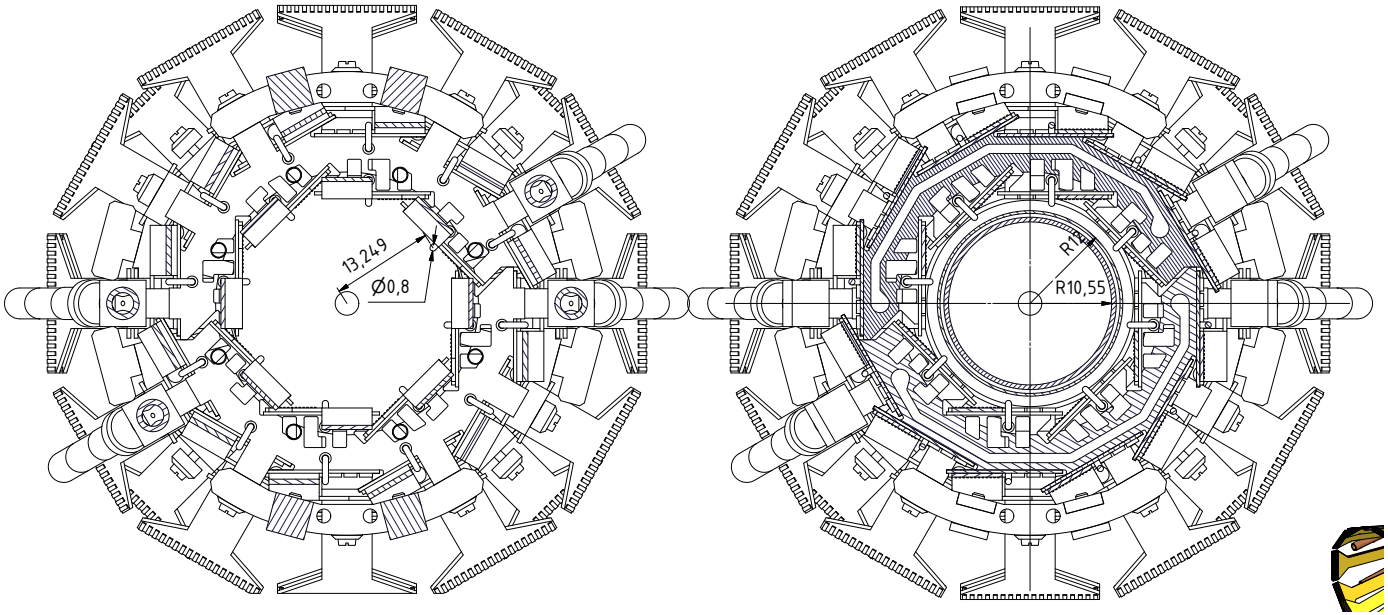

## Outer Layer



# Complete Design



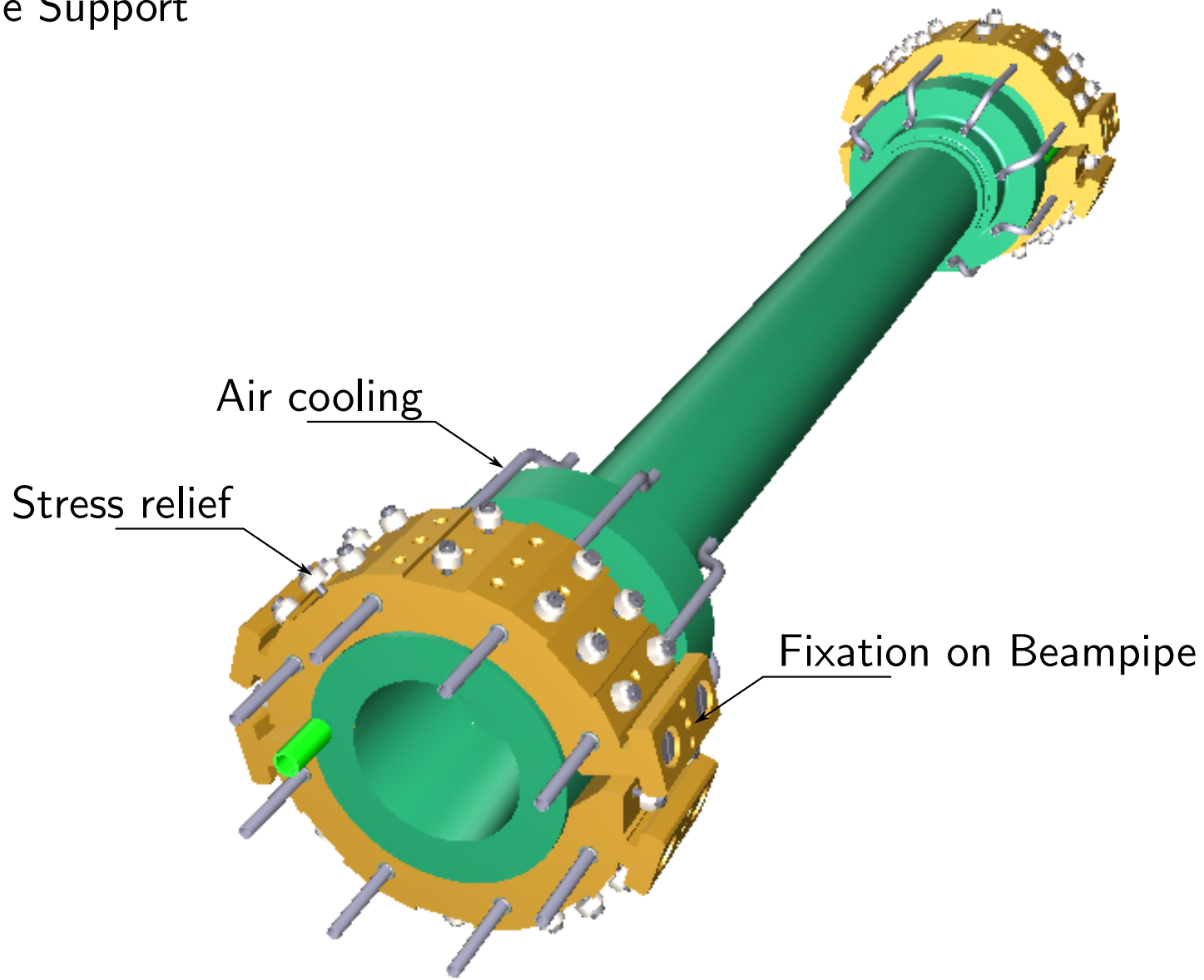



# Design Components

Beampipe

# Design Components

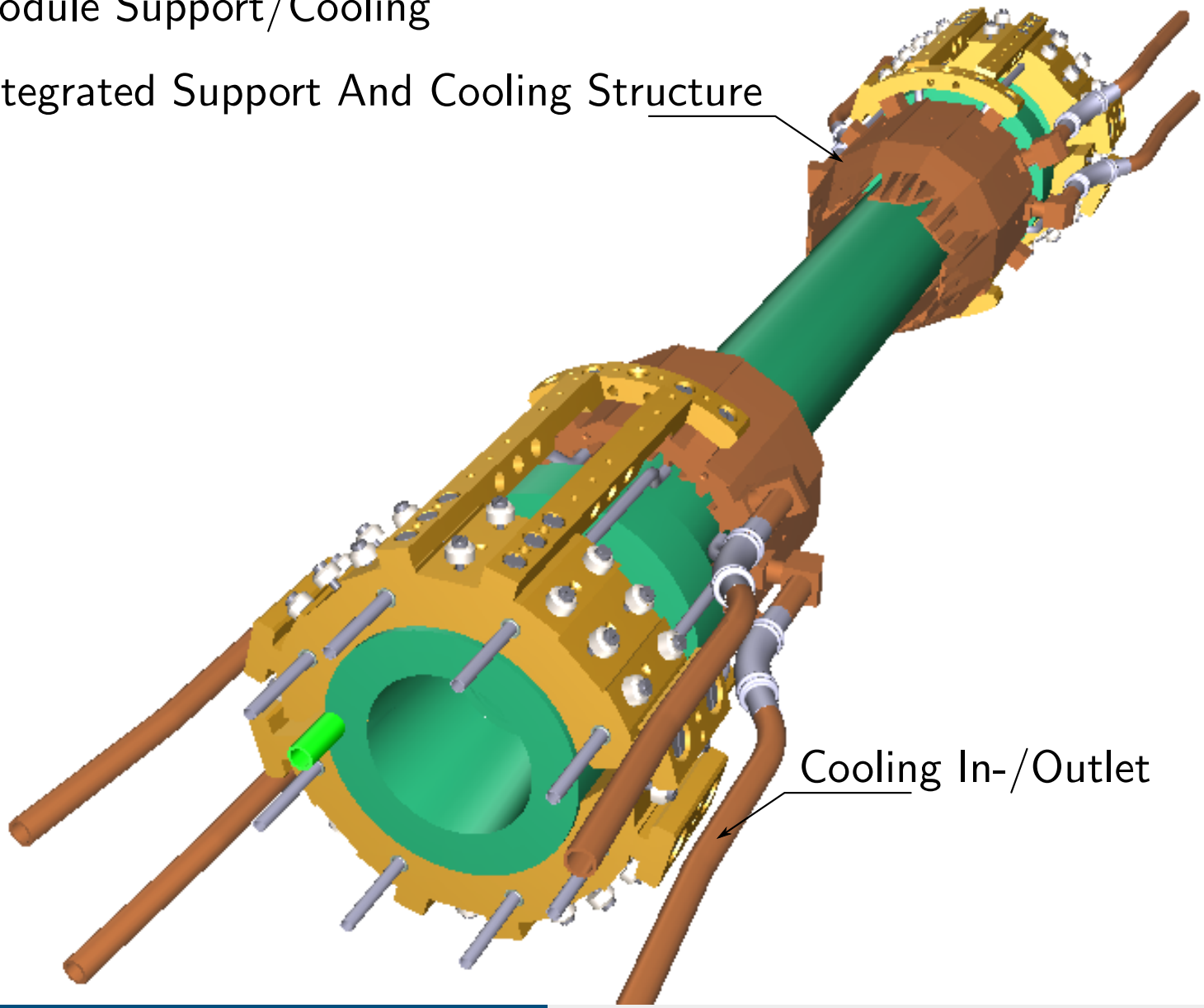
## Beampipe Support



# Design Components

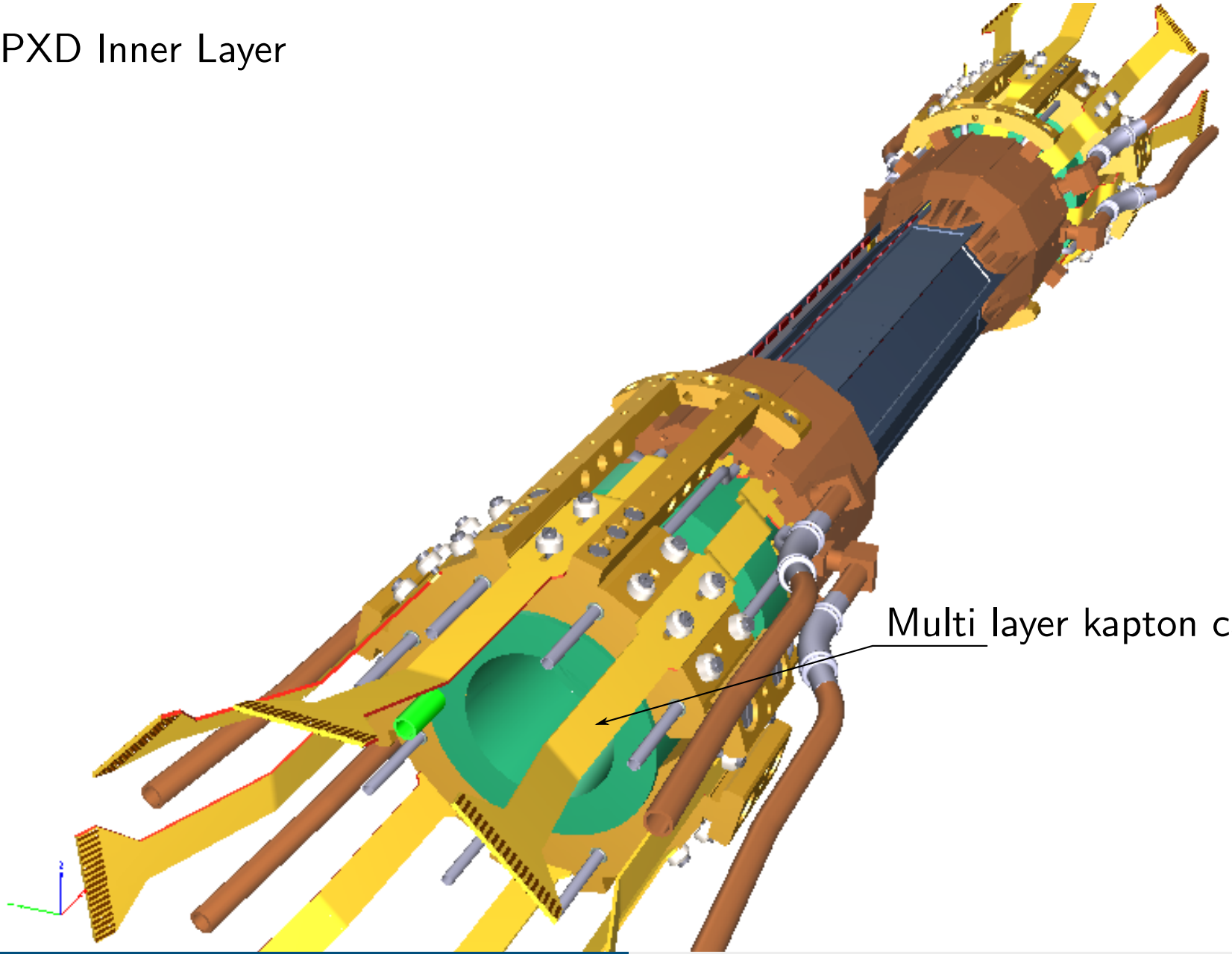
## PXD Module Support/Cooling

### Integrated Support And Cooling Structure



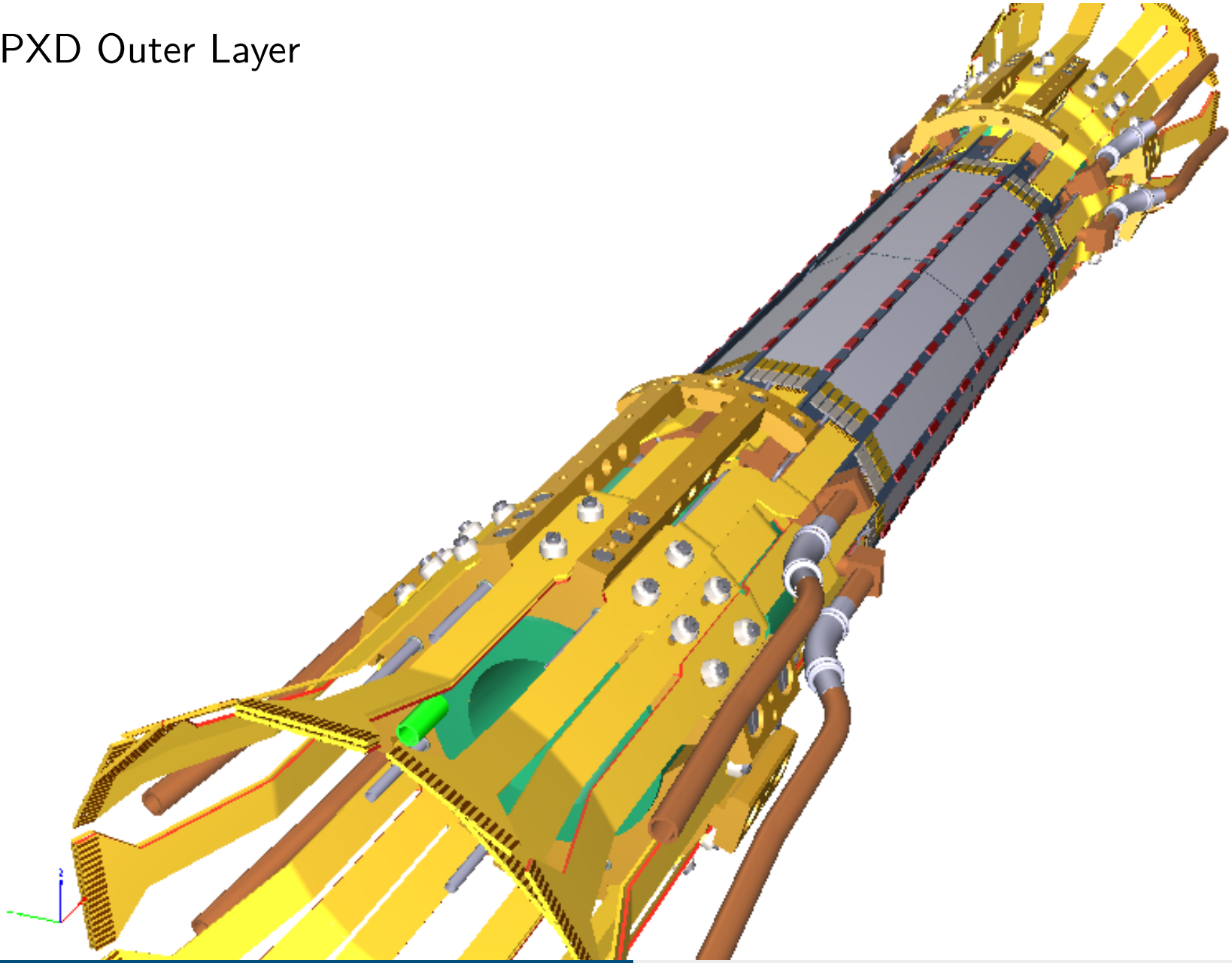
# Design Components

## PXD Inner Layer



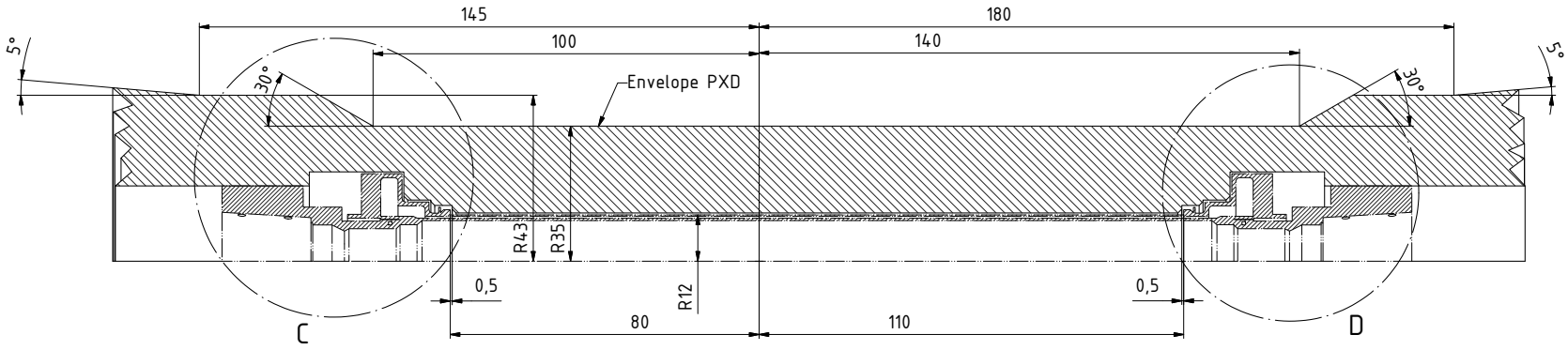
# Design Components

## PXD Outer Layer



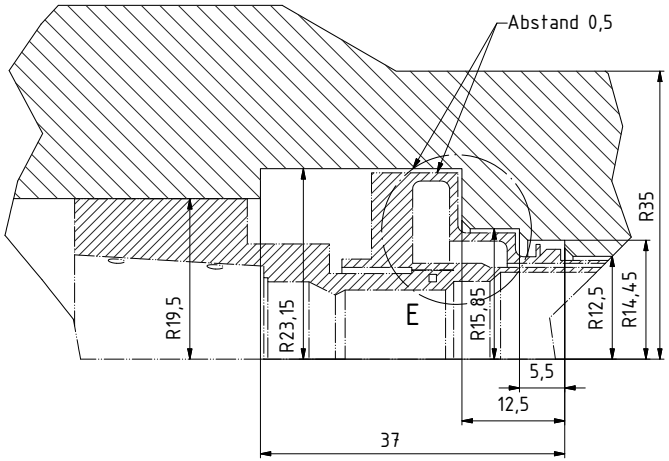
# PXD Envelope

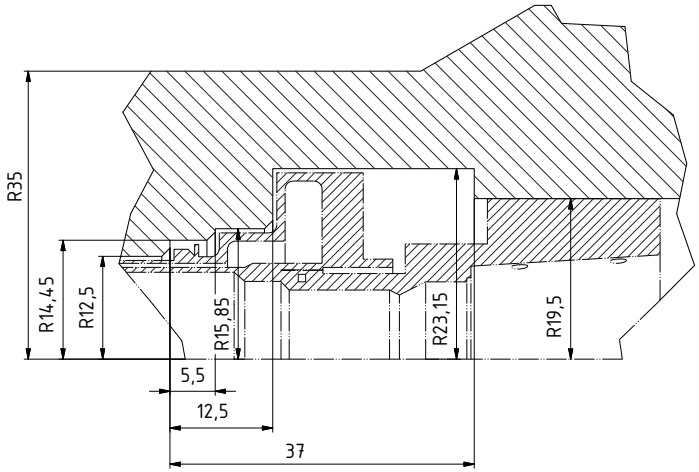
We prepared an envelope for the PXD as reference for other groups (SVD)




C ( 2 : 1 )

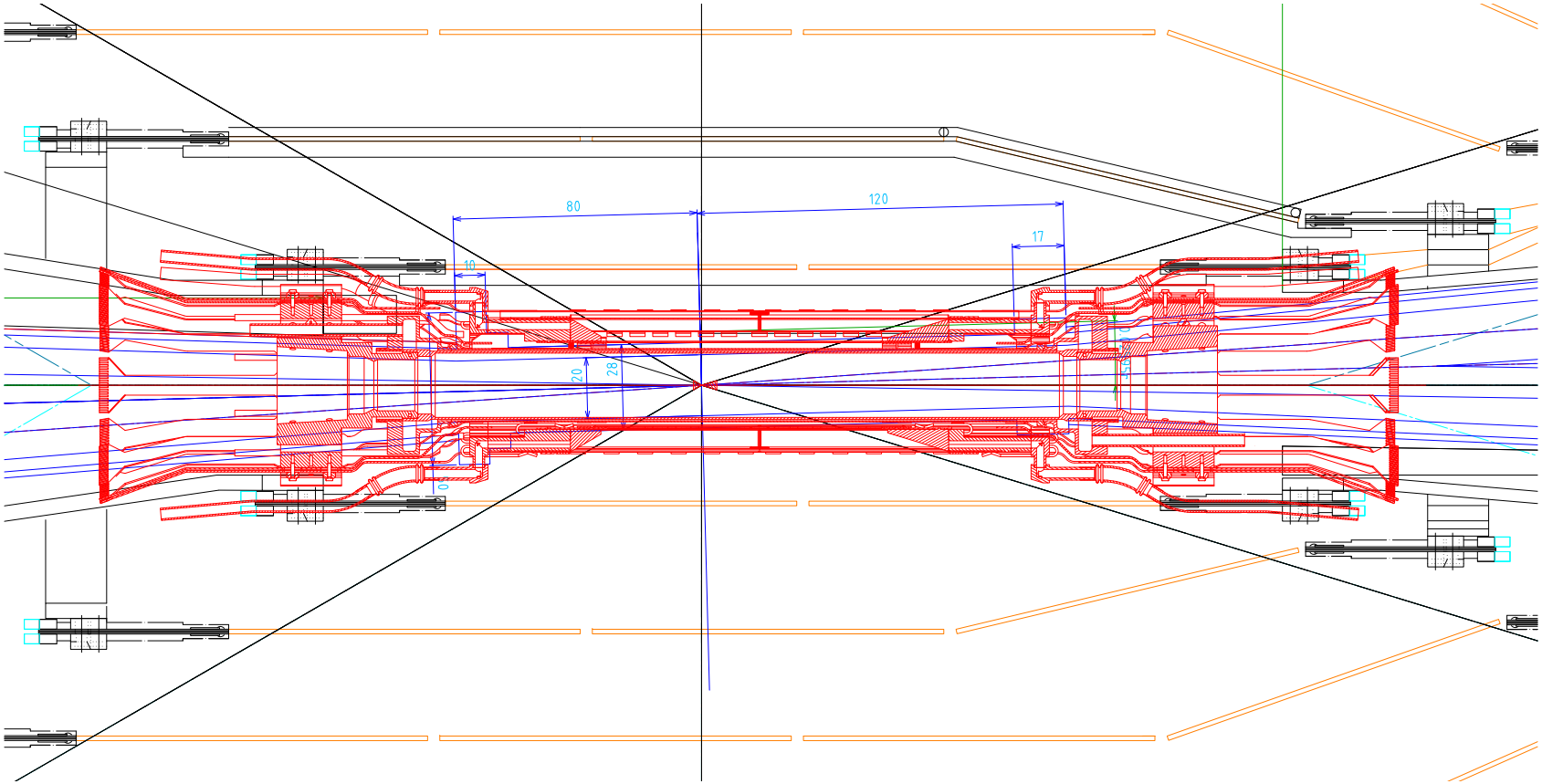
D ( 2 : 1 )



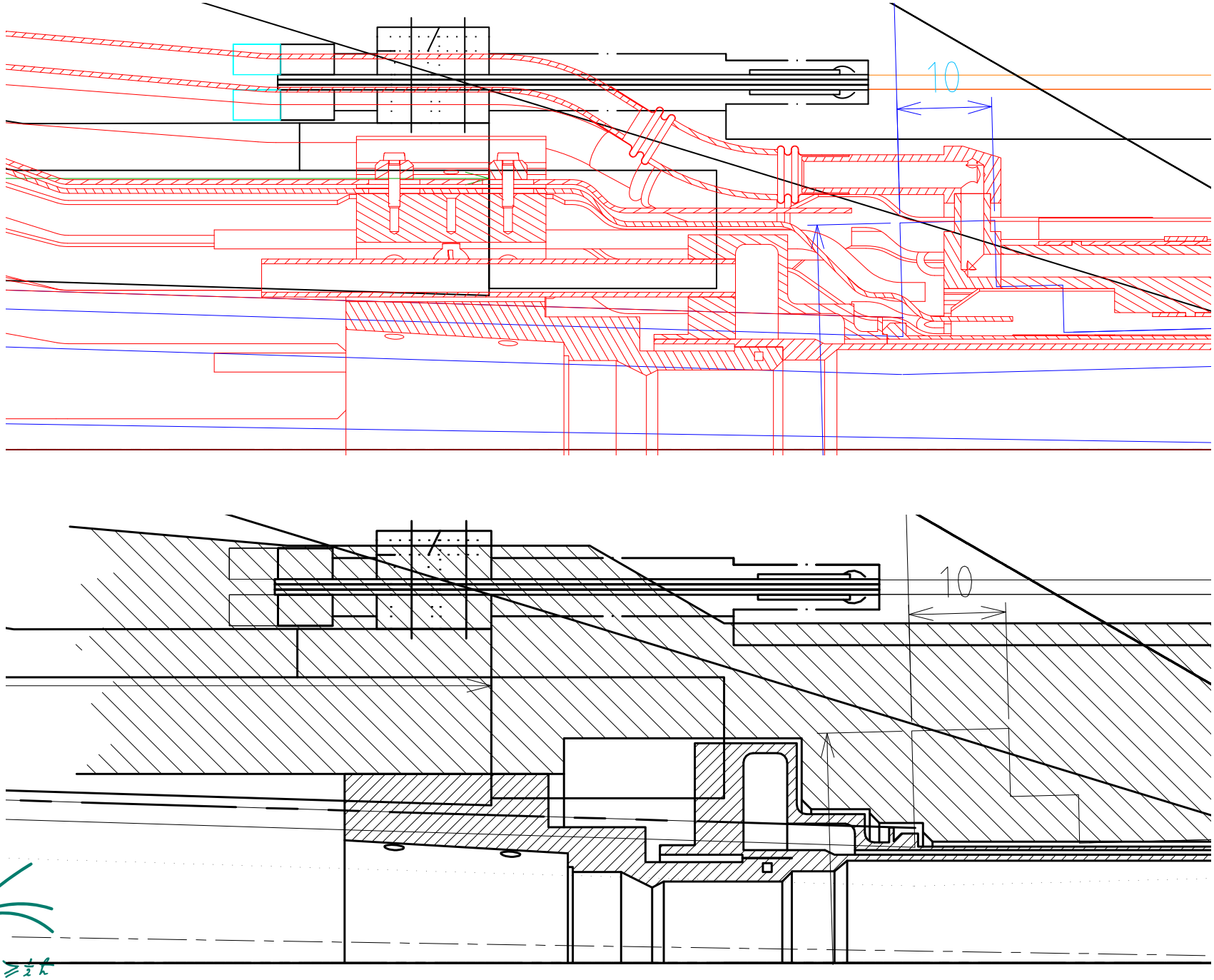



# PXD + SVD

PXD design entered into current SVD design by Tanaka-san




- discrepancies in Beam Pipe design
- problem with support structures of SVD inner layer


10
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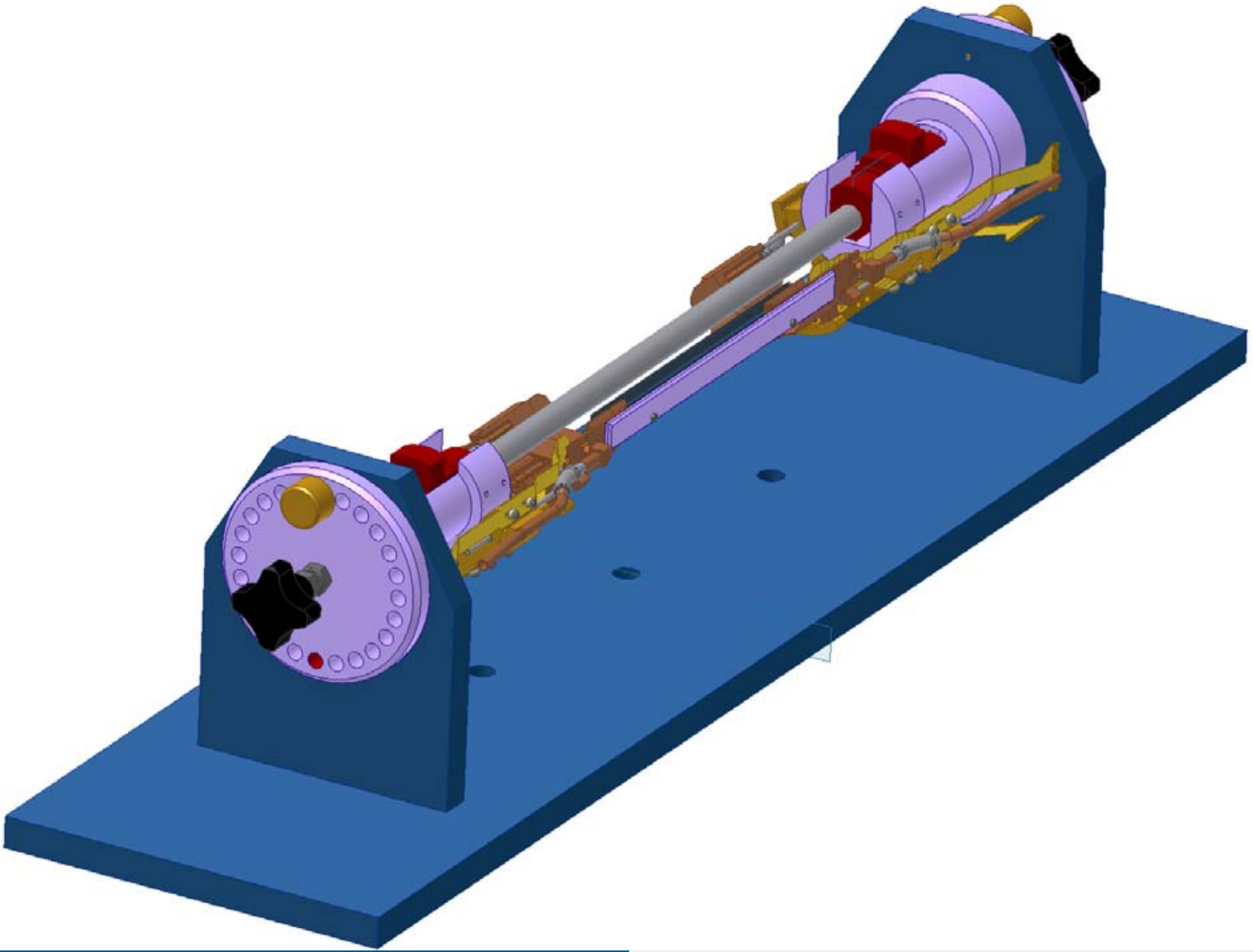
# Conclusions

- no CVD or TPG anymore
- minimized distance between chips and cooling
- open for different cooling scenarios
- complete 3D design ready for evaluation/production
- possible problems with SVD support, needs to be clarified/discussed

# Thank you
# for your attention

# Detector Assembly



# Detector Transport