

Sample changers – non ambient

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www.europeanspallationsource.se

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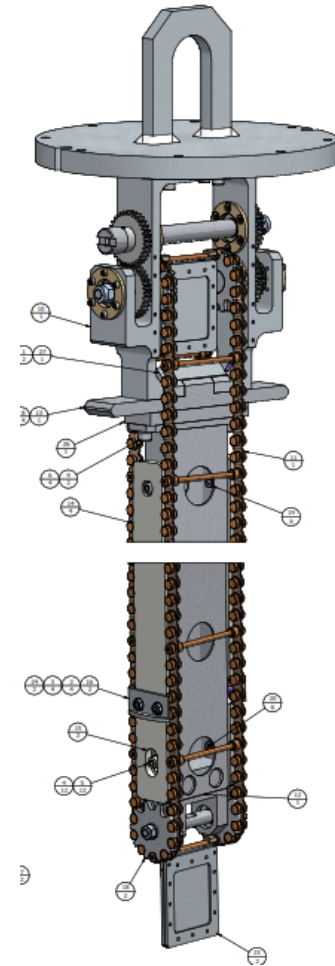
Instruments with low-T sample changers requested

- DREAM
- VESPA
- CSPEC
- HEIMDAL
- MIRACLES
- ESTIA (Whole Cryostat)

Sample changer (SC) –ideas from VESPA

- Requirements:
 - Needs to work with the VESPA CCR (no change-over!)
 - < 1 hr for installing it
 - Should contain at least 30 samples, preferably 50 (needs to have enough space to run for a weekend: 1 hr/sample including cooling time)
 - Waiting samples should be pre-cooled, preferably to 70K or lower
 - Camera/scanner to scan the sample that goes into beam for tracking
- TOSCA SC:
 - 36 Samples at 10K
 - Not reloadable while running

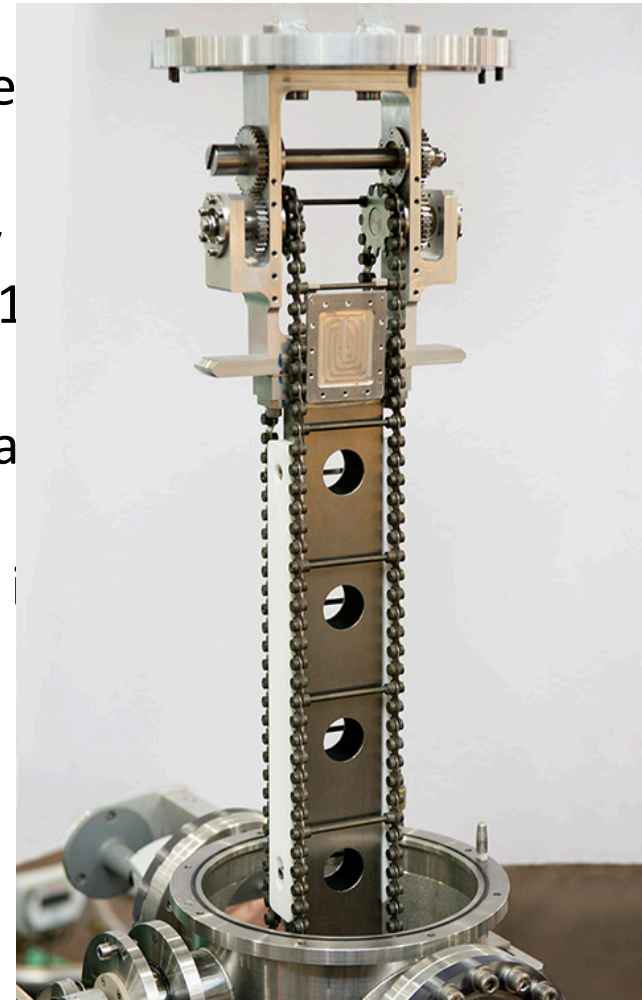
TOSCA SC



Sample changer (SC) –ideas from VESPA

TOSCA SC

- Requirements:
 - Needs to work with the VESPA CCR (no change)
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 - Camera/scanner to scan the sample that goes in for tracking
- TOSCA SC:
 - 36 Samples at 10K
 - Not reloadable while running



Sample environment: sample changer (SC)

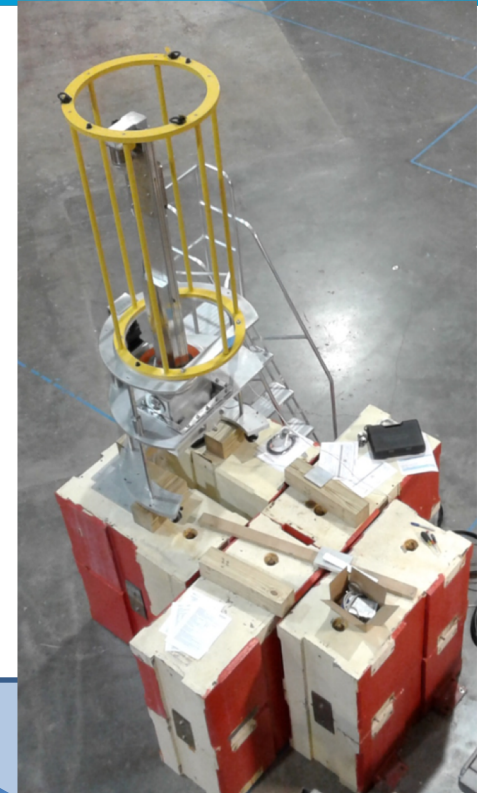
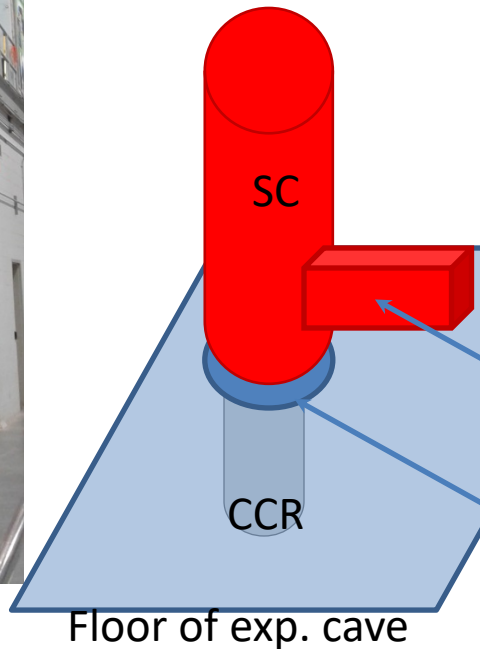
- ✓ Variable temperature (8-300K)
- ✓ Enough samples to last the weekend (~50 samples)
- ✓ Easy/fast to install. Uses the VISION CCR
- ✓ Samples are cooling while “waiting”



Valve to keep CCR sample area evacuated while installing SC



Wheels for easy move of SC



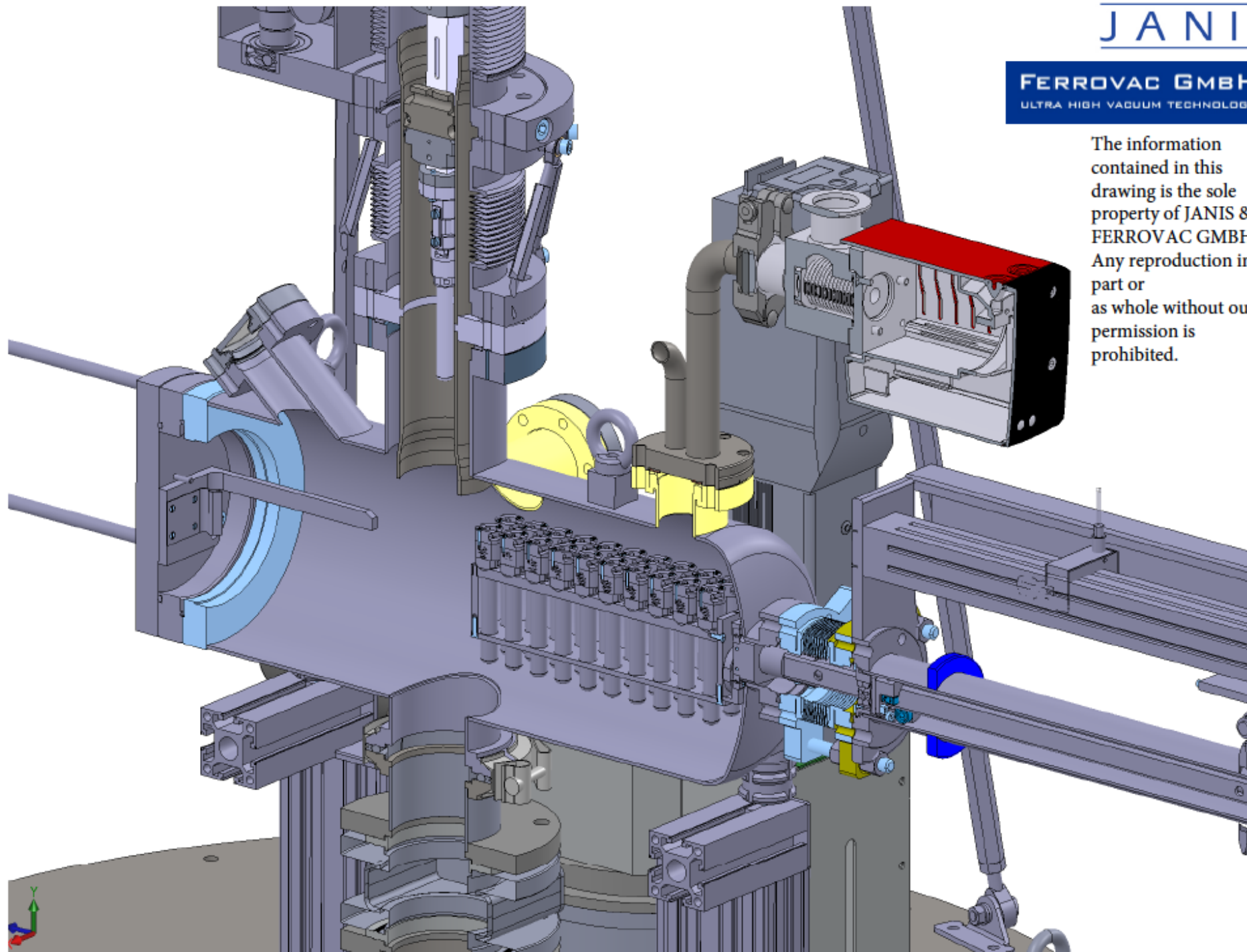
Sample Magazine

VALVE

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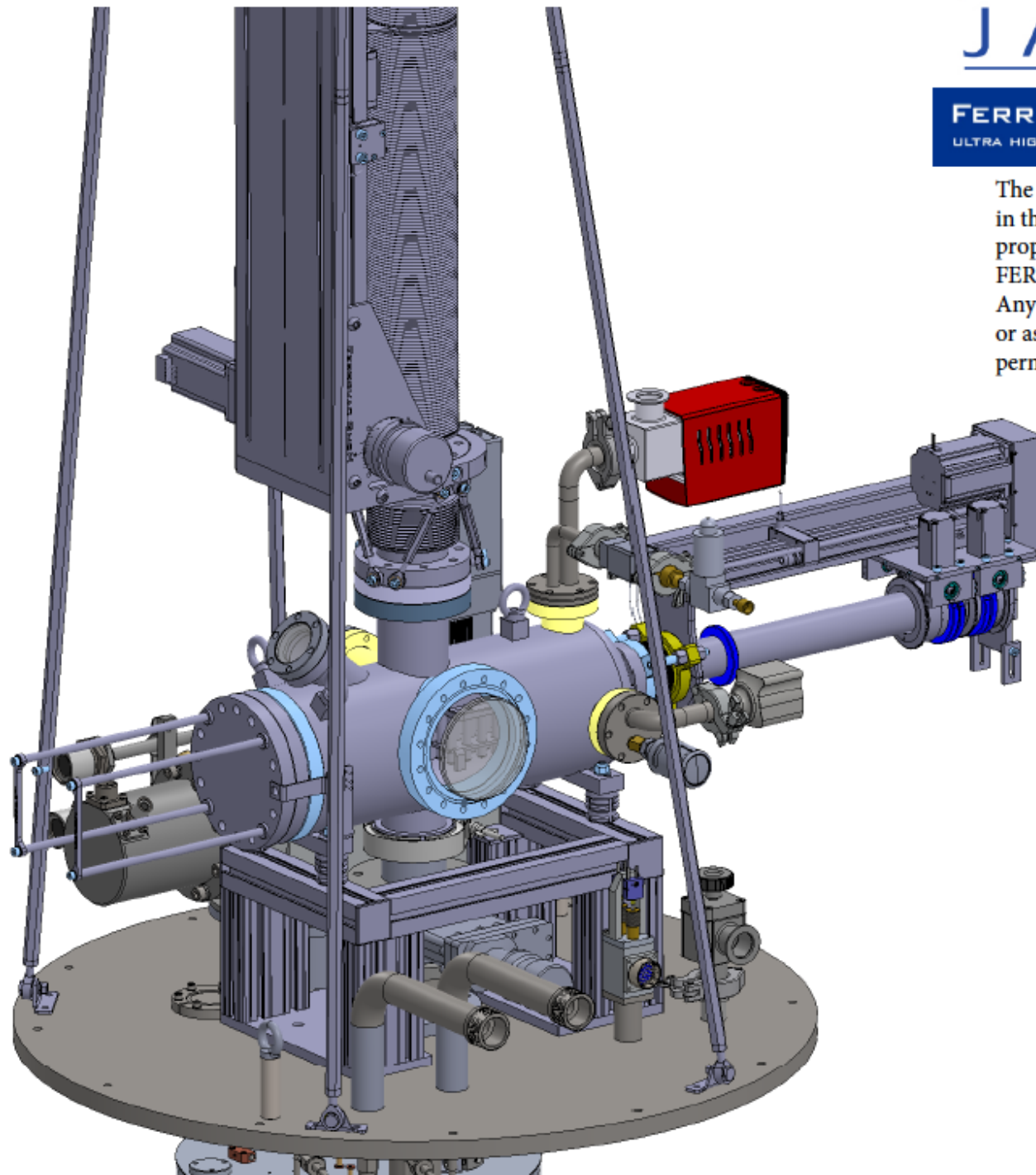
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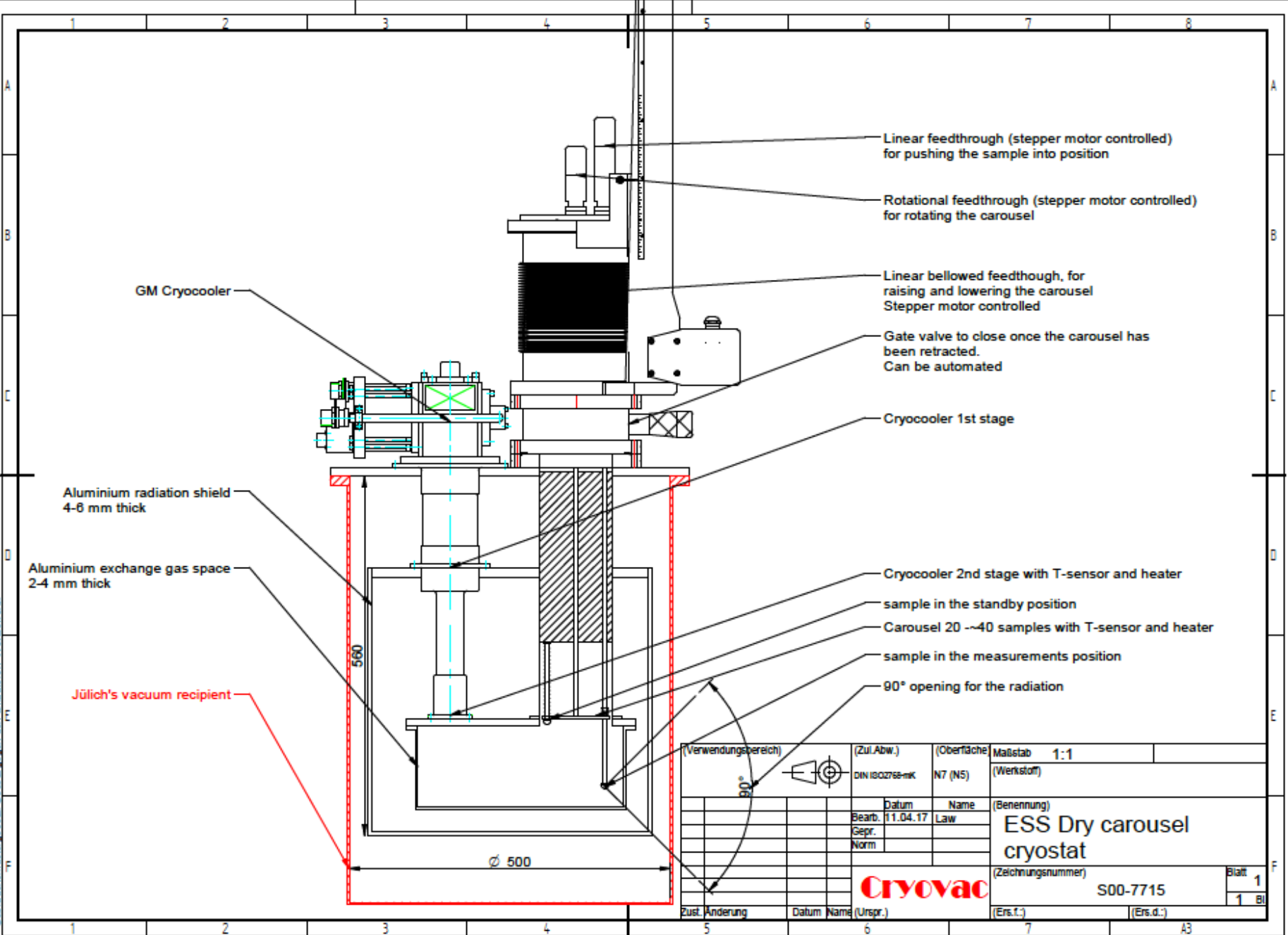
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GM Cryocooler

Linear feedthrough (stepper motor controlled) for pushing the sample into position

Rotational feedthrough (stepper motor controlled) for rotating the carousel

Linear bellowed feedthrough, for raising and lowering the carousel Stepper motor controlled

Gate valve to close once the carousel has been retracted. Can be automated

Cryocooler 1st stage

Aluminium radiation shield 4-8 mm thick

Aluminium exchange gas space 2-4 mm thick

Cryocooler 2nd stage with T-sensor and heater

sample in the standby position

Carousel 20 ~40 samples with T-sensor and heater

sample in the measurements position

90° opening for the radiation

Jülich's vacuum recipient

600

∅ 500

(Verwendungsbereich)	(Zul.Abw.) DIN ISO 2768-mK	(Oberfläche) N7 (N5)	Maßstab 1:1 (Werkstoff)	
	Datum Bearb. 11.04.17	Name Law	(Benennung) ESS Dry carousel cryostat	
	Gepr.		(Zeichnungsnummer) S00-7715	Blatt 1
	Norm		(Ers.f.)	1 Bl.
Zust. Änderung	Datum	Name (Urspr.)	(Ers.f.)	(Ers.d.)

Cryovac

S00-7715

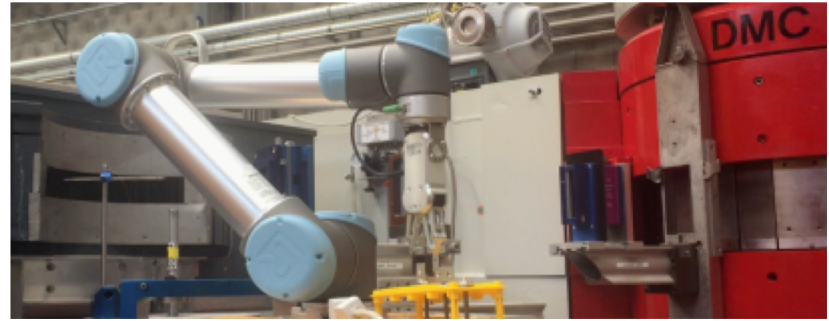
Blatt 1
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A3

SAMPLE ENVIRONMENT FOR HEIMDAL

Collaborative robot

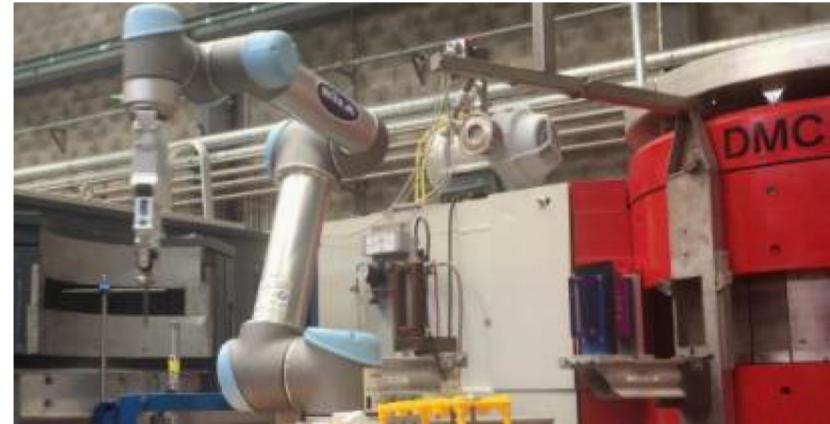
Universal robots UR5



Very easy programming for pick and place.

Tested at ambient conditions
running 18 samples in 24 hours at DMC at PSI

Combined with hot air blower would allow
-Pick and place + temperature RT-1000K



Next step:

Barcode reader before placing sample

Vacuum around sample

Sample rotation by robot



AARHUS
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PAUL SCHERRER INSTITUT

PSI

Interreg
Öresund-Kattegat-Skagerrak
European Regional Development Fund



- <https://www.youtube.com/watch?v=Yttsp6UZYS0&list=PLhuA2DQyfTMnbccQENFdgCUox85EWiBmS&index=3>

Questions

- Temperature range (low, high, both in same apparatus?)
- Type of sample (single crystal, powder)
- Sample size/shape, holder type (e.g. V can)
- Typical measurement time
- Number of samples
- Sample in vacuum, exchange gas, etc.
- Instrument geometry