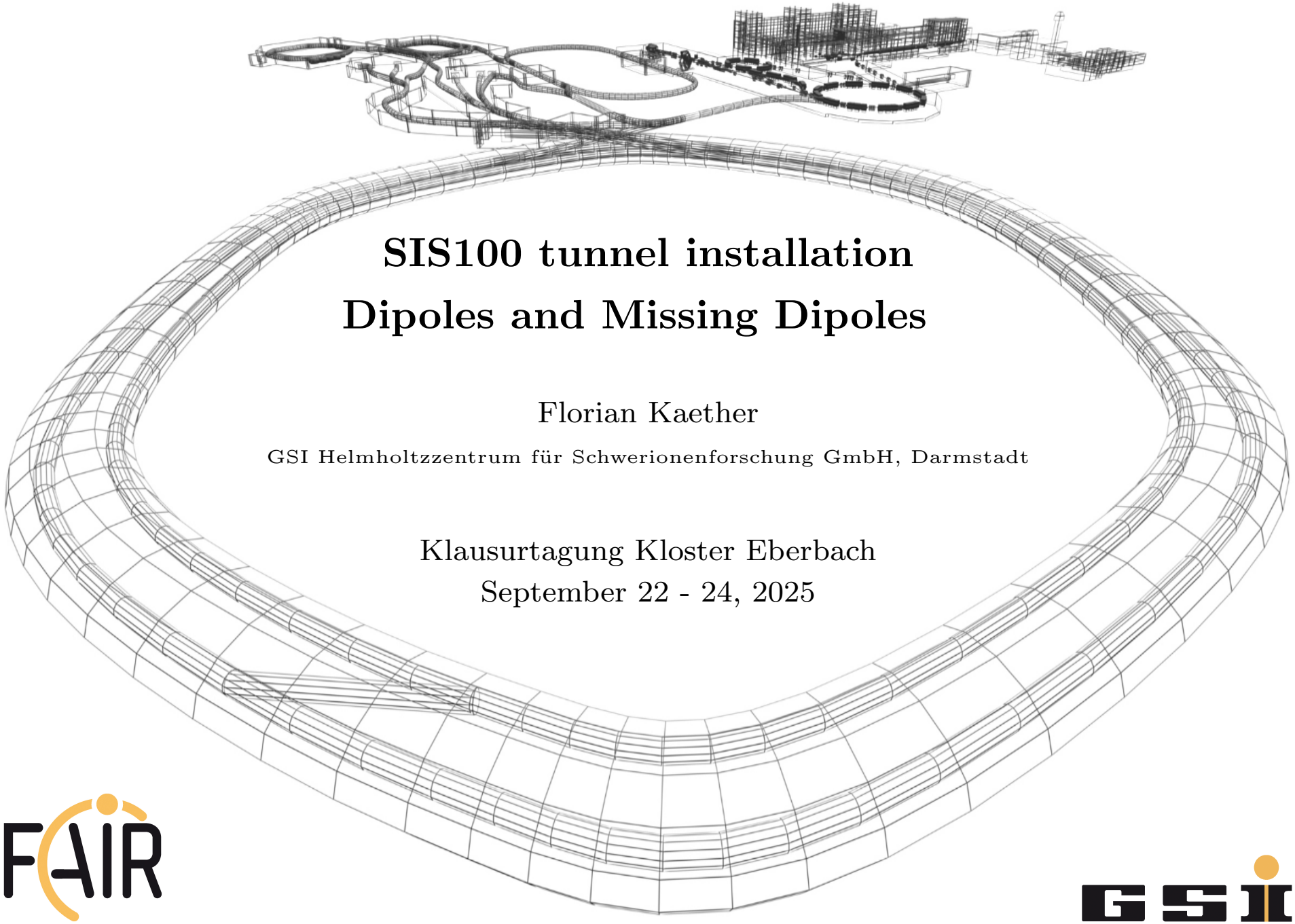

SIS100 tunnel installation
Dipoles and Missing Dipoles

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Klausurtagung Kloster Eberbach
September 22 - 24, 2025

Dipole transports to the SIS100 tunnel

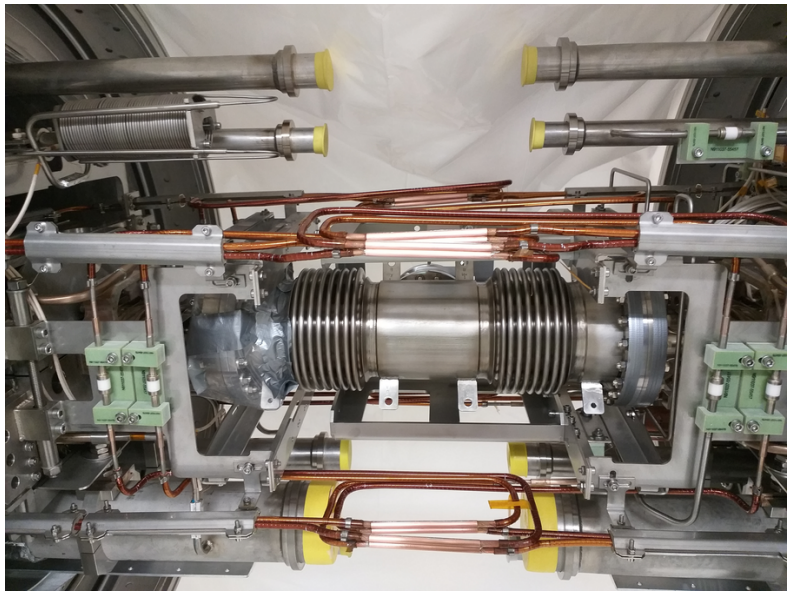
- 88 dipoles and missing dipoles are inside the tunnel (of 130 in total)
  - 80 dipoles (of 108)
  - 8 missing dipoles (of 12)
- missing:
  - sector 5 is still completely empty.
  - sector 4 - cells 8,9,A,B were temporarily skipped to have more space at the labyrinth for other transports
  - cell E in sectors 4 and 6 were skipped beacause of the fire protection wall

Installation Phase A (before welding)

Completed in sectors 1, 2 and 3:

- Telescopic bellow mounting
- DP pairs positioned on blue line with 1 mm precision
- Beam chambers cleaned and connected
- Busbars soldered (exception: sector 3 has to be resoldered. This will be done together with the welding).

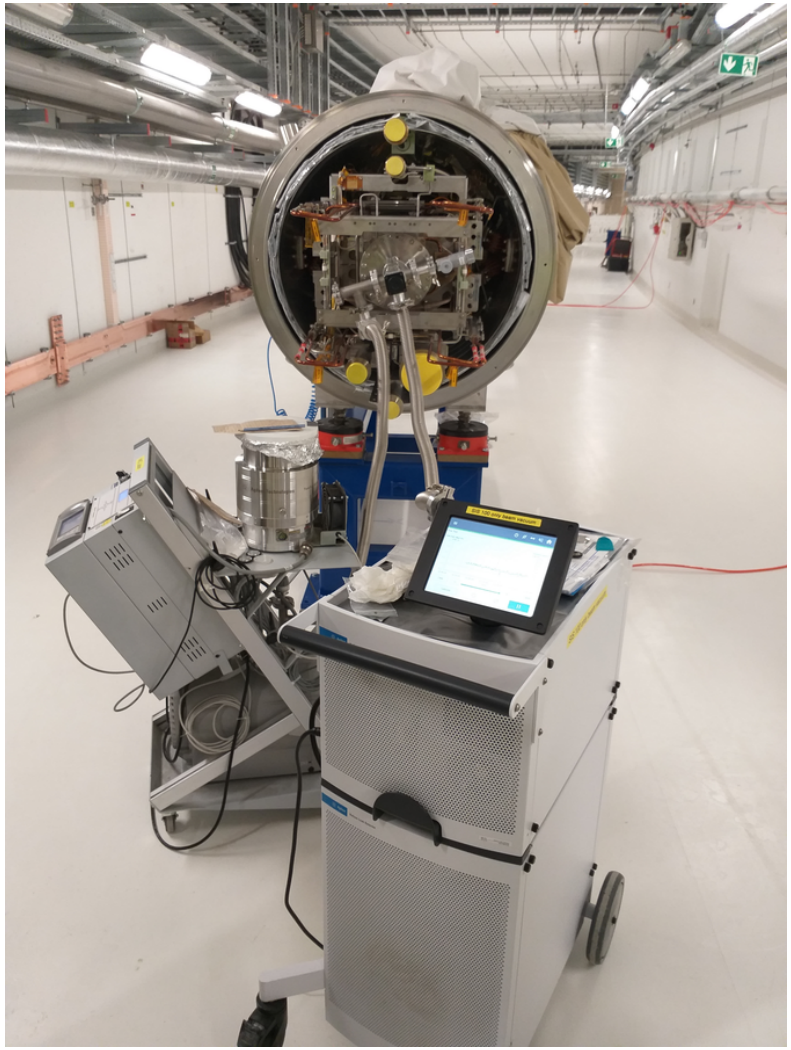
In sectors 4 and 6 not started yet. IFJPAN will be back in October to continue.



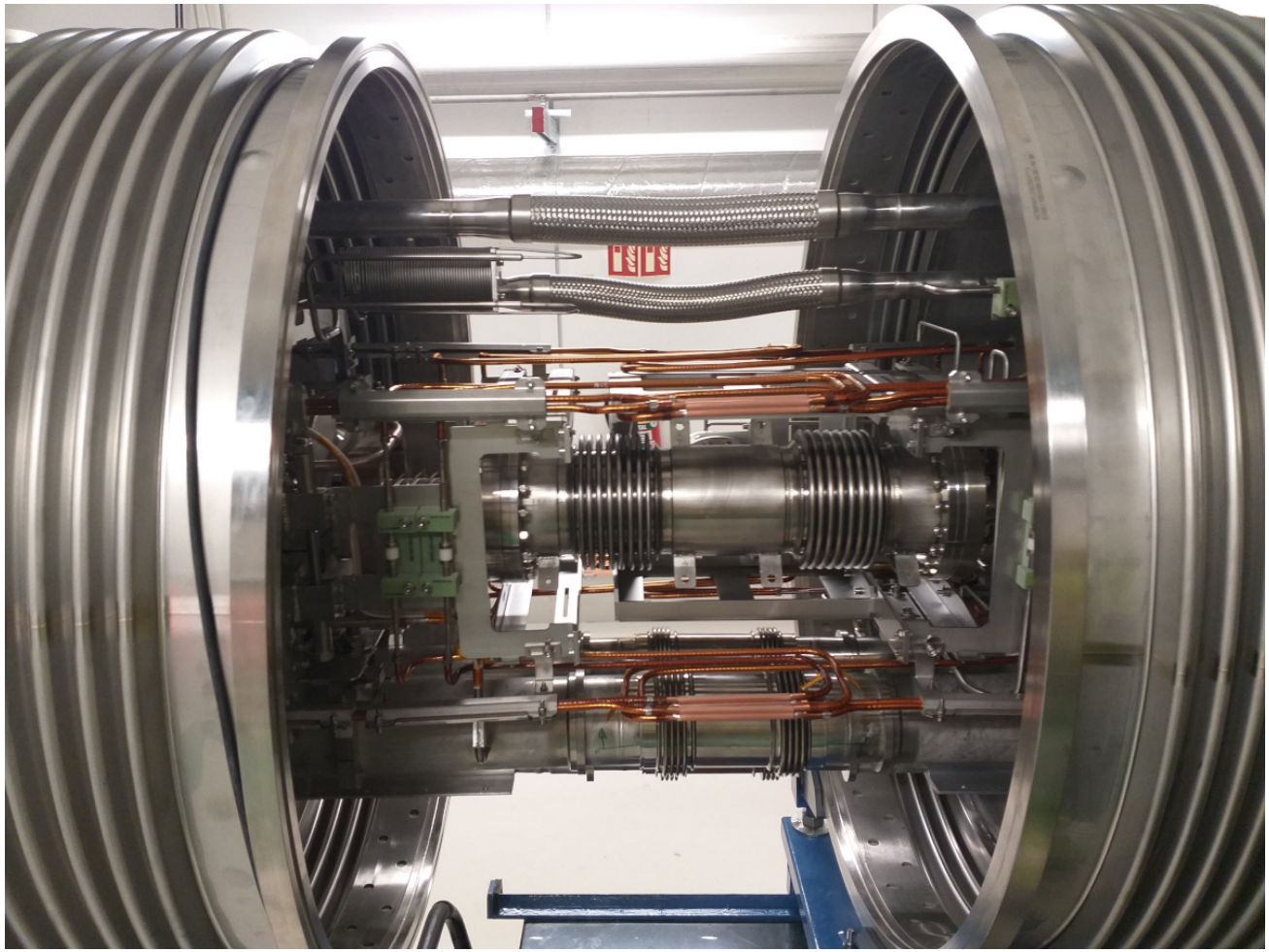
Test program in phase A

Completed in sectors 1, 2 and 3:

- Visual tests after transport
- HV / LV - test
  (all single modules, but to avoid too much stress only one pair to gain experience)
- Continuity test
  (all single modules and pairs)
- Sensor alive test
  (all single modules and pairs)
- UHV leak check beamlines (all pairs)



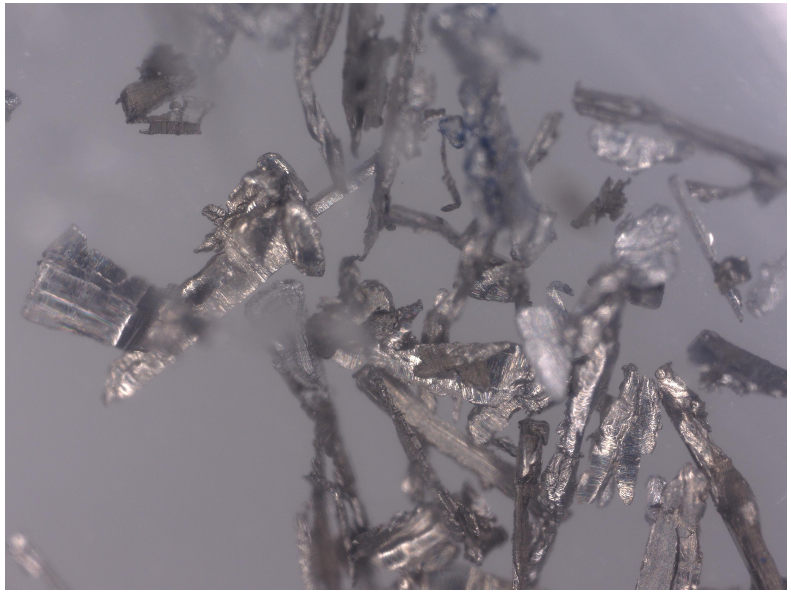
Process lines - welding



First DP-DP pairs in sector 1 successfully welded !
More infos in the talks of T. Winkler ans T. Ziglasch.

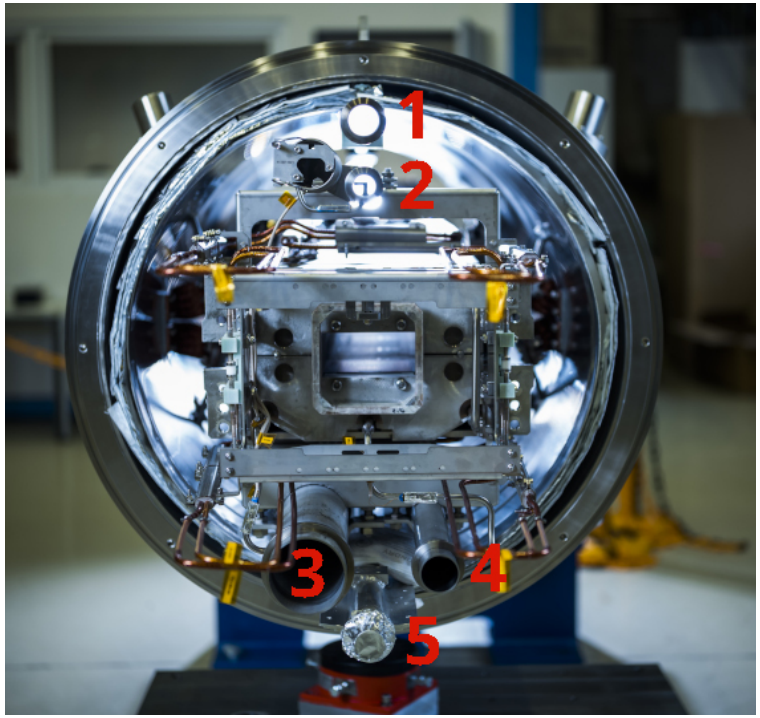
Process lines - cleaning

- Small particles were found in some Helium-pipes
  → creates risks for restrictor and cooling plant
- Analyzation by technology laboratory (see pics)
- Some metal parts probably created by welding team during pipe preparation
  → solved by improved protection
- Other material unclear (epoxy like, brittle, maybe solder flux remains?)



Process lines - cleaning

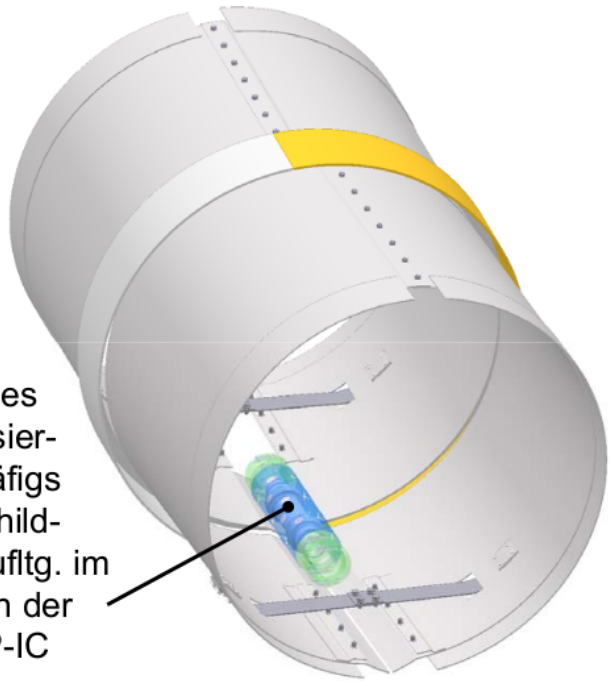
- Cleaning of all pipes before the welding
- Easy access to pipes 1,3 and 5
- More difficult for return lines (2 and 4) because of recooler and holder inside, but vacuum cleaning with viedoscope is possible
- Final control with videoscope after welding



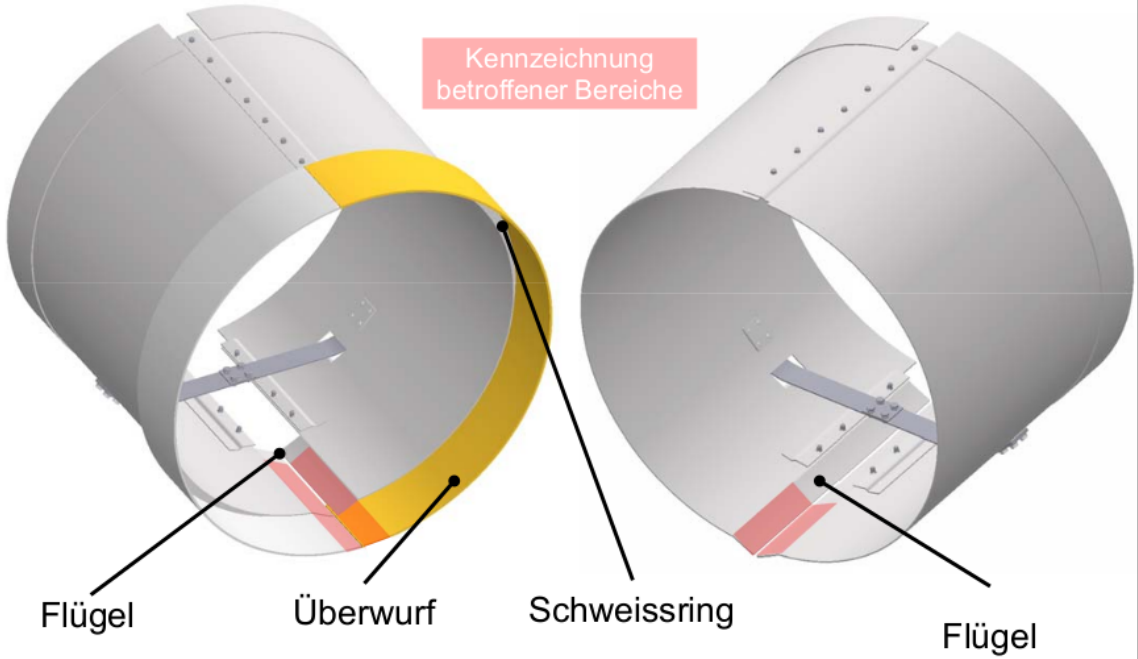
Thermal shield modifications

Kollisionen in den DP-DP-IC-Schilden

- **DP-DP-IC-Schilde - Kollisionen:**



Lage des Stabilisier-ungskäfigs der Schild-rücklaufltg. im Bereich der DP-DP-IC



Betroffen von der Kollision sind in der DP-DP-IC die abgekanteten Flügel im unteren Teil der Schilde sowie der Überwurf und der Schweissring an dem der Überwurf angebunden ist.

(slide by Jan-Patrick Meier)

Modification started at a small company in Darmstadt (Stahl-Metallbau Hirschmüller)

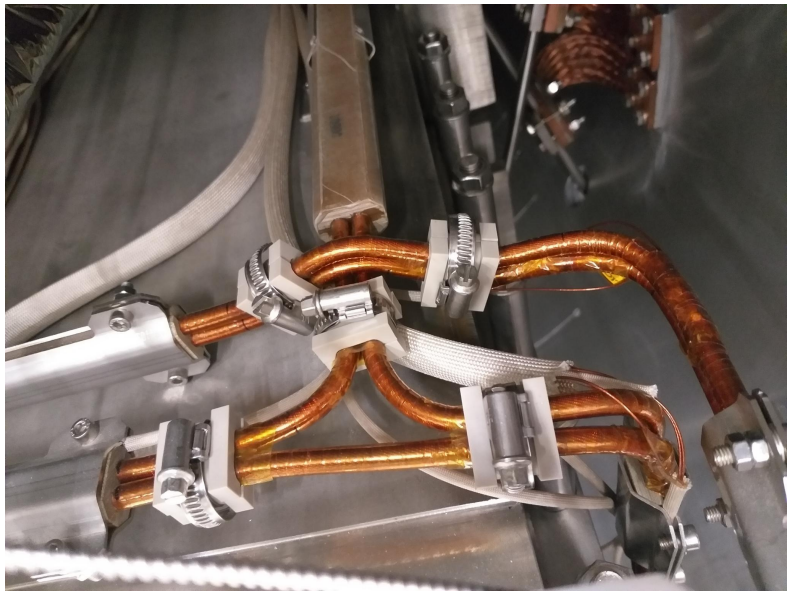
Open tasks: Busbar clamps

Clamps for soldered Busbar-connections

- small 220 pieces ordered + delievered for DP-DP connection
- not installed yet to keep space for the welding team

Movement-protection

- Pablo Knoblauch is working on this topic
- Two possible concepts:
  - small clamps (like in the right picture)
  - epoxy bandage
- many pros and cons:
  accessibility, stability, sharp edges etc.
- no final decision yet



Damaged Dipole 93

Status:

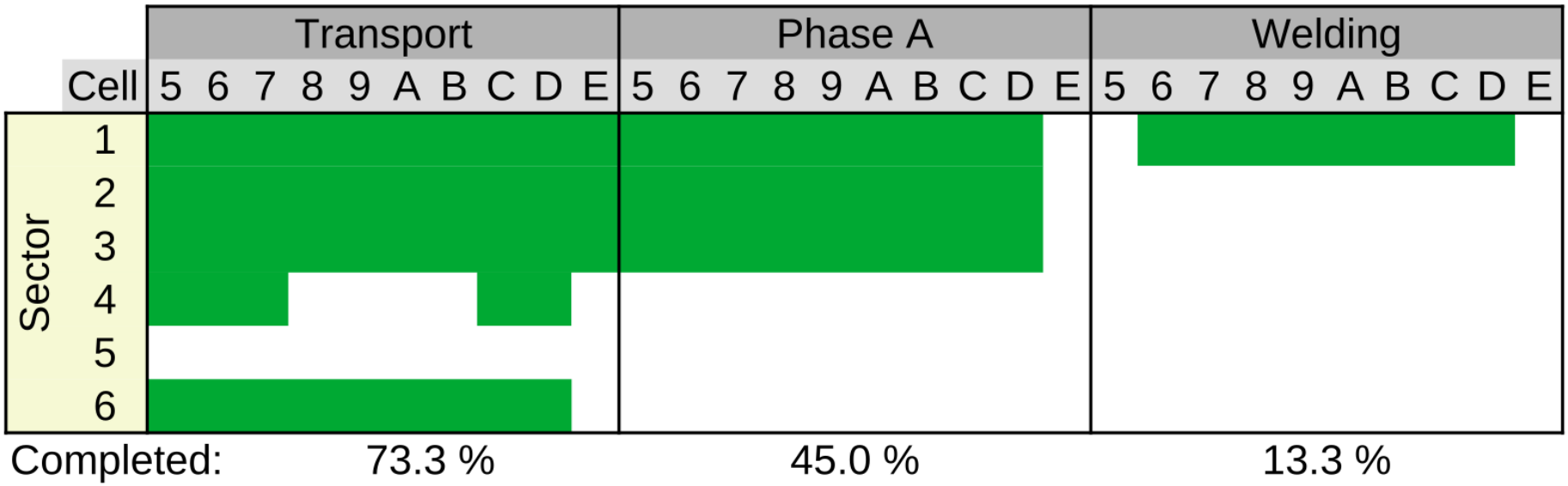
- BNET and insurance both agreed to a fixed price
- Repair started in summer 2025
- Ongoing negotiations about GSI costs: administration, personnel for tests, STF infrastructure etc.

Strategy:

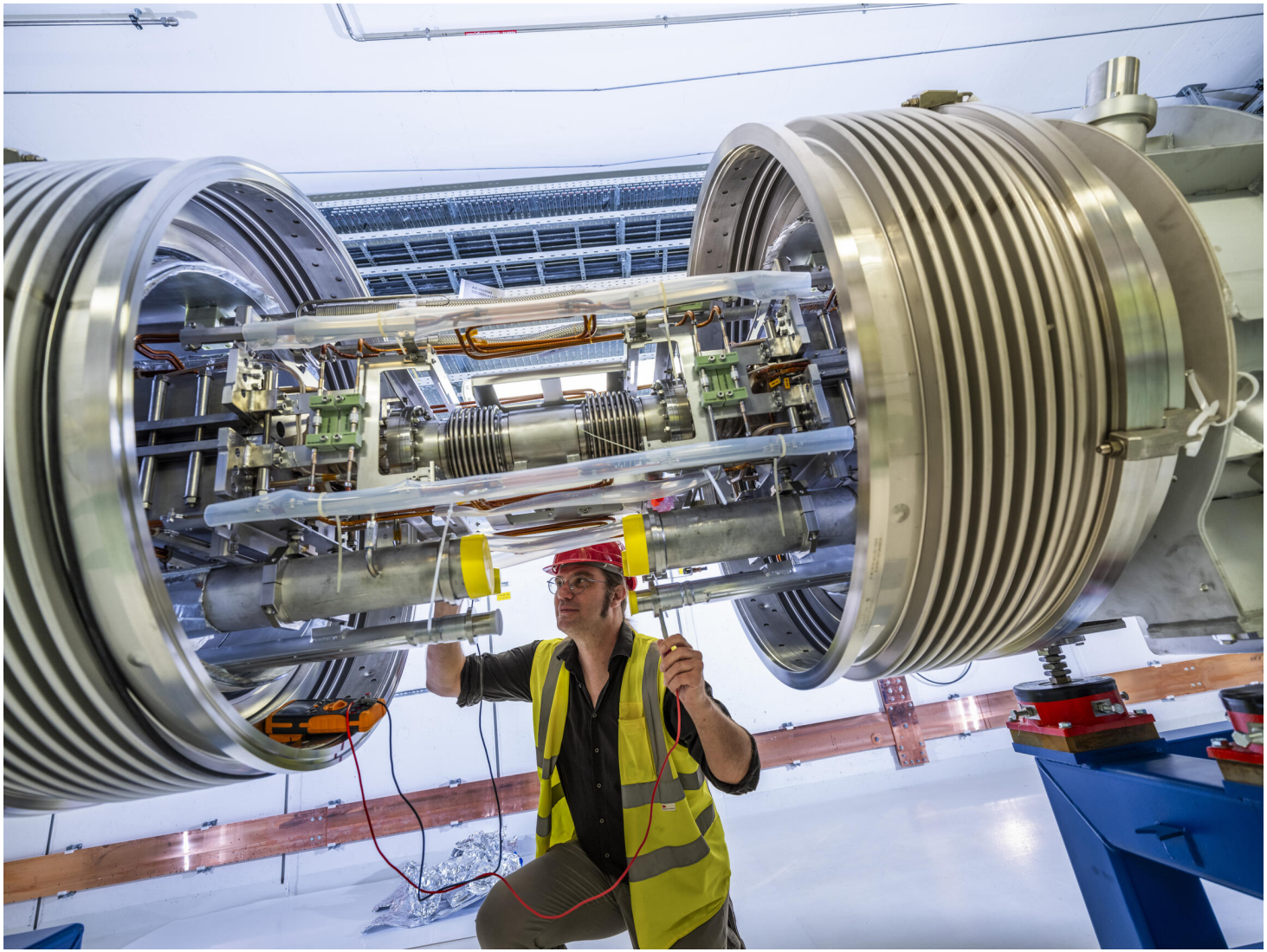
- Cryostat, thermal shield, beam chamber scrapped (too much damage).
- New yoke will be build from steel for quadrupoles.
- Delivery of repaired dipol to GSI without beam chamber. After magnetical field measurements beam chamber and CAP will be installed.

Actual picture (last Friday):
half yokes are produced (laser welded by sub-contractor in Rostock)

Summary - Dipoles installation progress



The End



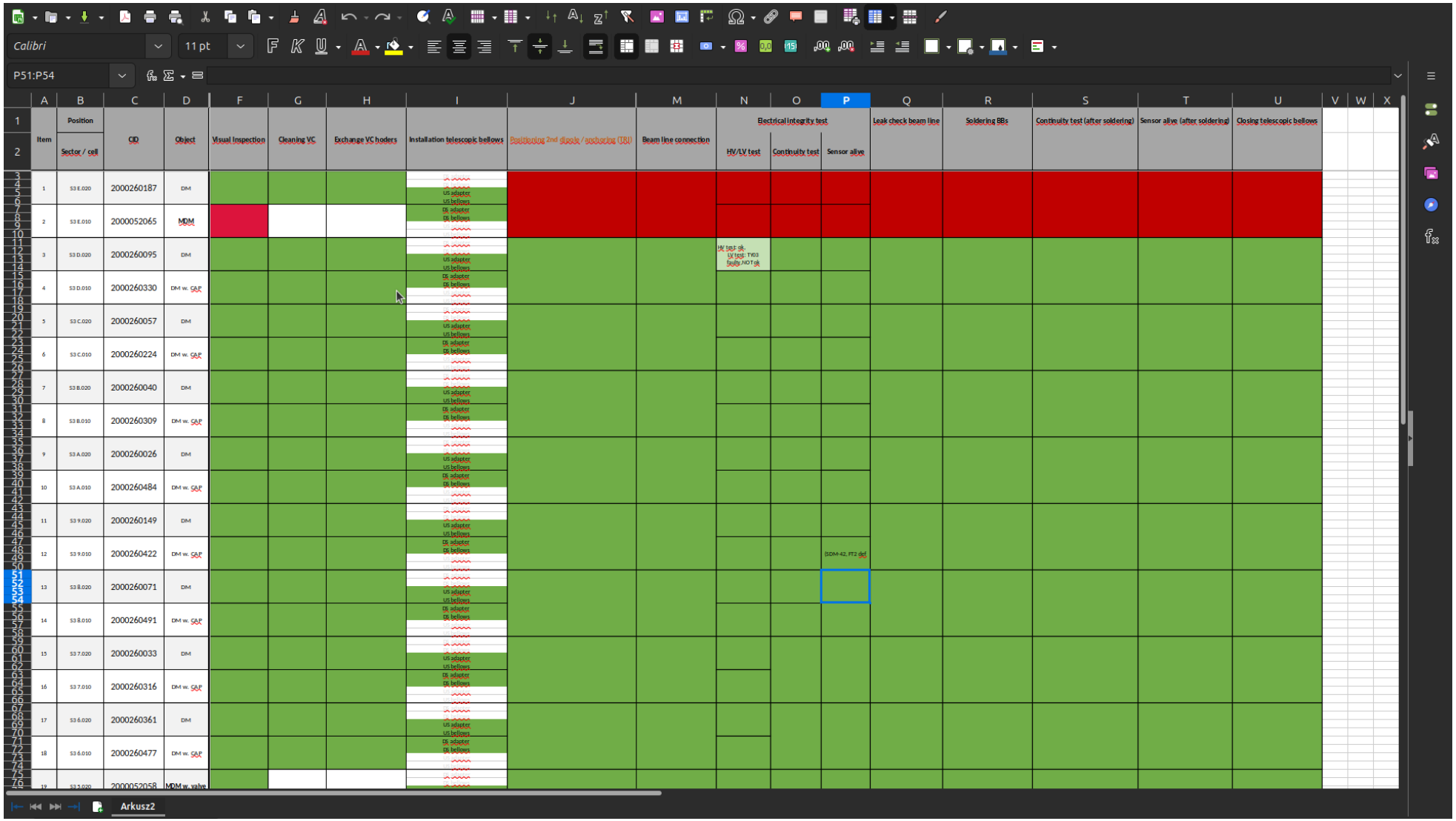
A posing scientist is doing something completely meaningless.

DP-DP installation sequence

First round (DP-DP pairs)		
	Work step	Execution /Resp.
1	Installation of accelerator sensors (Weiterstadt)	SCM
2	Separation dipole - support frame (Weiterstadt)	Schenker/ TRI
3	Installing the lining sheets (Futterbleche) (same thickness for all magnets?)	SCM
4	Mounting the dipole on the transport frame (Weiterstadt)	Schenker/ TRI
5	Loading of support frame on the truck (Weiterstadt)	TRI/ Schenker
6	Transport dipole and support frame from Weiterstadt to the entrance of the tunnel	TRI/ Schenker
7	Mounting the dipole on the support frame	TRI
8	Transport the dipole + support into the tunnel and to the cell (zig-zag)	TRI
9	Transport the telescopic bellows from Weiterstadt to the tunnel (one batch per arc, parking position)	TRI
10	Removal of side walls of wooden boxes and transport out of tunnel	TRI
11a	**for first dipole of each pair:** Positioning to the blue line in the final position (with „Galgen“)	TRI
12a	**for first dipole of each pair:** Anchoring process on the blue line (with final fixation)	TRI
13	Visual inspection	SCM

First round (DP-DP pairs)		
	Work step	Execution/Resp.
14	Installation of new holders of the vacuum chamber	IFJ PAN
15	Cleaning of the vacuum chamber	IFJ PAN
16	Installation of telescopic bellows	IFJ PAN
11b	**for second dipole of each pair:** Positioning to the blue line in final positon (with „Galgen“)	TRI
12b	**for second dipole of each pair:** Anchoring process at blue line (with final fixation)	TRI
17	Purging with synthetic air (if required)	tbd
18	Electrical integrity test (HV, LV, continuity)	SCM
19	Sensor a-live test	SCM
20	Closing of the beampipe	IFJ PAN
21	Leak test of the beampipe connection	IFJ PAN
22	Soldering of BBs (interconnection)	IFJ PAN
23	Closing telescopic bellows for protection	IFJ PAN
24	Sensor a-live test	SCM

Backup slides: keeping track on work in progress



Item	Position Sector / cell	CID	Object	Visual Inspection	Cleaning VC	Exchange VC hoders	Installation telescopic bellows	Positioning 2nd check / reshoring (TBI)	Beam line connection	Electrical integrity test: HV/LV test	Electrical integrity test: Continuity test	Electrical integrity test: Sensor alive	Leak check beam line	Soldering BBs	Continuity test (after soldering)	Sensor alive (after soldering)	Closing telescopic bellows
1	S3 E.020	2000260187	DM				US adapter, US bellows, DS adapter, DS bellows										
2	S3 E.010	2000052065	MDM														
3	S3 D.020	2000260095	DM				US adapter, US bellows, DS adapter, DS bellows			HV test ok, LV test: TV03 faulty, NOT ok							
4	S3 D.010	2000260330	DM w. GAP														
5	S3 C.020	2000260057	DM				US adapter, US bellows, DS adapter, DS bellows										
6	S3 C.010	2000260224	DM w. GAP														
7	S3 B.020	2000260040	DM				US adapter, US bellows, DS adapter, DS bellows										
8	S3 B.010	2000260309	DM w. GAP														
9	S3 A.020	2000260026	DM				US adapter, US bellows, DS adapter, DS bellows										
10	S3 A.010	2000260484	DM w. GAP														
11	S3 9.020	2000260149	DM				US adapter, US bellows, DS adapter, DS bellows										
12	S3 9.010	2000260422	DM w. GAP									(SDM-42, FT2 del					
13	S3 8.020	2000260071	DM				US adapter, US bellows, DS adapter, DS bellows										
14	S3 8.010	2000260491	DM w. GAP														
15	S3 7.020	2000260033	DM				US adapter, US bellows, DS adapter, DS bellows										
16	S3 7.010	2000260316	DM w. GAP														
17	S3 6.020	2000260361	DM				US adapter, US bellows, DS adapter, DS bellows										
18	S3 6.010	2000260477	DM w. GAP														
19	S3 5.020	2000052058	MDM w. valve														