

Installation of the European XFEL Accelerator

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for the European XFEL Accelerator Consortium

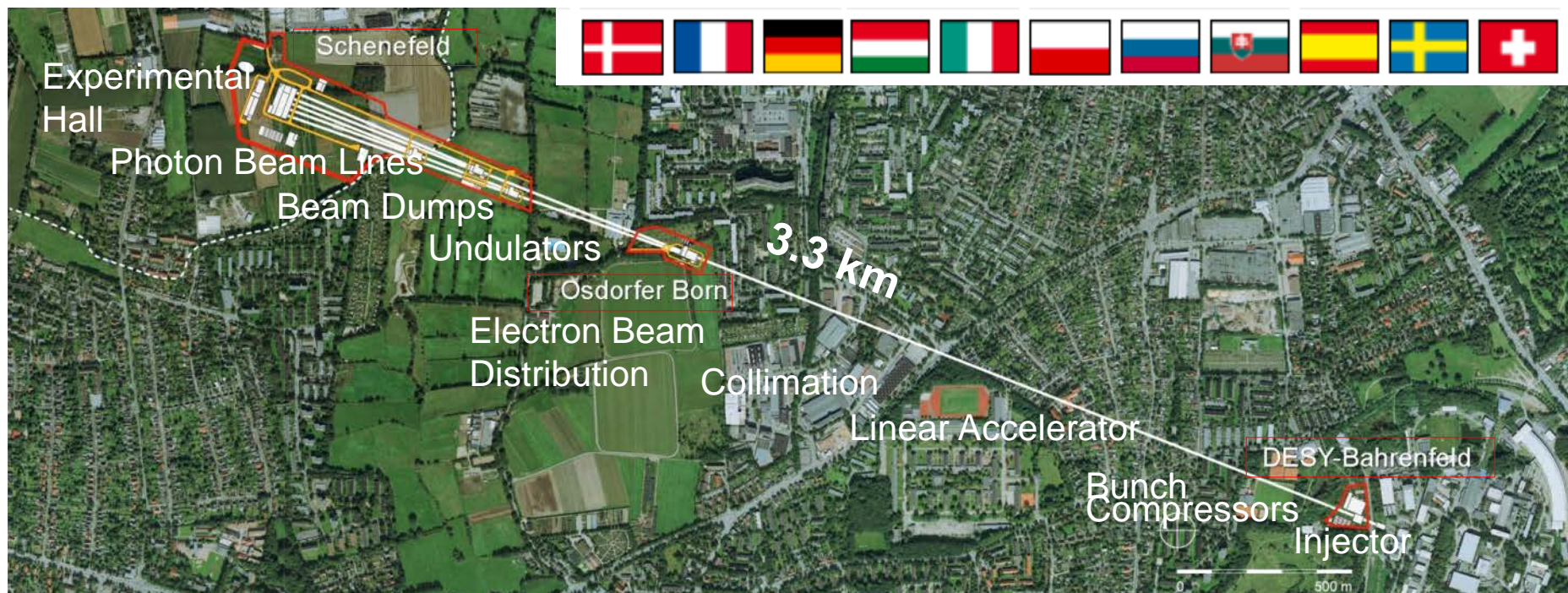
IKC BrightnESS 2nd Best Practice Workshop,
Catania



European XFEL at a Glance

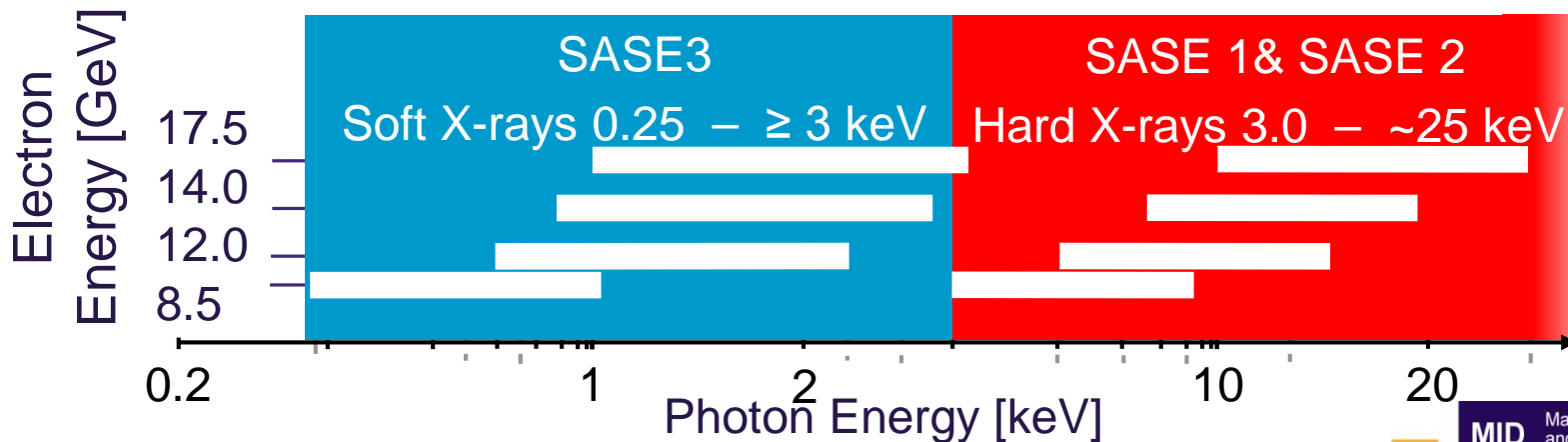
2

- International project realised in Hamburg area, Germany
- 17.5 GeV superconducting linac, 500 kW beam power
- 27000 pulses per second in 10 Hz burst mode
- Three variable gap undulators for hard and soft X-rays
- Initially 6 equipped experiments
- All accelerator and beamlines in tunnels 6 -25 m below surface

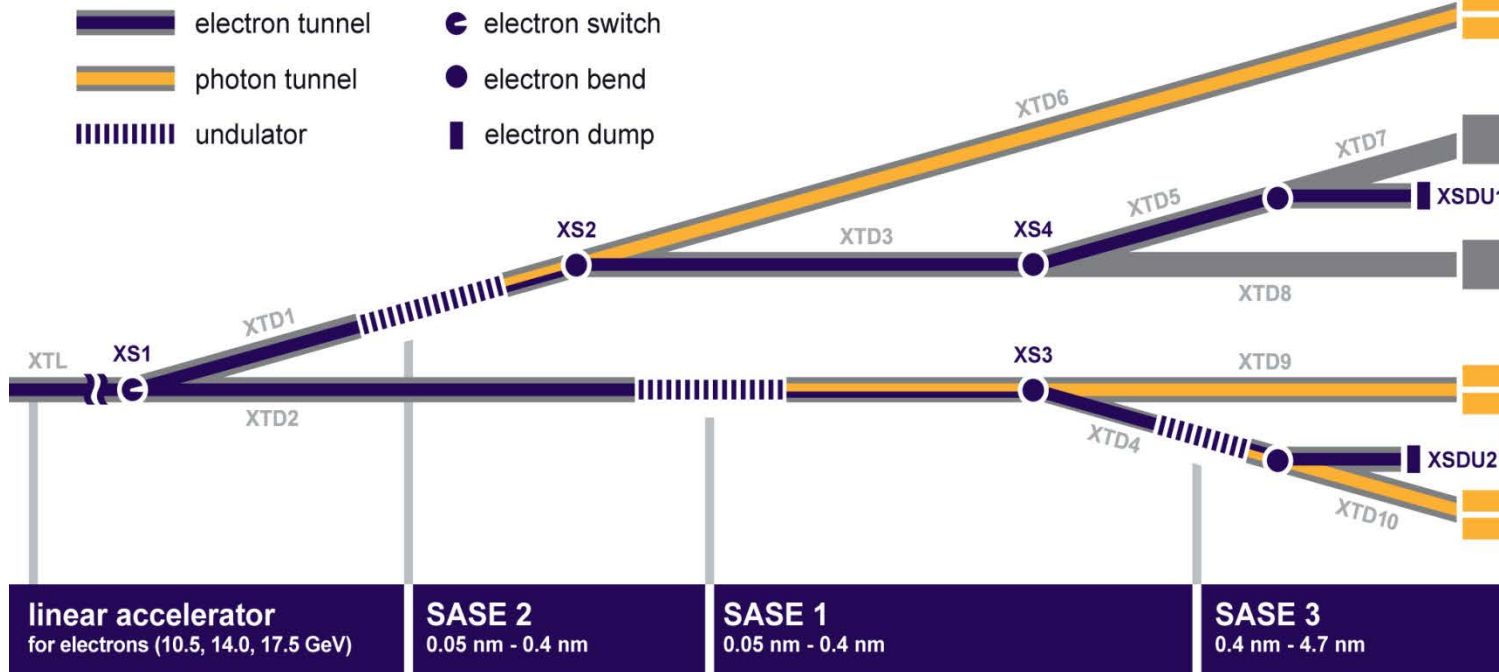


Covers photon energies from 0.25 keV to 25 keV

3



- electron tunnel
- photon tunnel
- undulator
- electron switch
- electron bend
- electron dump



MID Materials Imaging and Dynamics

HED High-energy Density matter Experiments

Optional space for two undulators and four instruments

SPB Single Particles, clusters & Biomolecules

FXE Femtosecond X-ray Experiments

SQS Small Quantum Systems

SCS Spectroscopy & Coherent Scattering

XHEXP1



European
XFEL



Logos of various research institutions and funding agencies, including DESY, INFN, CERN, and others.

Start of commissioning



INFOS & SERVICES

- » PRESS
- » WORK AND PRIVATE LIFE
- » OFFERS FOR PUPILS
- » SERVICES FOR INDUSTRY
- » DESY USER

» ACCELERATORS

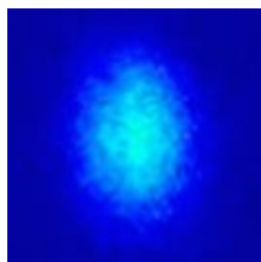
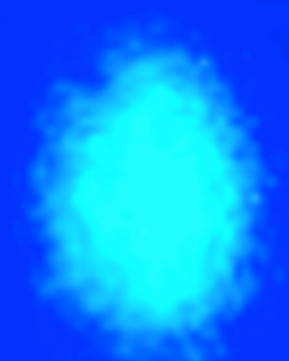
» PHOTON SCIENCE

» PARTICLE PHYSICS



FIRST LASING.

World's largest X-ray laser
generates first laser light



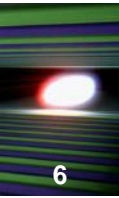
17/05/04 · Press-Release

Biggest X-ray laser in the world generates its first laser light

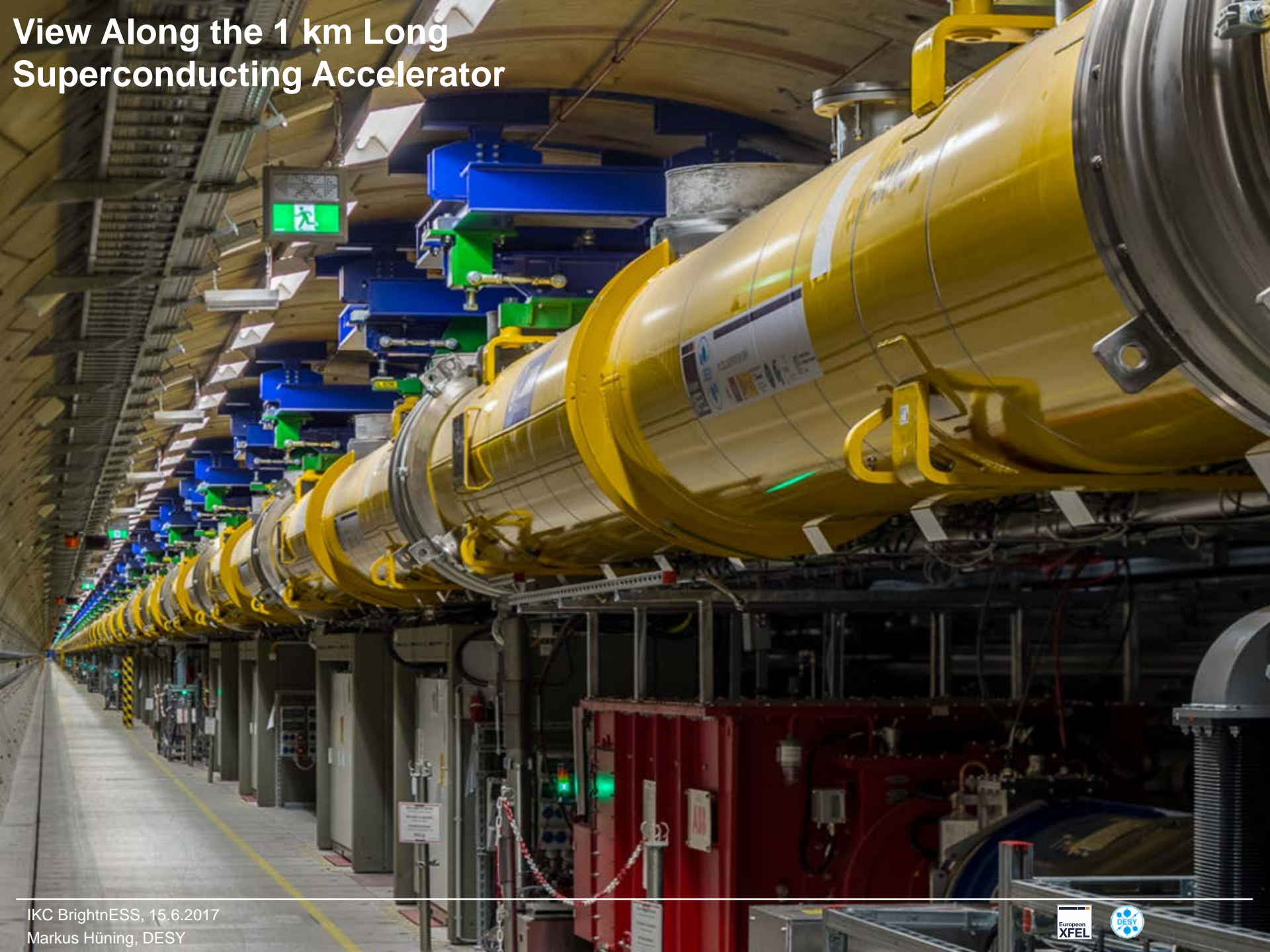
In the metropolitan region of Hamburg, the European XFEL, the biggest X-ray laser in the world, has reached the last major milestone before the official opening in September. The 3.4 km long



In-kind Contributions



- 69 in-kind contribution contracts with 22 institutions in 9 countries
- 562M€ from total value 1143M€, 49%
- 30 contracts with DESY, 72.7% of the in-kind value

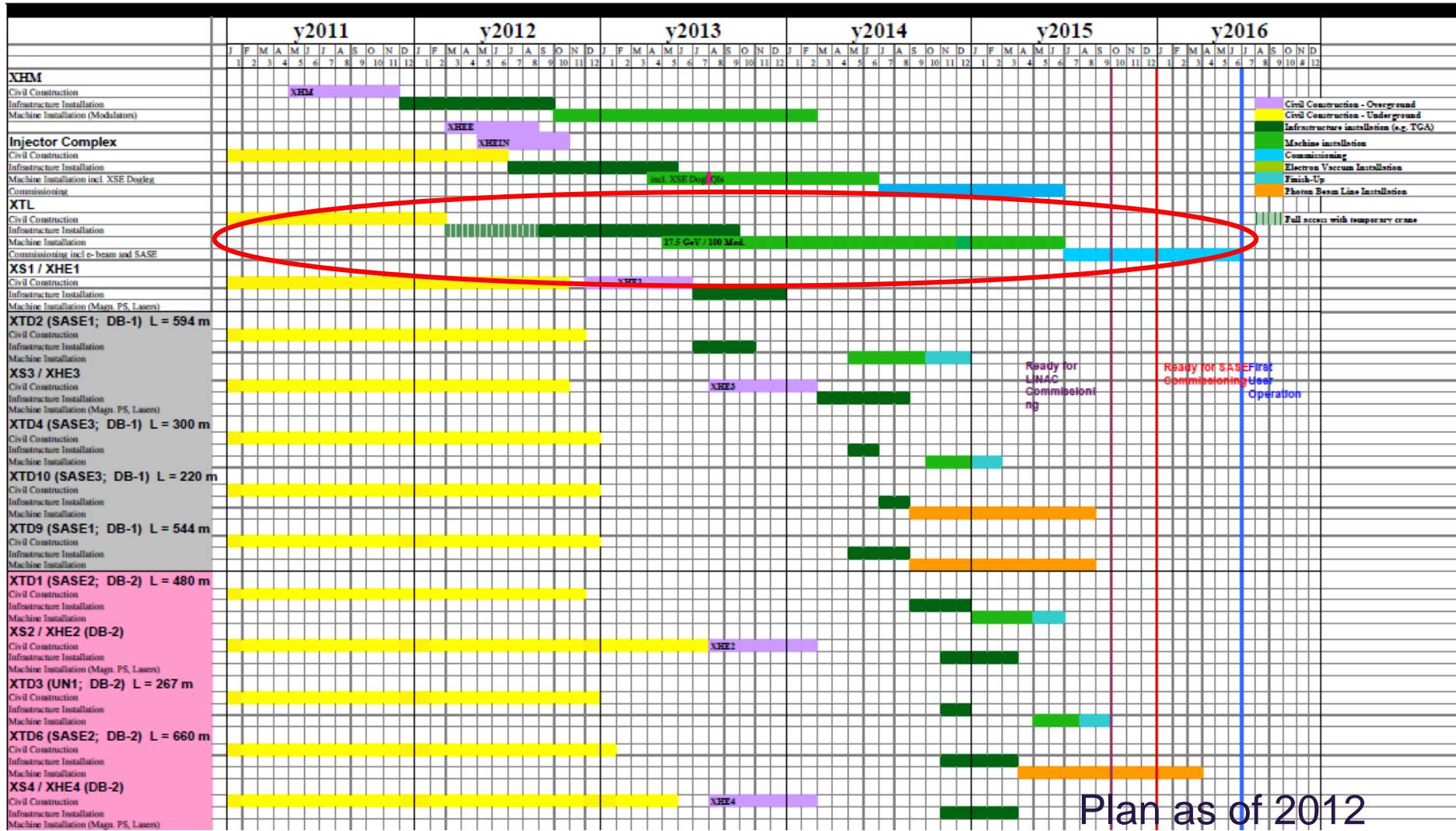
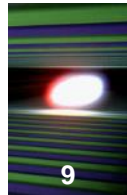


View Along the 1 km Long Superconducting Accelerator

The same tunnel
5 1/2 years before



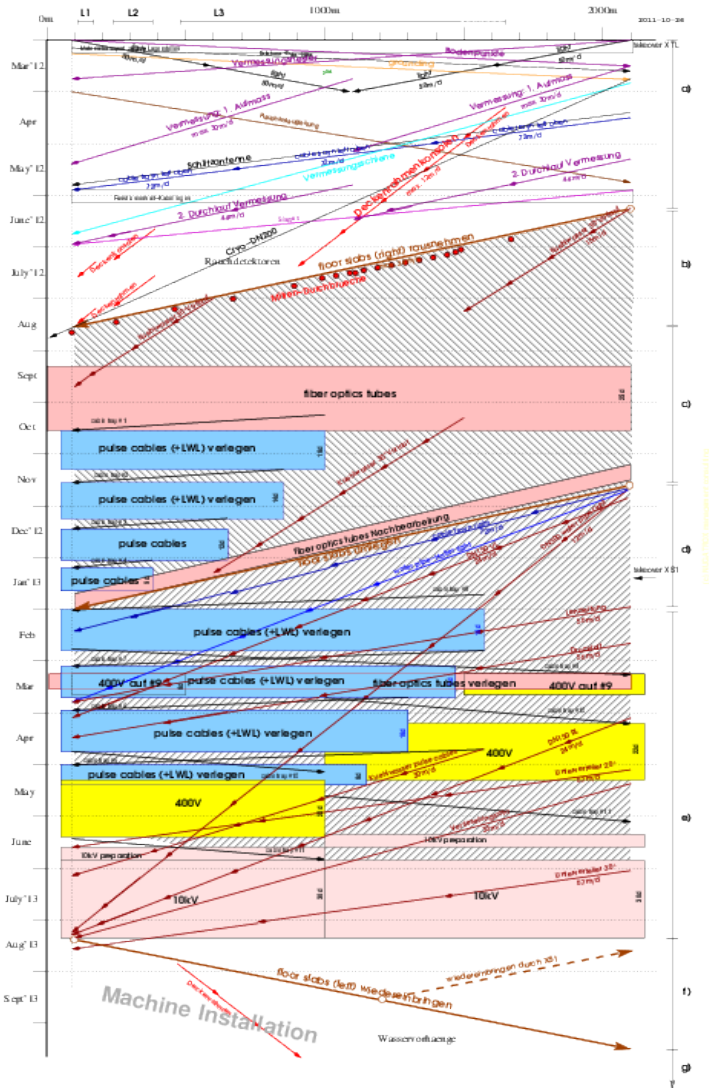
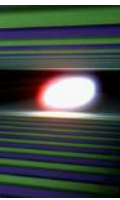
Construction, Installation, Commissioning



Plan as of 2012

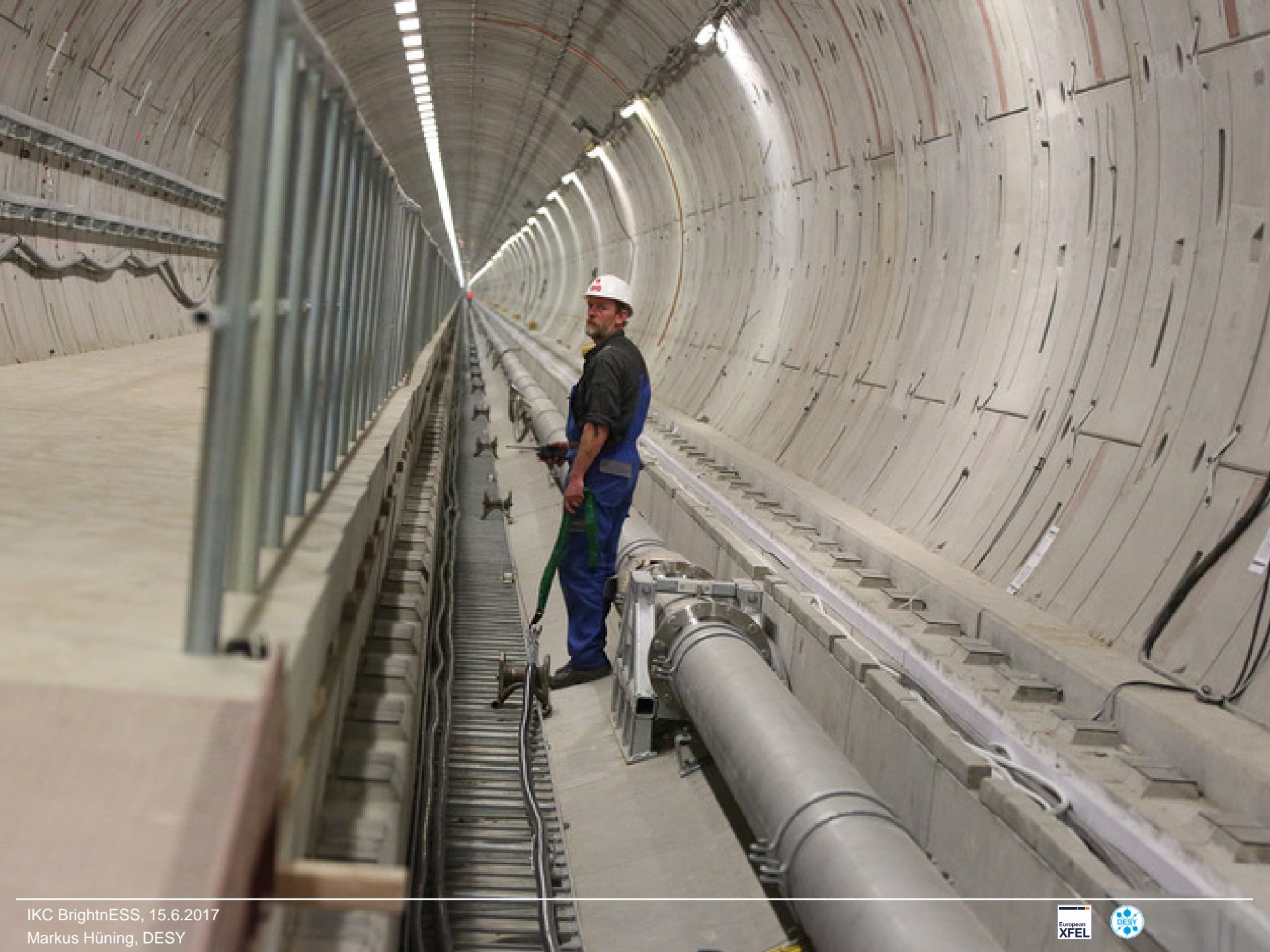
TGA_XSE_Arbeitsliste Eckoldt.xls [Read-Only] [Compatibility Mode] - Microsoft Excel																
R81 seperater Raum 22.06.12																
	A	C	D	E	F	G	H	J	K	L	M	N	O	P	Q	
1	16.05.2012	Level	Raum	Zweck	Anzahl (St.)	Anschlussart	Nennspannung	Leistungsbedarf der V	Gleichzeitigkeitsfaktor	Not-Aus	Notstromversorgung	Usy	Beleuchtung	Verantwortlicher	Workpackage	
149		UG05	017	Zugangssystem	1	Schuko 230 V, 16 A		3000	100	Nein	Ja	Ja		WP34, Faesing	WP34	no
150	Pumpenraum Primärkreis															
151		UG05	018	Beleuchtung	1						Nein	Nein	Standardb	WP34, Faesing	WP34	
152		UG05	018	Steckdosenkombination	1	Schuko 230 V, 16 A		3000	1	Nein	Nein	Nein		WP34, Faesing	WP34	
153		UG05	018	injector1, injector2, TDS	3	Festanschluss	Drehstrom 400 V	4000	100	Nein	Nein	Nein		WP34, Ullrich 9-3189		
154																
155	Medienschacht															
156		UG05	019	Beleuchtung	1								Standardb	WP34, Havlicek	WP34	
157		UG05	019	Schaltsschrank RLT Klappensteuerung	1	Festanschluss	Wechselstrom 23	3000	10	Nein	Nein	Ja		WP34 Feuker	WP34	
158																
159	Fläche LLRF															
160		UG05	020	IT	6	Festanschluss	Wechselstrom 23	1100	50	Nein	Nein	Nein		Witt		
161		UG05	020	Umluftkühlgerät	1	Festanschluss	Wechselstrom 23	1000	20	Nein	Nein	Nein		WP34 Feuker	WP34	
162		UG05	020	LLRF System Racks ist eine UV an der Wand mög	4	Festanschluss	Wechselstrom 23	2000	100	Ja (Pers)	Ja	Ja		Wojciech Wierba / MSK	WP02	Me
163		UG05	020	LLRF System Racks	4	Festanschluss	Wechselstrom 23	2000	100	Ja (Pers)	Nein	Nein		Wojciech Wierba / MSK	WP02	
164																
165																
166	"Stellplatz Triebkopf"															
167		UG05	021	Steckdosenkombination	1	Steckdosenkombin	Wechselstrom 23	3000	1	Nein	Nein	Nein			WP33	Ste
168																
169	Klystron															
170		UG05	022	TDS Modulator	1	Festanschluss	Drehstrom 400 V	15000	100	Ja (Pers)	Nein	Nein		M. Huening		18
171		UG05	022	Reservemodulator	1	Festanschluss	Drehstrom 400 V	15000	5	Ja (Pers)	Nein	Nein		M. Huening		18
172		UG05	022	HF Elektronik/Steuerung	1	Festanschluss	Drehstrom 400 V	10000	100	Nein	Nein	Nein		M. Huening		18
173		UG05	022	Steckdosenkombination	1	Steckdosenkombin	Wechselstrom 23	11000	5	Nein	Nein	Nein			WP33	Ste
174		UG05	022	Umluftkühlgeräte	2	Festanschluss	Wechselstrom 23	1000	20	Nein	Nein	Nein		WP34 Feuker	WP34	
175		UG07	022	IT-Verteiler	8	Festanschluss	Drehstrom 400 V	6000	50		Ja	Ja		WP34, Witt	WP34	Su
176																
177	UG06															
178	Verwahrraum															
179		UG06	010	keine Beleuchtung	0						Nein	Nein	Standardb	WP34, Faesing	WP34	ver
180																
Stand Stromversorgung / Klima, Lueftung, Heizung / Wasser / Telefone / IT-Netzwerk / Druckluft / Sicherheit / Raumkataster / Konfig / IT-Netz Profibus MKS																

Planning diagram



Shows:

- ★ **when and where** does a task take place
- ★ **How long** it takes
- ★ **How many teams** can work at the same time
- ★ Which teams will **meet** or occupy the **same place**
- ★ This is a useful tool to talk about arrangements.
- ★ Only useful in tunnels.
- ★ Cannot replace a gantt diagram, but adds to it.

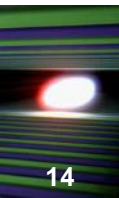


Scenes from the main Tunnel

13

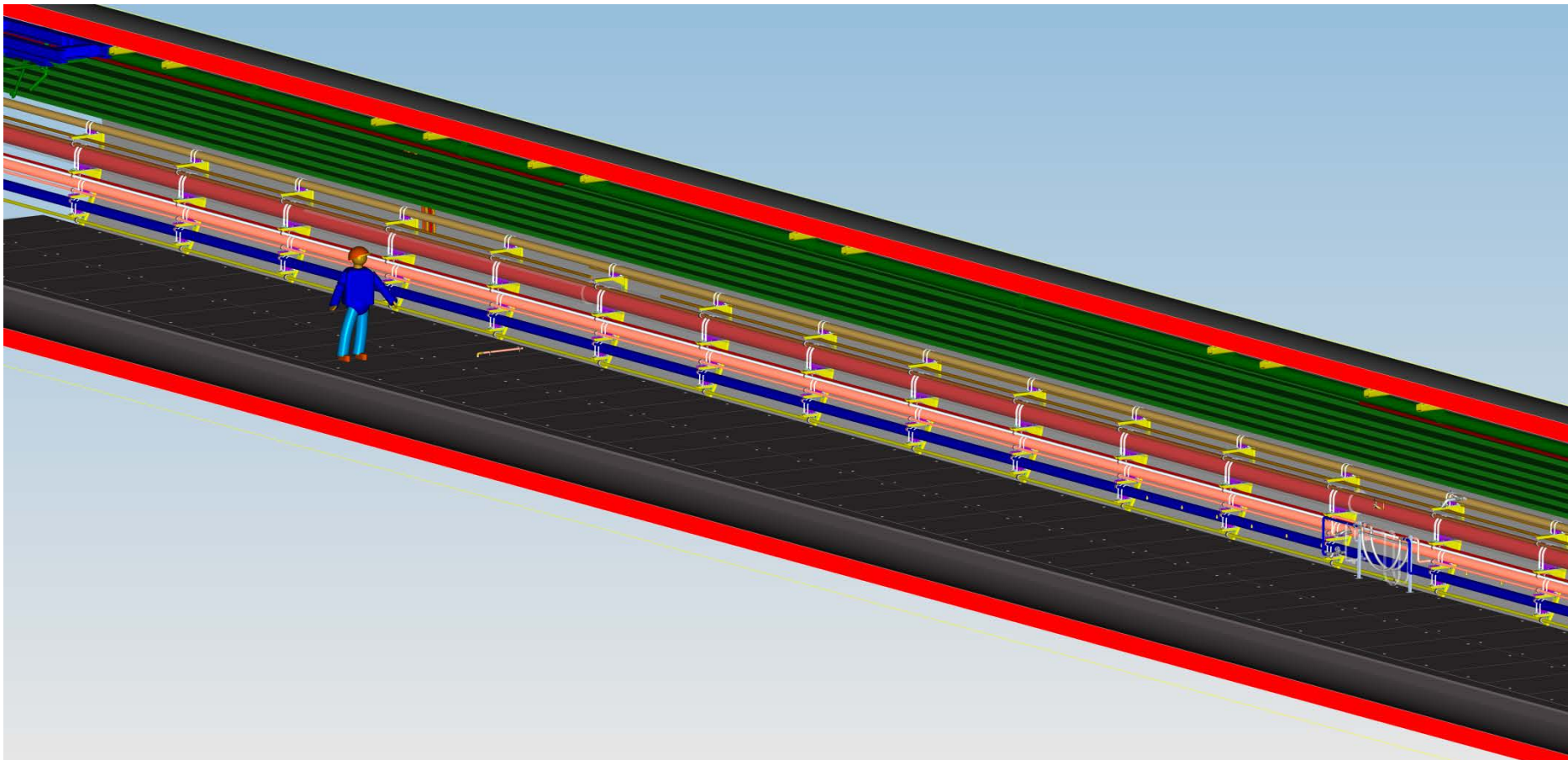


End of XTL Infrastructure Installation



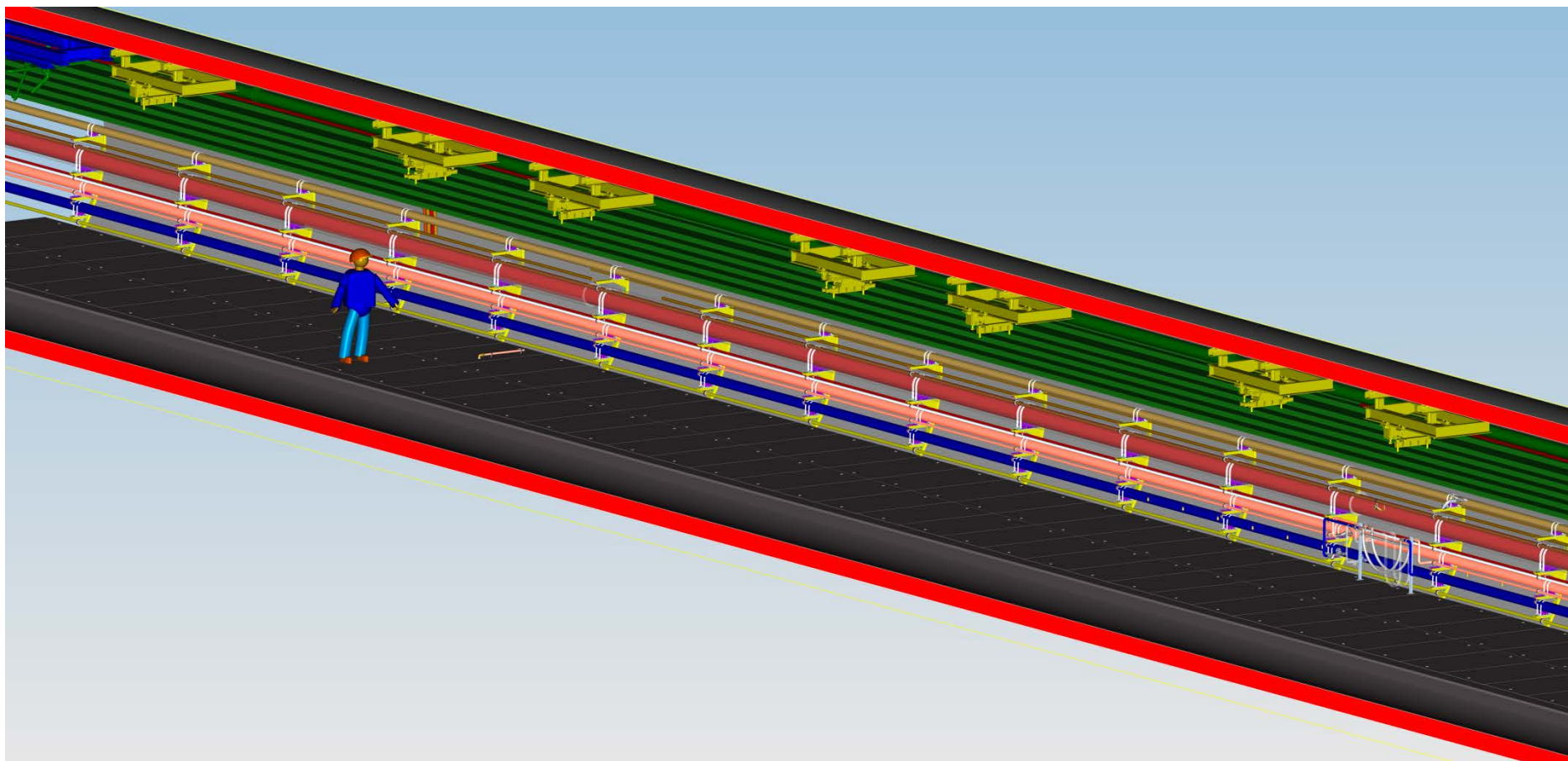
Installation of the Cryo String: Tunnel ready

15



Installation of the Cryo String: Ceiling Frames

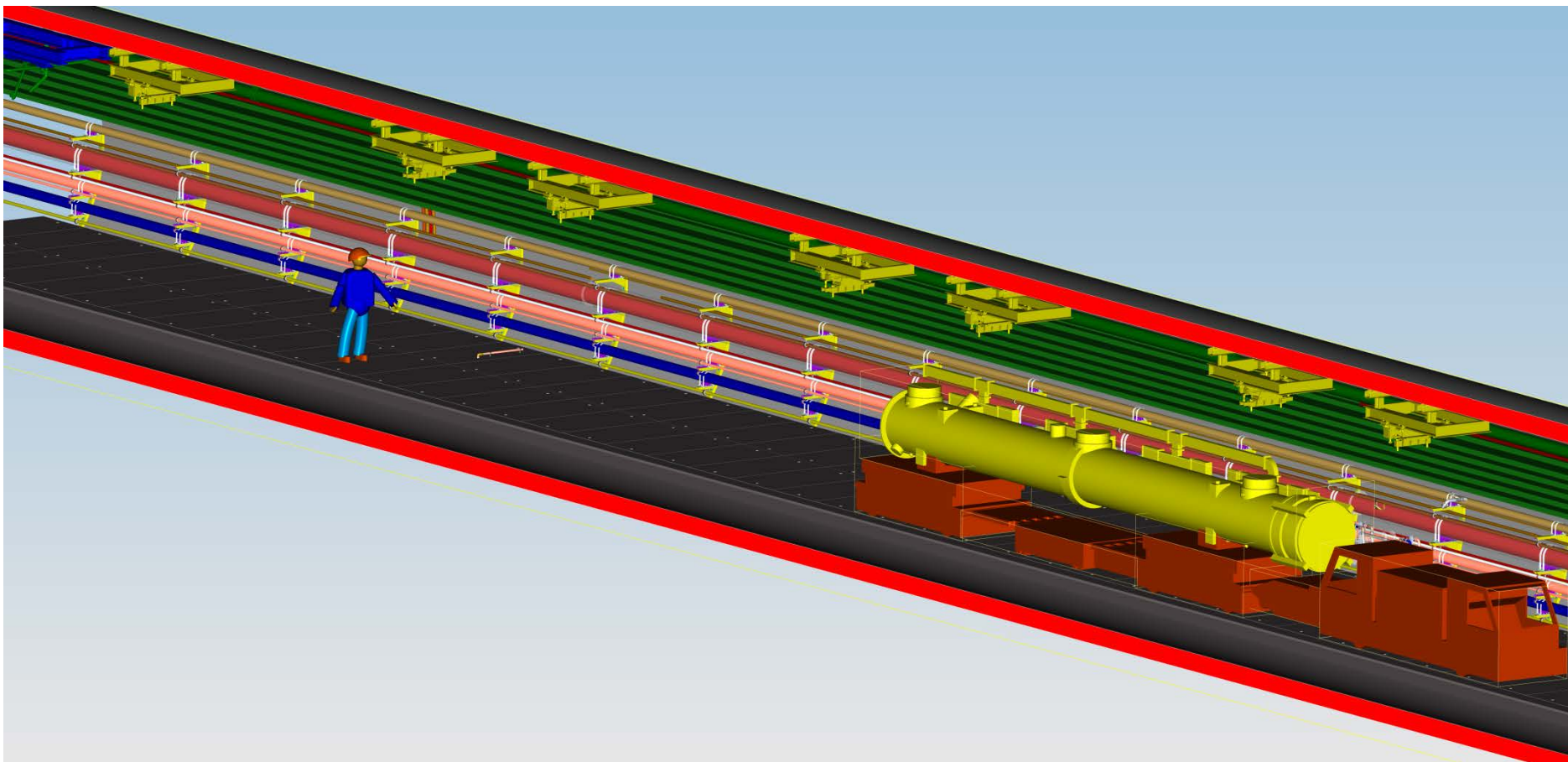
16



■ Done before start of machine installation

Installation of the Cryo String: Modules

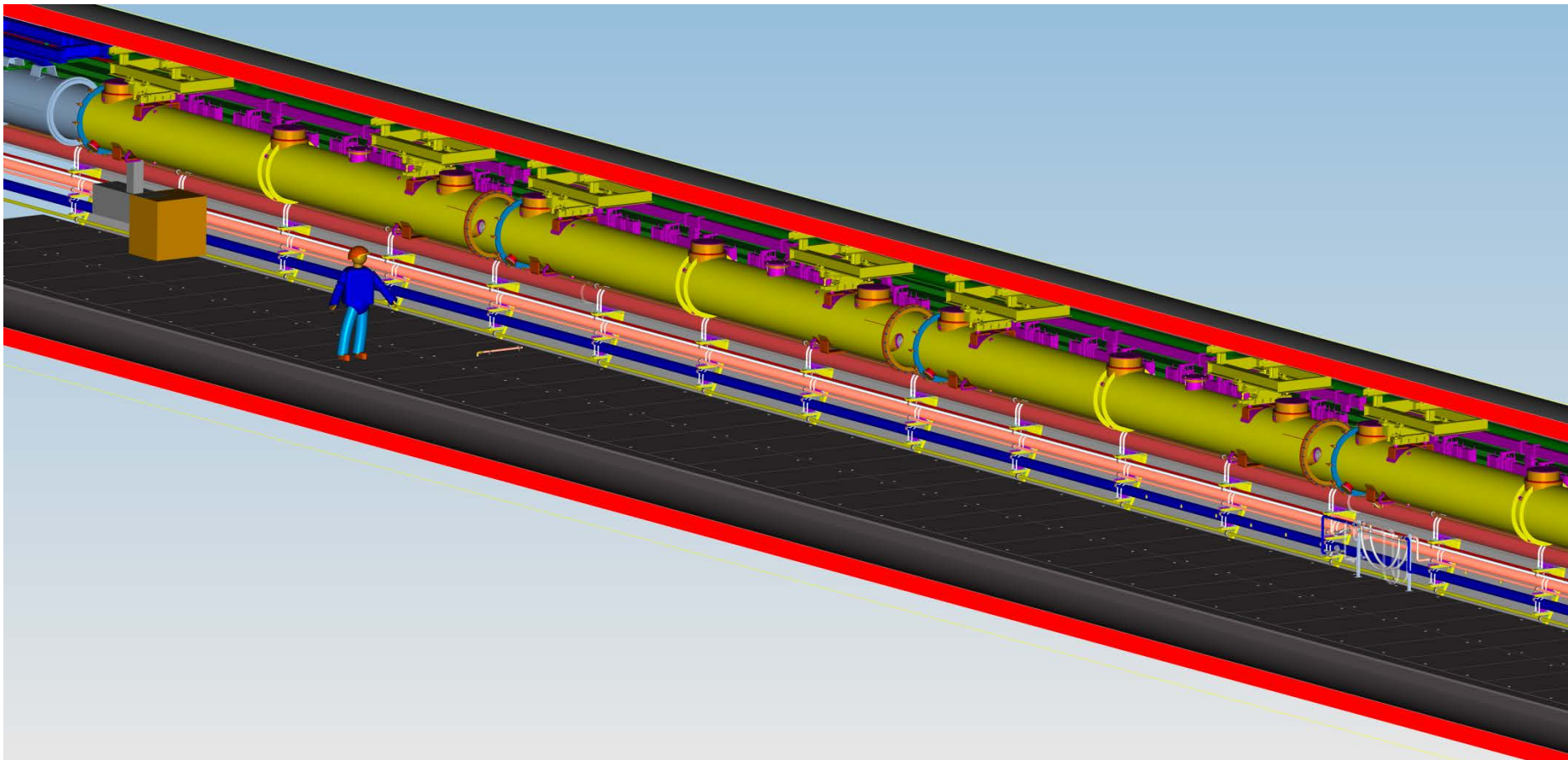
17



■ One module per day

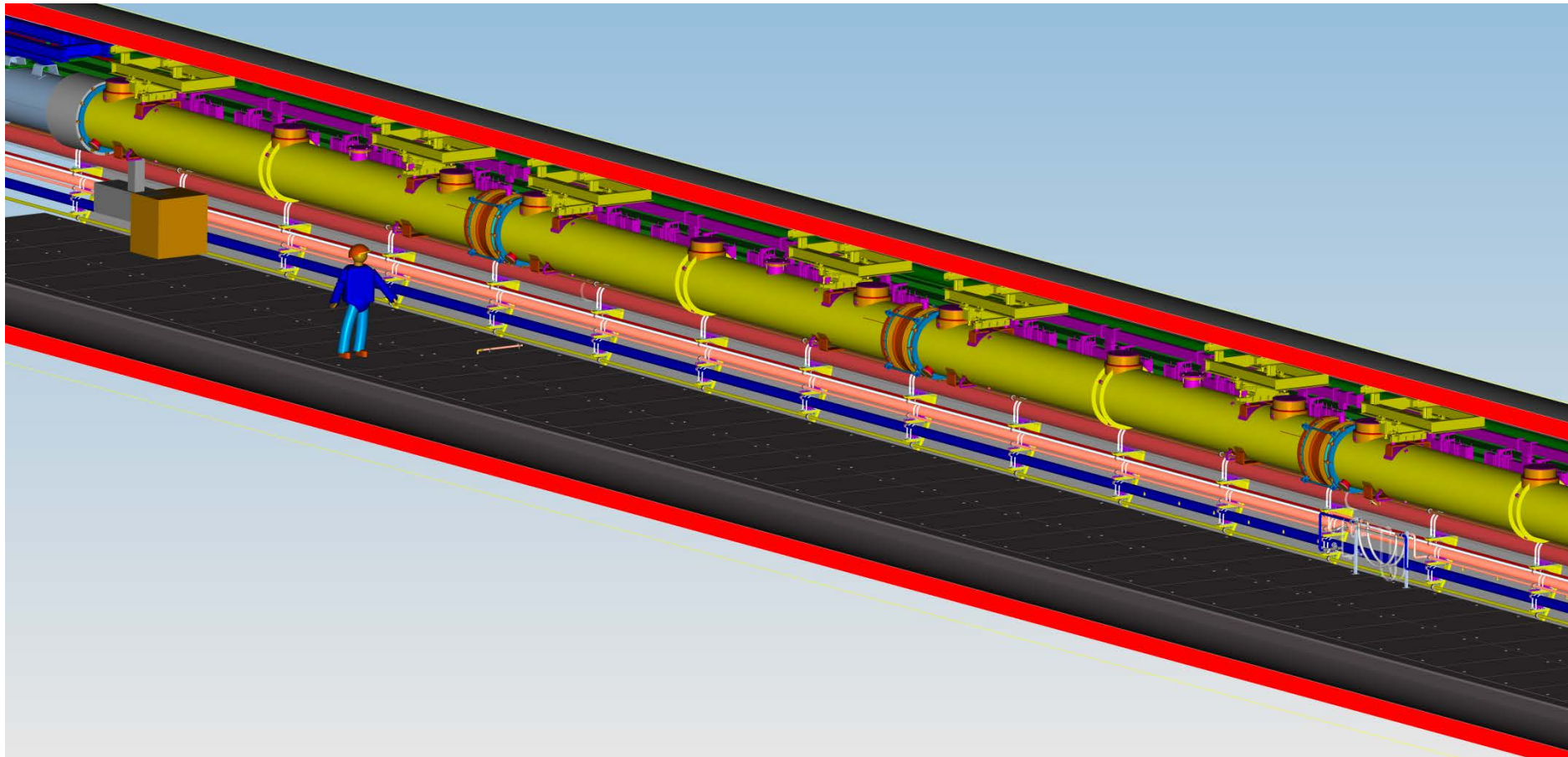
Installation of the Cryo String: Modules

18



12 days

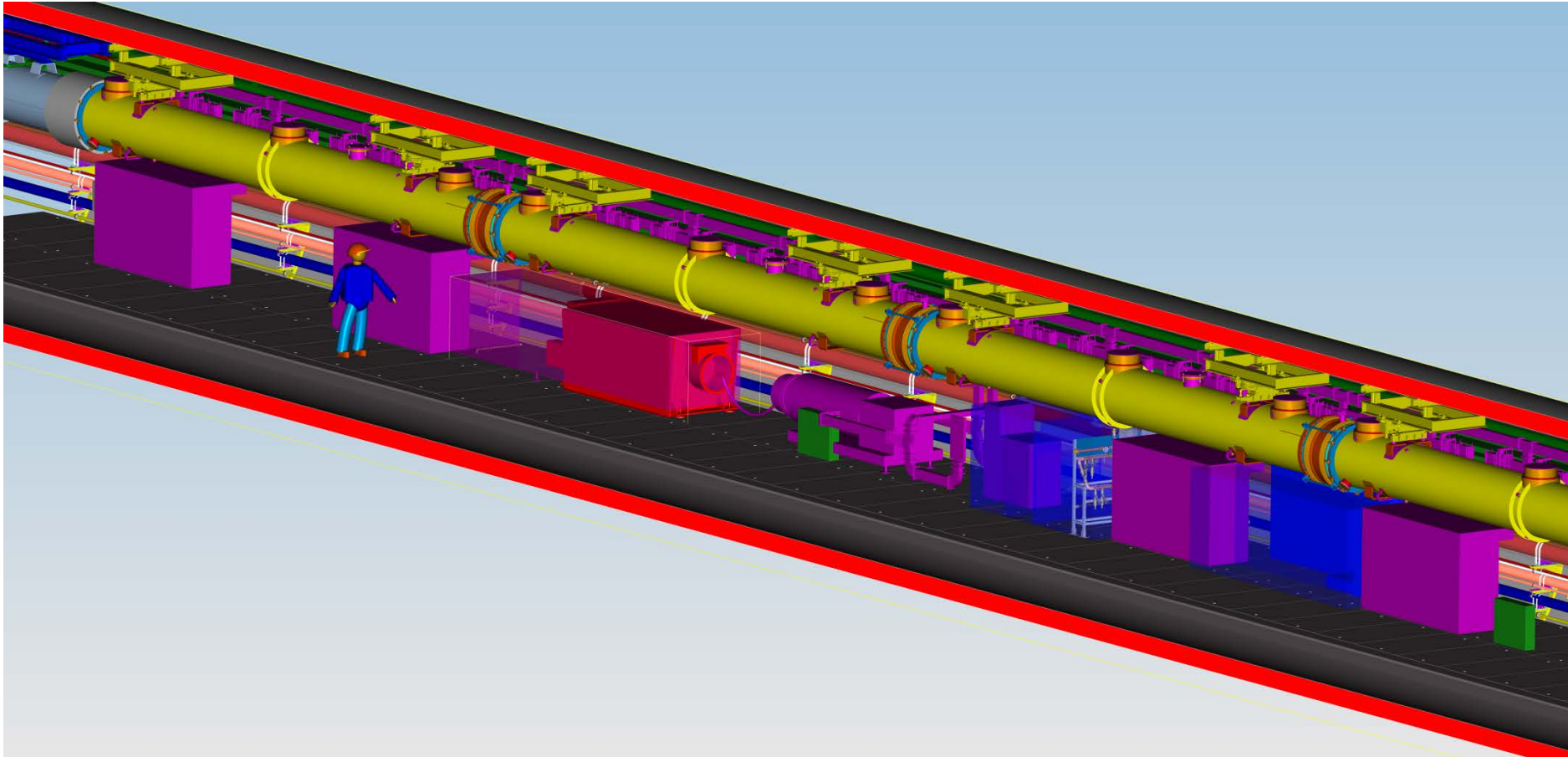
Installation of the Cryo String: Cryo Connection



12 days

12 weeks

Installation of the Cryo String: Klystron & Racks



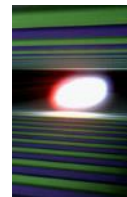
12 days

12 weeks

12 weeks

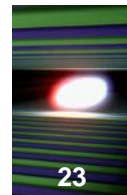
Superconducting Cavities and Modules





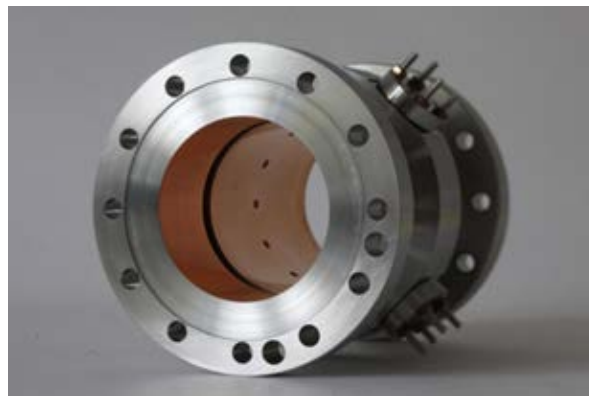
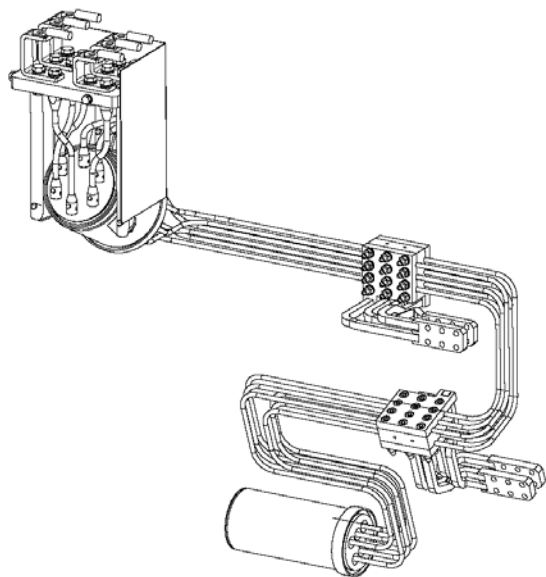
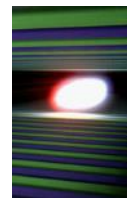
- Two vendors for mechanical production and preparation of 808 cavities (+32 others)
- All cavities tested in the AMTF
 - 70% met performance goal (23.6 MV/m at $Q_0=10^{10}$) immediately
 - 23% met performance goal after re-treatment
- Cavity testing external in-kind contribution
- Test results stored in database (actually 3)
 - AMTF database
 - Cavity database (all cavities ever tested at DESY)
 - EDMS



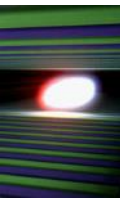


- Big Collaborative Effort
- Majority of work contributed by external in-kind partners
- 24/69 IKC (16/39 non-DESY IKC) related to module production and testing
- Work packages deeply interlaced, close follow-up, intense use of management tools
- Although they were in part actually assigned to different tasks,
strong technical support group by DESY essential for success

Cold Magnets, Current Leads and BPM



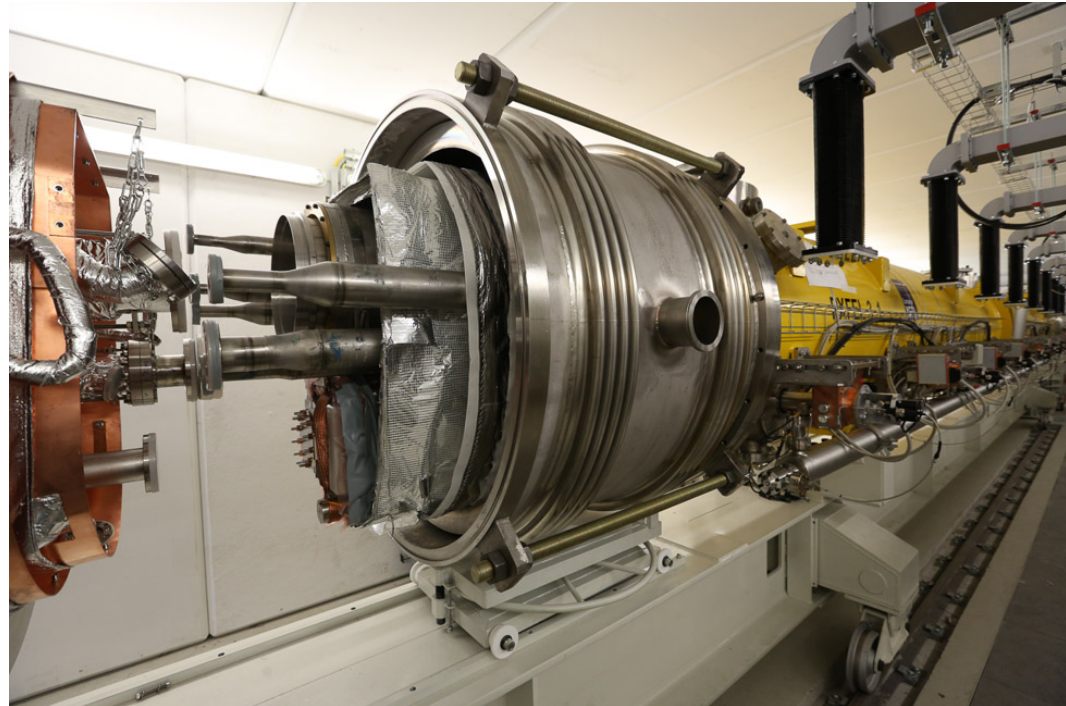
Couplers-String-Module



- All components supplied by different in-kind contributors
- Planned by MSPE (MS Project Enterprise)
 - Interlinked schedules
 - Strong dependencies
- Fully documented and managed via EDMS

Module Testing

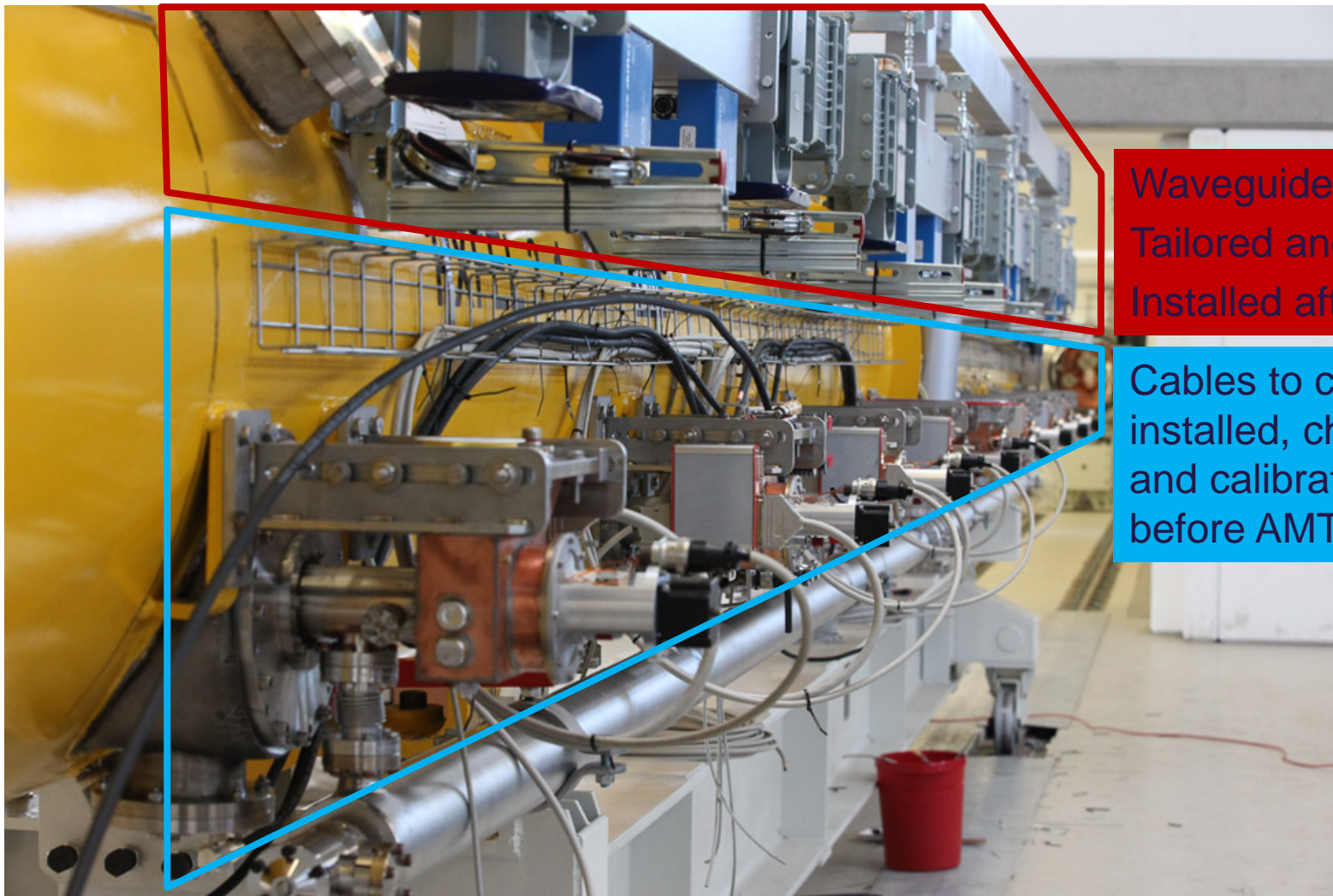
- Module testing takes 2 weeks per module
- Three parallel test stands allowed for through-put of 1.5 module per week (after streamlining)



		Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday	Monday	Tuesday
PLAN I - MODULE	XATB 1	A	B	B	B/C	C	C	D	D	D	D	D/E	E	E	F	C
	XATB 2								A	B	B	B			C	C
	XATB 3															A

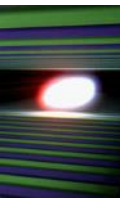
Wednesday	Thursday	Friday	Saturday	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday	Monday	Tuesday	Wednesday
C/D	D	D	D	D	E	E	E	E/F	F			C	C	C/D	D	D	D	D	E	E	E/F
B	B	B/C	C	C	D	D	D	D	D/E	E	E	F		A	B	B	B/C	C	D	D	D
																			A	B	

External Equipment at Module

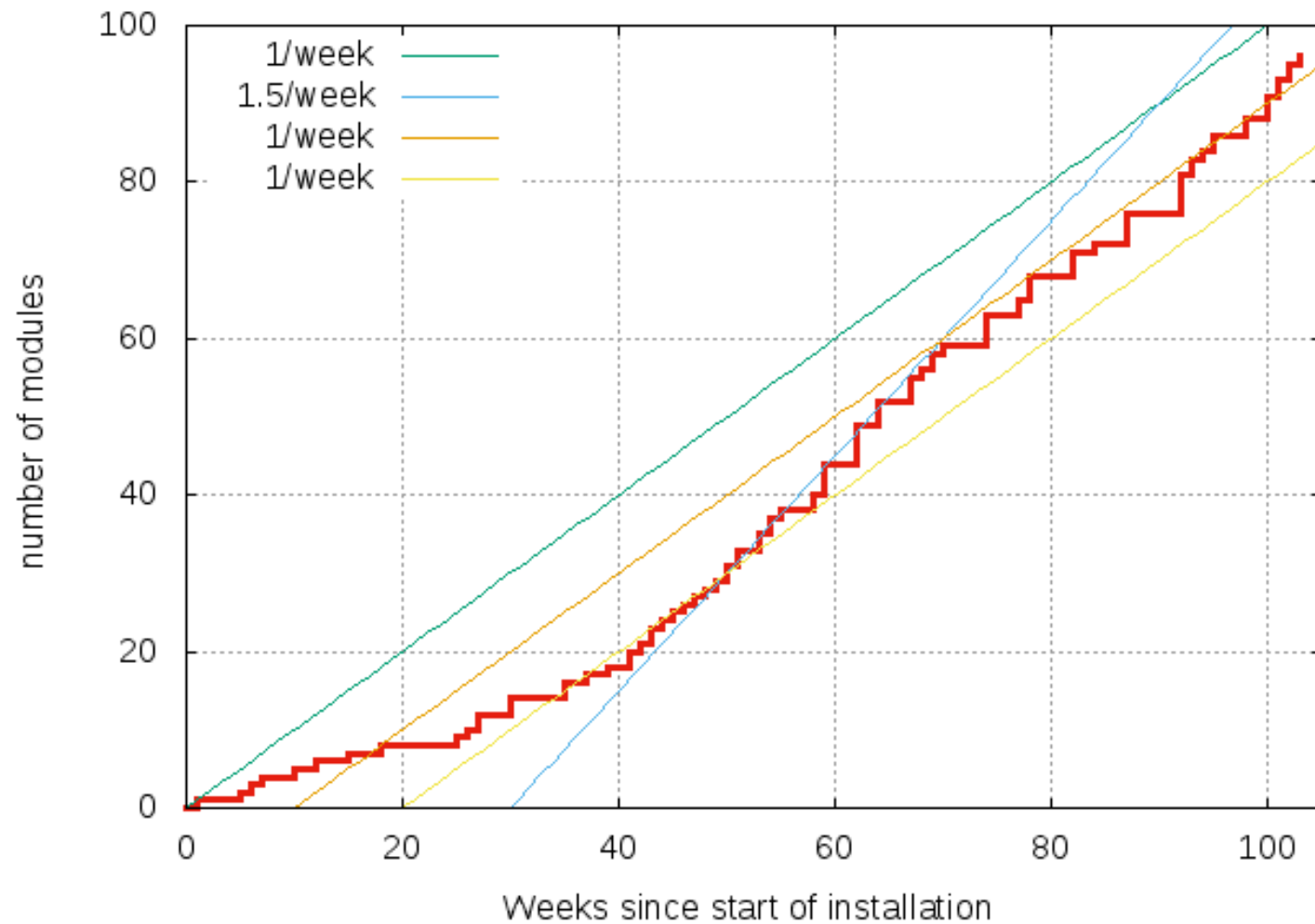


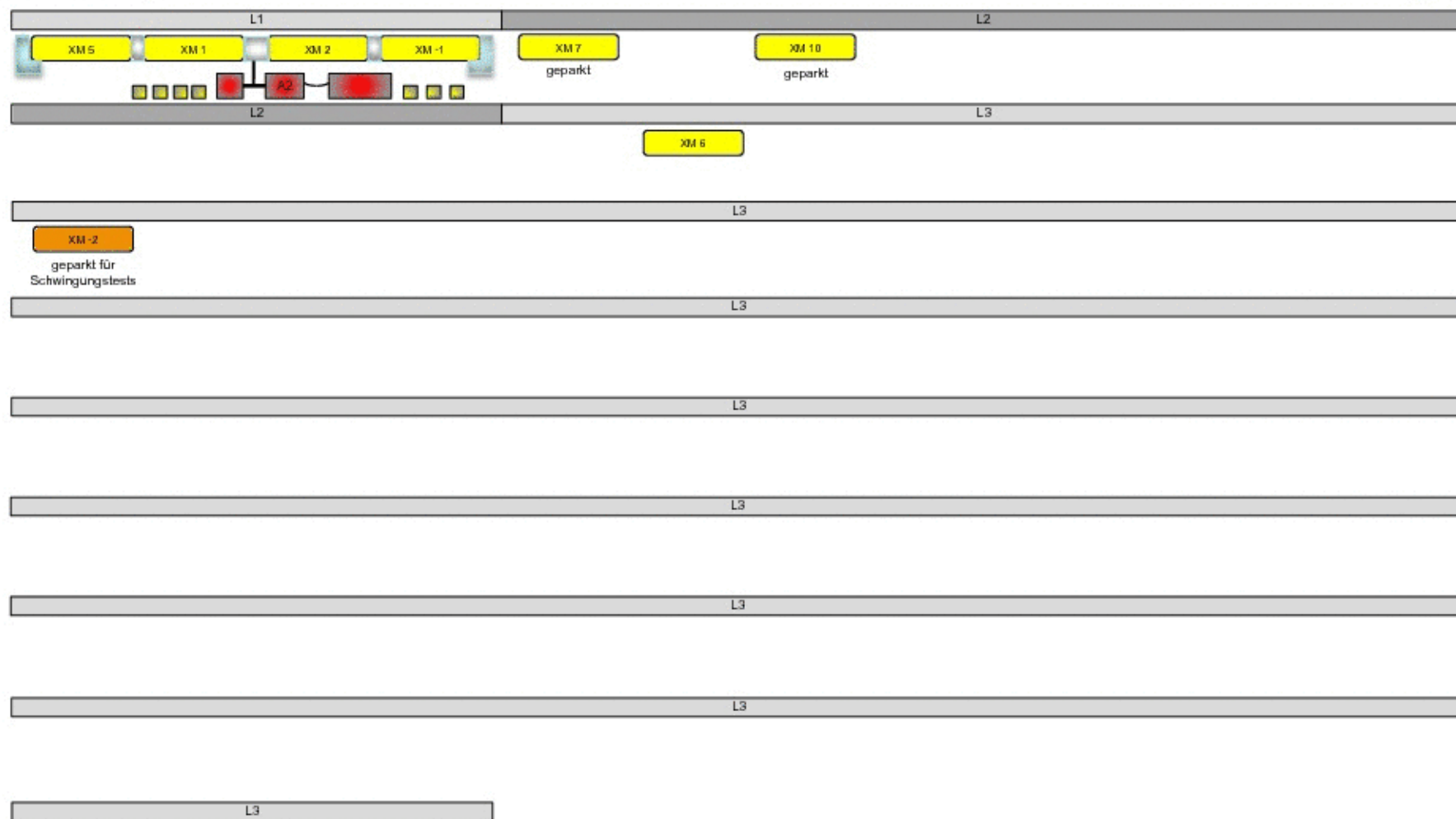
Waveguides and cables
Tailored and calibrated
Installed after AMTF test

Cables to coupler
installed, checked
and calibrated
before AMTF test



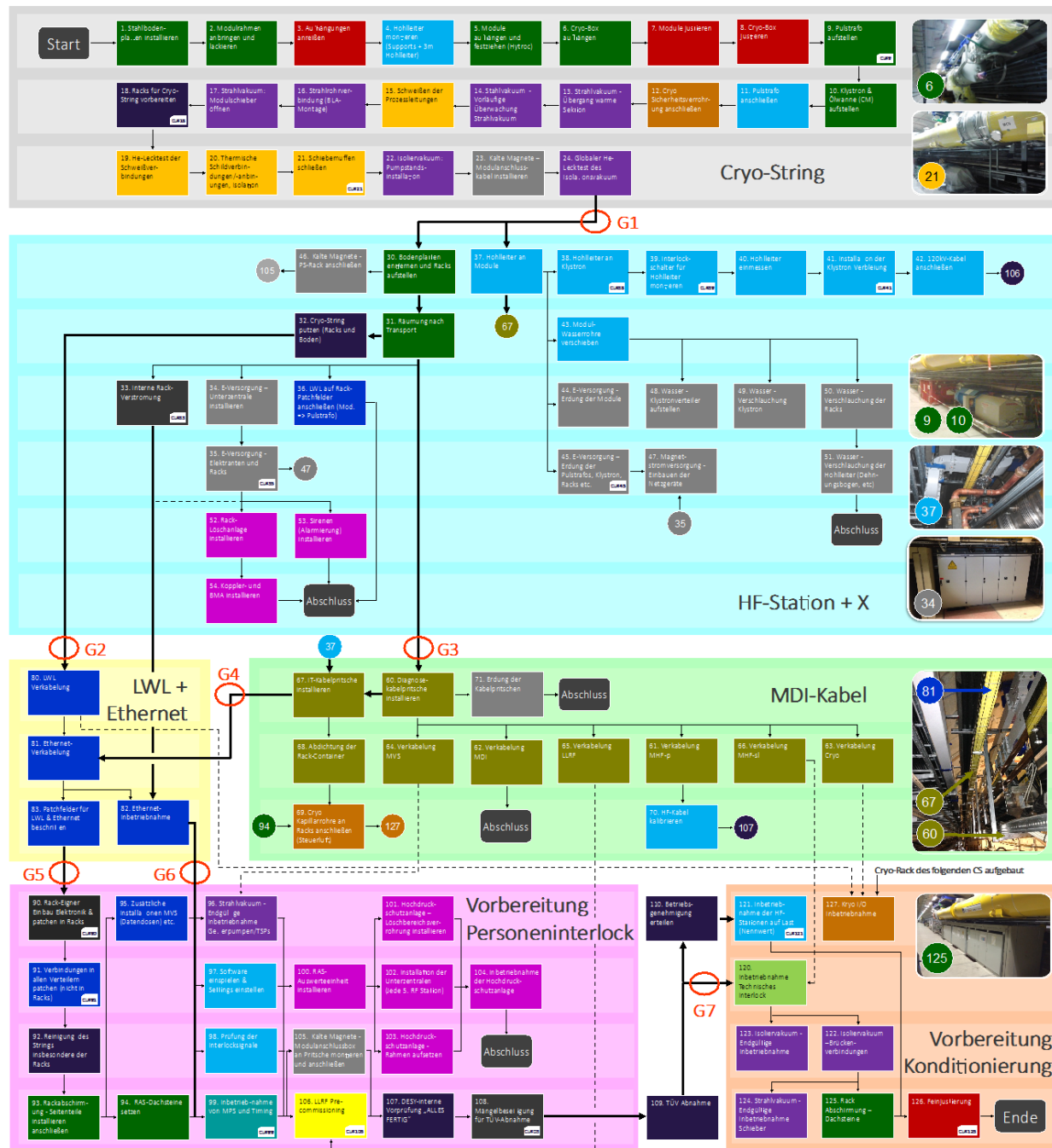
number of modules installed in XTL 2016-08-01





Process Map

Parallel to setting up an MBOM



Item Information

https://teamcenter.desy.de/TC90PRD/controller/home

80%

Suchen

Home Exit DESY

Markus Hüning

Advanced Search...

Main Menu Classification

Submit Item Reports Bookmark History History Current Lifecycle More Actions...

Select View:

XFEL

Project Management

Sites / Buildings / Infrastructure

XFEL Work Packages

XFEL

XFEL Project

Project Management

CLC: Cold Linac Coordination

MLC: Machine Layout Coordination

PSC: Photon Systems Coordination

TC: Technical Coordination

BCO & Dogleg Section Coordination

Bunch Compressor 1&2 Section Coordination

Cold Linac Section Coordination

Collimator Line Section Coordination

Injector Section Coordination

Photon Beamlines Section Coordination

Separation Section Coordination

Transfer Lines Section Coordination

Undulator Lines Section Coordination

Fabrication Part , D0000000680867,A,1,1 , Item Info : MBOM

Summary MBOM Properties Related Items Files Next Steps Classification Occurrence Configuration Positions

Promote States All Versions Access

Export Table As CSV HTML XML

EDMS-ID	Name	Description
D0000000680867,A,1,1	L3 Instrumented Cryosection	Instrumented Cryostrating Section Linac 3
D0000000681627,A,1,1	CS: Cryostrating	Cryostrating for XFEL Linac
D0000000682417,A,1,1	CFF: Connection Box Half (Interface End)	Generic part, an appropriate alternate part will be asser
D0000000682247,A,1,1	CFF: Connection Box Half (Interface Feed)	Generic part, an appropriate alternate part will be asser
D0000000677247,A,1,1	MAML: Mounted Accelerator Module Left	Mounted Accelerator Module (Cryomodule) Left
D0000000676627,A,2,1	AMVDL: Accelerator Module with Waveguide Distribution Left	Accelerator Module (Cryomodule) with Waveguide Distr
D0000000676507,A,1,1	AM: Accelerator Module	Accelerator Module (Cryomodule)
D0000000681517,A,1,1	AMC: Accelerator Module Cabling	Accelerator module cabling including patch panels
D0000000676907,A,3,1	WDL: Waveguide Distribution Left	Waveguide Distribution Left
D0000000679787,A,1,1	CFF: Module Ceiling Frame with Suspension, Fixed point	Ceiling frame including the suspension and the ceiling br
D0000000677487,A,1,1	CFL: Module Ceiling Frame with Suspension, Loose point	Ceiling frame including the suspension and the ceiling br
D0000000677367,A,1,1	MAMR: Mounted Accelerator Module Right	Mounted Accelerator Module (Cryomodule) Right
D0000000676807,A,2,1	AMWDR: Accelerator Module with Waveguide Distribution Right	Accelerator Module (Cryomodule) with Waveguide Distr
D0000000679787,A,1,1	CFF: Module Ceiling Frame with Suspension, Fixed point	Ceiling frame including the suspension and the ceiling br
D0000000677487,A,1,1	CFL: Module Ceiling Frame with Suspension, Loose point	Ceiling frame including the suspension and the ceiling br
D0000000663977,A,1,1	MC: Module Connection	module to module connection
D0000000682447,A,1,1	MC: Module Cryobox Connection (Generic Part)	DUMMY, will be replaced with appropriate alternate part
D0000000681047,A,1,1	MEC: Mounted End Cap	Mounted End Cap
D0000000682697,A,1,1	EC: End Cap	a cryogenic box between the last module in the string a
D0000000698697,A,1,1	ECF: End Cap Frame with Suspension (Ceiling Frame)	Ceiling frame including the suspension and the ceiling br
D0000000681157,A,1,1	MFC: Mounted Feed Cap	Mounted Feed Cap
D0000000684427,A,1,1	MSC: Mounted String Connection Box	Mounted String Connection Box

Expansion level: 1 Save Expansion Level Reset Expansion Level


System Status: OK

1 items in the Attached Files List.
You have 6 assignments in this Work List.

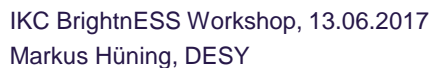
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alert("Your web browser does not have support
for Java 2 Applets.");
</SCRIPT>

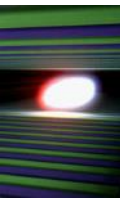
Edit Set Context Refresh Baseline BOM Find Top Item Change Column Display Settings

33



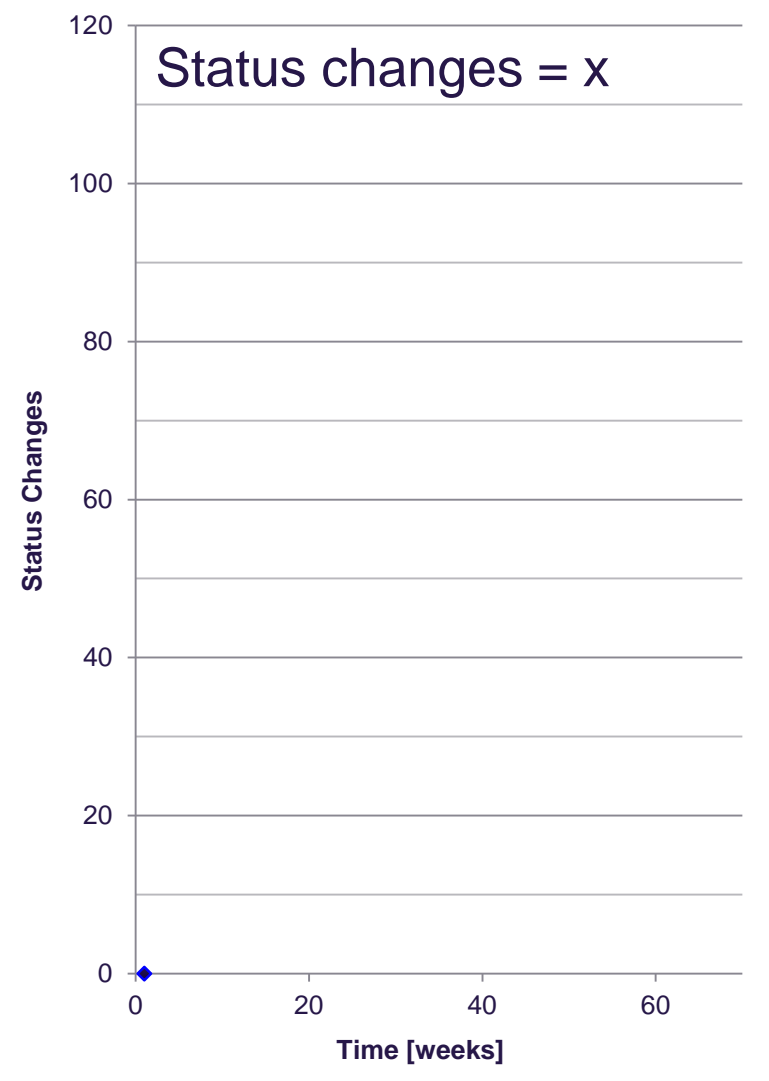
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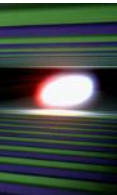




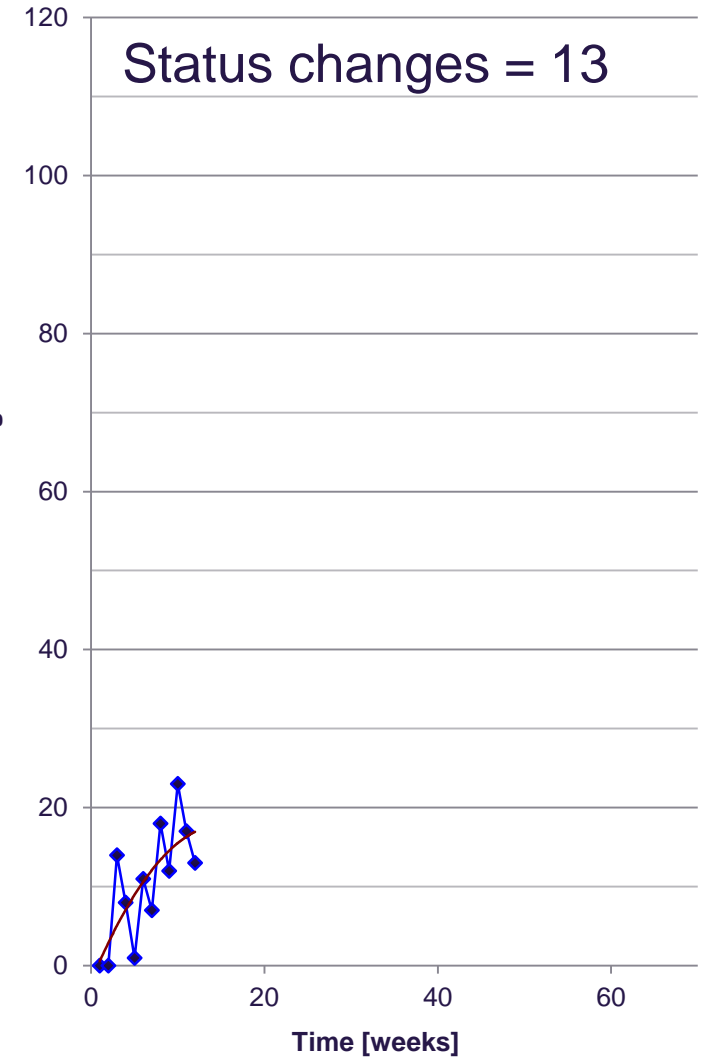
Prozess		CS3		CS4			CS5		CS6					
Nr.	Prozessschritte	WP/Gruppe	A6.L3	A7.L3	A8.L3	A9.L3	A10.L3	A11.L3	A12.L3	A13.L3	A14.L3	A15.L3	A16.L3	A17.L3
Vacuum-String														
1	Strahlraumkammer installieren	WP/3	OK	OK	-	-	-	-	-	-	-	-	-	-
2	Modulare Komponenten einbauen	WP/3	OK	OK	-	-	-	-	-	-	-	-	-	-
3	Aufhängungen anbringen	WP/3	OK	OK	OK	-	-	-	-	-	-	-	-	-
4	Modulare Aufhängungen und Stationen (Hubs)	WP/3	OK	OK	OK	-	-	-	-	-	-	-	-	-
5	Modulare Aufhängungen und Stationen (Hubs)	WP/3	OK	OK	OK	-	-	-	-	-	-	-	-	-
6	Modulare und Cryo-Box Justieren	WP/3	in Arbeit	OK	OK	-	-	-	-	-	-	-	-	-
7	Cryo-Schaltkreisverbindung anbringen	WP/3	in Arbeit	-	-	-	-	-	-	-	-	-	-	-
8	Strahlraum - Übergang zum nächsten Sektor	WP/3	in Arbeit	-	-	-	-	-	-	-	-	-	-	-
9	Strahlraum - Vorläufige Überwachung Strahlraum	WP/3	in Arbeit	-	OK	-	-	-	-	-	-	-	-	-
10	Strahlraum - Überwachung (WP/3 WP/3)	WP/3	in Arbeit	OK	in Arbeit	-	-	-	-	-	-	-	-	-
11	Schleifen der Leitungen des "Drehkreuz" und in-Rücklauf	WP/3	OK	OK	OK	-	-	-	-	-	-	-	-	-
12	Überwachung der Leitungen (WP/3 WP/3)	WP/3	OK	OK	OK	-	-	-	-	-	-	-	-	-
13	Schleifen der Leitungen (WP/3 WP/3)	WP/3	OK	OK	OK	-	-	-	-	-	-	-	-	-
14	Heizleistung der Schweißverbindungen	WP/3	OK	OK	OK	in Arbeit	-	-	-	-	-	-	-	-
15	Thermische Schweißverbindungen anbringen	WP/3	in Arbeit	in Arbeit	in Arbeit	-	-	-	-	-	-	-	-	-
16	Thermische Schweißverbindungen anbringen, Location	WP/3	in Arbeit	in Arbeit	in Arbeit	-	-	-	-	-	-	-	-	-
17	Thermische Schweißverbindungen anbringen	WP/3	in Arbeit	in Arbeit	in Arbeit	-	-	-	-	-	-	-	-	-
18	Schleifen der Leitungen (WP/3 WP/3)	WP/3	in Arbeit	in Arbeit	in Arbeit	-	-	-	-	-	-	-	-	-
19	Globaler Heizeffekt des Strahlraums	WP/3	in Arbeit	in Arbeit	in Arbeit	-	-	-	-	-	-	-	-	-
20	Globaler Heizeffekt des Strahlraums / Backs aufbauen / Kryostat aufbauen	WP/3	-	-	-	-	-	-	-	-	-	-	-	-
HF-Abschnitt														
21	Cable-Latch anbringen	WP/3	-	-	-	-	-	-	-	-	-	-	-	-
22	HF-Entladung	WP/3	-	-	-	-	-	-	-	-	-	-	-	-
23	Heizleistung im Kryostat	WP/3	-	-	-	-	-	-	-	-	-	-	-	-
24	Heizleistung im Kryostat	WP/3	-	-	-	-	-	-	-	-	-	-	-	-
25	Heizleistung im Kryostat	WP/3	-	-	-	-	-	-	-	-	-	-	-	-
26	Heizleistung im Kryostat	WP/3	-	-	-	-	-	-	-	-	-	-	-	-
27	Heizleistung im Kryostat	WP/3	-	-	-	-	-	-	-	-	-	-	-	-
28	Wasser - Versuchsraum Kryostat	WP/3	-	-	-	-	-	-	-	-	-	-	-	-
29	Wasser - Versuchsraum Kryostat	WP/3	-	-	-	-	-	-	-	-	-	-	-	-
30	Wasser - Versuchsraum Kryostat	WP/3	-	-	-	-	-	-	-	-	-	-	-	-
31	Wasser - Versuchsraum Kryostat	WP/3	-	-	-	-	-	-	-	-	-	-	-	-
32	Wasser - Versuchsraum Kryostat	WP/3	-	-	-	-	-	-	-	-	-	-	-	-
33	Wasser - Versuchsraum Kryostat	WP/3	-	-	-	-	-	-	-	-	-	-	-	-
34	Wasser - Versuchsraum Kryostat	WP/3	-	-	-	-	-	-	-	-	-	-	-	-
35	Wasser - Versuchsraum Kryostat	WP/3	-	-	-	-	-	-	-	-	-	-	-	-
36	Wasser - Versuchsraum Kryostat	WP/3	-	-	-	-	-	-	-	-	-	-	-	-
37	Wasser - Versuchsraum Kryostat	WP/3	-	-	-	-	-	-	-	-	-	-	-	-
38	Wasser - Versuchsraum Kryostat	WP/3	-	-	-	-	-	-	-	-	-	-	-	-
39	Wasser - Versuchsraum Kryostat	WP/3	-	-	-	-	-	-	-	-	-	-	-	-
40	Wasser - Versuchsraum Kryostat	WP/3	-	-	-	-	-	-	-	-	-	-	-	-
41	Wasser - Versuchsraum Kryostat	WP/3	-	-	-	-	-	-	-	-	-	-	-	-
42	Wasser - Versuchsraum Kryostat	WP/3	-	-	-	-	-	-	-	-	-	-	-	-
43	Wasser - Versuchsraum Kryostat	WP/3	-	-	-	-	-	-	-	-	-	-	-	-
44	Wasser - Versuchsraum Kryostat	WP/3	-	-	-	-	-	-	-	-	-	-	-	-
45	Wasser - Versuchsraum Kryostat	WP/3	-	-	-	-	-	-	-	-	-	-	-	-
46	Wasser - Versuchsraum Kryostat	WP/3	-	-	-	-	-	-	-	-	-	-	-	-
47	Wasser - Versuchsraum Kryostat	WP/3	-	-	-	-	-	-	-	-	-	-	-	-
48	Wasser - Versuchsraum Kryostat	WP/3	-	-	-	-	-	-	-	-	-	-	-	-
49	Wasser - Versuchsraum Kryostat	WP/3	-	-	-	-	-	-	-	-	-	-	-	-
Verkabelung RF-String														
50	Verkabelung RF-String	MD	-	-	-	-	-	-	-	-	-	-	-	-
51	Verkabelung RF-String	MD	-	-	-	-	-	-	-	-	-	-	-	-
52	Verkabelung RF-String	MD	-	-	-	-	-	-	-	-	-	-	-	-
53	Verkabelung RF-String	MD	-	-	-	-	-	-	-	-	-	-	-	-
54	Verkabelung RF-String	MD	-	-	-	-	-	-	-	-	-	-	-	-
55	Verkabelung RF-String	MD	-	-	-	-	-	-	-	-	-	-	-	-
56	Verkabelung RF-String	MD	-	-	-	-	-	-	-	-	-	-	-	-
57	Verkabelung RF-String	MD	-	-	-	-	-	-	-	-	-	-	-	-
58	Verkabelung RF-String	MD	-	-	-	-	-	-	-	-	-	-	-	-
59	Verkabelung RF-String	MD	-	-	-	-	-	-	-	-	-	-	-	-
String Verkabelung LWL und Ethernet														
60	LWL Verkabelung	IT	-	-	-	-	-	-	-	-	-	-	-	-
61	Ethernet Verkabelung	IT	-	-	-	-	-	-	-	-	-	-	-	-
62	Ethernet Verkabelung	IT	-	-	-	-	-	-	-	-	-	-	-	-
Vorbereitung Personen-Interlock														
63	Vorbereitung Personen-Interlock	WP/3	-	-	-	-	-	-	-	-	-	-	-	-
64	Vorbereitung Personen-Interlock	WP/3	-	-	-	-	-	-	-	-	-	-	-	-
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66	Vorbereitung Personen-Interlock	WP/3	-	-	-	-	-	-	-	-	-	-	-	-
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Vorbereitung Konditionierung														
70	Vorbereitung Konditionierung	WP/3	-	-	-	-	-	-	-	-	-	-	-	-
71	Vorbereitung Konditionierung	WP/3	-	-	-	-	-	-	-	-	-	-	-	-
72	Vorbereitung Konditionierung	WP/3	-	-	-	-	-	-	-	-	-	-	-	-
73	Vorbereitung Konditionierung	WP/3	-	-	-	-	-	-	-	-	-	-	-	-
74	Vorbereitung Konditionierung	WP/3	-	-	-	-	-	-	-	-	-	-	-	-
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76	Vorbereitung Konditionierung	WP/3	-	-	-	-	-	-	-	-	-	-	-	-
77	Vorbereitung Konditionierung	WP/3	-	-	-	-	-	-	-	-	-	-	-	-
78	Vorbereitung Konditionierung	WP/3	-	-	-	-	-	-	-	-	-	-	-	-
79	Vorbereitung Konditionierung	WP/3	-	-	-	-	-	-	-	-	-	-	-	-
80	Vorbereitung Konditionierung	WP/3	-	-	-	-	-	-	-	-	-	-	-	-
81	Vorbereitung Konditionierung	WP/3	-	-	-	-	-	-	-	-	-	-	-	-
82	Vorbereitung Konditionierung	WP/3	-	-	-	-	-	-	-	-	-	-	-	-
83	Vorbereitung Konditionierung	WP/3	-	-	-	-	-	-	-	-	-	-	-	-
84	Vorbereitung Konditionierung	WP/3	-	-	-	-	-	-	-	-	-	-	-	-
85	Vorbereitung Konditionierung	WP/3	-	-	-	-	-	-	-	-	-	-	-	-
86	Vorbereitung Konditionierung	WP/3	-	-	-	-	-	-	-	-	-	-	-	-
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91	Vorbereitung Konditionierung	WP/3	-	-	-	-	-	-	-	-	-	-	-	-
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94	Vorbereitung Konditionierung	WP/3	-	-	-	-	-	-	-	-	-	-	-	-
95	Vorbereitung Konditionierung	WP/3	-	-	-	-	-	-	-	-	-	-	-	-
96	Vorbereitung Konditionierung	WP/3	-	-	-	-	-	-	-	-	-	-	-	-
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99	Vorbereitung Konditionierung	WP/3	-	-	-	-	-	-	-	-	-	-	-	-
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103	Vorbereitung Konditionierung	WP/3	-	-	-	-	-	-	-	-	-	-	-	-
104	Vorbereitung Konditionierung	WP/3	-	-	-	-	-	-	-	-	-	-	-	-
105	Vorbereitung Konditionierung	WP/3	-	-	-	-	-	-	-	-	-	-	-	-
106	Vorbereitung Konditionierung	WP/3	-	-	-	-	-	-	-	-	-	-	-	-
107	Vorbereitung Konditionierung	WP/3	-	-	-	-	-	-	-	-	-	-	-	-
108	Vorbereitung Konditionierung	WP/3	-	-	-	-	-	-	-	-	-	-	-	-
109	Vorbereitung Konditionierung	WP/3	-	-	-	-	-	-	-	-	-	-	-	-
110	Vorbereitung Konditionierung	WP/3	-	-	-	-	-	-	-	-	-	-	-	-
111	Vorbereitung Konditionierung	WP/3	-	-	-	-	-	-	-	-	-	-	-	-
112	Vorbereitung Konditionierung	WP/3	-	-	-	-	-	-	-	-	-	-	-	-
113	Vorbereitung Konditionierung	WP/3	-	-	-	-	-	-	-	-	-	-	-	-
114	Vorbereitung Konditionierung	WP/3	-	-	-	-	-	-	-	-	-	-	-	-
115	Vorbereitung Konditionierung	WP/3	-	-	-	-	-	-	-	-	-	-	-	-

Begin of status recording at cryo string 3 in the progress matrix





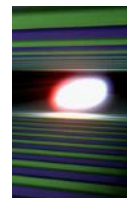
Prozess		CS3			CS4			CS5			CS6			
Nr.	Prozessschritte	WP/Gruppe	A6.1.3	A7.1.3	A8.1.3	A9.1.3	A10.1.3	A11.1.3	A12.1.3	A13.1.3	A14.1.3	A15.1.3	A16.1.3	A17.1.3
Vacuum-String														
1	Strahlbündelröhre installieren	WP33	OK	OK	OK	OK	OK	OK	-	-	-	-	-	-
2	Modulraum anordnen und lackieren	WP32	OK	OK	OK	OK	OK	OK	-	-	-	-	-	-
3	Aufhängungen anstellen	WP32	OK	OK	OK	OK	OK	OK	-	-	-	-	-	-
5	Module aufhängen und festziehen (Hydro)	WP33	OK	OK	OK	OK	OK	OK	-	-	-	-	-	-
6	Top-Cryo-Drainage aufhängen	WP32	In Arbeit	OK	OK	OK	OK	OK	-	-	-	-	-	-
7	Module und Cryo-Rohr kasieren	WP32	In Arbeit	OK	OK	OK	OK	OK	-	-	-	-	-	-
8	Cryo-Sicherheitsversorgung anschließen	WP13	In Arbeit	OK	OK	OK	OK	OK	-	-	-	-	-	-
9	Strahlraum - Übergang warme Isolation	WP30	In Arbeit	OK	OK	OK	OK	OK	-	-	-	-	-	-
10	Strahlraum - Vorüberge. Überwachung Strahlraum	WP30	In Arbeit	OK	OK	OK	OK	OK	-	-	-	-	-	-
11	Strahlraum - Überwachung (WP2, WP3)	WP33	In Arbeit	OK	OK	OK	OK	OK	-	-	-	-	-	-
12	Schweißen der Leitungen des Strahlraums und des Rücklauf	WP33	In Arbeit	OK	OK	OK	OK	OK	-	-	-	-	-	-
13	Strahlraumverbindung (DIA-Montage)	WP30	OK	OK	OK	In Arbeit	OK	OK	-	-	-	-	-	-
14	Schweißen der freileitenden Prozessleitungen	WP33	In Arbeit	OK	OK	OK	OK	OK	-	-	-	-	-	-
15	He-Liquid-Strahlraumverbindungen	WP33	OK	OK	OK	In Arbeit	OK	OK	-	-	-	-	-	-
16	Strahlraum-Modulabschleifer öffnen	WP30	OK	OK	OK	In Arbeit	OK	OK	-	-	-	-	-	-
17	Thermische Schutzverklebung entfernen, Isolation	WP30	OK	OK	OK	OK	OK	OK	-	-	-	-	-	-
18	Isolationskabel: Pumpeninstallation	WP30	OK	OK	OK	-	-	-	-	-	-	-	-	-
19	Schweißarbeiten abschließen	WP33	OK	OK	OK	-	-	-	-	-	-	-	-	-
20	Goldbarer He-Liquid-Strahlraum	WP30	OK	OK	OK	-	-	-	-	-	-	-	-	-
30	Goldbarer He-Liquid-Strahlraum / Krypton aufhängen	WP33	OK	OK	OK	-	-	-	-	-	-	-	-	-
HF-Abschnitt														
31	LWL-Kabel anschließen	WP31	OK	OK	OK	-	-	-	-	-	-	-	-	-
32	LWL anschließen	WP31	OK	In Arbeit	OK	-	-	-	-	-	-	-	-	-
33	Kabel an Krypton	WP31	OK	OK	OK	-	-	-	-	-	-	-	-	-
34	Kabel an Module	WP31	OK	OK	OK	-	-	-	-	-	-	-	-	-
35	Kabel anordnen	WP31	OK	OK	OK	-	-	-	-	-	-	-	-	-
36	Interlockkabel für Hotlines montieren	WP31	In Arbeit	OK	OK	-	-	-	-	-	-	-	-	-
37	Wasser - Hydroisolation anschließen	WP34	-	-	-	-	-	-	-	-	-	-	-	-
38	Wasser - Verschönerung Krypton	WP34	-	-	-	-	-	-	-	-	-	-	-	-
39	Wasser - Verschönerung der Röhre	WP34	-	-	-	-	-	-	-	-	-	-	-	-
40	Wasser - Verschönerung der Röhre (Drehungsbogen, etc.)	WP34	-	-	-	-	-	-	-	-	-	-	-	-
41	C-Vorwärmung - Betrieben und Rucksack	WP34	-	-	-	-	-	-	-	-	-	-	-	-
42	C-Vorwärmung - Prüfung der Module	WP34	-	-	-	-	-	-	-	-	-	-	-	-
43	C-Vorwärmung - Prüfung des Pumpen- und Krypton- etc.	WP34	-	-	-	-	-	-	-	-	-	-	-	-
44	Stromversorgung künftige Krypton anschließen	WP34	-	-	-	-	-	-	-	-	-	-	-	-
45	Wasserversorgung - Einbau der Kryptonpumpe	WP34	-	-	-	-	-	-	-	-	-	-	-	-
46	Rucksackverklebung - Seitenlinie installieren	WP33	-	-	-	-	-	-	-	-	-	-	-	-
47	Wasser - Verschönerung Krypton	WP34	-	-	-	-	-	-	-	-	-	-	-	-
48	Krypton- und BMA-Installation	WP36	In Arbeit	In Arbeit	In Arbeit	-	-	-	-	-	-	-	-	-
49	Wasser - Verschönerung Krypton	WP36	In Arbeit	In Arbeit	In Arbeit	-	-	-	-	-	-	-	-	-
Verkabelung RF-String														
60	Diagnosekabelplätze installieren	MO	OK	OK	OK	-	-	-	-	-	-	-	-	-
61	Verkabelung LRF-p	MO	In Arbeit	In Arbeit	In Arbeit	-	-	-	-	-	-	-	-	-
62	Verkabelung LRF-p	MO	In Arbeit	In Arbeit	In Arbeit	-	-	-	-	-	-	-	-	-
63	Verkabelung Cryo	MO	In Arbeit	In Arbeit	In Arbeit	-	-	-	-	-	-	-	-	-
64	Verkabelung LRF-p	MO	In Arbeit	In Arbeit	In Arbeit	-	-	-	-	-	-	-	-	-
65	Verkabelung LRF-p	MO	In Arbeit	In Arbeit	In Arbeit	-	-	-	-	-	-	-	-	-
66	Verkabelung LRF-p	MO	In Arbeit	In Arbeit	In Arbeit	-	-	-	-	-	-	-	-	-
67	Verkabelung LRF-p	MO	In Arbeit	In Arbeit	In Arbeit	-	-	-	-	-	-	-	-	-
68	Verkabelung LRF-p	MO	In Arbeit	In Arbeit	In Arbeit	-	-	-	-	-	-	-	-	-
69	Verkabelung LRF-p	MO	In Arbeit	In Arbeit	In Arbeit	-	-	-	-	-	-	-	-	-
String Verkabelung LWL und Ethernet														
80	LWL Verkabelung	IT	OK	OK	OK	-	-	-	-	-	-	-	-	-
81	Ethernet Verkabelung	IT	In Arbeit	In Arbeit	In Arbeit	-	-	-	-	-	-	-	-	-
82	Ethernet Verkabelung	IT	In Arbeit	In Arbeit	In Arbeit	-	-	-	-	-	-	-	-	-
Vorbereitung Personen-Interlock														
90	Interlock und Kryptonverbindung M-String, LRF	WP30	-	-	-	-	-	-	-	-	-	-	-	-
91	Strahlraum - Endgültige Interlockverdrahtung (WP3)	WP30	-	-	-	-	-	-	-	-	-	-	-	-
92	Strahlraum - Endgültige Interlockverdrahtung (WP3)	WP30	-	-	-	-	-	-	-	-	-	-	-	-
93	Strahlraum - Endgültige Interlockverdrahtung (WP3)	WP30	-	-	-	-	-	-	-	-	-	-	-	-
94	Strahlraum - Endgültige Interlockverdrahtung (WP3)	WP30	-	-	-	-	-	-	-	-	-	-	-	-
95	Strahlraum - Endgültige Interlockverdrahtung (WP3)	WP30	-	-	-	-	-	-	-	-	-	-	-	-
96	Strahlraum - Endgültige Interlockverdrahtung (WP3)	WP30	-	-	-	-	-	-	-	-	-	-	-	-
97	Strahlraum - Endgültige Interlockverdrahtung (WP3)	WP30	-	-	-	-	-	-	-	-	-	-	-	-
98	Strahlraum - Endgültige Interlockverdrahtung (WP3)	WP30	-	-	-	-	-	-	-	-	-	-	-	-
99	Strahlraum - Endgültige Interlockverdrahtung (WP3)	WP30	-	-	-	-	-	-	-	-	-	-	-	-
Vorbereitung Konditionierung														
110	Technische Interlock - Vorbereitung	WP30	-	-	-	-	-	-	-	-	-	-	-	-
111	Isolationskabel - Endgültige Verbindungen	WP30	-	-	-	-	-	-	-	-	-	-	-	-
112	Isolationskabel - Endgültige Verbindungen	WP30	-	-	-	-	-	-	-	-	-	-	-	-
113	Isolationskabel - Endgültige Verbindungen	WP30	-	-	-	-	-	-	-	-	-	-	-	-
114	Isolationskabel - Endgültige Verbindungen	WP30	-	-	-	-	-	-	-	-	-	-	-	-
115	Isolationskabel - Endgültige Verbindungen	WP30	-	-	-	-	-	-	-	-	-	-	-	-



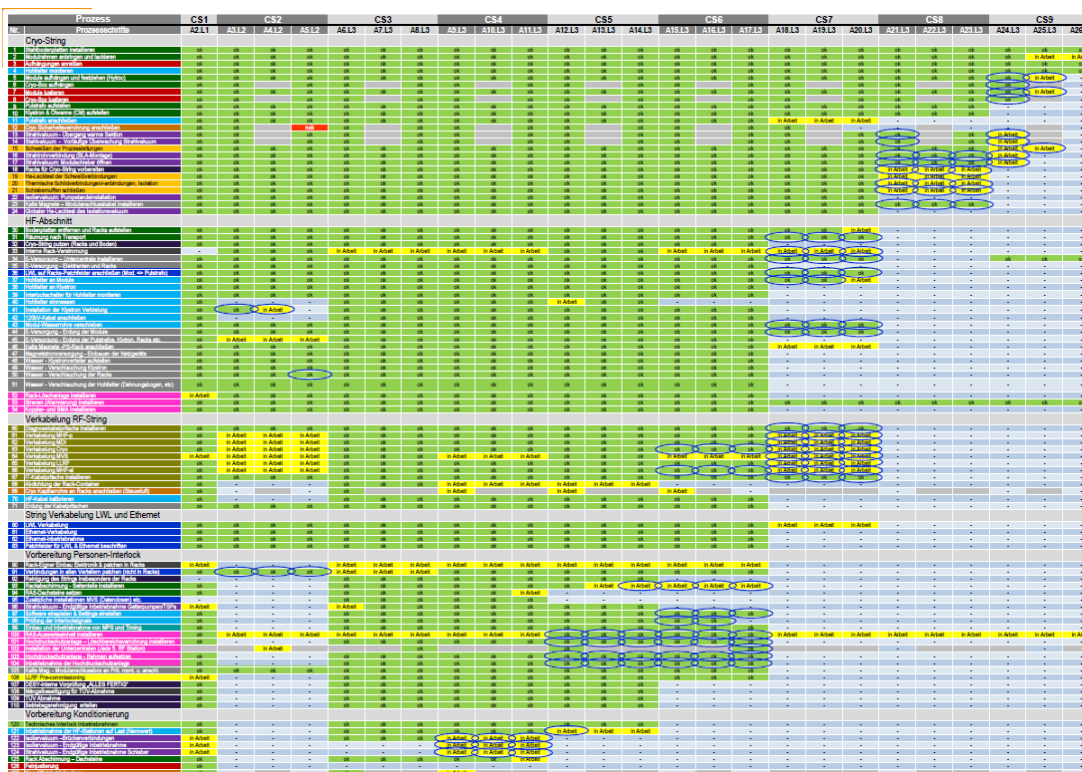




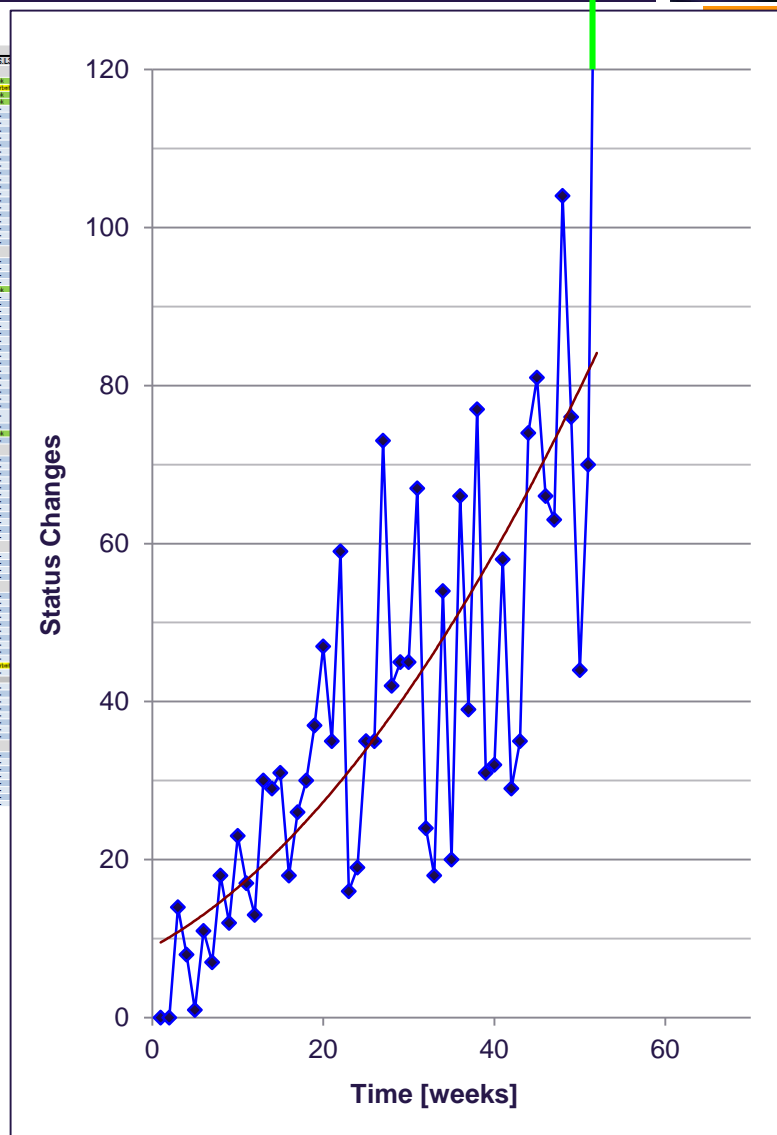
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Status 26 July 2016

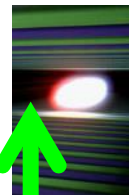


Record level

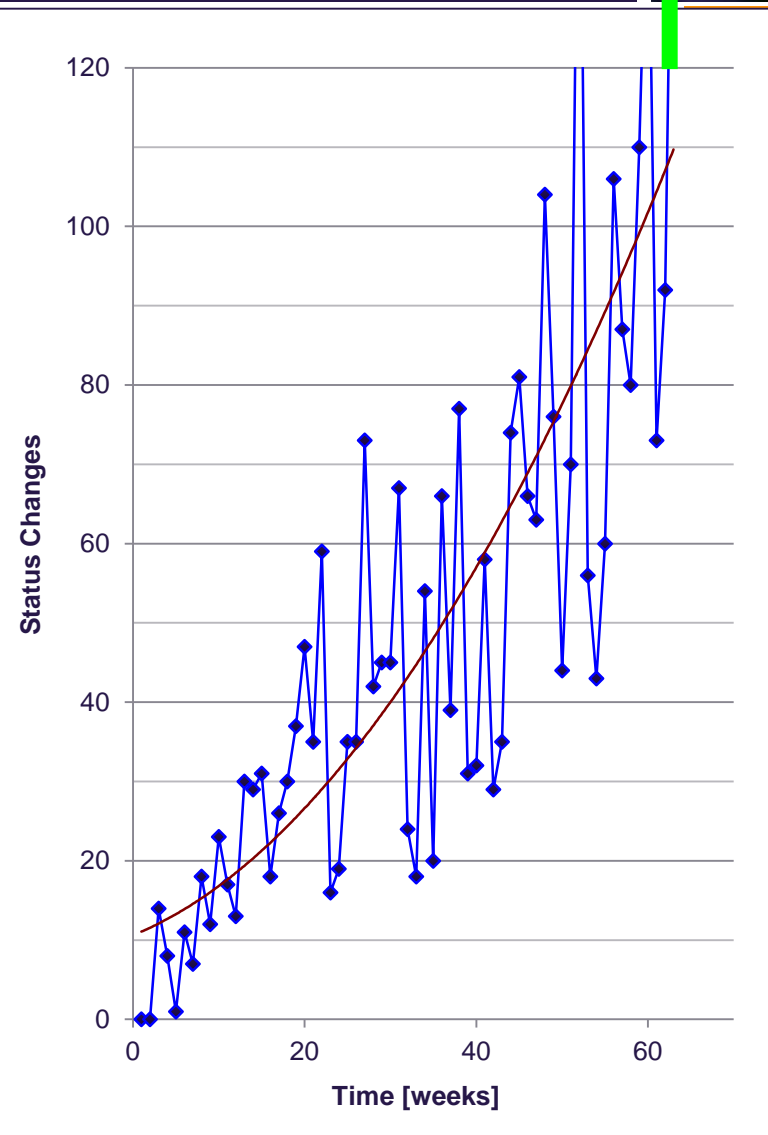


Status 11 October 2016

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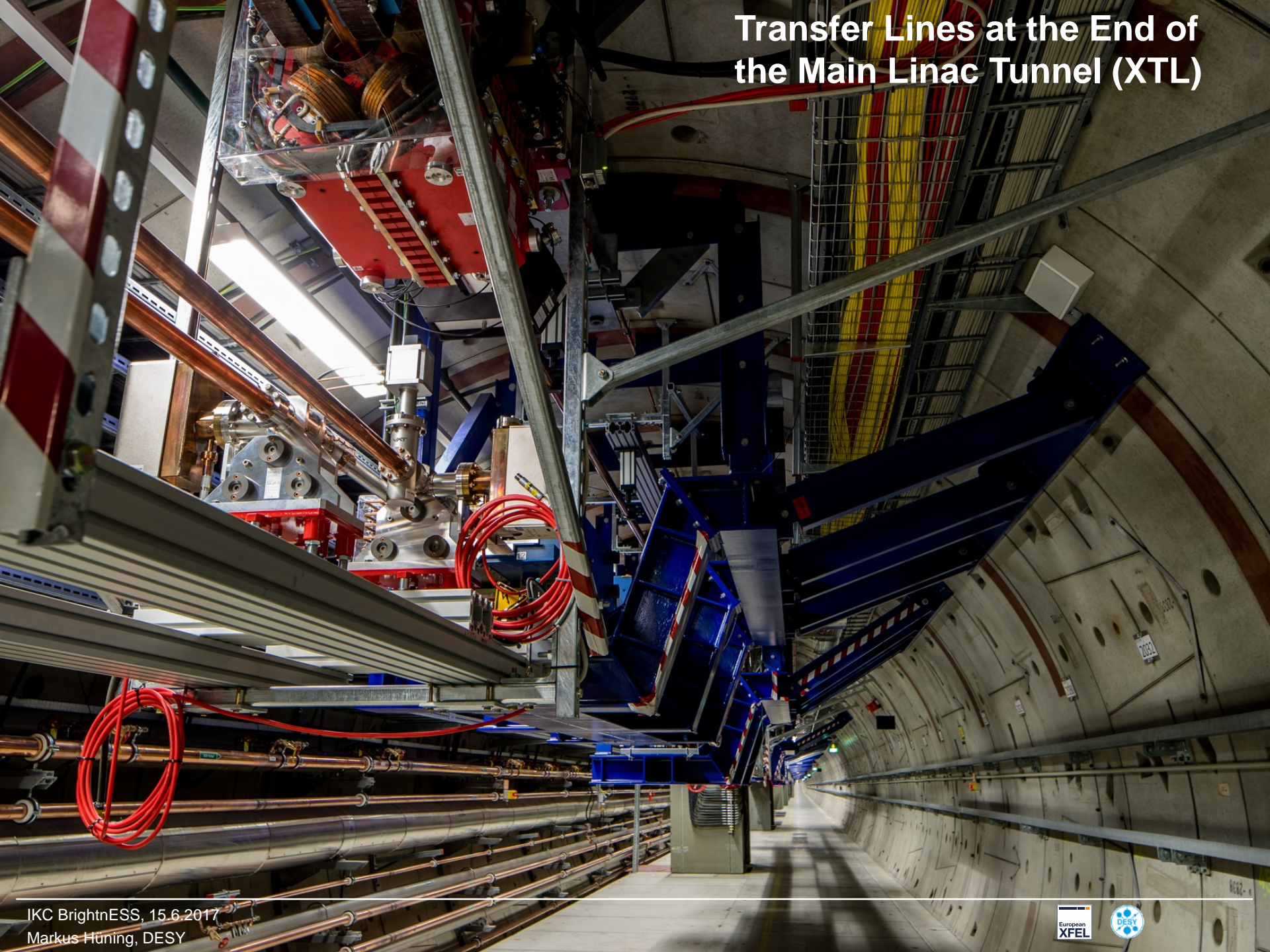
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2. Cryo-String									
3. Cryo-String									
4. Cryo-String									
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First Bunch Compressor Chicane (BC0)

Transfer Lines at the End of the Main Linac Tunnel (XTL)



Backside view



Undulator Section with
climate enclosure in the back



General Assembly of the European
XFEL Accelerator Consortium
04.05.2017

