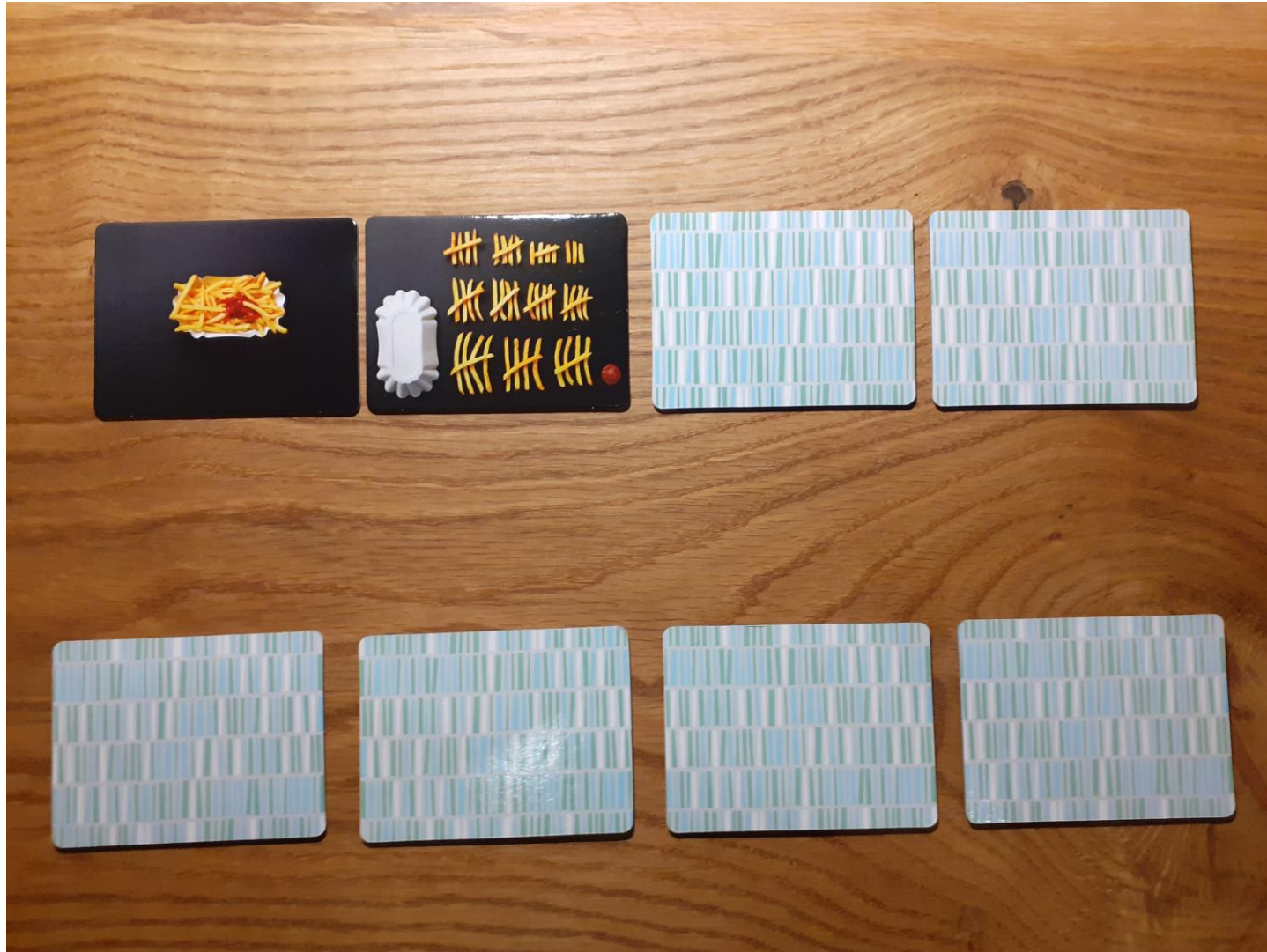




FAIR PLM

Lifecycle Management for FAIR/GSI

Klaus Höhne
Operator School 2024



Why?

- FAIR is a
 - Complex project.
 - Many people are involved in the project
 - Involved people are distributed over many countries
 - Very long lifetime of FAIR (> 30 years)
 - Significant fluctuations on involved people (getting retired, new job opportunities, changes due to private situations, ...)
- Documentation is therefore essential
 - to know what is where
 - to have access to relevant data every time
 - to understand who made which decision
 - to keep know-how on site
 - to organize maintenance

Identifier for technical Objects

Before the introduction of the PLM data model identifier made for a different purpose have been used to identify technical objects.

Those identifier are

- good for their purpose
- not good for lifecycle management

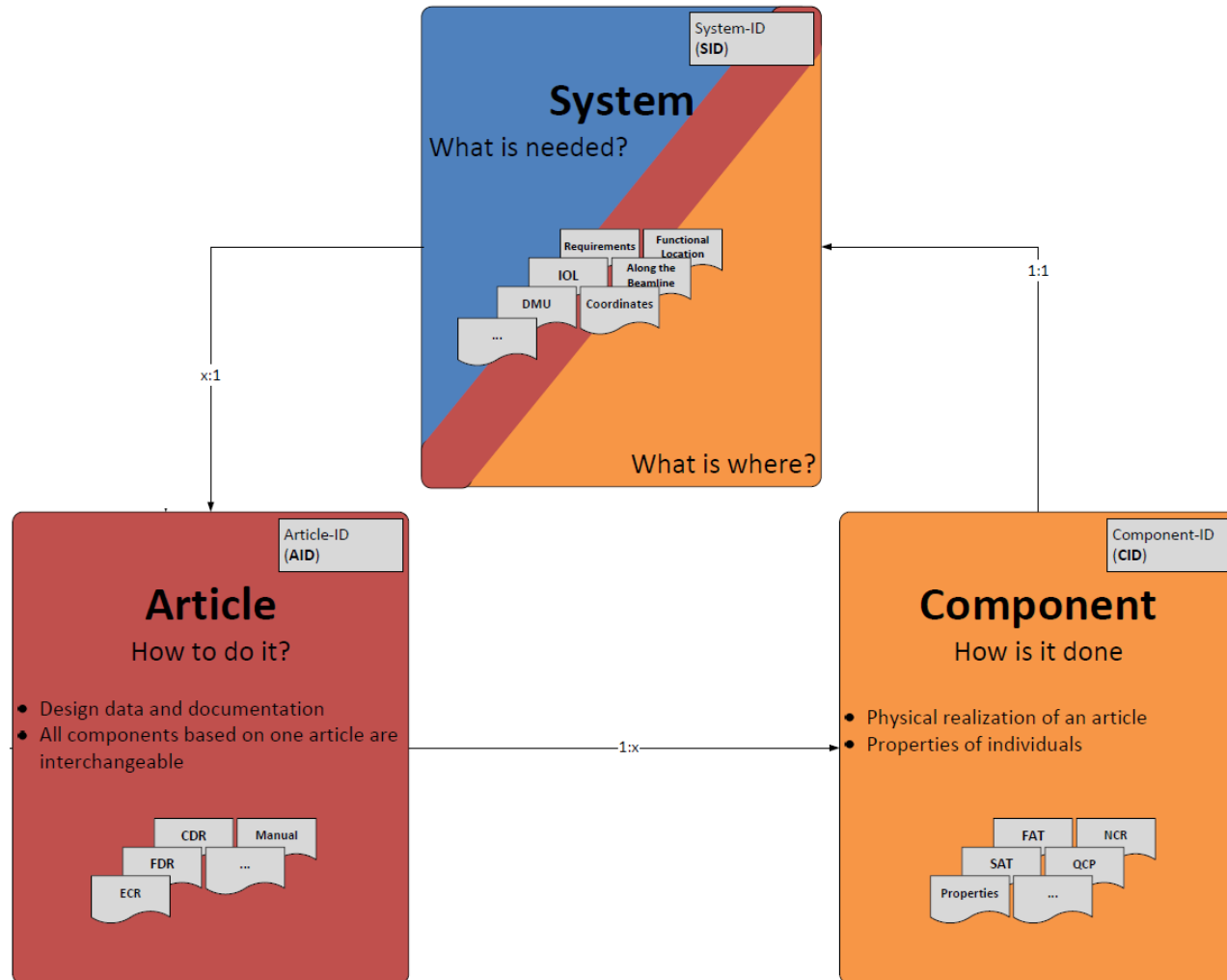
Requirements for PLM identifier

- unique
- 1:1 mapping to technical objects
- large enough number range (#)
- constant over the life cycle (t)
- global rules (§)

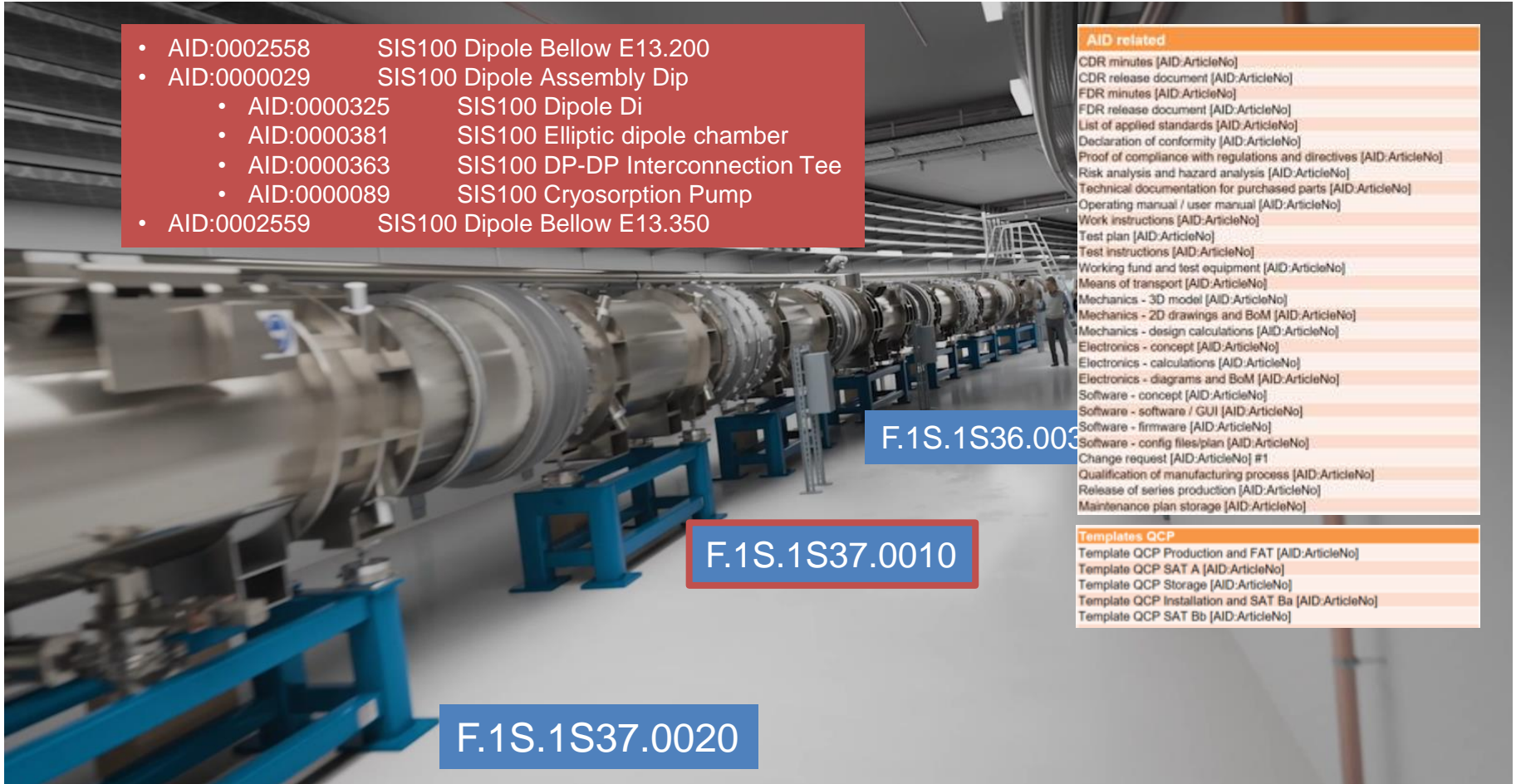
Identifier	Purpose	Mapping	#	t	§
PSP code	Shares/budget	m:n	✓	✗	✓
Specification no.	Document (contract)	m:n	✓	✓	✓
Drawing no.	Drawing/model	1:1	✓	✗	✗
Device type	Multiple articles	1:n	✓	✓	✓
Acc nomen	Controls address	1:1	✗	✗	✓
CDB Component*	= Device type + Acc nomen	1:n	✗	✗	✓
Component (CID)*	Physical device	1:1	✓	✓	✓
Name	Org. unit internal solution	1:1	✓	✗	✗

* A component (CID) is called asset in the CDB

PLM Concept Data Model



PLM Concept Planning, Design



- AID:0002558 SIS100 Dipole Bellow E13.200
- AID:0000029 SIS100 Dipole Assembly Dip
 - AID:0000325 SIS100 Dipole Di
 - AID:0000381 SIS100 Elliptic dipole chamber
 - AID:0000363 SIS100 DP-DP Interconnection Tee
 - AID:0000089 SIS100 Cryosorption Pump
- AID:0002559 SIS100 Dipole Bellow E13.350

F.1S.1S36.003

F.1S.1S37.0010

F.1S.1S37.0020

- AID related**
- CDR minutes [AID:ArticleNo]
 - CDR release document [AID:ArticleNo]
 - FDR minutes [AID:ArticleNo]
 - FDR release document [AID:ArticleNo]
 - List of applied standards [AID:ArticleNo]
 - Declaration of conformity [AID:ArticleNo]
 - Proof of compliance with regulations and directives [AID:ArticleNo]
 - Risk analysis and hazard analysis [AID:ArticleNo]
 - Technical documentation for purchased parts [AID:ArticleNo]
 - Operating manual / user manual [AID:ArticleNo]
 - Work instructions [AID:ArticleNo]
 - Test plan [AID:ArticleNo]
 - Test instructions [AID:ArticleNo]
 - Working fund and test equipment [AID:ArticleNo]
 - Means of transport [AID:ArticleNo]
 - Mechanics - 3D model [AID:ArticleNo]
 - Mechanics - 2D drawings and BoM [AID:ArticleNo]
 - Mechanics - design calculations [AID:ArticleNo]
 - Electronics - concept [AID:ArticleNo]
 - Electronics - calculations [AID:ArticleNo]
 - Electronics - diagrams and BoM [AID:ArticleNo]
 - Software - concept [AID:ArticleNo]
 - Software - software / GUI [AID:ArticleNo]
 - Software - firmware [AID:ArticleNo]
 - Software - config files/plan [AID:ArticleNo]
 - Change request [AID:ArticleNo] #1
 - Qualification of manufacturing process [AID:ArticleNo]
 - Release of series production [AID:ArticleNo]
 - Maintenance plan storage [AID:ArticleNo]

- Templates QCP**
- Template QCP Production and FAT [AID:ArticleNo]
 - Template QCP SAT A [AID:ArticleNo]
 - Template QCP Storage [AID:ArticleNo]
 - Template QCP Installation and SAT Ba [AID:ArticleNo]
 - Template QCP SAT Bb [AID:ArticleNo]

PLM Concept Production, Installation, ...



- CID:02000250188 AID:0002558 SIS100 Dipole Bellow E13.200
- CID:02000260316 AID:0000029 SIS100 Dipole Assembly Dip
 - CID:02000010317 AID:0000325 SIS100 Dipole Di
 - CID:07000005103 AID:0000089 SIS100 Cryosorption Pump
 - CID:07000061093 AID:0000381 SIS100 Elliptic dipole chamber
 - CID:07000120479 AID:0000363 SIS100 DP-DP Interconnection Tee
- CID:02000251048 AID:0002559 SIS100 Dipole Bellow E13.350

- CID related
- NCR [CID:ComponentID] #1
 - Certificates of personnel [CID:ComponentID]
 - Certificates of material [CID:ComponentID]
 - QCP Production and FAT [CID:ComponentID]
 - FAT report [CID:ComponentID]
 - FAT release document [CID:ComponentID]
 - QCP SAT A [CID:ComponentID]
 - Technical documentation [CID:ComponentID]
 - SAT Aa [CID:ComponentID]
 - SAT Ab report [CID:ComponentID]
 - SAT A release document [CID:ComponentID]
 - QCP Storage [CID:ComponentID]
 - Test records storage [CID:ComponentID]
 - QCP SAT Ba [CID:ComponentID]
 - SAT Ba report [CID:ComponentID]
 - SAT Ba release document [CID:ComponentID]
 - QCP SAT Bb [CID:ComponentID]
 - SAT Bb report [CID:ComponentID]
 - SAT Bb release document [CID:ComponentID]

F.1S.1S36.0030

F.1S.1S37.0010

F.1S.1S37.0020

PLM Realization Translation to SAP



Planning

Design

Production

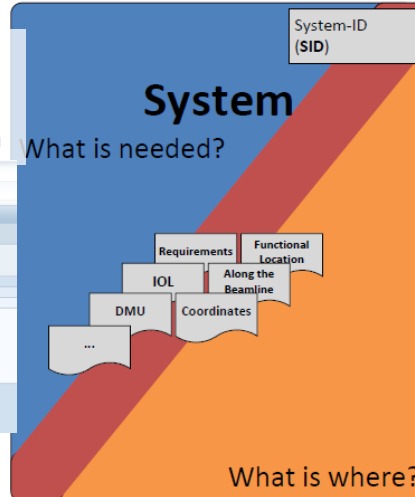
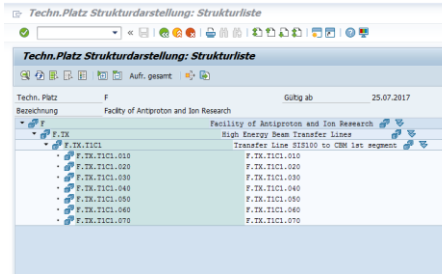
Installation

Operation

Dismantling

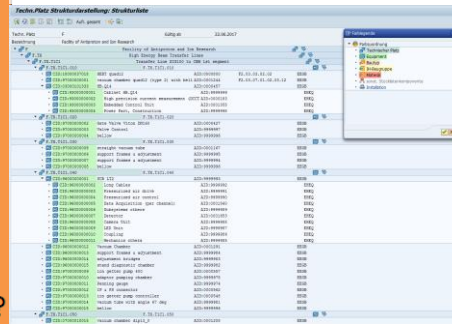
Planning:

- Functional Location
- BoM Functional Location



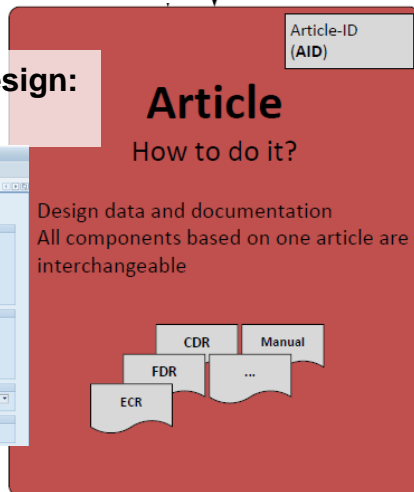
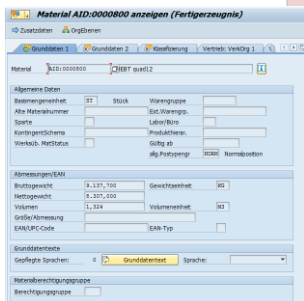
Installation, Operation, Maintenance

- Functional Location
- Equipment



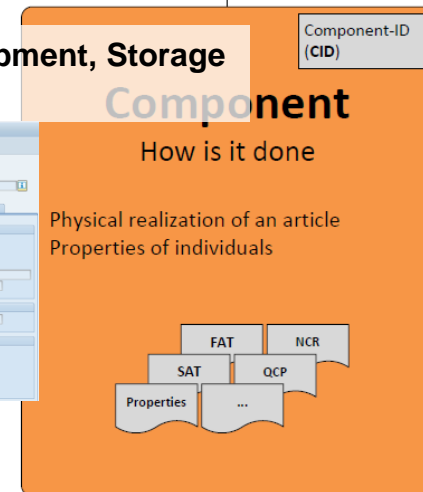
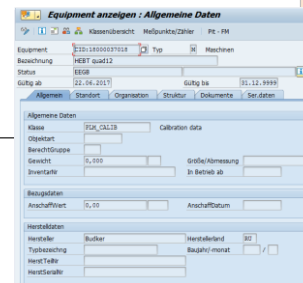
Procurement, Design:

- Material



Production, Shipment, Storage

- Equipment



PLM Realization

Functional Locations w/ AID & CID



Techn. Platz Strukturdarstellung: Strukturliste

Techn. Platz anzeigen: Stammdaten

Technischer Platz: F.1S.1S37
Bezeichnung: SIS Sector 3 - Cell 7

Techn. Platz: F.1S.1S37.0010 Typ: F FAIR
Bezeichnung:
Status: ANGL WORK

Allgemein Standort Struktur Dokumente **Klassendaten**

Klassifizierung

Beschleunignomenklatur

1S37MH1
1S37VD1
1S37VP1C
1S37VU1
1S37YMM1
1S37YQM1.A

X-GEO-Koordinate: 512.672
Y-GEO-Koordinate: 779.791
Z-GEO-Koordinate: -13.500
Beam off group:
NE-Area:
Staging Step: FS

ANGL 1 ST

Item	Item Description	Item Description
F.1S.1S37	SIS Sector 3 - Cell 7	
F.1S.1S37.0010	SIS Sector 3 - Cell 7	
AID:0002558	SIS100 Dipole Bellow E13.200	
AID:0000029	SIS100 Dipole Assembly Dip	
AID:0000325	SIS100 Dipole Di	
AID:0000326	SIS100 Dipole Coil Di	
AID:0000328	SIS100 Dipole Yoke Di	
AID:0000381	SIS100 Elliptic dipole chamber	
AID:0000363	SIS100 DP-DP Interconnection Tee	
AID:0000089	SIS100 Cryosorption Pump	
AID:0002559	SIS100 Dipole Bellow E13.350	
CID:02000250188	SIS100 Dipole Bellow E13.200	
CID:02000251048	SIS100 Dipole Bellow E13.350	
CID:02000260316	SIS100 Dipole Assembly Dip	
CID:02000010317	SIS100 Dipole Di	
CID:02000020323	SIS100 Dipole Yoke Di	
CID:02000040338	SIS100 Dipole Coil Di	
CID:07000005103	SIS100 Cryosorption Pump	
CID:07000061093	SIS100 Elliptic dipole chamber	
CID:07000120479	SIS100 DP-DP Interconnection Tee	
F.1S.1S37.0020		
AID:0002561	SIS100 Dipole Bellow E13.355	
AID:0000028	SIS100 Dipole Assembly Din	
AID:0002558	SIS100 Dipole Bellow E13.200	
CID:02000250195	SIS100 Dipole Bellow E13.200	
CID:02000251697	SIS100 Dipole Bellow E13.355	
CID:02000260033	SIS100 Dipole Assembly Din	
F.1S.1S37.0030		
AID:0002533	Quadrupole Doublet Assembly Type 1.7B	

PLM Realization Components - Documents & History



Equipment anzeigen : Allgemeine Daten

SAP Equipment anzeigen

Equipment: CID:02000010317 Typ: F FAIR - Equipment

Bezeichnung: SIS100 Dipole Di

Status: EHEQ INTG

Gültig ab: 21.05.2024 Gültig bis: 31.12.9999

[Allgemein](#)
 [Standort](#)
 [Struktur](#)
 [Dokumente](#)
 [Ser.daten](#)
 [Klassendaten](#)

Allgemeine Daten

Klasse: PLM_LOGISTICS Logistikdaten

Objektart:

BerechtGruppe:

Gewicht: 3.150,000 KG Größe/Abmessung:

Inventarnummer:

In Betrieb ab:

Nutzungsenddat.:

Bezugsdaten

AnschaffWert: 0,00 AnschaffDatum:

Herstelldaten

Hersteller: BNG Herst. Land/Reg:

Typbezeichnung:

Baujahr/-monat:

HerstTeilNr:

HerstSerialNr: N.911037-I-031

Lieferanten-/Herstellergarantie

Garantiebeginn:

GewährEnde:

Mustergarantie:

Equipmentstamm-Verknüpfungen mit Dokumenten

Dokument mit Original	Beschreibung
> TDO/1107754/000/01	NCR #1
> TDO/1107755/000/01	Certificates of personnel
> TDO/1107756/000/01	Certificates of material
> TDO/1107757/000/01	QCP Production and FAT
> TDO/1107758/000/01	FAT report
> TDO/1107759/000/01	FAT release document
> TDO/1107760/000/01	QCP SAT A
> TDO/1107761/000/01	Technical documentation
> TDO/1107762/000/01	SAT Aa
> TDO/1107762/000/02	SAT Aa
> TDO/1107763/000/01	SAT Ab report
> TDO/1107764/000/01	SAT A release document
> TDO/1107765/000/01	QCP Storage
> TDO/1107766/000/01	Test records storage
> TDO/1107767/000/01	QCP SAT Ba
> TDO/1107768/000/01	SAT Ba report
> TDO/1107769/000/01	SAT Ba release document

Serialnummernhistorie

SAP

Material: AID:0000325 Materialkurzt

Serialnummer: CID:02000010317

Equipment: CID:02000010317 Bezeichnung Obj

Serialnummernhistorie

<input type="checkbox"/>	<input type="checkbox"/>	21.05.2024 11:25:22	F.1S.1S37.0010	CID:02000260316
<input type="checkbox"/>	<input type="checkbox"/>	25.04.2024 10:25:32	LAG.9000	CID:02000260316
<input type="checkbox"/>	<input checked="" type="checkbox"/>	01.06.2022 8:00:00	SIS100 Dipole Assembly Dip	CID:020002603
<input type="checkbox"/>	<input type="checkbox"/>	25.01.2022 10:00:00	LAG.3200	CID:02000260316
<input type="checkbox"/>	<input type="checkbox"/>	11.01.2022 10:00:00	LAG.3040	CID:02000260316
<input type="checkbox"/>	<input type="checkbox"/>	08.06.2020 10:38:29	LAG.3200	CID:02000260316
<input type="checkbox"/>	<input type="checkbox"/>	26.05.2020 14:11:45	LAG.3040	CID:02000260316
<input type="checkbox"/>	<input type="checkbox"/>	26.05.2020 14:07:15		CID:02000260316
<input type="checkbox"/>	<input type="checkbox"/>	04.05.2020 14:34:22	LAG.3040	
<input type="checkbox"/>	<input type="checkbox"/>	06.08.2019 09:17:32		CID:02000260316

PLM Realization Components - Structure & Attributes



Equipment anzeigen : Struktur

SAP Equipment anzeigen

Klassenübersicht Meßpunkte/Zähler Alle Messbelege Mehr

Equipment: CID:02000010317 Typ: F FAIR - Equipment

Bezeichnung: SIS100 Dipole Di

Status: EHEQ INTG

Gültig ab: 21.05.2024 Gültig bis: 31.12.9999

Allgemein Standort **Struktur** Dokumente Ser.daten Klassendaten

Strukturierung

Techn. Platz: F_1S_1S37_0010

Bezeichnung:

Überg. Equip.: CID:02000260316

Bezeichnung: SIS100 Dipole Assembly Dip

Position:

Tech.Identnr.:

Bautyp: AID:0000325

SIS100 Dipole Di

Equipments

Pos.	Equipment	UntEq	Bezeichnung	EqmtArt	Hersteller	TypBez	Tech.ID	So
0010	CID:02000020323	<input type="checkbox"/>	SIS100 Dipole Yoke Di		BNG			
0010	CID:02000040338	<input type="checkbox"/>	SIS100 Dipole Coil Di		BNG			

Equipment anzeigen : Klassendaten

SAP Equipment anzeigen

Klassenübersicht Meßpunkte/Zähler Alle Messbelege

Equipment: CID:02000010317 Typ: F FAIR - Equipment

Bezeichnung: SIS100 Dipole Di

Status: EHEQ INTG

Gültig ab: 21.05.2024 Gültig bis: 31.12.9999

Allgemein Standort Struktur **Dokumente** Ser.daten Klassendaten

Klassifizierung

Beschleunigenomenklatur: 1S37MH1

Arbeitspaket: WP_02_08_02_01

Subprojekt: SIS100 / SIS18

Institute: GSI

Zolltarifnummer: 85059029990

Außertarifliche Zollbefreiung:

Gewicht (brutto): 3.150,00 kg

Höhe (brutto): 1.968,00 mm

Breite (brutto): 1.055,00 mm

Länge (brutto): 4.500,00 mm

Lagerbedingungen: TROCKEN

Wartung während Lagerung nötig:

Anschlagmittel: KRANÖSEN OBEN

Lieferort: STF

Lieferort Baustelle: T110

Einbauort (geplant): 1SXY, U30

Ansprechpartner Campus: F. KAETHER, C. ROUX

Einbautermin (geplant): 01.04.2021

Liefertermin (geplant): 19.02.2020

Summary

- Documentation is essential for efficient and successful operation/maintenance of the facility.
The long lifecycle time of > 30y amplifies this argument!
- The PLM concept follows the approaches in other accelerator facilities, industries, and text books.
- Main objects are System (Functional Location), Article (Material), Component (Equipment).
- FAIR/GSI wide standards are set/used.
- At FAIR/GSI SAP in standard configuration is used.
- The PLM concept is successfully established for all phases up to installation.
Roll-out for following phases in due time.

Thank you for your attention



and have a peaceful



Advent and Christmas season!