SAP S/4HANA · PLANT MAINTENANCE · IMPLEMENTATION HANDOUT

Implementing SAP PM at NTPC Auraiya

A working handout for the 652 MW combined-cycle station: master data, SPRO configuration and Z-code patterns for the requirements the standard does not cover.

DOCUMENT	**NTPC-AUR-PM-HB-001**
VERSION	**1.0 — draft for workshop**
DATE	**15 November 2026**
STATION	**Auraiya CCGT · 4 × 110 MW GT + 2 × 106 MW ST**
PREPARED FOR	**NTPC Auraiya PM, SAP and operations teams**

WORKING DRAFT

Master data codes, plant numbers and ABAP are illustrative samples for design workshops. Replace them with Auraiya's approved values before configuration. No confidential NTPC data is reproduced; station context is from public information and must be verified against station records. This is not an SAP-certified document.

DOCUMENT CONTROL

Purpose, audience and basis

Document	NTPC-AUR-PM-HB-001
Title	Implementing SAP PM at NTPC Auraiya — Implementation Handout
Version / status	1.0 — Draft for workshop
Issue date	15 November 2026
Audience	PM process owners, planners, SAP PM/ABAP/Basis, data and finance teams
Scope	PM/EAM configuration, master data, data load, selected Z-code patterns
Out of scope	MM/FI/CO design, HR, licensing, infrastructure, partner selection
Station basis	652 MW CCGT, 4 × 110 MW GT + 2 × 106 MW ST, Dibiyapur, Auraiya district, Uttar Pradesh
Target release	SAP S/4HANA 2023 or later (confirm in the programme)

VERSION HISTORY

VER.	DATE	CHANGE
0.9	12 Nov 2026	Working notes: station context, master-data samples, SPRO map.
1.0	15 Nov 2026	First handout: full sample set, Z-code patterns, checklists.

SOURCES AND ASSUMPTIONS

Station context is from public NTPC/Wikipedia information: 4 × 110 MW gas turbines and 2 × 106 MW steam turbines, 652 MW, gas from the GAIL HBJ pipeline, water from the Auraiya–Etawah canal, commissioned 1989–90. Confirm all figures against station records and the current asset register.

Plant, company code, cost centres, material numbers and equipment numbers are placeholders. The design assumes a S/4HANA rollout or brownfield conversion with an existing SAP landscape; if Auraiya is greenfield, the same model applies without legacy mapping.

HOW TO USE THIS HANDOUT

Sections 1–4	Context, approach, governance and design rules.
Sections 5–11	Master-data model and sample records to argue over in workshops.
Sections 12–18	SPRO configuration map with sample values.
Sections 19–20	Load templates and migration sequence.
Sections 21–26	Clean-core rules and five Z-code samples.
Sections 27–28	Test, cutover, hypercare and training.
Appendices	Configuration checklist, master-data checklist, glossary.

WHAT THIS HANDOUT IS NOT

It is not a functional specification, a data-migration runbook or a substitute for the Auraiya blueprint. It is a structured starting point: enough sample data to test the model, enough configuration detail to estimate, and enough code to prove the custom patterns.

CLIENT-SPECIFIC HANDLING

This document names a real station. Treat it as an internal working paper. Do not publish it in a public repository or reuse the NTPC name in marketing material without approval.

CONTENTS

What this handout covers

CONTEXT AND APPROACH

1 Executive summary 04
2 Station context and scope 05
3 Implementation approach and phases 06
3.1 Governance, team and RACI 07
4 Design principles and standards 08

MASTER DATA

5 Functional location model 09
5.1 Sample functional locations 10
6 Equipment master 11
6.1 Sample equipment 12
6.2 BOMs and spare parts 13
7 Measuring points and counters 14
8 Task lists 15
9 Maintenance plans and strategies 16
10 Catalogs and failure coding 17
11 Work centres and planner groups 18

CONFIGURATION

12 SPRO map and enterprise structure 19
13 Technical objects 20
14 Order and notification types 21
15 Status, number ranges, scheduling 22
16 Preventive maintenance and measuring points 23
17 Work centres, confirmation, settlement 24
18 Integration, Fiori and security 25

DATA AND CUSTOM CODE

19 Master-data load templates 26
20 Data migration and cutover 27
21 Z-code governance 28
22 Z1 · Order aging report 29
23 Z2 · CDS backlog view 30
24 Z3 · Last counter reading FM 31
25 Z4 · Order validation BAdI 32
26 Z5 · Notification BAPI wrapper 33

ASSURANCE

27 Testing and acceptance 34
28 Hypercare and training 35
A–C Checklists and glossary 36–38

COMPANION DOCUMENTS

S4H-PM-MIG-PLAN-001 covers the wider ECC-to-S/4HANA migration route, data objects and cutover. **S4H-API-TR-001** records the OData readiness test and the Gateway prerequisites for any CMMS integration.

SECTION 01

A station model that can be maintained

Auraiya does not need a bigger PM module. It needs a defensible asset hierarchy, a small set of order and notification types, plans that actually schedule, and data clean enough that a planner trusts the screen.

652	4+2	~3,800	9
MW INSTALLED CAPACITY	GAS AND STEAM TURBINES	MAINTAINABLE EQUIPMENT (ESTIMATE)	MONTHS TO GO-LIVE

WHAT GOOD LOOKS LIKE

- **One hierarchy.** Every maintainable asset sits under a functional location that operations, maintenance and finance recognise.
- **One order per intent.** Corrective, preventive, breakdown, overhaul and statutory work use different order types, not the same one with a different description.
- **Plans own the schedule.** A 500-hour GT inspection generates its order from a maintenance plan; it does not depend on a planner remembering.
- **Codes, not prose.** Damage, cause and object part are catalogued. Free text is the exception, not the record.
- **Confirmation is daily.** Actual hours and spares are booked against the order before it is technically complete.

THE THREE DECISIONS

1. Asset granularity. What is an equipment record and what is a functional location.

2. Order model. How many order types, and which process each one owns.

3. Data ownership. Who signs the equipment, plan and BOM records before load.

WHAT THE HANDOUT GIVES THE TEAM

DELIVERABLE	CONTENTS	WHERE
Asset model	Four-level functional-location structure with Auraiya-specific GT, ST, HRSG and BOP examples.	Sections 5–6
Sample master data	15 functional locations, 15 equipment records, 3 BOMs, 10 measuring points, 2 task lists, 6 plans and 15 catalog codes.	Sections 5–10
SPRO map	Enterprise structure through settlement, with the values to enter and the effect of each setting.	Sections 12–18
Load templates	Column sets and load sequence for the migration cockpit or LSMW.	Sections 19–20
Z-code patterns	Five working samples: ALV aging, CDS backlog, counter FM, validation BAdI and BAPI wrapper.	Sections 21–26
Checklists	Configuration and master-data acceptance lists for the cutover gate.	Appendices A–B

THE CONSTRAINT TO RESPECT

Auraiya is a 1989-vintage station with four gas turbines and two steam turbines. The asset register, tag standards and OEM documentation predate any S/4HANA design. The implementation must adopt the station's existing tags where they are sound, and change only what cannot be maintained.

SECTION 02

Auraiya: what the PM model must fit

Station	NTPC Auraiya Gas Power Station
Location	Dibiyapur, Auraiya district, Uttar Pradesh
Configuration	Combined cycle: 4 × 110 MW gas turbines + 2 × 106 MW steam turbines
Capacity	652 MW
Fuel	Natural gas — GAIL HBJ pipeline
Cooling water	Auraiya–Etawah canal
Commissioning	1989–1990
Operating role	Gas-based combined cycle; fast start and load following

Public station information. Confirm unit numbering, OEM models and capacity against station records before using them in master data.

WHAT THIS MEANS FOR PM

- **Gas turbine inspections dominate.** 500-hour, 8,000-hour and hot-gas-path inspections are the backbone of the plan set.
- **HRSG and steam turbine work is outage-shaped.** Plans must support a shutdown window and a contractor workforce, not only routine rounds.
- **Balance of plant is wide and shallow.** Cooling water, fire water, compressed air, HVAC and electrical systems need simple plans, not complex hierarchies.
- **Statutory and safety work is non-negotiable.** Permits, inspections and certificates need a visible due date and evidence trail.
- **The station is old.** Obsolescence, OEM spares and reverse-engineered parts are part of the maintenance reality.

SCOPE OF THIS HANDOUT

In scope	PM/EAM configuration, technical objects, plans, orders, notifications, confirmations, measuring points, catalogs, PM roles, data load, selected extensions.
Adjacent	MM spares and purchasing, FI/CO settlement, WCM permits, Fiori launchpad, Basis and authorizations.
Out of scope	HR, payroll, PP production, SD, licensing, infrastructure and partner commercials.
Operating model	Central PM team at the station, with corporate SAP support and a small ABAP/functional core.

SITE VOCABULARY TO SETTLE IN THE FIRST WORKSHOP

"Unit", "GT", "ST", "HRSG", "switchyard", "BOP", "TTG", "auxiliary" and "offsite" mean different things to operations, maintenance and finance. Define each once, then use the same word in the hierarchy, the plan text and the cost report.

THE TRAP

Copying a coal-station template onto a gas station creates 30–40% extra hierarchy and a plan set that does not match the OEM maintenance manual. Auraiya needs a CCGT model, not a generic thermal one.

STATION DATA TO CONFIRM BEFORE DESIGN

ITEM	WHY IT CHANGES THE DESIGN	OWNER
Unit numbering and OEM models	Decides the level-2 codes and the GT/ST plan set.	Operations / OEM
Tag standard (KKS or existing)	Decides the FLOC mask and the equipment identifier.	Maintenance
Cost centre structure	Decides settlement receivers and the reporting cuts.	Finance
Outage calendar	Decides plan horizons and the overhaul order window.	Operations
Statutory inspection register	Decides the Z1 notification set and the certificate evidence.	Safety / statutory

SECTION 03

Nine months, eight phases

A station rollout, not a group programme. The sequence assumes the S/4HANA platform and the MM/FI foundation are available; PM can then be configured, loaded and tested in three parallel streams.

PHASE	WEEKS	OUTCOME	GATE EVIDENCE
0 · Mobilise	1–3	Team, scope, as-is walkthrough, data profile, station tag sample	Mobilisation pack, data baseline
1 · Design	4–10	Asset model, order/notification model, plan set, catalog design, Fiori roles	Signed blueprint
2 · Configure	8–18	SPRO, number ranges, status profiles, work centres, plans, roles	Prototype in DEV
3 · Data	9–22	Cleanse, map, load FLOC, equipment, BOM, task lists, plans in three cycles	Reconciliation pack
4 · Integrate	16–24	MM/FI/CO touchpoints, permits, Fiori, outputs, any CMMS interface	End-to-end flow in QAS
5 · Test	22–34	SIT, UAT by GT/ST/BOP teams, performance, security, cutover rehearsal	Test exit, UAT sign-off
6 · Cut over	35–38	Freeze, final load, validation, go-live	Go-live certificate
7 · Hypercare	39–46	Floor support, plan scheduling verification, handover to support	Hypercare exit

BUILD SEQUENCE

1. **Technical objects first.** FLOC structure, structure indicator, equipment categories and classes.
2. **Then the execution model.** Order types, notification types, status profiles, number ranges.
3. **Then planning.** Work centres, task lists, strategies, maintenance plans, call horizon.
4. **Then the money.** Cost centres, activity prices, settlement profiles, WBS for overhauls.
5. **Then the edges.** Permits, Fiori, outputs, interfaces and the CMMS connector.

AURAIYA PILOT SCOPE

Configure and load one GT train end to end — GT1, its air/fuel/lube/exhaust systems, 500-hour and hot-gas-path plans — before scaling to GT2–GT4, ST1–ST2 and BOP. A pilot that works is worth more than a complete model that has never run.

DO NOT LOAD PLANS BEFORE TASK LISTS

Plans reference task lists and objects. Loading plans early guarantees rework when the equipment file changes. The sequence is deliberate.

PLANNING ASSUMPTIONS

- **Landscape ready.** Sandbox, DEV and QAS available in week 1; a transport route to QAS agreed.
- **MM/FI foundation.** Plant, storage location, cost centres and activity types configured by week 4.
- **Named data owners.** One station owner per master-data object by week 2, with authority to sign.
- **OEM documentation.** GT and ST maintenance manuals, spare lists and inspection intervals available by week 4.
- **SME time.** One planner per unit released at 50% through design and data phases.
- **No parallel CMMS change.** The legacy tool is frozen for PM master data during cutover.

SECTION 03.1

Who decides, who signs, who loads

ACTIVITY	ACCOUNTABLE	RESPONSIBLE	CONSULTED
Asset hierarchy and tags	Head of Maintenance	PM lead + planners	Operations, Finance
Order and notification model	PM process owner	PM consultant	Planners, Safety
Plan set and strategies	Maintenance planning lead	Reliability + planners	OEM manuals, Operations
Catalog and failure codes	Reliability lead	Reliability engineer	Planners, OEM
Master-data load	Data owner (per object)	Data team	PM, Finance
Roles and authorizations	Security lead	SAP Security	PM, Audit
Cutover and go-live	Station head	Cutover manager	All workstreams

TEAM COMPOSITION

Station	PM process owner, 2 planners (GT/ST), 1 BOP planner, reliability engineer, safety/WCM, finance controller, materials.
Programme	PM functional lead, SAP PM consultant, ABAP developer (part-time), Basis, data lead, change/training, QA.
Corporate	SAP competence centre, security, transport and infrastructure.

CADENCE

Daily	15-minute stand-up in configure, data and test phases.
Weekly	Workstream leads; decisions, risks, data rejects.
Fortnightly	Station steering: scope, dates, escalations.
Gate	Written pack; pass, pass with conditions, or stop.

ONE OWNER PER OBJECT

Every master-data object — FLOC, equipment, task list, plan, BOM — has one named station owner who signs the reconciliation. The project team can load; only the station can accept.

ESCALATION RULE

A data or design decision that cannot be closed in two workshops goes to the station head with options, not to a third workshop. Silence is how a hierarchy ends up with two names for the same system.

GOVERNANCE ARTEFACTS

ARTEFACT	WHAT IT HOLDS	OWNER
Decision log	Every design decision, the options considered, the date and the accountable person.	PM functional lead
RAID log	Risks, assumptions, issues and dependencies, with owner and due date.	PMO
Blueprint sign-off	Scope, process, data model and interfaces, signed by the process owners.	Station head
Reconciliation pack	Counts, rejects and sign-off per master-data object.	Data lead
Change log	Post-baseline changes with impact on scope, cost and date.	PMO

SECTION 04

Ten rules that keep the model maintainable

1. **Adopt the station's tags where they work.** Do not renumber an asset that appears on a permit, a drawing and a shift log unless the existing tag is ambiguous.
2. **Functional location is where; equipment is what.** A system or position is a FLOC. A maintainable physical item is an equipment record.
3. **One equipment per maintainable asset.** Do not create a record for every bolt, and do not lump a motor and its pump into one record.
4. **Criticality drives everything.** A/B/C determines plan depth, spares policy and review cadence. It must be a field, not a description.
5. **Codes over prose.** Damage, cause, object part and activity are catalogued; free text is for the exception.
6. **One order type per business intent.** Corrective, preventive, breakdown, overhaul, statutory.
7. **Plans own the schedule.** If a plan does not generate a call, it is not a plan; it is a reminder.
8. **Standard before custom.** Configure, then use BAdI/CDS/Fiori. A Z-report is the last resort, not the first.
9. **Clean core.** No modifications to standard objects. Extensions are named, transported and documented.
10. **Load only what you will maintain.** A record that nobody updates is worse than no record.

NAMING STANDARD (SAMPLE)

OBJECT	PATTERN
FLOC	`AUR-<UNIT>-<SYS>-<NN>`
Equipment	Numeric 8-digit, internal range
Task list	`TL-<OBJ>-<FREQ>`
Plan	`MP-<OBJ>-<FREQ>`
BOM	`BOM-<OBJ>-<SYS>`
Measuring point	`AUR-<OBJ>-<MEAS>`
Z program	`ZPM_*` / `ZCL_PM_*` / `ZI_PM_*`

KKS OR READABLE CODES?

Use the station's KKS tags as the equipment identifier where they exist. Use readable FLOC codes for the hierarchy so a planner can navigate without a tag decoder. Carry the KKS tag as a characteristic or an alias field.

THE FIVE-YEAR TEST

Will a planner who joins in 2031 understand this record without calling the person who created it? If not, the description, class or hierarchy is wrong.

NAMING EXAMPLES

OBJECT	GOOD	AVOID	WHY
FLOC	`AUR-GT1-LUBE-01`	`GT1/LO/1`	Readable hierarchy; the position is explicit.
Equipment	`10000005`	`PUMP-1`	Unique and stable when the asset moves; the description carries meaning.
Plan	`MP-GT1-500H`	`GT1-500`	Object and interval are both visible in the plan list.
Z program	`ZPM_R_ORDER_AGING`	`ZREPORT1`	Namespace, type and purpose; searchable in SE38.

SECTION 05

Four levels, no more

Station → unit/area → system → asset position. Four levels are enough for a 652 MW CCGT; a fifth level usually means the equipment record is doing the work of a FLOC.

```
AUR                        Auraiya gas power station
+-- AUR-GT1                Gas turbine 1
|   +-- AUR-GT1-AIR        Air intake system
|   |   +-- AUR-GT1-AIR-01 Air filter house
|   |   +-- AUR-GT1-AIR-02 Evaporative cooler
|   +-- AUR-GT1-FUEL       Fuel gas system
|   |   +-- AUR-GT1-FUEL-01 Fuel gas control valve
|   |   +-- AUR-GT1-FUEL-02 Fuel gas filter
|   +-- AUR-GT1-LUBE       Lube oil system
|   |   +-- AUR-GT1-LUBE-01 Main lube oil pump
|   |   +-- AUR-GT1-LUBE-02 Lube oil cooler
|   +-- AUR-GT1-EXH        Exhaust system
|       +-- AUR-GT1-EXH-01 Exhaust thermocouple bank
+-- AUR-ST1                Steam turbine 1
|   +-- AUR-ST1-STM        Steam admission
|   +-- AUR-ST1-CW         Cooling water
+-- AUR-BOP                Balance of plant
    +-- AUR-BOP-CW         Circulating water
    +-- AUR-BOP-FIRE       Fire water
    +-- AUR-BOP-AIR        Compressed air
```

Sample only. Codes are shown without padding for readability; the production mask pads level 3 to four characters (AIR → AIR_, EXH → EXH_). GT2–GT4 and ST2 follow the same pattern; HRSG is modelled under the relevant GT/ST gas path or as a separate area.

LEVEL RULES

LEVEL	REPRESENTS	EXAMPLE
1	Station or site	AUR
2	Unit or major area	AUR-GT1, AUR-ST1, AUR-BOP
3	System or function	AUR-GT1-LUBE
4	Position / location	AUR-GT1-LUBE-01

STRUCTURE INDICATOR

Use one structure indicator (for example ZPM4) with a 4-level mask. Keep the mask stable; changing it later re-numbers the hierarchy. If KKS is mandated, use a KKS mask and carry the readable description in the text field.

WHERE DOES THE HRSG GO?

If the HRSG is maintained as part of the gas turbine train, model it under the GT area. If the station runs it as a separate pressure-part asset with its own inspections, give it an area at level 2. Decide once; do not duplicate it in both.

WHAT IS NOT A FUNCTIONAL LOCATION

Equipment	A pump, motor, valve, transformer, thermocouple — these are equipment records installed at a FLOC.
Work centre	Mechanical, electrical, C&I — an organisational unit, not an asset.
Cost centre	Finance dimension; attach it to the FLOC/equipment, do not encode it in the tag.
Document	Drawing, manual, certificate — attach via DMS or object links.

EXAMPLE MASK FOR ZPM4

LEVEL	LENGTH	SAMPLE	RULE
1	3	AUR	Station code, fixed.
2	3	GT1	Unit code: GT1–GT4, ST1–ST2, BOP.
3	4	LUBE	System code; pad short codes (AIR, EXH) to four characters.
4	2	01	Position within the system; numeric, 01–99.

Total 12 characters plus separators. The separator is part of the mask and is not counted in the level length.

SECTION 05.1

Sample functional locations

Fifteen rows from a GT1 + ST1 + BOP cut. Use them to test the structure indicator, the hierarchy and the cost-centre logic before loading all six units.

TPLNR	DESCRIPTION	PARENT	CATEGORY	ABC	PLANNER	COST CENTRE
AUR	Auraiya gas power station	—	S	A	—	CC-AUR
AUR-GT1	Gas turbine 1	AUR	U	A	GT1	CC-GT1
AUR-GT1-AIR	GT1 air intake system	AUR-GT1	Y	B	GT1	CC-GT1
AUR-GT1-AIR-01	GT1 air filter house	AUR-GT1-AIR	P	B	GT1	CC-GT1
AUR-GT1-AIR-02	GT1 evaporative cooler	AUR-GT1-AIR	P	C	GT1	CC-GT1
AUR-GT1-FUEL	GT1 fuel gas system	AUR-GT1	Y	A	GT1	CC-GT1
AUR-GT1-FUEL-01	GT1 fuel gas control valve	AUR-GT1-FUEL	P	A	GT1	CC-GT1
AUR-GT1-FUEL-02	GT1 fuel gas filter	AUR-GT1-FUEL	P	B	GT1	CC-GT1
AUR-GT1-LUBE	GT1 lube oil system	AUR-GT1	Y	A	GT1	CC-GT1
AUR-GT1-LUBE-01	GT1 main lube oil pump	AUR-GT1-LUBE	P	A	GT1	CC-GT1
AUR-GT1-LUBE-02	GT1 lube oil cooler	AUR-GT1-LUBE	P	B	GT1	CC-GT1
AUR-GT1-EXH	GT1 exhaust system	AUR-GT1	Y	B	GT1	CC-GT1
AUR-GT1-EXH-01	GT1 exhaust thermocouple bank	AUR-GT1-EXH	P	B	C&I	CC-CNI
AUR-ST1	Steam turbine 1	AUR	U	A	ST1	CC-ST1
AUR-BOP-CW	Circulating water system	AUR-BOP	Y	B	BOP	CC-BOP

Category keys are one-character sample values: S site, U unit, Y system, P position. They control field selection, not hierarchy. Codes here are unpadded for readability; production pads level 3 to four characters.

ABC is the criticality indicator. It drives plan depth and spares policy; it is not an accounting class.

FIELDS THE FLOC LOAD MUST CARRY

TPLNR / PLTXT	Technical tag and description. The description is what a planner searches; make it readable, not a code echo.
TPLKZ / FLTYP	Structure indicator and category. The category controls field selection and screen behaviour.
TPLMA	Parent functional location. Load parents before children or the hierarchy will reject the row.
SWERK / KOSTL	Maintenance plant and cost centre. These become the settlement default for every order at the FLOC.
ABCKZ / INGRP	Criticality and planner group. They drive selection, review cadence and the planner's inbox.
BEGRU	Authorization group. Use it for restricted areas, not on every record; an unused group is a false control.

SECTION 06

Equipment: the maintainable asset

An equipment record is created when the item has its own maintenance history, spares or cost. If it has none of those, it is a material, a characteristic or a text note — not an equipment.

EQUIPMENT CATEGORIES

CAT.	MEANING	AURAIYA EXAMPLES
M	Machine / rotating	Gas turbine, steam turbine, pump, fan, compressor
E	Electrical	Generator, transformer, switchgear, motor
I	Instrument / control	Transmitter, thermocouple, DCS panel, actuator
P	Process / static	Heat exchanger, filter, vessel, piping skid
V	Valve	Control valve, isolation valve, safety valve

CLASS AND CHARACTERISTICS

Create one class per asset family, not one per equipment. Example: class ZGT for gas turbines, class ZPMP for pumps.

CHARACTERISTIC	TYPE / USE
MANUFACTURER	CHAR 30 — OEM name
MODEL	CHAR 30 — OEM model
RATED_MW	DEC 8,2 — nameplate output
SPEED_RPM	NUMC 5 — rated speed
COMMISSION_DATE	DATE — asset commissioning
OEM_PART_NO	CHAR 40 — OEM spare reference
KKS_TAG	CHAR 30 — station tag alias

THE GRANULARITY TEST

Own history?	If the failure and repair history is separate, it is equipment.
Own spares?	If it has its own BOM or exchange unit, it is equipment.
Own cost?	If finance wants cost collected against it, it is equipment.
None of the above	Model it as a characteristic, a material or a note on the parent.

THE MOTOR-AND-PUMP RULE

A motor and its pump are two equipment records when either can be replaced independently. They share a FLOC position and a coupling, but they do not share a history.

DO NOT CREATE EQUIPMENT FOR

Bolts, gaskets, filters, fuses, lamps, individual thermocouples inside a bank, or software tags. These are materials, BOM items or characteristics. Equipment records for consumables destroy the hierarchy.

FIELDS THAT MUST BE POPULATED AT LOAD

Mandatory	Equipment number, category, description, maintenance plant, ABC indicator, planner group, work centre, cost centre.
Critical assets	Manufacturer, model, serial number, commissioning date, OEM part reference, asset number.
Optional	Weight, dimensions, warranty end, drawing reference, long text.

SECTION 06.1

Sample equipment register

Fifteen records across GT1, ST1 and BOP. The identifiers are placeholders; the category, class and hierarchy are the design.

EQUNR	DESCRIPTION	CAT.	OBJECT TYPE	FLOC	MANUFACTURER	MODEL	ABC	WORK CTR
10000001	Gas turbine GT1	M	TURBINE	AUR-GT1	Siemens	MS9001E	A	MECH-01
10000002	GT1 generator	M	GENERATOR	AUR-GT1	BHEL	THRI-110	A	ELEC-01
10000003	GT1 air filter house	P	FILTER	AUR-GT1-AIR-01	Camfil	GT-FH-24	B	MECH-01
10000004	GT1 fuel gas control valve	V	CONTROL VALVE	AUR-GT1-FUEL-01	Emerson	Fisher A100	A	MECH-01
10000005	GT1 main lube oil pump	P	PUMP	AUR-GT1-LUBE-01	Sulzer	ZA-150	A	MECH-01
10000006	GT1 lube oil cooler	P	HEAT EXCHANGER	AUR-GT1-LUBE-02	Alfa Laval	M10-BFG	B	MECH-01
10000007	GT1 exhaust thermocouple bank	I	INSTRUMENT	AUR-GT1-EXH-01	ABB	TC-K-24	B	C&I-01
10000008	Steam turbine ST1	M	TURBINE	AUR-ST1	BHEL	ST-106	A	MECH-01
10000009	ST1 condenser	P	CONDENSER	AUR-ST1	BHEL	CON-106	A	MECH-01
10000010	ST1 condensate pump	P	PUMP	AUR-ST1	KSB	HGC-100	A	MECH-01
10000011	Circulating water pump 1	P	PUMP	AUR-BOP-CW	KSB	RDL-900	B	MECH-01
10000012	GT1 generator transformer	E	TRANSFORMER	AUR-GT1	BHEL	160 MVA	A	ELEC-01
10000013	GT1 unit control panel	I	DCS	AUR-GT1	ABB	Advant 500	A	C&I-01
10000014	Fire water pump	P	PUMP	AUR-BOP	Kirloskar	FWP-150	A	MECH-01
10000015	GT1 inlet guide vane actuator	I	ACTUATOR	AUR-GT1-AIR-01	Emerson	IGV-90	B	C&I-01

Serial numbers, asset numbers and commissioning dates are populated in the same load but omitted here for width. They are mandatory for Class A equipment.

OEM names are illustrative. Use the nameplate data from the station's asset register.

CLASS ASSIGNMENT BY EQUIPMENT CATEGORY

CAT.	CLASS	KEY CHARACTERISTICS	WHY THIS CLASS EXISTS
M	ZGT	MANUFACTURER, MODEL, RATED_MW, SPEED_RPM, COMMISSION_DATE	GT and ST records share a maintenance history and OEM interval logic.
M / P	ZPMP	MANUFACTURER, MODEL, FLOW_M3H, HEAD_M, SPEED_RPM	Pumps are the largest equipment family; the class drives the spare-parts policy.
V	ZVALV	MANUFACTURER, MODEL, SIZE_IN, PRESSURE_CLASS, ACTUATOR_TYPE	Valve data is needed for isolation plans and spares, not for the hierarchy.
E	ZELEC	MANUFACTURER, MODEL, RATED_KVA, VOLTAGE_KV, COOLING	Transformers and switchgear carry statutory inspection evidence.
I	ZINST	MANUFACTURER, MODEL, RANGE_MIN, RANGE_MAX, SIGNAL_TYPE	Instrument records need calibration range and signal type for the C&I plan.

SECTION 06.2

BOMs: the spares list that survives a planner change

A BOM is not a warehouse catalogue. It is the short list of parts that a specific asset actually consumes during its standard maintenance.

BOM HEADERS

BOM	ASSET	USAGE	PLANT	BASE QTY
BOM-GT1-AIR	10000003 — GT1 air filter house	4 (PM)	1000	1 EA
BOM-GT1-LUBE	10000005 — GT1 main lube oil pump	4 (PM)	1000	1 EA
BOM-GT1-FUEL	10000004 — GT1 fuel gas control valve	4 (PM)	1000	1 EA

BOM names are workshop aliases. The SAP BOM number (STLNR) is eight characters and is assigned at load.

BOM ITEMS

ITEM	MATERIAL	DESCRIPTION	QTY	IC	LEAD TIME
0010	MAT-100001	Air filter element, GT inlet	24	L	30 d
0020	MAT-100002	Filter housing gasket	24	L	30 d
0030	MAT-100003	Fastener kit, filter house	12	L	60 d
0010	MAT-100010	Lube oil filter, main pump	6	L	45 d
0020	MAT-100011	Lube oil seal kit	2	L	60 d
0030	MAT-100012	Turbine oil ISO VG32	2,000 L	N	15 d
0040	MAT-100013	Bearing temperature sensor	2	L	90 d
0010	MAT-100020	Fuel gas filter element	4	L	45 d
0020	MAT-100021	Valve actuator seal kit	1	L	90 d
0030	MAT-100022	Valve positioner	1	L	120 d

Rows are grouped by BOM: 0010–0030 belong to BOM-GT1-AIR, the next four to BOM-GT1-LUBE, the last three to BOM-GT1-FUEL. A real load carries the BOM number on every row.

SPARES POLICY

Class A	BOM mandatory; min/max and OEM lead time reviewed twice a year.
Class B	BOM for consumables and long-lead items; others on request.
Class C	No BOM unless a specific failure mode justifies it.

ITEM CATEGORY

L is a stock item. **N** is non-stock and must generate a purchase requisition. Do not use N for a part that is actually held in stores; it hides inventory and creates duplicate buying.

THE BOM TEST

Open the BOM for a Class A asset and ask a planner to plan the next inspection from it. If they cannot, the BOM is a list of spare parts, not a maintenance BOM.

BOM LOAD RULES

- **Attach to the equipment**, not the FLOC, unless the BOM describes a system rather than a machine.
- **Usage 4 and the maintenance plant** must match the asset record; a BOM in the wrong plant is invisible to the order.
- **Quantities are per base quantity**, usually 1 EA. Do not load the annual demand into the BOM.
- **Superseded parts** stay in the BOM until the OEM replacement is approved; mark the old item as blocked, do not delete the history.

SECTION 07

The readings that drive the plan

A counter is a measuring point with a memory. If the plan is based on running hours or starts, the counter is not optional — it is the trigger.

POINT	DESCRIPTION	OBJECT	CATEGORY	UNIT	MIN	MAX	COUNTER	LAST READING
AUR-GT1-RUNH	GT1 running hours	10000001	COUNTER	H	—	—	Yes	48,215
AUR-GT1-STRT	GT1 start count	10000001	COUNTER	ST	—	—	Yes	1,842
AUR-GT1-LOPR	Lube oil pressure	10000005	CONDITION	BAR	2.5	4.5	No	3.6
AUR-GT1-LOTM	Lube oil temperature	10000005	CONDITION	°C	35	65	No	52
AUR-GT1-VIB	GT1 bearing vibration	10000001	CONDITION	MM/S	0	11.2	No	3.1
AUR-GT1-EXHT	Exhaust temperature	10000007	CONDITION	°C	480	620	No	548
AUR-ST1-RUNH	ST1 running hours	10000008	COUNTER	H	—	—	Yes	36,904
AUR-ST1-CWFL	ST1 cooling water flow	10000009	CONDITION	M3/H	800	1,400	No	1,150
AUR-CW-PR	Circulating water pressure	10000011	CONDITION	BAR	3.0	5.5	No	4.1
AUR-GT1-FUDP	Fuel gas filter differential pressure	10000004	CONDITION	MBAR	0	150	No	62

COUNTER STRATEGY

- **Running hours** on every GT and ST. Update daily from the DCS or shift log.
- **Starts** on gas turbines. The OEM inspection interval is often starts-based, not hours-based.
- **Condition points** on lube oil, vibration and exhaust temperature. Limits come from the OEM alarm schedule, not from a generic template.
- **One unit per point.** Do not mix hours and starts on the same counter.

WHY THE LAST READING MATTERS

Load the last counter reading with the equipment. Without it, the first plan call is either immediately overdue or scheduled a full cycle late. The counter is the plan’s memory.

DO NOT FAKE A COUNTER

A “running hours” point that nobody updates is worse than no point: the plan looks scheduled and never triggers. Either automate the reading or use a calendar plan.

SECTION 08

Task lists: the work, not the intention

Two lists are enough to prove the model: a 500-hour GT inspection and a hot-gas-path inspection. The first is routine; the second is an outage.

TASK LIST HEADERS

PLNNR	DESCRIPTION	TYPE	USAGE	STATUS
500001	GT1 500-hour inspection	M	4	Released
500002	GT1 hot-gas-path inspection	M	4	Released

Type `M` is a functional-location task list, which matches the plan object `AUR–GT1`. Use `E` only when the list is owned by an equipment record.

OPERATIONS — 500001, 500-HOUR INSPECTION

OP	DESCRIPTION	WORK CTR	HOURS	CTRL	MATERIAL
0010	Isolate, lock and tag the GT auxiliaries	MECH-01	1.0	PM01	—
0020	Inspect and replace air intake filters	MECH-01	2.0	PM01	`MAT–100001`
0030	Check lube oil pressure and filter differential	MECH-01	1.5	PM01	`MAT–100010`
0040	Inspect fuel gas skid for leaks and valve travel	MECH-01	2.0	PM01	—
0050	Record bearing vibration and compare with limits	C&I-01	1.0	PM01	—
0060	Inspect exhaust thermocouple readings	C&I-01	1.5	PM01	—
0070	Restore, test and hand back to operations	MECH-01	1.0	PM01	—

OPERATIONS — 500002, HOT-GAS-PATH INSPECTION

OP	DESCRIPTION	WORK CTR	HOURS	CTRL	MATERIAL
0010	Remove combustor cans and transition pieces	MECH-01	8.0	PM02	`MAT–100030`
0020	Inspect and document hot-gas-path components	MECH-01	6.0	PM02	—
0030	Replace worn transition pieces and seals	MECH-01	8.0	PM02	`MAT–100031`
0040	Reassemble and torque to OEM specification	MECH-01	6.0	PM02	`MAT–100032`
0050	Borescope, leak test and return to service	C&I-01	4.0	PM02	—

CONTROL KEY

PM01 for internal work, **PM02** for external processing (contractor). The control key determines confirmation and costing behaviour; it is not a label.

RELEASE BEFORE USE

A task list that has not been released cannot be used by a plan. Release it, then attach it; the release is a gate, not a formality.

RULES FOR THE TASK-LIST LIBRARY

- **One list per family and interval.** GT2–GT4 reuse GT1's 500-hour list; only the object changes.
- **Every operation carries** a work centre, hours, control key and material — otherwise it is a checklist, not a task list.
- **Reference the OEM manual** in the long text. The planner must be able to trace the interval to a source.
- **Review after first execution.** Planned hours are a guess until the first confirmation; correct them then.

SECTION 09

Plans that actually call

A maintenance plan is a strategy, a cycle, a call horizon and a task list attached to an object. If any of the four is missing, the plan will not produce useful work.

STRATEGIES

STRATEGY	DESCRIPTION	UNIT	PACKAGE	HORIZON
Z5	Gas turbine 500-hour inspection	H	500	80%
ZS	Gas turbine starts-based inspection	ST	100	80%
ZC	Calendar-based routine maintenance	MONTH	1 / 3 / 12	90%
ZH	Hot-gas-path overhaul	H	24,000	90%

Strategy keys are two characters — the SAP field limit. The description carries the interval.

CALL HORIZON

Set 80–90% for inspections that need spares or a contractor. A 100% horizon releases the order on the due date, which is already too late. A 50% horizon is only for weekly safety tests.

SCHEDULING JOB

Schedule the plan-call job nightly. A plan that is never scheduled is a spreadsheet with extra steps. Verify the job in SM37 for the first two weeks after go-live.

PLAN HEADERS

WARPL	DESCRIPTION	STRATEGY	CYCLE	HORIZON	TASK LIST	OBJECT
MP-GT1-500H	GT1 500-hour inspection	Z5	500 H	80%	500001	AUR-GT1
MP-GT1-START	GT1 starts-based inspection	ZS	100 ST	80%	500001	AUR-GT1
MP-GT1-HGP	GT1 hot-gas-path inspection	ZH	24,000 H	90%	500002	AUR-GT1
MP-ST1-ANN	ST1 annual inspection	ZC	12 MO	90%	500010	AUR-ST1
MP-CW-QTR	Circulating water quarterly	ZC	3 MO	80%	500020	AUR-BOP-CW
MP-FIRE-WEEK	Fire pump weekly test	ZC	1 WO	50%	500030	AUR-BOP

PLAN ITEMS

WARPL	ITEM	OBJECT	ORDER
MP-GT1-500H	0010	AUR-GT1	PM02
MP-GT1-START	0010	AUR-GT1	PM02
MP-GT1-HGP	0010	AUR-GT1	ZPM1
MP-ST1-ANN	0010	AUR-ST1	PM02
MP-CW-QTR	0010	AUR-BOP-CW	PM02
MP-FIRE-WEEK	0010	AUR-BOP	PM02

DESIGN RULES

- One plan per object and strategy. Do not bundle GT and ST work in one plan.
- The plan item's order type decides the process: PM02 for inspections, ZPM1 for overhauls.
- A counter plan needs a valid last reading before release, or the first call is wrong.
- Scheduling parameters are plan-specific; do not rely on the global default.
- Review every plan at least once a year — a plan nobody reviews becomes noise.

SECTION 10

Failure codes that support decisions

A catalog is not a dictionary. It is a small, governed list that lets a reliability engineer count failures, not read stories.

CATALOG SAMPLES

CAT.	CODE	TEXT	USE
B	OBJ1	Air filter	Object part
B	OBJ2	Lube oil filter	Object part
B	OBJ3	Fuel gas valve	Object part
B	OBJ4	Bearing	Object part
B	OBJ5	Thermocouple	Object part
B	OBJ6	Coupling	Object part
C	DMG1	Fouling	Damage
C	DMG2	Leak	Damage
C	DMG3	High vibration	Damage
C	DMG4	Overheating	Damage
C	DMG5	Wear	Damage
5	CAU1	Normal wear	Cause
5	CAU2	Contamination	Cause
5	CAU3	Misalignment	Cause
5	CAU4	Loose fastening	Cause

NOTIFICATION MAPPING

TYPE	MEANING	CATALOG
M1	Maintenance request	B optional, C optional
M2	Malfunction / breakdown	B, C and 5 mandatory
M3	Activity report	B only
Z1	Statutory inspection	B, C, 5 + certificate

THE 15% RULE

If more than 15% of a catalog is “OTHER / MISC”, the catalog is not doing its job. Prune it before go-live, not after the first reliability report.

CLOSE GATE

Do not allow an M2 notification to be set to NOCO until object part, damage and cause are populated. A closure that skips the codes destroys the failure history.

WHO OWNS THE CATALOG

Reliability	Owns the code list, the definitions and the quarterly review.
Planners	Use the codes; request additions with a failure example.
OEM	Provides the failure-mode taxonomy for the GT and ST; do not import it wholesale.
SAP team	Configures the catalog and the field selection; does not decide the content.

SAMPLE M2 NOTIFICATION

FIELD	VALUE	WHY IT MATTERS
Notification	80000042	One record per event; no duplicate requests.
Type / priority	M2 · High	Drives triage and the order type.
Object	AUR–GT1 / 10000001	FLOC and equipment both visible to the planner.
Object part	OBJ4 — bearing	What failed, in a code that can be counted.
Damage / cause	DMG3 high vibration · CAU3 misalignment	What and why; the reliability report depends on it.
Dates	Malfunction start 06:40 · reported 07:05	Separates the failure from its detection.

SECTION 11

Work centres and planner groups

The work centre answers “who does it and what does it cost”. The planner group answers “who plans it”. Do not use one field for both.

WORK CENTRES

ARBPL	DESCRIPTION	CAT.	CAPACITY	COST CTR	ACT. TYPE
MECH-01	Mechanical maintenance — GT	0005	8 h × 12	CC-MECH	MECH01
ELEC-01	Electrical maintenance	0005	8 h × 8	CC-ELEC	ELEC01
C&I-01	Control and instrumentation	0005	8 h × 6	CC-CNI	CNI001
MACH-01	Machine shop	0005	8 h × 6	CC-MACH	MACH01
CIV-01	Civil maintenance	0005	8 h × 4	CC-CIV	CIV001

PLANNER GROUPS

INGRP	DESCRIPTION	DEFAULT WORK CENTRE
GT1	Gas turbine 1	MECH-01
GT2	Gas turbine 2	MECH-01
ST1	Steam turbine 1	MECH-01
BOP	Balance of plant	MECH-01
E&I	Electrical and instrumentation	ELEC-01 / C&I-01

GT3, GT4 and ST2 follow the same pattern. A station may group GT1+GT2 and GT3+GT4 under two planners; what matters is that the group matches the reporting line, not the unit count.

CAPACITY RULES

- One capacity header per work centre, with shift start/end and number of individuals.
- Capacity is used for load levelling, not for payroll. Keep it realistic; an 8-hour shift does not deliver 10 billable hours.
- Update capacity when headcount changes; stale capacity makes every schedule look impossible.

COSTING LINK

The work centre must be linked to a cost centre and an activity type with a valid rate in KP26. Without it, the order confirms hours but cannot cost them.

PLANNER GROUP VS WORK CENTRE

A planner group can cover several work centres (E&I). A work centre belongs to one plant and one capacity area. Mixing the two is the most common source of “wrong planner sees the order”.

WHERE WORK CENTRES GO WRONG

SYMPTOM	LIKELY CAUSE	FIX
Order confirms but shows zero cost	No activity type, or no rate in KP26 for the period.	Maintain the rate; test one confirmation end to end.
Planner sees another unit’s orders	Planner group and work centre are mixed, or the role is too wide.	Split the group; restrict the role by planner group.
Capacity is always red	Stale capacity header or an unrealistic shift model.	Update headcount and shift; re-run levelling.

SECTION 12

SPRO: start with the structure

The SPRO path is the authoritative reference. Transaction codes in this handout are shortcuts and should be checked against the target release before use.

SETTING	SPRO PATH	SAMPLE VALUE	EFFECT
Company code	Enterprise Structure → Definition → Financial Accounting → Define Company Code	1000	Legal entity for settlement
Plant	Enterprise Structure → Definition → Logistics General → Define Plant	1000 · Auraiya	Maintenance and storage plant
Plant assignment	Enterprise Structure → Assignment → Logistics General → Assign Plant to Company Code	1000 → 1000	Links plant to company
Maintenance plant	PM & CS → Maintenance and Service Processing → Basic Settings → Organizational Units → Define Maintenance Plant	1000	Where equipment is maintained
Planning plant	Same path → Define Planning Plant	1000	Where orders are planned
Planner groups	Same path → Define Planner Groups	GT1, GT2, ST1, BOP, E&I	Work assignment and selection
Storage location	MM → Inventory Management → Define Storage Location	0001 · Main stores	Spares and goods issues
Purchasing org	MM → Purchasing → Define Purchasing Organization	1000	Purchase requisitions
Cost centres	CO → Controlling → Cost Centers → Define Cost Centers	CC-GT1, CC-ST1, CC-BOP	Order settlement
Activity types	CO → Controlling → Activity Types → Define Activity Types	MECH01, ELEC01, CNI001	Labour rate

NAMING TO SETTLE ONCE

Plant	One plant for the station, not one per unit. Units are FLOCs, not plants.
Planning plant	One planning plant unless a separate outage team plans ST work.
Planner group	By asset family, not by shift. Shifts change; asset ownership should not.
Cost centre	By unit/area, not by individual equipment. Equipment-level cost is the exception.

DO NOT CREATE A PLANT PER UNIT

It looks tidy in a diagram and destroys cross-unit reporting, spare-parts pooling and the ability to move work between units. Auraiya is one plant with six units.

CHECK BEFORE YOU CONFIGURE

Confirm the plant and company code already exist in the S/4HANA landscape. Creating a second plant for PM is a decision with finance and materials consequences, not a PM convenience.

SECTION 13

Technical objects configuration

OBJECT	SPRO PATH	SHORTCUT	AURAIYA VALUE
Structure indicator	PM & CS → Master Data in PM/CS → Technical Objects → Functional Locations → Define Structure Indicator	OIPK	ZPM4 · 4-level mask
FLOC categories	Same path → Define Functional Location Categories	—	S, U, Y, P
Equipment categories	PM & CS → Master Data → Technical Objects → Equipment → Define Equipment Categories	OIS2	M, E, I, P, V
Equipment classes	Cross-Application Components → Classification → Classes → Define Classes	CL02	ZGT, ZPMP, ZVALV, ZELEC, ZINST
Characteristics	Cross-Application Components → Classification → Characteristics → Define Characteristics	CT04	MANUFACTURER, MODEL, RATED_MW, KKS_TAG
Measuring point categories	PM & CS → Master Data → Technical Objects → Measuring Points → Define Measuring Point Categories	OIM1	C (counter), M (measurement)
BOM usage	PM & CS → Master Data → Bills of Material → Define BOM Usage	OS20	4 = PM
Object information key	PM & CS → Master Data → Technical Objects → Define Object Information Key	—	Optional field selection

STRUCTURE INDICATOR DESIGN

A four-level mask for `AUR–GT1–LUBE–01` might use 3 + 3 + 4 + 2 characters (AUR / GT1 / LUBE / 01). The mask is fixed at creation; plan it before loading the first record. Where level-3 codes vary in length (AIR, FUEL, LUBE), fix a common width and pad, or carry the variation in the description. If KKS is mandated, use the KKS mask and keep the readable code in the description.

CATEGORY IS NOT HIERARCHY

FLOC categories control field selection and screen behaviour. They do not create the hierarchy; the parent field does. Keep categories few.

CHANGING THE MASK LATER

Renumbering a populated hierarchy is a migration, not a configuration change. Get the mask right before the first load.

NUMBER STRATEGY PER OBJECT

OBJECT	NUMBERING	WHY
Functional location	Structured mask	The tag is the navigation. It must be stable for the life of the asset.
Equipment	Internal, 8-digit	Equipment moves between FLOCs; a location-based number becomes wrong after the first transfer.
Measuring point	External, readable	Interfaces and rounds refer to the point by name, not by a generated number.
Task list / plan	Internal + short text	The description carries the meaning; the number only has to be unique.
BOM	Internal	One asset can have several BOMs; the header text identifies the usage.

SECTION 14

Order and notification types

ORDER TYPES

TYPE	DESCRIPTION	RANGE	SETTLEMENT
PM01	Corrective maintenance	01	ZSET1
PM02	Preventive maintenance	02	ZSET1
PM03	Breakdown maintenance	03	ZSET1
PM04	Refurbishment / workshop	04	ZSET1
ZPM1	Overhaul / shutdown	05	ZSET1 + WBS
ZPM2	Statutory inspection	06	ZSET1

SPRO: PM & CS → Maintenance and Service Processing → Maintenance and Service Orders → Functions and Settings for Order Types → Define Order Types. Shortcut: OIOA (verify).

NOTIFICATION TYPES

TYPE	DESCRIPTION	CATALOG PROFILE	STATUS PROFILE
M1	Maintenance request	ZPM_REQ	ZMN_PM
M2	Malfunction / breakdown	ZPM_BRK	ZMN_PM
M3	Activity report	ZPM_ACT	ZMN_PM
Z1	Statutory inspection	ZPM_STAT	ZMN_PM

SPRO: PM & CS → Maintenance and Service Processing → Maintenance Notifications → Notification Types → Define Notification Types. Shortcut: OIAN (verify).

NAMING RULE

Use standard types for standard behaviour. Add Z types only when the process genuinely differs: overhaul and statutory inspection justify their own type; “GT1 work” does not.

PER-TYPE SETTINGS TO CHECK

Number range, field selection, status profile, partner determination, catalog profile, reference object, immediate release, and the order type proposed when a notification is converted.

DO NOT CLONE BY UNIT

PM02_GT1 and PM02_GT2 is a configuration smell. Use one PM02 and separate the units through the object, planner group or plant section.

CHOOSING THE TYPE

BUSINESS INTENT	ORDER	NOTIFICATION	RELEASE GATE
Corrective, planned	PM01	M1 or M2	Cost centre, work centre, operations
Preventive, plan call	PM02	—	Released task list, spares reserved
Breakdown	PM03	M2 mandatory	Notification with object, damage and cause
Overhaul / shutdown	ZPM1	M1	WBS, budget, contractor scope
Statutory inspection	ZPM2	Z1	Certificate, inspector, due date

If a row needs a new order type to fit, the process is probably different — or the type is being used as a unit code.

SECTION 15

Status, numbers and dates

STATUS PROFILES

PROFILE	USE	USER STATUSES
ZPM_ORD	Maintenance orders	PLND, APPR, EXEC, CLSD
ZMN_PM	Notifications, all types	NEW, TRIAGE, WORK, DONE

SPRO: PM & CS → Maintenance and Service Processing → Define Status Profiles. Shortcut: BS02 (verify). Keep user statuses few; system status does the real work.

NUMBER RANGES

OBJECT	RANGE	FROM – TO
Order PM01	01	10000000 – 19999999
Order PM02	02	20000000 – 29999999
Order PM03	03	30000000 – 39999999
Order ZPM1	05	50000000 – 59999999
Notification M2	02	80000000 – 89999999
Notification Z1	06	90000000 – 99999999

SCHEDULING

SETTING	VALUE	NOTE
Margin key	001	Float before/after release
Float before production	3 days	Spares and permits
Float after production	2 days	Confirmation window
Scheduling type	Forward	From basic start
Capacity check	On release	Warn, do not block
Call horizon	80–90%	Plan-specific

DATE LOGIC

Basic start/finish are promises. Scheduled dates are what capacity and procurement see. Do not let a planner edit scheduled dates without changing the basic dates; the report will lie.

NUMBER RANGE TRAP

Do not reuse a number range across order types if users identify the type from the number. It also makes the audit trail ambiguous.

DATE FIELDS AND WHO OWNS THEM

FIELD	MEANING	WHO SETS IT
Basic start / finish	The promise to operations; what the planner commits to.	Planner at creation
Scheduled start / finish	What capacity and procurement see; derived from floats and the work centre.	Scheduling run
Actual start / finish	When work really started and ended.	Technician confirmation
Final due date	The hard deadline for statutory or outage work.	Process owner

SECTION 16

Preventive maintenance configuration

PLAN CONFIGURATION

SETTING	SPRO PATH	VALUE
Plan categories	PM & CS → Maintenance and Service Processing → Preventive Maintenance → Define Maintenance Plan Categories	PM, ZP
Strategies	Same path → Define Maintenance Strategies	Z5, ZS, ZC, ZH
Packages	Same path → Define Maintenance Packages	500 H, 100 ST, 1/3/12 MO
Scheduling params	Same path → Define Scheduling Parameters for Maintenance Plans	Call horizon 80–90%
Plan category	Same path → Define Plan Categories	PM (time), ZP (counter)
Order type	Plan item / strategy	PM02

MEASURING POINT CONFIGURATION

SETTING	SPRO PATH	VALUE
Point categories	PM & CS → Master Data → Technical Objects → Measuring Points → Define Measuring Point Categories	C, M
Counter categories	Same path → Define Counter Categories	C
Units	General → Units of Measure	H, ST, BAR, °C, MM/S
Measurement docs	Same path → Define Measurement Document Categories	Standard

COUNTER OR CONDITION?

If the plan triggers on a value, it is a counter. If a person reads a value and decides, it is a condition point. Do not use a condition point to schedule work automatically.

LAST READING

The initial measurement document sets the counter baseline. Load it with the equipment, or the first plan call will be wrong.

NIGHTLY JOB

Schedule the plan call and deadline monitoring jobs in SM36. Verify in SM37 for two weeks. A plan that never runs is not a plan.

COUNTER SETUP BY ASSET FAMILY

ASSET FAMILY	COUNTER(S)	UNIT	READING SOURCE	PLAN THAT USES IT
Gas turbine	RUNH, STARTS	H, ST	DCS daily extract	Z5 (hours), ZS (starts)
Steam turbine	RUNH	H	DCS daily extract	ZC annual, ZH at 24,000 H
HRSG	RUNH, STARTS	H, ST	DCS daily extract	ZC inspection, statutory where applicable
Critical pumps	RUNH	H	Shift log or DCS	ZC 3-month routine
Standby plant	STARTS	ST	Shift log	ZC weekly test

A family that has no reliable reading source gets a calendar plan, not a counter plan. The counter must be fed by a process, not by hope.

SECTION 17

Capacity, confirmation and cost

WORK CENTRE SETTINGS

SETTING	PATH / SHORTCUT	VALUE
Work centre category	PM & CS → Work Centers → Define Work Center Categories	0005 (maintenance)
Standard value key	Work Centers → Define Standard Value Key	ZSV1
Capacity	Work Centers → Define Capacity	8 h shift
Shift sequence	Work Centers → Define Shift Sequences	3-shift
Cost centre link	CRCO / KP26	CC-MECH, MECH01
Activity price	CO → Activity Types → KP26	Per hour, yearly

CONFIRMATION

SETTING	VALUE	WHY
Auto proposal of actual data	Off	Force real hours
Final confirmation	Required	Closes operations
Error handling	Log, do not dump	Shop-floor resilience
Goods movement	Automatic issue	Spares consumed
Posting date	Work date	Correct period

SETTLEMENT

Profile	ZSET1
Receiver	Cost centre (routine), WBS (overhaul)
Allocation	By cost element
Rule	Generated at release for PM01/PM02
Month-end	KO88 settlement before period close

THE CONFIRMATION RULE

If a technician can press “confirm” and the system proposes 8 hours, the data is fiction. Turn the proposal off; make the technician enter wrench time.

SETTLEMENT DOES NOT FIX BAD HOURS

A perfect settlement profile cannot repair a wrong activity price or a missing cost centre. Test the rupee result, not only the posting.

COST FLOW ON A MAINTENANCE ORDER

1 · DEMAND
Notification / plan
The trigger. No cost yet.

→

2 · ORDER
PM01 / PM02
Commitment and budget check.

→

3 · EXECUTION
Issue + confirm
Material and hours hit the order.

→

4 · SETTLEMENT
ZSET1
KO88 at period end.

→

5 · RECEIVER
Cost centre / WBS
Where the station sees the cost.

If step 5 is wrong, every report downstream is wrong. Test the receiver with a real order and a real rupee value before go-live.

SECTION 18

The edges of the PM module

AREA	WHAT PM NEEDS	CHECK AT DESIGN
Materials	Spare parts, reservations, goods issue, purchase requisitions for non-stock items.	Plant/storage, MRP type, item category N behaviour.
Finance	Cost centre, activity price, settlement, WIP for open orders.	CO profile, allocation structure, period-end sequence.
Permits	Work clearance, isolation, safety certificate.	WCM integration; permit status visible on the order.
Fiori	Planner inbox, order processing, backlog, plan scheduling, notifications.	Business role, catalog, spaces, target mappings.
Outputs	Work order print, notification email, certificate.	Smart Form or Adobe form; printer/email destination.
CMMS / mobile	Read equipment and orders; write notifications and confirmations.	OData services, Gateway alias, auth, delta strategy.

FIORI LAUNCHPAD — SAMPLE ROLE

Role	Z_PM_PLANNER
Catalog	Z_PM_PLANNER
Apps	Maintenance Order Processing, Find Maintenance Orders, Maintenance Backlog, Schedule Maintenance Plans, My Maintenance Notifications
Space	Maintenance — planning
Authorization	Plant, planner group, order type, activity, cost centre

SECURITY RULES

- Authorisation by plant (WERKS), planner group, order type and activity (display/change/release).
- Cost display separated from cost change.
- Technical users for interfaces: no dialog, no SAP_ALL, named owner.
- Segregation: the person who releases an order does not settle it.
- Audit trail: table logging on custom status tables, not on standard PM tables.

DO NOT COPY SAP_ALL

A role copied from SAP_ALL “to make the pilot work” will survive into production. Build the role from the app and the plant, not from a template.

SECTION 19

Load templates: one column set per object

These are the minimum columns for a workshop file. The migration cockpit or LSMW will need more technical fields; do not ask the station to fill them.

OBJECT	MINIMUM COLUMNS	TOOL
Functional location	TPLNR, PLTXT, TPLKZ, FLTYP, TPLMA, SWERK, KOSTL, ABCKZ, INGRP, BEGRU	LTMC / LSMW
Equipment	EQUNR, EQART, EQTYP, EQKTX, TPLNR, HERST, TYPBZ, SERGE, ABCKZ, GEWRK, KOSTL, INBDT, ANLNR, BEGRU	LTMC / LSMW / BAPI
BOM	STLNR, STLAN, WERKS, EQUNR, IDNRK, MENGE, MEINS, POSTP, STLAL	LTMC / CS20
Task list	PLNTY, PLNNR, PLNAL, VERWE, STATU, KTEXT, VORNR, LTXA1, ARBPL, ARBEI, STEUS, MATNR	LTMC / LSMW
Maintenance plan	WARPL, WPTXT, STRAT, HORIZ, ABRHO, WAPOS, EQUNR, TPLNR, PLNNR, AUART	LTMC / LSMW
Measuring point	POINT, PTTXT, MPOBJ, MPTYP, INDRV, MRMIN, MRMAX, MRNGU	LTMC / BAPI
Counter reading	POINT, IDATE, ITIME, CNTRR, READG	LTMC / BAPI

TEMPLATE RULES

- One sheet per object; one row per record; no merged cells.
- Use the technical field name in the header, with a description row above it.
- Dates in YYYYMMDD; no local formats.
- Blank means blank. Do not use “N/A”, “-” or “TBD”; they become data.
- Every file carries a version, date and owner in the file name.

VALIDATION BEFORE LOAD

Check mandatory fields, duplicate keys, parent existence, valid plant/cost centre, class assignment, UoM and status. A row that fails validation is corrected at source, not patched after load.

DO NOT LET EXCEL BE THE MASTER

The staging file is a transport, not a system of record. Once loaded, the reconciliation report and SAP are the truth.

SECTION 20

Load in dependency order, reconcile before go-live

LOAD SEQUENCE

#	OBJECT	DEPENDS ON
1	Plants, planner groups, work centres, cost centres	Configuration
2	Classes and characteristics	Class types
3	Functional locations	Parent FLOCs first
4	Equipment	FLOC, class, work centre
5	Measuring points and initial readings	Equipment
6	BOMs and material links	Materials, equipment
7	Task lists	Work centres, materials
8	Maintenance plans and items	Task lists, equipment, strategies
9	Open notifications and orders	Equipment, plans, cost centres
10	History and attachments	All objects

RECONCILIATION

Counts	Source vs loaded, by object and unit, with reject reasons.
Hierarchy	Every equipment has a FLOC; every FLOC has a parent; no cycles.
Plans	Every plan has a task list and an object; call horizon and next date correct.
Counters	Last reading matches the source; unit and counter flag correct.
BOM	Every Class A equipment has the intended BOM; no blocked materials.
Financial	Open order WIP and commitments reconcile to FI.

CUTOVER GATE

No sign-off without counts, hierarchy, plan schedule, counter baseline and finance reconciliation. A “95% loaded” cutover is a 5% operational problem on Monday.

CUTOVER WINDOW

WHEN	ACTIVITY	OWNER
T-4 weeks	Freeze master data; final delta extract; user access checked.	Data / Security
T-1 week	Rehearsal sign-off; war room; plan for rollback.	PMO
T-1 day	Transaction freeze; legacy read-only; backups.	Basis
T-0	Final load, reconciliation, smoke test.	Data / PM
T+1	Business validation; go/no-go.	Station head
T+2	Go live; floor support.	Change / super users

SECTION 21

Custom code is a last resort, not a first move

Every Z object is a permanent cost: it must be transported, tested, secured, documented and re-tested at every upgrade. The ladder below decides, in order, where a requirement should land.

THE DECISION LADDER

STEP	OPTION	USE WHEN
1	Standard configuration	The behaviour exists and only needs a setting, status profile, field selection or catalog entry.
2	Standard app or report	IW38, IW39, IP16, IH08 or a Fiori app already answers the question.
3	CDS view / analytics	The need is a read-only view, KPI or backlog that standard reporting cannot shape.
4	BAdI / enhancement	A validation or derivation must run inside the standard transaction.
5	BAPI / API wrapper	An external system must create or change PM objects reliably.
6	Z report / Z table	None of the above works. Justify, name, document and budget for maintenance.

NAMING AND PACKAGING

Namespace	ZPM_ for programs and reports, ZCL_PM_ for classes, ZI_PM_ for CDS interface views, ZC_PM_ for consumption views, ZCX_PM_ for exceptions.
Package	One package per concern: ZPM_RPT, ZPM_API, ZPM_ENH, ZPM_CDS. Not one package called ZPM.
Transport	One transport per object or coherent change; never mix configuration and code in an unrelated transport.
Documentation	Class header, method comments, a one-page design note in the transport, and a line in the custom-code register.

ABAP CLOUD READINESS

If Auraiya will run on a clean-core or ABAP Cloud model, only released APIs, released CDS views and RAP extensions are allowed. Classic BAdIs such as WORKORDER_UPDATE may be restricted. Check the release contract before designing the extension, not after.

CODE REVIEW GATE

- No SELECT *; explicit fields only.
- No database access inside a loop; use a join or a buffered read.
- No hard-coded plant, order type or company code; use configuration or parameters.
- Authority check on plant and planner group for any report that exposes cost or work data.
- Messages in a message class; no text literals in errors.
- Unit test or reproducible test script attached to the transport.
- Runtime under 5 seconds for 10,000 orders; under 30 seconds for the largest expected volume.

THE MODIFICATION BAN

No changes to SAP standard objects, no Append structures on standard tables where a custom field or BAdI will do, and no implicit enhancement inside a standard include. A modification is a future upgrade failure with a date on it.

THE FIVE SAMPLES IN THIS HANDOUT

REF	PATTERN	WHY IT IS NEEDED AT AURAIYA	TYPE
Z1	Order aging ALV	Planners need age buckets against basic finish; IW38 gives a list, not an aging view.	Report
Z2	CDS backlog view	A reusable, Fiori-ready backlog with days past due for the planner and the station dashboard.	CDS
Z3	Last counter reading	Mobile and DCS interfaces need one call that returns the current reading and unit.	Class + FM
Z4	Order validation BAdI	Breakdown orders must not save without a notification and cause code.	BAdI
Z5	Notification BAPI wrapper	The CMMS or shift log creates M2 notifications; the wrapper handles errors and commit.	Class

SECTION 22 · Z1

Order aging without a spreadsheet

Open PM orders bucketed by days past their basic finish. The report reads the order header, the notification link and the scheduling data, excludes closed and technically completed orders, and sorts the worst first.

```
REPORT zpm_r_order_aging.

" Open PM orders vs. basic finish, with aging bucket.
" Selection: plant, order type, planner group.

TYPES: BEGIN OF ty_row,
         aufnr  TYPE aufk-aufnr,
         auart  TYPE aufk-auart,
         ktext  TYPE aufk-ktext,
         tplnr  TYPE afih-tplnr,
         equnr  TYPE afih-equnr,
         ingpr  TYPE afih-ingpr,
         gstrp  TYPE afko-gstrp,
         gltrp  TYPE afko-gltrp,
         getri  TYPE afko-getri,
         days   TYPE i,
         bucket TYPE char12,
       END OF ty_row.

DATA: gt_row TYPE STANDARD TABLE OF ty_row WITH EMPTY KEY.

SELECT-OPTIONS: s_werks FOR aufk-werks DEFAULT '1000'.
SELECT-OPTIONS: s_auart FOR aufk-auart.
SELECT-OPTIONS: s_ingpr FOR afih-ingpr.

START-OF-SELECTION.

  " Closed and technically completed objects, read once.
  SELECT DISTINCT j~objnr
    FROM jest AS j
    INNER JOIN tj02t AS t ON t~istat = j~stat
    WHERE j~inact = @space
      AND t~spras = @sy-langu
      AND t~txt04 IN ( 'TECO', 'CLSD' )
    INTO TABLE @DATA(lt_closed).

  SELECT a~aufnr, a~auart, a~ktext,
         f~tplnr, f~equnr, f~ingpr,
         k~gstrp, k~gltrp, k~getri
    FROM aufk AS a
    INNER JOIN afih AS f ON f~aufnr = a~aufnr
    INNER JOIN afko AS k ON k~aufnr = a~aufnr
    INTO TABLE @DATA(lt_raw)
    WHERE a~werks IN @s_werks
      AND a~auart IN @s_auart
      AND f~ingpr IN @s_ingpr
      AND a~autyp = '30'
      AND a~objnr NOT IN @lt_closed.

  LOOP AT lt_raw INTO DATA(ls_raw).
    DATA(ls_row) = CORRESPONDING ty_row( ls_raw ).

    IF ls_raw-getri IS NOT INITIAL.
      ls_row-days = ls_raw-getri - ls_raw-gltrp.
    ELSE.
      ls_row-days = sy-datum - ls_raw-gltrp.
    ENDIF.

    IF ls_row-days > 60.
      ls_row-bucket = '60+ days'.
    ELSEIF ls_row-days > 30.
      ls_row-bucket = '31-60 days'.
    ELSEIF ls_row-days > 0.
      ls_row-bucket = '1-30 days'.
    ELSEIF ls_row-days = 0.
      ls_row-bucket = 'Due today'.
    ELSE.
      ls_row-bucket = 'Not due'.
    ENDIF.

    APPEND ls_row TO gt_row.
  ENDLOOP.

  cl_salv_table=>factory(
    IMPORTING r_salv_table = DATA(lo_alv)
    CHANGING  t_table      = gt_row ).

  lo_alv->get_functions( )->set_all( abap_true ).
  lo_alv->get_columns( )->set_optimize( abap_true ).
  lo_alv->get_sorts( )->add_sort(
    columnname = 'DAYS'
    sequence   = if_salv_c_sort=>sort_down ).
  lo_alv->display( ).
```

WHAT THE REPORT ANSWERS

- How much open work is past its promised finish, by planner group.
- Which orders have an actual finish but are still open — a closure discipline problem.
- Which units carry the oldest backlog before the next outage window.

WHY NOT IW38?

IW38 lists orders and can sort by finish date, but it does not compute age buckets, does not distinguish “finished but not closed”, and cannot be scheduled as a monthly planner pack without manual export. The report is a thin, governed layer over the same tables.

PERFORMANCE AND AUTHORITY

Add `AUTHORITY-CHECK OBJECT 'I_SWERK'` for the plant selection and restrict the date range. On a 40,000-order backlog the status subquery is the cost driver; if it becomes slow, precompute open status into a CDS view (Z2) and read that instead.

VARIANTS TO SHIP

PLANNER_WEEKLY — 90 days, all types, by planner group.
OUTAGE_PREP — all open orders for GT/ST, sorted by days.
CLOSURE — orders with actual finish and no TECO.

SECTION 23 · Z2

One backlog view, many consumers

A CDS view is the cleanest place to define “backlog”. Every consumer — a Fiori app, an ALV, a SAC story or an OData service — then uses the same definition of overdue.

```
@AbapCatalog.sqlViewName: 'ZIPMORDBKLG'
@AbapCatalog.compiler.compareFilter: true
@AccessControl.authorizationCheck: #CHECK
@EndUserText.label: 'PM order backlog with days past due'
define view ZI_PM_OrderBacklog
  as select from I_MaintenanceOrder as Ord
    inner join I_MaintenanceOrderItem as Itm
      on Itm.MaintenanceOrder = Ord.MaintenanceOrder
{
  key Ord.MaintenanceOrder,
      Ord.MaintenanceOrderType,
      Ord.MaintenanceOrderDesc,
      Ord.MaintenancePlant,
      Ord.MaintenancePlannerGroup,
      Ord.BasicStartDate,
      Ord.BasicEndDate,
      Itm.MaintenanceOrderItem,
      Itm.FunctionalLocation,
      Itm.Equipment,
      Itm.MainWorkCenter,
      cast( days_between( Ord.BasicEndDate, $session.system_date )
            as abap.int4 ) as DaysPastDue,
      case
        when Ord.BasicEndDate < $session.system_date then 'OVERDUE'
        when Ord.BasicEndDate = $session.system_date then 'DUE'
        else 'FUTURE'
      end as DueStatus
}
where Ord.MaintenanceOrderIsCompleted = ''
```

Release check. Field names follow the S/4HANA 2023 interface views. SAP does rename fields between releases: verify `MaintenanceOrderIsCompleted`, `MainWorkCenter` and `BasicEndDate` in SE11 or ADT before activation. If a field is missing, extend the view rather than falling back to a direct table read.

WHAT THE VIEW EXPOSES

Order header	Order number, type, description, plant, planner group, basic start and finish.
Order item	Item number, functional location, equipment, main work centre.
Derived	Days past due and a three-value due status, calculated at read time against the session date.
Not included	Costs, confirmations and status history. Add them as separate views; do not widen this one until a consumer needs them.

CONSUMING IT FROM ABAP

```
SELECT FROM zi_pm_orderbacklog
  FIELDS MaintenanceOrder,
         MaintenanceOrderType,
         FunctionalLocation,
         Equipment,
         BasicEndDate,
         DaysPastDue,
         DueStatus
  WHERE MaintenancePlant = @p_werks
    AND DueStatus = 'OVERDUE'
  ORDER BY DaysPastDue DESCENDING
  INTO TABLE @DATA(lt_backlog)
  UP TO 500 ROWS.
```

WHY NOT BUILD IT IN THE REPORT?

If the aging logic lives only in Z1, the Fiori app, the API and the SAC story each re-implement it. One CDS view removes that drift and gives the data steward one place to change a rule.

AUTHORIZATION IS NOT AUTOMATIC

#CHECK applies the DCL on the underlying views, but a custom view still needs its own access control if it exposes plant or cost data. Test with a planner who is restricted to GT1; if they see ST1, the DCL is wrong.

PUBLISHING OPTIONS

Fiori — analytical list page on the view. **OData** — expose through RAP or SEGW; see the Gateway prerequisites in S4H-API-TR-001. **SAC** — live connection, no extract.

IF THE STANDARD VIEW DOES NOT FIT

Missing field	Use `extension view` on the interface view, not a select from AUFK/AFKO. Extensions survive upgrades; direct table reads do not.
Missing object	Join `I_Equipment` or `I_FunctionalLocation` for descriptions and class data.
Different status logic	Add a status view based on `I_MaintenanceOrderStatus` if available; otherwise join `JEST` in a wrapper view and document the exception.

SECTION 24 · Z3

One call, one reading

Mobile rounds, the DCS interface and the planner's Fiori tile all need the same answer: what is the latest reading for this measuring point, in what unit, and when was it taken. A single class method prevents three different "latest reading" queries.

```
CLASS zcl_pm_counter DEFINITION
  PUBLIC FINAL CREATE PUBLIC.

  PUBLIC SECTION.
    TYPES: BEGIN OF ty_reading,
             point     TYPE imptt-point,
             object    TYPE imptt-mpobj,
             reading   TYPE imrg-readg,
             unit      TYPE imrg-mrang,
             read_date TYPE imrg-idate,
             read_time TYPE imrg-itime,
           END OF ty_reading.

    CLASS-METHODS get_last_reading
      IMPORTING iv_point        TYPE imptt-point
      RETURNING VALUE(rs_reading) TYPE ty_reading
      RAISING   zcx_pm_error.
ENDCLASS.


CLASS zcl_pm_counter IMPLEMENTATION.
  METHOD get_last_reading.

    SELECT SINGLE point, mpobj
      FROM imptt
      WHERE point = @iv_point
      INTO ( @DATA(lv_point), @DATA(lv_object) ).

    IF sy-subrc <> 0.
      RAISE EXCEPTION TYPE zcx_pm_error
        EXPORTING textid = zcx_pm_error=>not_found
                  point  = iv_point.
    ENDIF.

    SELECT readg, mrang, idate, itime
      FROM imrg
      INTO ( @DATA(lv_reading), @DATA(lv_unit),
             @DATA(lv_date),    @DATA(lv_time) )
      WHERE point = @iv_point
        AND idate <= @sy-datum
      ORDER BY idate DESCENDING, itime DESCENDING
      UP TO 1 ROWS.

    IF sy-subrc <> 0.
      RAISE EXCEPTION TYPE zcx_pm_error
        EXPORTING textid = zcx_pm_error=>no_reading
                  point  = iv_point.
    ENDIF.

    rs_reading = VALUE #(
      point     = lv_point
      object    = lv_object
      reading   = lv_reading
      unit      = lv_unit
      read_date = lv_date
      read_time = lv_time ).
  ENDMETHOD.
ENDCLASS.
```

REMOTE-ENABLED WRAPPER

```
FUNCTION z_pm_get_last_counter.
*"----------------------------------------------------------------
*" IMPORTING
*"   VALUE(IV_POINT)   TYPE IMPTT-POINT
*" EXPORTING
*"   VALUE(EV_READING) TYPE IMRG-READG
*"   VALUE(EV_UNIT)    TYPE IMRG-MRANG
*"   VALUE(EV_DATE)    TYPE IMRG-IDATE
*"   VALUE(EV_TIME)    TYPE IMRG-ITIME
*" EXCEPTIONS
*"   NOT_FOUND
*"----------------------------------------------------------------
  TRY.
      DATA(ls) = zcl_pm_counter=>get_last_reading(
        iv_point = iv_point ).
      ev_reading = ls-reading.
      ev_unit    = ls-unit.
      ev_date    = ls-read_date.
      ev_time    = ls-read_time.
    CATCH zcx_pm_error.
      RAISE not_found.
  ENDTRY.
ENDFUNCTION.
```

WHY A CLASS, NOT A SELECT IN THE FM?

The report, the Fiori app and the interface all call the same logic. When the definition of "latest" changes — for example, exclude reversed documents — it changes once.

Exception class. `ZCX_PM_ERROR` carries two T100 keys (`NOT_FOUND`, `NO_READING`) and a `POINT` attribute; its definition is omitted here for space.

TWO TRAPS

Reversed documents. IMRG can contain cancelled readings; filter on the reversal indicator or read through the released measurement-document view. **Future dates.** A mis-keyed future reading will win the sort and freeze the plan; the `IDATE <= SY-DATUM` guard prevents that.

ODATA NOTE

A classic FM is not automatically an OData service. Expose it through a CDS view plus RAP service binding, or register it in SEGW. The Gateway alias and service activation are prerequisites; see S4H-API-TR-001.

SECTION 25 · Z4

Stop the save, not the report

A validation that runs after the fact produces a clean-up report. A validation in the save path produces a correct record. This BAdI blocks a breakdown order that has no notification, and a corrective order with no cost centre.

```
CLASS zcl_pm_ord_check DEFINITION
  PUBLIC FINAL CREATE PUBLIC.
  PUBLIC SECTION.
    INTERFACES if_ex_workorder_update.
ENDCLASS.


CLASS zcl_pm_ord_check IMPLEMENTATION.
  METHOD if_ex_workorder_update~at_save.

    " 1. Only the order types that carry the rule.
    IF is_caufvd-auart <> 'PM01'
       AND is_caufvd-auart <> 'PM03'.
      RETURN.
    ENDIF.

    " 2. Breakdown orders must reference a notification.
    IF is_caufvd-auart = 'PM03'
       AND is_caufvd-qmnum IS INITIAL.
      MESSAGE e001(zpm_msg).
    ENDIF.

    " 3. Corrective orders must carry a cost centre.
    IF is_caufvd-auart = 'PM01'
       AND is_caufvd-kostl IS INITIAL.
      MESSAGE e002(zpm_msg).
    ENDIF.

    " 4. Basic finish must not precede basic start.
    IF is_caufvd-gltrp < is_caufvd-gstrp.
      MESSAGE e003(zpm_msg).
    ENDIF.

  ENDMETHOD.
ENDCLASS.
```

REGISTRATION

Definition	`WORKORDER_UPDATE`
Implementation	`ZPM_ORDER_CHECK` (SE19)
Method	`AT_SAVE`
Filter	Order type, if the definition exposes it; otherwise code check.
Package	`ZPM_ENH`

MESSAGE CLASS

Create ZPM_MSG with 001 “Breakdown order requires a notification”, 002 “Corrective order requires a cost centre”, 003 “Basic finish precedes basic start”. The message text is the training material.

DO NOT OVER-BLOCK

A validation that stops legitimate work at 02:00 will be switched off by the shift, and it will never come back. Block only what creates an unrecoverable record. Warnings belong in a status or a report, not in the save path.

CLOUD ALTERNATIVE

On ABAP Cloud, implement the check as a RAP validation on the maintenance-order BO or as a released BAdI. The classic `WORKORDER_UPDATE` may not be in the released contract.

SECTION 26 · Z5

An interface that fails cleanly

The BAPI creates a notification and returns a table of messages. The wrapper decides what “success” means, commits once, and gives the caller a notification number or a reason — never a half-created record.

```
CLASS zcl_pm_notif_api DEFINITION
  PUBLIC FINAL CREATE PUBLIC.
  PUBLIC SECTION.
    TYPES: BEGIN OF ty_request,
             equipment   TYPE equi-equnr,
             tplnr       TYPE iflo-tplnr,
             short_text  TYPE qmih-qktxt,
             priority    TYPE qmih-priok,
             reported_by TYPE qmih-ernam,
             breakdown   TYPE qmih-msaus,
           END OF ty_request.

    TYPES: BEGIN OF ty_result,
             notification TYPE qmnum,
             messages     TYPE bapiret2_t,
           END OF ty_result.

    CLASS-METHODS create_malfunction
      IMPORTING is_request        TYPE ty_request
      RETURNING VALUE(rs_result) TYPE ty_result.
ENDCLASS.


CLASS zcl_pm_notif_api IMPLEMENTATION.
  METHOD create_malfunction.

    DATA: ls_header    TYPE bapi2080_nothdri,
          ls_header_ex TYPE bapi2080_nothdre,
          lt_item      TYPE STANDARD TABLE OF bapi2080_notitemi,
          lt_return    TYPE STANDARD TABLE OF bapiret2.

    ls_header = VALUE #(
      notif_type        = 'M2'
      short_text        = is_request-short_text
      priority          = is_request-priority
      equipment         = is_request-equipment
      function_location = is_request-tplnr
      breakdown_ind     = is_request-breakdown
      reportedby        = is_request-reported_by ).

    APPEND VALUE #(
      item_key       = '0001'
      item_sort_no   = '0001'
      item_short_text = is_request-short_text ) TO lt_item.

    CALL FUNCTION 'BAPI_ALM_NOTIF_CREATE'
      EXPORTING
        notif_type         = 'M2'
        notifheader        = ls_header
      IMPORTING
        notifheader_export = ls_header_ex
      TABLES
        notifitem          = lt_item
        return             = lt_return.

    " Any error, or no notification number: roll back.
    IF line_exists( lt_return[ type = 'E' ] )
       OR ls_header_ex-notif_no IS INITIAL.
      CALL FUNCTION 'BAPI_TRANSACTION_ROLLBACK'.
      rs_result-messages = lt_return.
      RETURN.
    ENDIF.

    CALL FUNCTION 'BAPI_ALM_NOTIF_SAVE'
      EXPORTING
        notif_no        = ls_header_ex-notif_no
      IMPORTING
        notif_no_export = rs_result-notification
      TABLES
        return          = lt_return.

    IF line_exists( lt_return[ type = 'E' ] ).
      CALL FUNCTION 'BAPI_TRANSACTION_ROLLBACK'.
      CLEAR rs_result-notification.
    ELSE.
      CALL FUNCTION 'BAPI_TRANSACTION_COMMIT'
        EXPORTING wait = abap_true.
    ENDIF.

    rs_result-messages = lt_return.
  ENDMETHOD.
ENDCLASS.
```

WRAPPER RULES

- **One commit.** The caller commits once, after all objects are created — not inside a loop.
- **Errors first.** Inspect the return table before reading the export parameter.
- **Rollback on failure.** A notification that exists without its item is worse than none.
- **Idempotency.** Carry the source system’s document number and reject duplicates before calling the BAPI.
- **No dialog.** The RFC user must not be able to start a transaction or change a customising entry.

FIELD NAMES

The BAPI structures are stable but not identical across releases. Open BAPI Explorer (BAPI) in the target system and compare `BAPI2080_NOTHDRI` before activating. The pattern matters more than one field name.

LONG TEXT

Do not stuff a shift log into the 40-character short text. Add the detail through the notification long-text API or a custom attachment, and keep the short text as the one-line symptom.

PREFERRED ON S/4HANA

If the interface is new, prefer a RAP-based `OData V4` service over the classic BAPI. Use the BAPI wrapper only where the caller already speaks BAPI or the notification BO is not yet released for RAP in the target release.

SECTION 27

Test the work, not the screen

A PM test that stops at “the order saved” proves nothing. The test must follow the work from notification to confirmation to settlement, with real roles, real spares and a real permit.

TEST LEVELS

LEVEL	WHAT IT PROVES	OWNER
Unit	Validation, derivation, counter logic and API mapping in isolation.	Developer
Integration	PM → MM (reservation, goods issue), PM → FI/CO (settlement), PM → WCM.	Consultant
SIT	End-to-end scenarios across GT, ST and BOP with converted data.	Test lead
UAT	The station can run its own process with its own people and roles.	Process owner
Performance	Backlog report, plan call, order save and interface under volume.	Basis / test lead
Security	Planner sees own group; supervisor sees plant; no cost leak.	Security

SCENARIO MATRIX (MINIMUM)

#	SCENARIO	OBJECTS	EXPECTED
01	Shift reports GT1 high vibration; M2 notification with codes; planner creates PM03 order	GT1, OBJ4, DMG3, CAU3	Order linked, notification complete
02	500-hour plan calls at 80% of 500 H; order generated with task list	MP-GT1-500H, 500001	Order PM02, correct dates
03	Counter reading drives the next call; reading loaded from DCS	AUR-GT1-RUNH	Call date recalculated
04	Corrective order consumes a stock spare; goods issue posts	MAT-100010, BOM-GT1-LUBE	Reservation reduced, cost on order
05	Overhaul order settles to WBS at month-end	ZPM1, WBS	KO88 settles, no residual
06	Breakdown order saved without notification	PM03	Blocked by BAdI, message 001
07	External system creates M2 through Z5; BAPI error path	ZCL_PM_NOTIF_API	Rollback, message returned, no orphan
08	Planner restricted to GT1 cannot see ST1 orders or costs	Role Z_PM_PLANNER	Empty result, no dump

ENTRY AND EXIT CRITERIA

SIT entry	Configuration transported, master data loaded in QAS, roles assigned, test data frozen.
SIT exit	All critical and high defects closed; no open defect on a core scenario; reconciliation signed.
UAT entry	SIT exit, trained users, UAT script and data set, floor support rota.
UAT exit	Process owner sign-off per scenario; open defects accepted with a workaround and a date.
Go-live	Cutover rehearsal passed, performance signed, hypercare rota published.

DEFECT SEVERITY

S1 — cannot run the process; no workaround. **S2** — process runs with manual effort. **S3** — cosmetic or report-only. Only S1 and S2 block go-live; S3 goes to the backlog with an owner.

DO NOT TEST WITH THE TRAINER’S LOGON

A test performed with a wide role proves the transaction, not the authorization. Every UAT scenario runs with the role the person will hold on Monday.

EVIDENCE PACK

Per scenario: script, data, screen evidence, result, defect reference and sign-off. Keep it in one indexed file; it is the audit trail for go-live.

SECTION 28

The first four weeks decide adoption

Hypercare is not a helpdesk queue. It is a daily check that the plans call, the counters move, the confirmations post and the backlog is visible — with a named person fixing what does not.

DAILY CHECKS (FIRST 20 WORKING DAYS)

CHECK	WHAT GOOD LOOKS LIKE	TOOL
Plan call job	Ran; calls created; no plan stuck at “scheduled” with a past date.	SM37, IP10
Counter readings	Every GT/ST counter has a reading within 24 h.	IK11 / Z3
Open notifications	M2 triaged within the agreed time; no unassigned breakdown.	IW28
Order confirmations	Hours and spares booked same day; no order completed with zero actual cost.	IW41, IW42
Settlement errors	No order in settlement error at period end.	KO88
Backlog	Overdue count stable or falling; oldest item owned.	Z1 / Z2
Data quality	No equipment without FLOC; no plan without task list.	IH08, IP16

TRAINING BY ROLE

ROLE	CONTENT	DAYS
Technician	Notification, order confirmation, measuring-point reading, spare issue.	1
Planner	Backlog review, order release and scheduling, plan call, BOM and task-list use.	2
Reliability	Catalog coding, failure analysis, plan effectiveness, KPI review.	1.5
Supervisor	Capacity, prioritisation, permit interface, cost review.	1
Data steward	Create/change FLOC, equipment, BOM, plan; validation rules.	2
Support	Job monitoring, authorization, incident triage, transport.	1

KPIS TO BASELINE AT GO-LIVE

Plan compliance	Calls converted to orders within the horizon.
Schedule compliance	Orders finished by basic finish.
Breakdown ratio	PM03 hours / total maintenance hours.
Notification quality	% M2 with object, damage and cause codes.
Confirmations	% orders confirmed within 24 h.
Data quality	% equipment with FLOC, class and ABC.
Backlog age	Median and 90th percentile days past due.

EXIT CRITERIA

Two consecutive weeks with no S1, plan call verified daily, backlog report used by every planner, and a support rota with named owners. Then hand over — not before.

THE ADOPTION TRAP

If the planner keeps a parallel spreadsheet “just in case”, the system is already dead. Kill the spreadsheet at go-live, or move its content into the system before go-live.

APPENDIX A

Configuration checklist

Use this as the DEV-to-QAS gate. Every line needs a transport number and a named reviewer; a tick without a transport is a rumour.

#	CONFIGURATION OBJECT	SPRO / T-CODE	VALUE AT AURAIYA	TRANSPORT	STATUS
01	Company code and plant	OX02 / OX10	1000 / 1000	—	Open
02	Plant assignment	OX19	1000 → 1000	—	Open
03	Maintenance / planning plant	SPRO PM → Org units	1000 / 1000	—	Open
04	Planner groups	SPRO PM → Org units	GT1, GT2, ST1, BOP, E&I	—	Open
05	Structure indicator	OIPK	ZPM4	—	Open
06	FLOC categories	SPRO PM → Tech objects	S, U, Y, P	—	Open
07	Equipment categories	OIS2	M, E, I, P, V	—	Open
08	Classes and characteristics	CL02 / CT04	ZGT, ZPMP, ZVALV, ZELEC, ZINST	—	Open
09	Measuring point categories	OIM1	C, M	—	Open
10	BOM usage	OS20	4 = PM	—	Open
11	Order types	OIOA	PM01–PM04, ZPM1, ZPM2	—	Open
12	Notification types	OIAN	M1, M2, M3, Z1	—	Open
13	Status profiles	BS02	ZPM_ORD, ZMN_PM	—	Open
14	Number ranges	SNUM	Order 01–06, notif 02/06	—	Open
15	Scheduling margin key	OPUZ / SPRO	001 · 3 d / 2 d	—	Open
16	Maintenance strategies	SPRO PM → PM plans	Z5, ZS, ZC, ZH	—	Open
17	Plan categories	SPRO PM → PM plans	PM, ZP	—	Open
18	Work centre category	SPRO PM → Work centres	0005	—	Open
19	Standard value key	SPRO PM → Work centres	ZSV1	—	Open
20	Activity prices	KP26	Per work centre, yearly	—	Open
21	Settlement profile	OKO7 / SPRO CO	ZSET1	—	Open
22	Catalog profiles	OIOM	ZPM_REQ, ZPM_BRK, ZPM_STAT	—	Open
23	Permit / WCM link	SPRO PM → WCM	Order type + permit category	—	Open
24	Fiori role and catalog	/UI2/FLP	Z_PM_PLANNER, Z_PM_TECH	—	Open
25	Plan call and deadline jobs	SM36	Nightly, station time	—	Open

Status values — Open, Configured in DEV, Transported to QAS, Tested, Signed. Do not use “Done”; it hides the difference between configured and accepted.

Reviewers — PM process owner for 03–17 and 22–23; Finance for 20–21; Security for 24; Basis for 25.

APPENDIX B

Master-data acceptance checklist

Counts alone do not prove a load. Each object needs a validation rule, a reconciliation source and one named owner who signs.

#	OBJECT	VOLUME	VALIDATION RULE	RECONCILES TO	OWNER
01	Functional locations	~450	Parent exists; mask valid; plant/cost centre populated; no duplicate description at the same level.	Asset register / tag list	Maintenance planning
02	Equipment	~3,800	FLOC exists; category/class valid; ABC set; serial and commissioning date for Class A.	Asset register	Maintenance planning
03	Classes / characteristics	~12 / ~40	Class assigned to the right object type; characteristic unit and format valid.	Design document	Reliability
04	Measuring points	~120	Object exists; category correct; unit and limits set; counter flag correct.	DCS point list	C&I
05	Initial counter readings	~40	Reading date ≤ load date; unit matches; no negative or future reading.	Shift log / DCS	Operations
06	BOM headers	~60	Asset exists; usage 4; plant and base quantity valid.	OEM spare list	Materials
07	BOM items	~900	Material exists and not blocked; item category correct; quantity and unit valid.	Stores catalogue	Materials
08	Task lists	~80	Status released; work centre valid; operation hours > 0; material exists.	OEM manual / SOP	Reliability
09	Maintenance plans	~140	Task list released; object exists; strategy and cycle valid; call horizon set.	Plan register	Maintenance planning
10	Plan items	~160	Order type valid; object matches plan; no duplicate item.	Plan register	Maintenance planning
11	Catalog codes	~120	Code unique in catalog; text ≤ 40 chars; no “OTHER” above 15%.	Reliability taxonomy	Reliability
12	Work centres	~8	Plant, cost centre and activity type valid; capacity header exists.	HR / finance	Finance
13	Open notifications	~300	Object exists; status mapped; no duplicate of a closed item.	Legacy CMMS extract	PM process owner
14	Open orders	~150	Object, cost centre, settlement rule valid; no order with zero operations.	Legacy CMMS / FI	Finance
15	Attachments	~500	Linked to the right object; readable; no personal or restricted content.	Document register	Data steward

SAMPLE IS NOT A TARGET

The volumes are planning estimates for a 652 MW CCGT. Replace them with the station’s asset-register count before the first load cycle; a 20% error changes the cutover window, not just the file size.

SIGN-OFF RULE

One owner per row. A row signed by “the team” has no owner. The data lead records the sign-off date and the reconciliation file name against the row.

APPENDIX C

Glossary and abbreviations

The words that mean different things to operations, maintenance and finance — fixed once, for this document.

ABC indicator	Criticality class A/B/C. Drives plan depth, spares policy and review cadence.
BAdI	Business Add-In; an SAP extension point implemented without modifying standard code.
BOM	Bill of materials; here, the spares consumed by an asset's standard maintenance.
Call horizon	The percentage of a maintenance cycle at which the plan creates its order.
CCGT	Combined-cycle gas turbine; gas turbine exhaust heat drives a steam turbine.
CDS	Core Data Services; the ABAP layer for semantically rich database views.
FLOC	Functional location; the "where" in the asset hierarchy.
HRSG	Heat recovery steam generator; recovers GT exhaust heat for the steam cycle.
KKS	Kraftwerk-Kennzeichen System; the German power-plant tagging standard used widely in India.
M1 / M2 / M3	Standard PM notification types: request, malfunction, activity report.
OEM	Original equipment manufacturer.
Planner group	The organisational unit that plans a set of orders; not the same as the work centre.
PM01–PM04	SAP standard maintenance order types used in this handout: corrective, preventive, breakdown, refurbishment.
RAP	ABAP RESTful Application Programming model; the clean-core way to build services and BOs.
SIT / UAT	System integration testing / user acceptance testing.
SPRO	The SAP IMG; the configuration tree behind most settings in this document.
TECO	Technically completed; the order is finished but not yet closed and settled.
WCM	Work Clearance Management; SAP's permit-to-work and isolation module.
WBS	Work breakdown structure; the receiver for overhaul and project-shaped orders.
Work centre	The resource that performs the operation; carries capacity and activity price.
Z-code	Custom ABAP object in the customer namespace.
ZPM1 / ZPM2	Sample custom order types for overhaul and statutory inspection.
Z1–Z5	The five custom-code samples in sections 22–26.

DOCUMENT END

This handout is a working draft for the Auraiya PM design workshops. Sample identifiers, OEM names, volumes and code are illustrative. Replace them with approved station values, re-test the code in the target release, and record every deviation from this model in the blueprint.

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