

Guideline to Map Calibration Process in SAP PM and QM Module



Applies to:

It applies all functional consultants working for PM and QM looking for Calibration process.

For more information, visit the [Enterprise Resource Planning homepage](#).

Summary

This document aims at explaining as guidelines for various ways of mapping the calibration process in QM and PM module of SAP.

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Instrument Calibration Process

Calibration is a process through which an instrument is examined with respect to a reference and set to produce accurate output.

To map the calibration process correctly various points need to be taken care for all Configuration, master data. The same is explained below.

Design of Equipment

All instrument needs calibration are to be categorized separately though standard equipment category: Q ie. "Test and Measuring Equipment". All Master calibrator instrument which are used to calibrate the instrument is to be categorized with Equipment category P i.e., Production Resources and Tools. Though Master calibrators also need calibration but in most cases, this is carried out externally i.e., from a statutory authority. Hence calibration of the same can be mapped through external services of Plant Maintenance.

Adopting the standard equipment categories in above process enable us to utilize the functionality of follow up action triggered automatically for usage decision additionally (detailed out in Usage decision follow-up action – page no- 11)

Master data uploading of all such equipment, we can use standard LSMW with IBIP structure with classification.

Design of Inspection Point & Inspection Type

Though SAP has provided standard inspection point 300 for equipment and 310 for Functional location and 14 as inspection type, however, following points may put certain additional advantage while thinking about customized inspection points.

- If Before calibration and after calibration steps are to be recorded and valued separately grouped at "Before" and "After", we can configure customized inspection point with Equipment as well as Before or After in Text Length 10 user field as below.

SPRO > Quality Management > Quality Planning > Inspection Planning > General > **Define Identifier for Inspection Points**

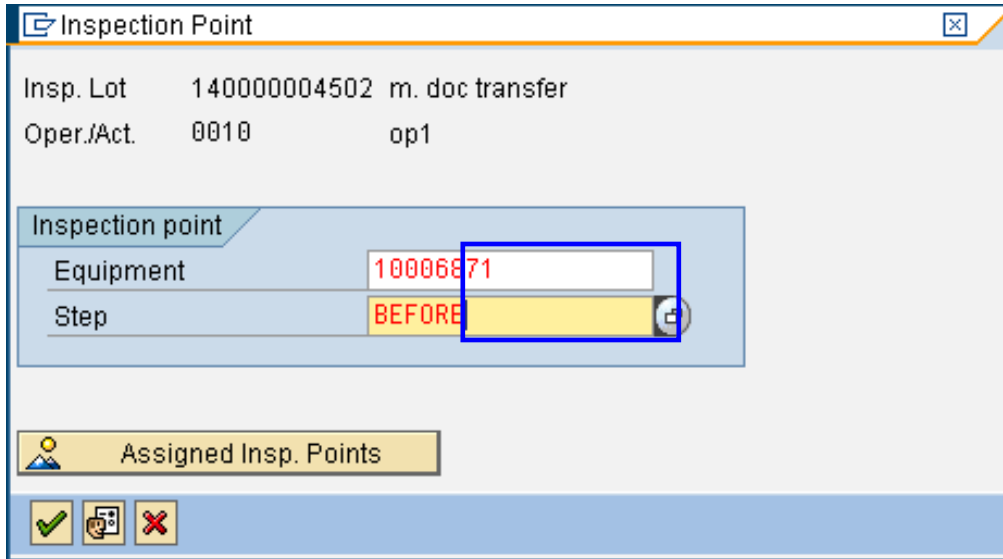
The screenshot shows the SAP SPRO configuration screen for 'Define Identifier for Inspection Points'. The title bar reads 'Change View "Inspection point/user field combination": Details'. The main configuration area is divided into several sections:

- Field combinat.:** Z00 Inspection of equipment
- InspPtype:** 1 Inspection point for equipment
- Function modules:** A blue box highlights this section.
- Predefined field (dependent on insp. point type):**

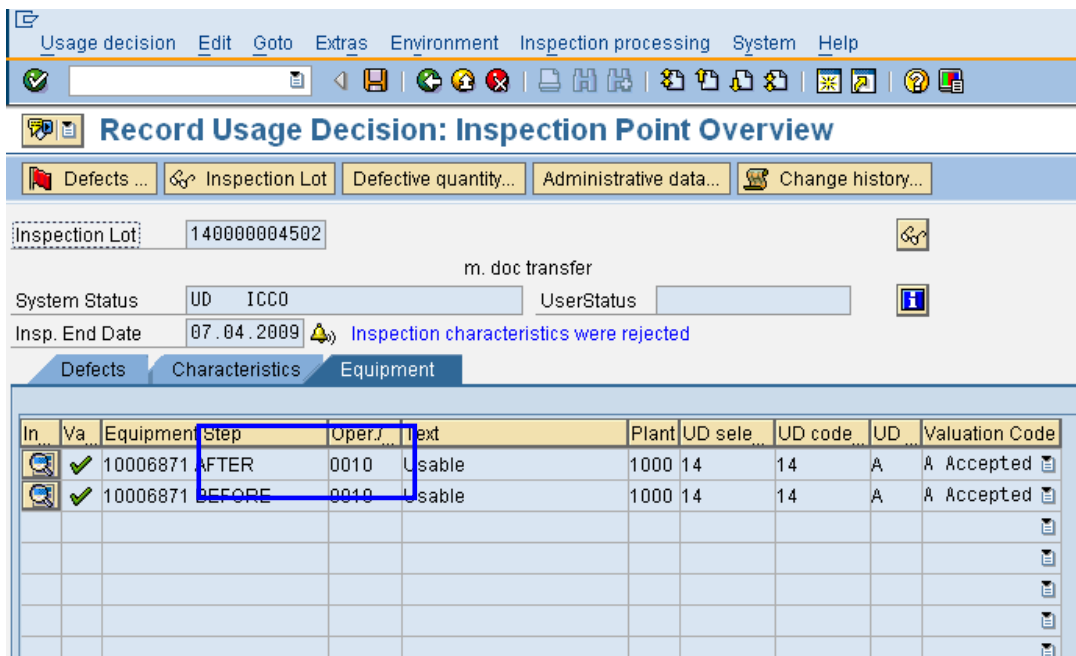
Field act.	Keyword
1	Equipment
- User fields:**

Field act.	Keyword
2	Step
- No. insp. points for char. summariz.:** 0
- Last inspected sample is valid

Furthermore, the function module can be created to restrict the F4 values of the additional User field in the function module tab.



We can do point valuation as well valuation at inspection lot level, the final UD screen will be as below.



- During defect recording process, if a notification needs to be generated, we can assign customized Inspection type to Customized Notification type (further detailed in defect recording section). The screen shown below.

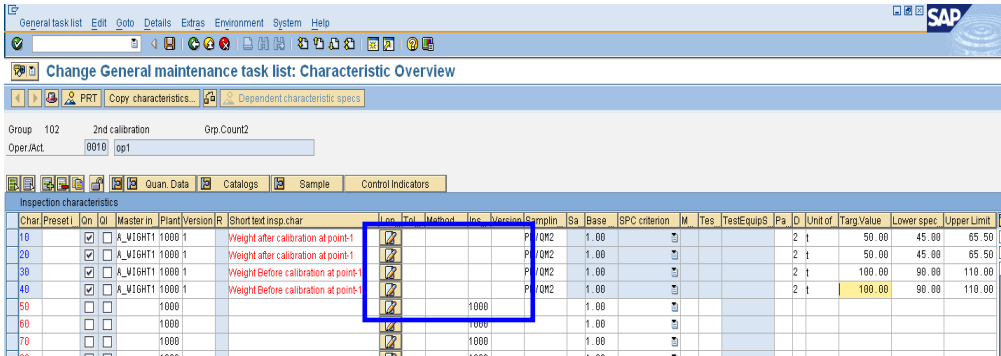
SPRO > Quality Management > Quality Planning > Quality Inspection > Inspection Lot Creation > **Maintain Inspection Types**

Design of MICs.

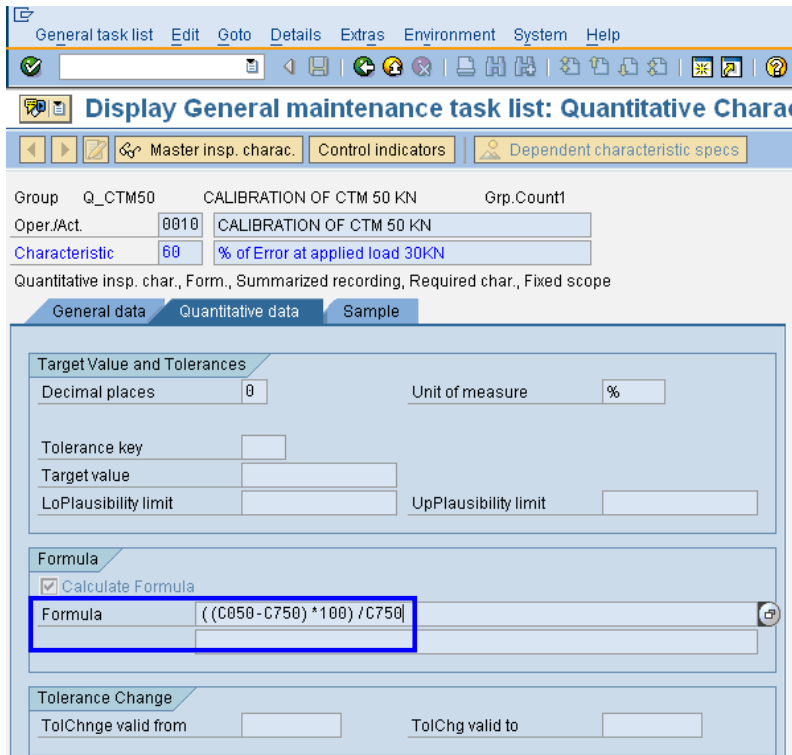
While deciding the Master inspection characteristics as master data design, following points may greatly influence the process.

- Complete/Incomplete copy model: If lower limit, upper limit, target value, control indicators are fixed and need not to be changed, we can go for complete copy model. If not, we need to use incomplete copy model and define all above during task list assignment level.
- If Before and after calibration recording calibration and valuation process are not managed by customized inspection point level as explained above, then to categorize the MICs which are for Before calibration and which are for after calibration, we may prefix B and A respectively. For example : for MIC which is for result recording of CYC 1 GAS TEMP AFTER 25% VALUE (A2_K1T14) i.e it is prefixed with A which categorizes this MIC will be used for "After Calibration". In this case, the no of MICs are going to be high.

- If we are managing the customized inspection point level and number of MIC master data maintenance is to be minimized, we can use the same MIC. The Text which is to be reflected in the Inspection lot result recording and further lot processing transaction, we can change the text as per requirement in the Task list assignment level. However, Please note that MIC result history is captured in the system is based on the MIC code. Entire master data control can be shifted from MIC to Task list assignment level as shown below.



- Calculated characteristics are used to calculate the error based on the following possibilities.
 1. Based on Formula as shown below. Here the formula used is : $((C050-C750)*100)/C750$ where C050: Arithmetic mean of measured values for char for 50 characteristics and C750 :Target value of characteristic 50. However, if for all steps, we need to define the formula the number of MIC is going to increase.



- Formula maintenance in each master data will increase based on above possibility. However, if the similar formula for Error is to be used, we can use function module (example) in SPRO> Quality Management> Quality Inspection>Results Recording> Define Parameters for Calculated Characteristics select Define Parameters for Calculated Characteristic as below. Here we are copying the standard function module "QEFC_FORMULA_CALC_EXAMPLE" and making our own logic. We can assign Y0 to each calculation instead of creating formula for each calculation. This function module is triggered when we do result recording and valuate and press close button and it processes all data available during result recording and outputs E_RESULT into the screen. In this function module we have obtained maximum absolute error % for all errors of all MICs grouped as "Before" and "After"

The screenshot shows the SAP SPRO 'Display View QM formula parameters: Details' screen. The interface includes a menu bar with 'Table View', 'Edit', 'Goto', 'Selection', 'Utilities(M)', 'System', and 'Help'. Below the menu is a toolbar with various icons. The main content area is divided into two sections: 'Parameter' and 'Origin of values'. In the 'Parameter' section, the 'Parameter' field contains 'Y0' and the 'Short text' field contains 'Function module MAX Error Cals PM'. In the 'Origin of values' section, the 'Use function module' checkbox is checked, and the 'Name of module' field contains 'ZQEFC_FORMULA_CALC_EXAM123', which is highlighted with a blue border.

Parameter	
Parameter	Y0
Short text	Function module MAX Error Cals PM

Origin of values	
<input checked="" type="checkbox"/> Use function module	
Name of module	ZQEFC_FORMULA_CALC_EXAM123

In addition to the above, if system should dynamically fetch certain constant into calculation to the function module, we can specify the same into the classification of the equipment as shown below.

The screenshot displays the SAP 'Change Equipment: General' screen. The 'Classification' section is highlighted, showing the following data:

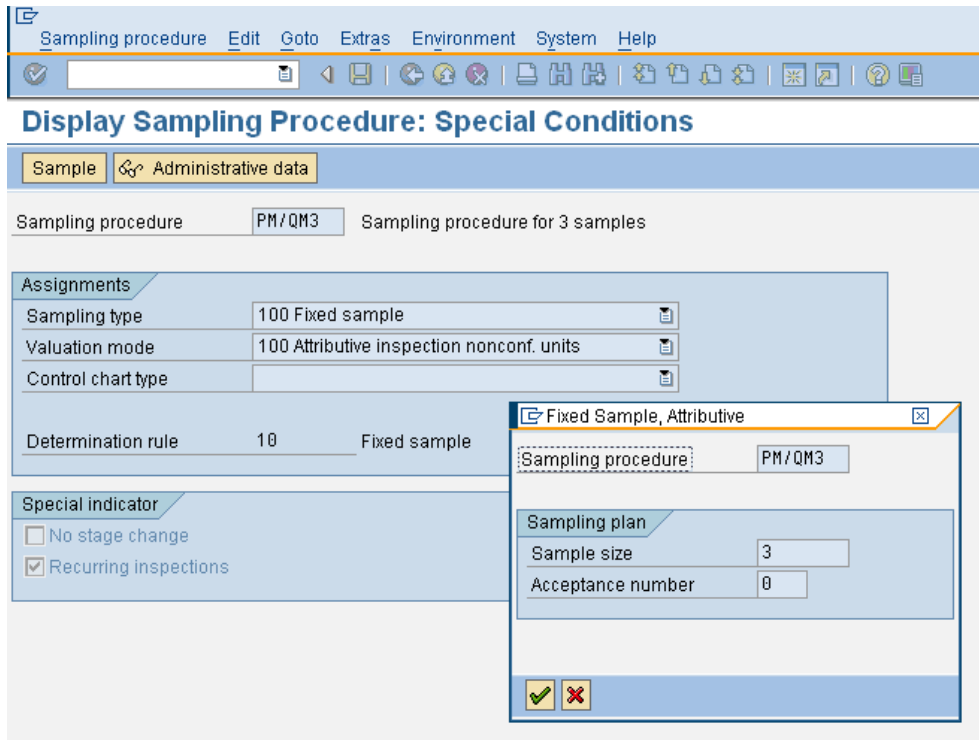
Field	Value
INSTRUMENT ID	CAL-BAL-07
INSTRUMENT LOCATION	GENERAL STORES
INSTRUMENT MAKE	TULAMAN
INSTRUMENT MODEL	GENERAL WEIGHING MACHINE
INSTRUMENT RANGE	HT-500 SERIES
INSTRUMENT SERVICE	0 TO 600 KGS
CALIBRATN RANGE FOR ERROR CAL	600

Here we are dynamically picking the Calibration range from equipment classification for error calculation to function module and calculating the error calculation. This gives flexibility to user to assign all constants, parameter for calculation and maintaining them in classification with minimum function modules.

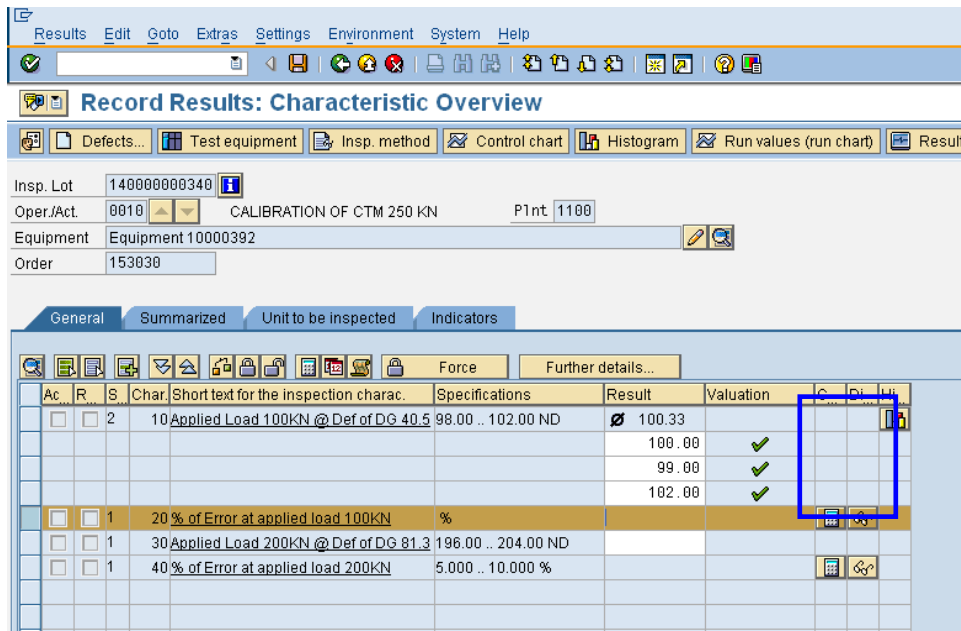
Above possibilities of calculated characteristics need to be selected judiciously to suit the requirement.

Design of Sampling Procedure:

Sometimes, during result recording, we may have requirement to record more than one sample, then we can use no of sample to record more than one results and system will calculate the arithmetic mean of all results of all sample. The sampling procedure for above case can be created as below.



Assignment of these sampling procedures will enable you to record multiple results in result recording screen as shown below.



For this we have to maintain control indicator of MIC as below. **Single result** radio button will enable us to record results based on the number of sample defined in sampling procedure.

Edit Characteristic Control Indicators

Quantitative characteristic

Type

- Lower specif. limit
- Upper specif. limit
- Check target value

Sample

- Sampling procedure
- SPC characteristic
- Additive sample
- Destructive insp.

Results confirmation

- Summ.recording
- Single result
- No charac. rec.
- Classed recording
- Defects recording
- Required char.
- Optional char.
- After accept.
- After rejection

✓ ⚠ ✖

Unless above, if we only require to record only single result for a MIC we can create a sampling procedure with no of sample as 1 and assign this to MIC in task List.

Design of Inspection Method

If laid down methods of calibration need to be mapped into calibration process, then we can create those many Inspection Methods and assign them correspondingly to each MIC of a Task list or we can assign the Method in MIC master itself.

Design of Task List

Three types of task lists are possible to use for calibration process. Mostly followed Task lists are General maintenance task list which can be created for all instrument having same calibration procedure.

In the task list we have assign the necessary inspection points (standard or customized) in header data. The task list will have one operation for calibration. Necessary MICs will be assigned this operation. Master calibrator and Tools which are PRT equipments will be assigned to this operation. Moreover, if we are using strategy task list, Maintenance package(s) needs to be assigned to operation. Uploading of task list with operation, PRTs assignment, Maint. Package assignment can be managed through standard LSMW with IBIP structures, however MIC assignment to task list operation, is not available in standard LSMW, for this we can create our own BDC.

Design of Maint. Plan and its Scheduling

Mostly calibration of instrument is done based on a single frequency, hence to make the Task list and Maint. Plan master data simple, we should use single cycle plan. Maint. Plan sort filed will play an important role in background scheduling of Maint. Plan. While configuring order type we should not maintain "Release immediately" flag. This will enable us to schedule all call objects which are generated from Maint. Plan scheduling to be in created mode so that user can release the same at his convenience.

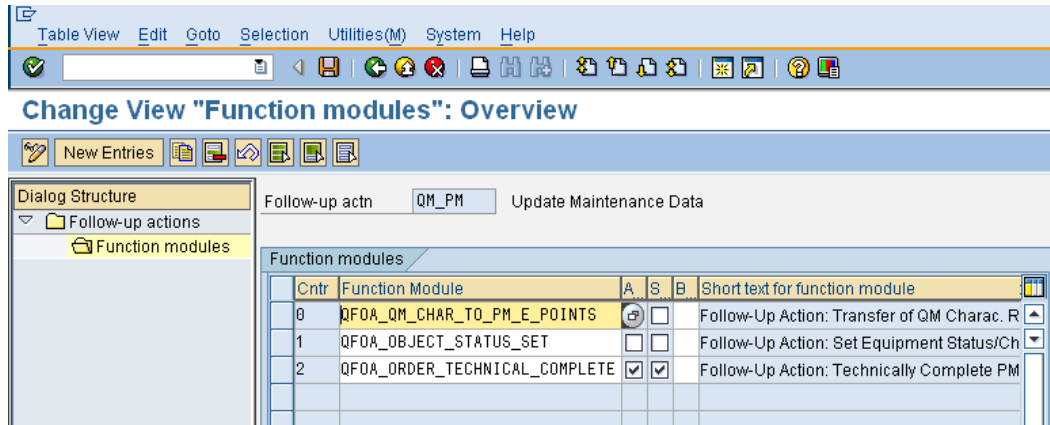
Design of Result Recording

Based on the above master data design, result recording transaction will take place.

Design of Usage Decision

Three SAP standard Follow up actions can be triggered during UD as shown below.

SPRO > Quality Management> Quality Inspection > Inspection Lot Completion > **Define Follow-Up Actions**

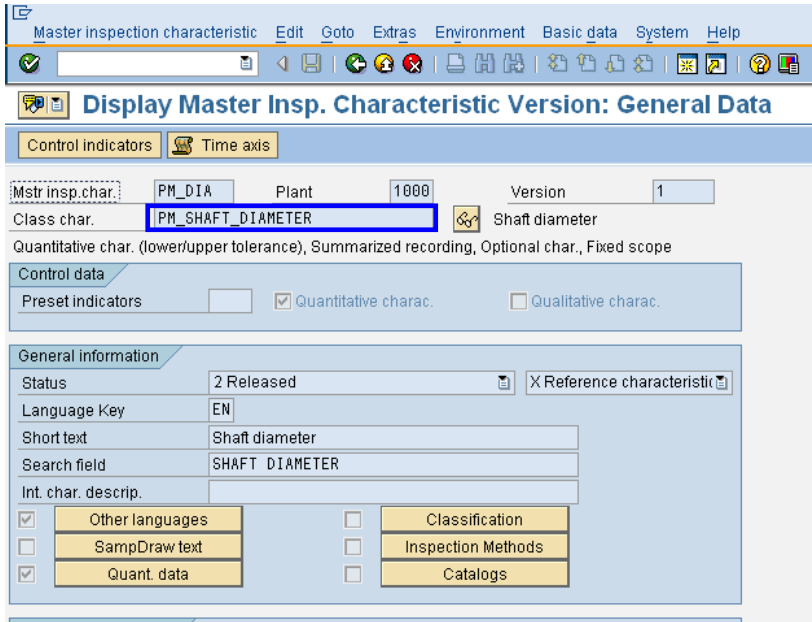


- | | | |
|---|-------------------------------|---|
| 1 | QFOA_QM_CHAR_TO_PM_E_POINTS | Follow-Up Action: Transfer of QM Charac. Results to PM Measuring Points |
| 2 | QFOA_OBJECT_STATUS_SET | Follow-Up Action: Set Equipment Status/Change Cycle Modification Factor |
| 3 | QFOA_ORDER_TECHNICAL_COMPLETE | Follow-Up Action: Technically Complete PM Order |

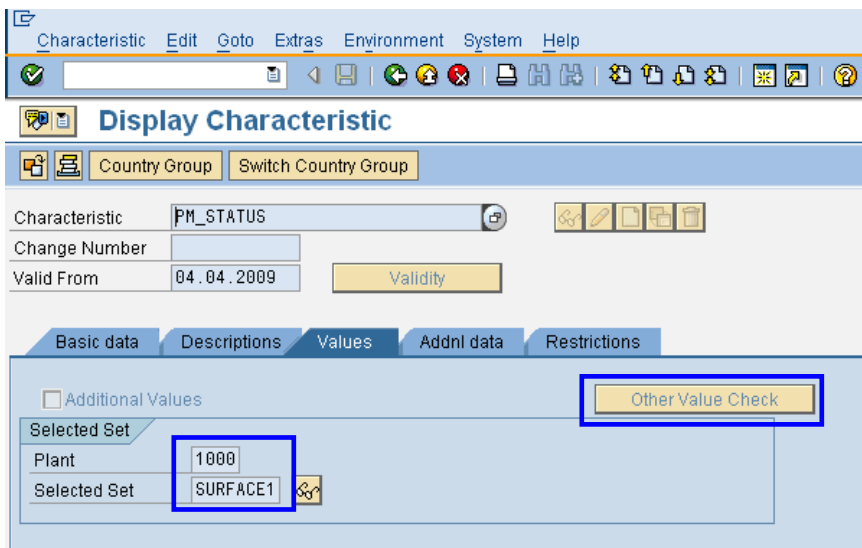
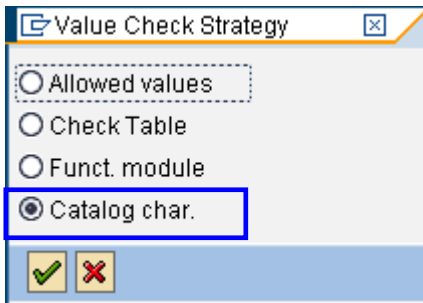
1st follow-up action can be used to transfer QM inspection results to the equipment/functional locations in PM as measurement documents. Both quantitative inspection characteristics (measured values) and qualitative inspection characteristics (characteristics with catalog attributes) are considered by the system. The link between the master inspection characteristics and the measuring points is created via a class characteristic.

For this to happen, following steps are to be followed.

1. We have to create characteristic (CT04) and assign this to the MIC from which this Measurement document is to be transferred through inspection lot as shown below.



2. The same Characteristics (CT04) to be assigned to measurement points for the same equipment. In case of Qualitative measurement, we need to create Characteristics (CT04) with selected set as shown below. This can be achieved by selecting other value Check in Value Tab. One Popup will appear in which we need to select Catalog Char Radio Button.



3. Once the Inspection lot is generated for the said equipment and result recording is done as shown below and UD is done,

Results Edit Goto Extras Settings Environment System Help

Display Results: Characteristic Overview

Insp. Lot: 140000004215
 Oper./Act: 0010 op1 P1nt: 1000
 Equipment: Equipment 10006871
 Order: 818178

General Summarized Indicators

Ac	R	S	Short text for the ins...	Specifications	Inspect	Inspected	Si	Result	Original Val	Va	D
<input checked="" type="checkbox"/>	<input type="checkbox"/>	5	Shaft diameter	155.0 .. 155.0 mm	1	1		= 155.00	155		<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>	<input type="checkbox"/>	5	Sealing length	50 .. 60 mm	1	1		= 50.0	50		<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>	<input type="checkbox"/>	5	Status	Oberfläche von Glaskö1		1		1 Perfect	1 PERFECT		<input checked="" type="checkbox"/>

4. Measurement documents will be updated which is linked from the Inspection lot > MIC > Characteristics(CT04) > Equipment > Measuring Point and the Measurement documents will be shown as below.

List Edit Goto Environment Settings System Help

Display Measurement Documents: Measurement Document List

Measurement document Measuring point

S	Measurement document	Measuring point	Date	Meas/TCRdg	Unit	Inspection Lot	Char.	CodeGrp	Code group text	Text	Val.
	1009013	11902	13.12.2008	155.0	mm	140000004215	10				
	1009014	11903	13.12.2008	50	mm		20				
	1009015	11906	13.12.2008				30	SURFACE	Surface of glass bodies	Perfect 1	
	1009011	11902	13.12.2008	156.0	mm	140000004214	10				
	1009012	11903	13.12.2008	45	mm		20				
	1009010	11902	13.12.2008	155.0	mm	140000004210	10				

2nd follow-up action can be used to set the status of the Instrument to NPRT, if UD is made as "Rejected". This is shown below. For this to happen the equipment category to be P or Q. Below pop-up comes based on the follow up action in which we can further influence the valuation and instrument status.

Status change for object

Technical Objects				
Object	Description	Current Status	Proposal	Cha
10006871	m. doc transfer	<input checked="" type="checkbox"/> ready for use	<input checked="" type="checkbox"/> ready for use	<input type="checkbox"/>

Change Status

Equipment: 10006450 Category: P Production resources/tools
 Description: test prt equipment

Status Business processes

System status		Status with status no.	
Stat	Text	No Stat	Text
<input checked="" type="checkbox"/>	AVLB Available	<input checked="" type="radio"/>	1 0001 Equipment releas. for product
<input checked="" type="checkbox"/>	NPRT PRT not ready for use	<input type="radio"/>	2 0002 Equipment avail. at warehouse
<input type="checkbox"/>		<input type="radio"/>	3 0003 Equipment damaged in wareh
<input type="checkbox"/>		<input type="radio"/>	4 0004 Equipment being repaired
<input type="checkbox"/>		<input type="radio"/>	5 0005 Equipment at contractor loc.

3rd follow-up action can be used to technically complete the Maintenance order once UD is done. For this we should use confirmation during saving result recording screen (pop-up) as shown below. It calls directly IW41 transaction and further operation confirmation can be carried out subsequently.

The screenshot shows the SAP 'Record Results: Characteristic Overview' interface. The main window displays inspection data for a specific lot and equipment. A 'Valuation' pop-up window is open, allowing the user to confirm the inspection results. The 'Confirmation' button in the pop-up is highlighted with a blue box.

Record Results: Characteristic Overview

Insp. Lot: 140000004500
 Oper./Act: 0010 op1 P1nt 1000
 Equipment: Equipment 10006871
 Order: 818545

General Summarized Indicators

Ac	R	S	Short text for the ins...	Specifications	Inspect	Inspected	Si	Result	Original Val	Va	Defect cl.	Al
<input checked="" type="checkbox"/>	<input type="checkbox"/>	5	Shaft diameter	155.0 .. 155.0 MM	1	1	=	155.00	155	✓		
<input checked="" type="checkbox"/>	<input type="checkbox"/>	5	Sealing length	50 .. 60 MM	1	1	=	55.0	55	✓		
<input type="checkbox"/>	<input checked="" type="checkbox"/>	5	Status	OBERFLÄCHE VON GI				3 DIRTY	3 DIRTY	✗	04 Min	

Valuation

Object for inspection
 Equipment 10006871

Confirmation

Valuate inspection point
 Proposal
 Valuation: Cannot be Used

Valuation

Design of Defect Recording

During calibration, if we need to track repetitive defect, we can record defect based on object part, Cause, Activities carried out to further record what activity carried out for setting the defect right for that instrument. The generated notification from defect recording screen is shown below.

The screenshot displays the SAP PM notification interface. At the top, there is a menu bar with options: Maintenance notification, Edit, Goto, Extras, Environment, System, and Help. Below the menu is a toolbar with various icons. The main title of the screen is "Create PM Notification: Error msg. from QM".

The notification details are as follows:

- Notification: %0000000001 MQ Repititive Problem
- Status: OSNO
- Order:

The interface is divided into several tabs: Object, Overview, Documents, Items, Tasks, Activities, and Dates. The "Object" tab is currently selected, showing the following fields:

- Reference object:** Functional loc., Equipment (10006871), Assembly.
- Responsibilities:** Planner Group (100 / 1000) Hr. Weber, Main WorkCtr (RM-MECH / 1000) Mechanical Raw mill, Person Responsi, Reported by (SHIBA), Notif.date (04.04.2009 13:24:57).
- Reference Documents:** Reference notif, Inspection Lot (14000004501).
- Item:** Object part (BLOWER 0001) inlet cone, Defect type (F-300 1) Incorrect Type, Text, Cause code, Cause text.

At the bottom right of the form, there is an "Entry" field with the value "1 frm 1".

Design of Certificate (Inspection Report) Printing

Calibration certificate can be printed from T code: QGA3. However, the format of standard SAP may not be acceptable to customer. Hence, we can use the same T-code and get our forms customized as shown below.

The screenshot displays the SAP QGA3 'Result Printout' interface. At the top, there is a menu bar with 'Program', 'Edit', 'Goto', 'System', and 'Help'. Below the menu is a toolbar with various icons. The main content area is divided into several sections:

- Inspection lot selection:** Contains input fields for 'Selection Profile', 'Inspection Lot' (with a 'to' field and a right arrow icon), and 'Maximum No. of Hits' (set to 50).
- Select inspection lots II:** A table-like structure with fields for 'End date' (28.03.2009 to 04.04.2009), 'Plant', 'Origin', 'Inspection Type', 'Batch', 'Material', 'Operation', and 'Partial lot'. Each field has a 'to' field and a right arrow icon.
- Texts:** A list of checkboxes:
 - Inspection descriptions
 - Long texts for insp. characs.
 - Long texts for UD
 - Long texts for lots/part. lots
- Extras:** A list of checkboxes:
 - Part. lot view for prod. lots
 - Defects
 - Single values/class values
 - Samples
- Print parameters:** Contains a 'Form' field with the value 'ziis_calibration' (highlighted with a blue box) and a 'Print dialog' checkbox which is checked.

Advantage of using standard T-code is that the same can be called from so many standard T code like QA32 etc. This is to be developed in SAP script.

A typical output is shown as below.

Text Edit Goto System Help

Print Preview of CANON Printer Page 00001 of 00001

CALIBRATION REPORT

Dept : Instrumentation	Date: 01.04.2009
Inspection lot no:140000000316	Maint.Order: 1000694
Maintenance plan no:000001000560	
Instrument code:10002883	WHB FEED WATER FLOW
Functional Location:VZ-CL-COG-FWS	

INSTRUMENT IDFT1024A	INSTRUMENT LOCATION NEAR WHB MAIN STEAM
STOP MOV	
INSTRUMENT MAKEROSEMOUNT	INSTRUMENT MODEL WHB FEED WATER FLOW
INSTRUMENT RANGE3051CD2A02A1A5M5	INSTRUMENT SERVICE 0 TO 4028 MMWC
CALIBRATN RANGE FOR ERROR CALC4028	

	Set Point Description	Target Value	UOM	Measured Value
Before	FLOW AT 0% BEFORE CAL IS	0.00	mmW	9.10
After	FLOW AT 0% AFTER CAL IS	0.00	mmW	9.50
Before	FLOW AT 25% BEFORE CAL IS	1007	mmW	1016
After	FLOW AT 25% AFTER CAL IS	1007	mmW	1016
Before	FLOW AT 50% BEFORE CAL IS	2014	mmW	2034
After	FLOW AT 50% AFTER CAL IS	2014	mmW	2034
Before	FLOW AT 75% BEFORE CAL IS	3021	mmW	3051
After	FLOW AT 75% AFTER CAL IS	3021	mmW	3051
Before	FLOW AT 100% BEFORE CAL IS	4028	mmW	4000
After	FLOW AT 100% AFTER CAL IS	4028	mmW	4000
Before	% OF ERROR BEFORE CALIBTRATION	0.00	%	0.75
After	% OF ERROR AFTER CALIBRATION	0.00	%	0.75

Task list used : FT001; 12; FLOW TX RANGE:0 TO 4028 MMWC

Master Calibration Details :

Final usage decision : A: Can be used

Next Due Date: 01.04.2009

Remarks:

Calibrated by:	Verified by:	Authorised by:
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If the customer is using various formats in legacy, we can work upon the information contained in the various formats and try to come out with single generic format which will suffice the purpose.

The output contains various information like header information in which detail of header inspection lot, department, maint. Order, Instrument etc are printed.

The next block contain all constants, all other details need to be printed for that instrument. This can be maintained in the equipment classification. By maintaining in the equipment classification gives us flexibility to add no of characteristics to be printed based on instrument and not fixed based on the format.

The next block contains all MIC description, UOM, Target Value and Measured values from Inspection lot. Here error calculated is stored as result and printed. If you want to print only the error step wise, we can calculate in customized form program and print it.

Related Content

www.help.sap.com

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