

Plant Maintenance EBM Preventive Maintenance Training

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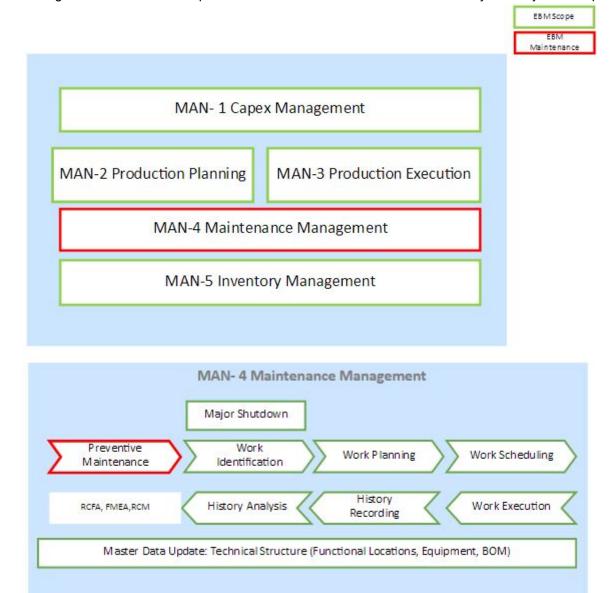


1. Introduction

This is the document that provides all the necessary information to enable the End User to perform their daily activities of SAP, related to preventive maintenance process, on the respective go-life date, in line with the following criteria:

- Speed of execution of tasks
- Quality of data entry
- Compliance with management rules
- Maximum user ease

Throughout this document explains in detail each of the activities necessary to carry out the process.



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Glossary & Abbreviations

The table below lists all the abbreviations used in the document with their complete description.

Abbreviation	Description				
B2R	Book to Report				
ВОМ	Bill of Materials				
CEM	Cement				
EBM	European Business Model				
FMEA	Failure Mode and Effect Analysis				
GI	Good Issue				
GR	Good Receipt				
GWOS	Graphical Work Order Scheduling				
KPI	Key Performance Indicator				
MAN	Manufacturing				
MR	Maintenance Request				
MRP	Material Requirement Planning				
O2C	Order to Cash				
P2P	Procurement				
PM	Plant Maintenance				
РО	Purchase Order				
PPI	Process Performance Indicator				
PR	Purchase Request				
RCFA	Root Cause Failure Analysis				
RCM	Reliability-Centered Maintenance				
SES	Service Entry Sheet				
WO	Maintenance Work order				

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WOMC	Work Order Mass Change
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2. Business Process

2.1 Preventive maintenance

Preventive Maintenance activities are cost-effective maintenance tasks carried out at predetermined intervals (time intervals, counter intervals) to check the current physical condition, to reduce probability and/or impact of a failure in operation, or to maintain a desired level of performance of an equipment. Preventive maintenance activities are also **necessary due to safety and environmental reasons**, and they require coordination with procurement/vendors in order to have the necessary spare parts and maintenance tools ready and third party services available on time. Maintenance plans are developed in order to plan resource assignments and schedule on time the needed maintenance operations.

The objective of this process is to establish a systematic approach to implement, control, and update the Preventive Maintenance program.

This process intends to establish a homogeneous standard system in LafargeHolcim to assess and evaluate the Preventive Maintenance flow in practice and in SAP PM.

The main elements of the Preventive Maintenance assessment are:

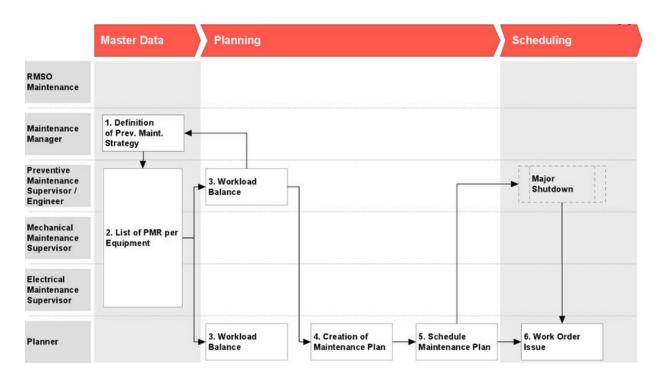
- Tasks lists: definition of the sequence of maintenance tasks and resources for work planning and scheduling.
- Work load balance: establishing a constant preventive tasks work load taking into account the frequency and the risk profile.
- Maintenance Strategies: definition of the rules and general scheduling information for preventive maintenance activities.
- Maintenance Items: Identify the objects where the maintenance tasks are performed.
- Maintenance Plan: describes a specific schedule for preventive maintenance tasks.

2.2 Preventive Maintenance Process flow

Below it is represented the preventive maintenance, highlighting the main activities that has to be done during the process as well as the actors to perform them.

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#	Step Name	Input	Description of Step	Output	
1	Prev. Maint. • Hierarchy Strategy • RMSO		Definition of the general scheduling information for the PMRs. With the packages it will define the when and the frequency of generation of the maintenance calls. Definition of the PMR to be implemented	Preventive Maintenance Strategy	
2	List of PMR per		Task list Department Duration Workforce requirements Recommended Frequency Materials Services		
3	Workload balance	Task lists	Task lists distribution through time and based on recommended frequency and risk profile in order not to have weekly workload peaks.	PMRs Master Schedule	
4	Maintenance - Maintenance Strategy specifies the dates, see		Elaboration of the Maintenance Plan which specifies the dates, sequences, and tasks to be performed upon maintenance objects.	Maintenance Item Maintenance Plan	
5	Maintenance creation upon the maintenance plan		Launch the maintenance plan for work order creation upon the specific details defined in the maintenance plan being schedule Setup deadline monitoring	System setup for PM02 Work Orders generation	
6	Work Order Issue	Deadline monitoring for PM02 Work Orders	Release the work orders through Deadline Monitoring	Automatic release of PM02 Work Orders	

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3.1 RACI Matrix

#	Step Name	Plant Manager	Maintenance Manager	Preventive Maintenance Superv. / Eng.	Mechanical Maintenance Supervisor	Electrical Maintenance Supervisor	Planner ²
1	Definition of Prev. Maintenance Strategy	C, I	Α*	C, I		1	I.
2	List of PMR per Equipment		A	R	R	R	C, I
3	Workload Balance		A	R	C, I	C,1	R
4	Creation of Maintenance Plan			A	C, I	C,1	R
5	Schedule Main tenance Plan			A	C, I	C,1	R
6	Work Order Issue		-	A	1	1	R

RACI definitions:

- Responsible: role working on the activity; the "doer".
- Accountable: role with authority; "the buck stops here"
- Consulted: role involved prior to decision or action; "in the loop"; two-way communication.
- <u>Informed</u>: role that needs to know of the decision or action; "keep in the picture"; one-way communication.

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3. Preventive Maintenance

3.1 Introduction

The preventive maintenance team, based on the data from manufacturers, the EMEA analysis performed, the existing PMRs, the equipment history analysis, the input and guidance given by LHGRS and local RMSO, is defining the maintenance strategy for the equipment of the plant, starting with the most critical (criticality A equipment).

The content of the strategy is basically focusing on the activities to be performed to minimize the risks of unplanned failures and to ensure proper and timely detection of deviations on equipment status. It means that the correct input for general scheduling information for the PMRs is pre-defined through packages (generation of maintenance calls) and the list of PMRs to be implemented.

The Production Check Sheet are defined and agreed in a shared responsibility with Production team.

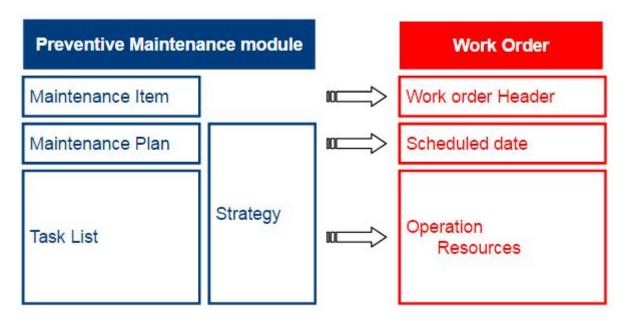
For SAP point of view four main object are needed to be created in order to automatically run the preventive order creation:

Maintenance Items

Maintenance plan

Maintenance task list

Maintenance strategies



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3.2 Preventive master data creation

3.3 List of PMR per equipment

The PMRs foreseen to be implemented at equipment level have to be more precisely defined. This is done by preparing the task lists, which include:

- · Operations (description of the activity to be performed)
- Duration (time planned to perform the activity)
- · Workforce requirements (number of workers to be assigned to the activity)
- Recommended Frequency (standard time horizon between two occurrences of the activity to be performed)
- · Materials (required for the activity, e.g. quantity of lubricant to be applied)
- Services (third party services required to perform the activity, e.g. service entry sheet calling on the service contract for Lifts).
- · Documents created in DMS

The PMRs are gradually consolidated per equipment, area, location and plant for the next process step.

General Task List

General maintenance task lists are task lists that do not refer to a specific technical object. Using general maintenance tasks lists, it is possible to define and manage sequences of maintenance tasks, and use them for work scheduling.

Furthermore, these tasks lists can be used as reference when creating functional location or equipment task lists.

As they are general, it is not possible to attach a component list to them.

Naming/Numbering Conventions

Task lists are organized by group (e.g.: for Kiln) thanks to naming/numbering convention. A group counter (sub group) separates the different task lists in one group. A group is common for all OpCos, but the task list itself is defined by planning plant. If no specific naming convention is defined, group can be used for different plants. It is therefore recommended to apply the following naming convention for general task list:

Always start with the ACS code of the plant.

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The rest of the code can use the task list in Cauldon plant: CLDX-WBIM

Task List for Equipment (to be avoided)

Equipment task lists are linked to one piece of equipment. Equipment task lists can help to prepare maintenance plans and orders. With equipment task lists, a maintenance task for a piece of equipment can be centrally defined and managed.

Task List for Functional Location

Functional location task lists are linked to one functional location. Functional location task lists can help to prepare maintenance plans and orders.

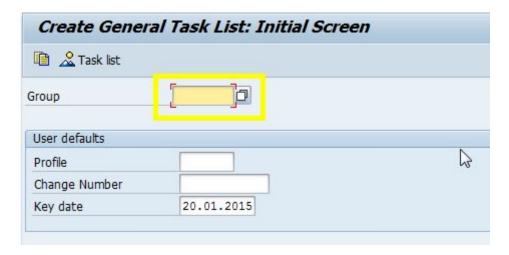
With functional location task lists, a maintenance task for the functional location can be centrally defined and managed.

3.3.1.1 Manual Creation of a task list

Standard way to create Maintenance task list in SAP

Main menu	Logistic>Plant Maintenance>Preventive Maintenance>Work Scheduling>Task list>general Maintenance task list
Transaction code	IA05

Following screen will appear



Enter the group base on following codification

Naming Convention

Always start with the ACS Plant Code

CLDX

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General Task List

For Walk By Inspection use WBI

Mechanical WBI

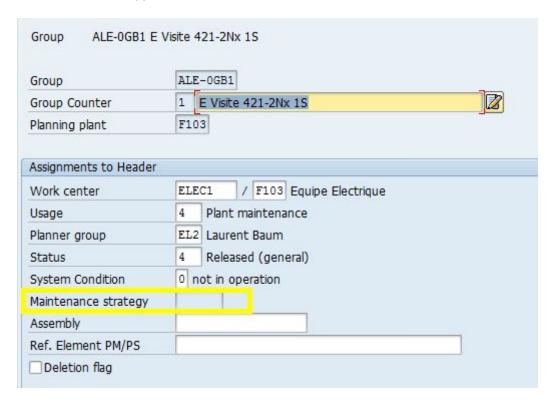
CLDX-WBI CLDX-WBIM

Task List for Functional Locations Functional location LHAC code

CLDX.632

• System automatically assigns a sequential number Group Counter for each task list

Fulfill the data that appear in the next screen:

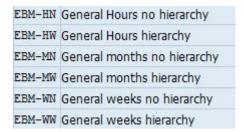


- Task list description
- Default work center
- Planner group assigned
- Status (always 4 if the task list is ready to be use)
- System condition

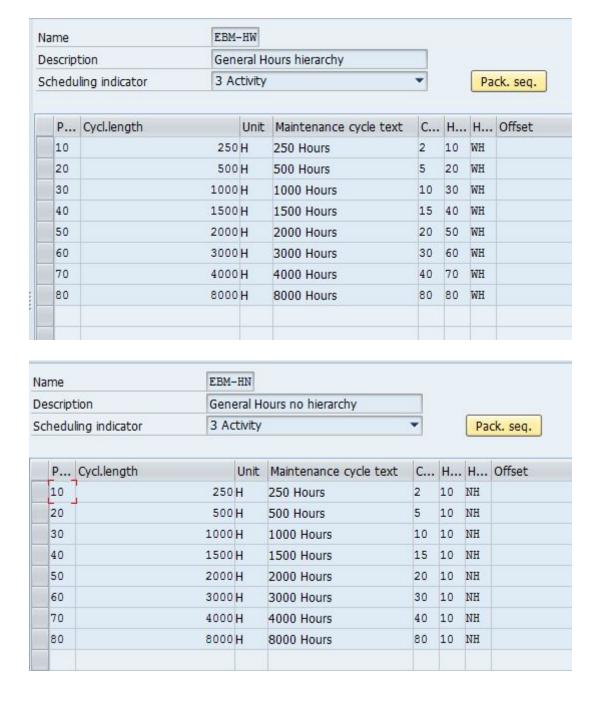
Strategy should to be enter if task list is defined following a predetermine sequence. EBM has defined 6 main strategies

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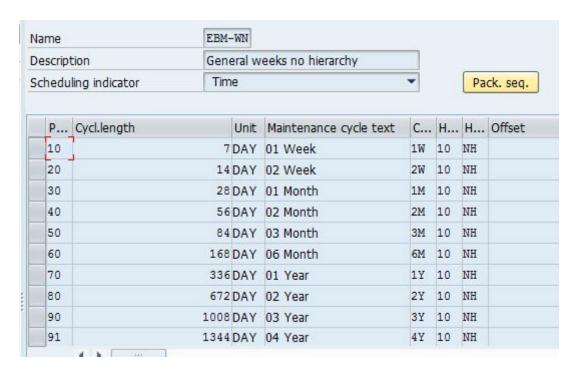
The hierarchy represent it used to determine in case that two package has to be executed in the same time which one should be executed.



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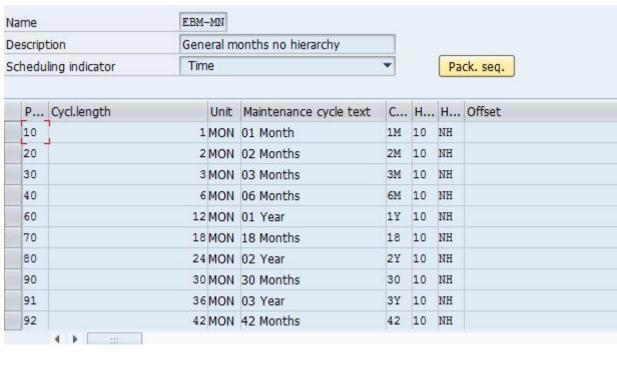


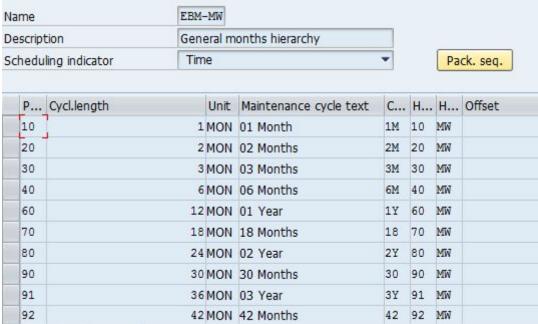
lame		EBM-W	***		_			
escrip	tion	Gener	al w	eeks hierarchy				
chedu	uling indicator	Time	9		*		Pa	ck. seq.
						,		
P	Cycl.length	U	Jnit	Maintenance cycle text	C	Н	н	Offset
10		7 D	AY	01 Week	1W	10	WW	
20	1	14 D	AY	02 Week	2W	20	WW	
30		28 D	AY	01 Month	1M	30	WW	
40		56 D	AY	02 Month	2M	40	WW	
50		84 D	AY	03 Month	ЗМ	50	WW	
60		168 D	AY	06 Month	6M	60	WW	
70		336 D	AY	01 Year	14	70	WW	
80		672 D	AY	02 Year	2Y	80	WW	
90		1008 D	AY	03 Year	3Y	90	WW	
91		1344 D	AY	04 Year	44	91	WW	



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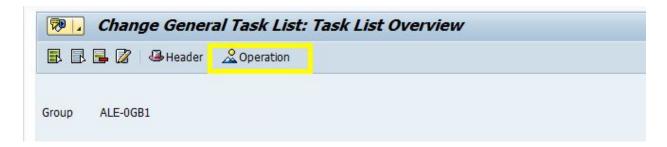


Strategies are defined at EITS level

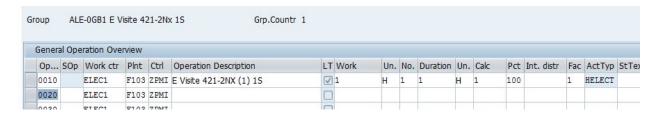
Once is enter please open the operation screen by clicking the Operation button

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Enter here the operation details



For functional location and equipment the way the transaction is running is the same. Just change the transaction to be enter

Task List Type	Creation	Change	Display	
Functional Location	IA11	IA12	IA13	
Equipment	IA01	IA02	IA03	
General	IA05	IA06	IA07	

3.3.1.2 Manual Creation of maintenance plans

Maintenance plans define the scheduling process which will allows SAP to generate Maintenance Call

Main Menu	Logistic>Plant	Maintenance>Preventive			
	Maintenance>Maintenance plans>Create				
Transaction Code	IP01, IP41, IP42				

Maintenance Item combines PM Technical objects with the Task List and provides the 'header' information for the PM02 work order. Several items can be added to the same maintenance plan

Enter in the IP01 transaction and fulfill the following info.

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Naming Convention

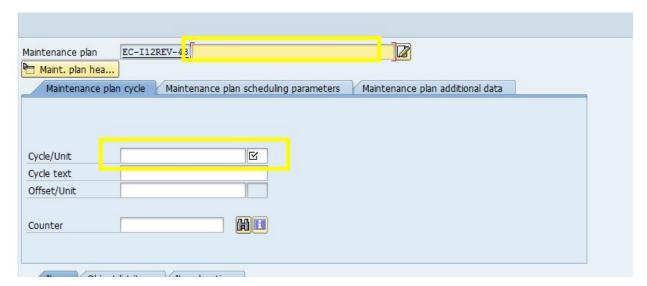
Start with ACS Plant Code
 Line
 CLDX-5
 Trades (M, E, Lub, PM etc)
 Type of maintenance (WBI, NDT)
 Increment number
 CLDX-5MWBI
 CLDX-5MWBI
 CLDX-5MWBI01

The plan category also has to be chosen, two options can be selected

- Notification
- Maintenance order

Depending of the selected one, the plan will generate notification or will generate preventive maintenance order

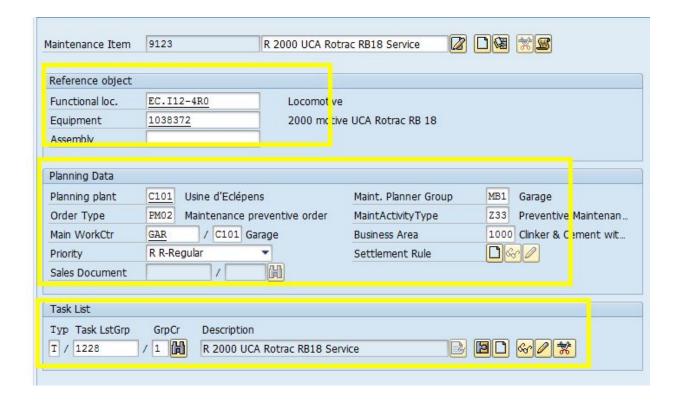
Once all the data above is selected we will access to a next screen:



We should enter the plan description and as well the cycle and units of the plan (in the case of single plan) if we chose strategy plan we should select first the strategy (explained above). Also if the plan depend of a counter we should indicate it.

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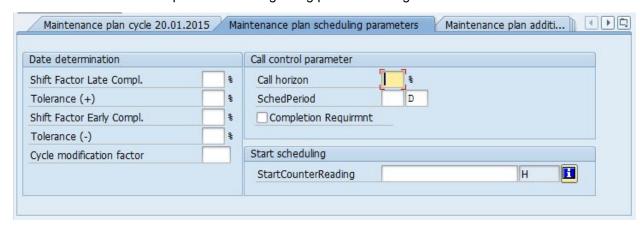
During the creation of the item three main block will appear



It is necessary to indicate for the first one the technical object that is affected

For the second one the planning data that the maintenance order generated will adopt
and for the third one the task list for the operation data

Once it is filled we can complete the data regarding plan scheduling and classification



Call Horizon: by default 80%

Scheduling Period: 91 days by default

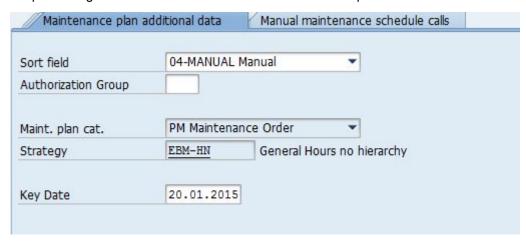
if Packages Length >3month then use 1 YR

By default this information are coming from the Strategies

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For plan categorization we need to fill data of Maintenance plan additional data tab



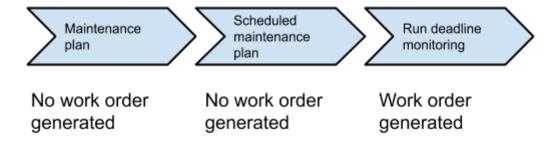
Sort field setup an automatic deadline monitoring

Define 4 Sort fields

- Auto 1 Year: Creation of Maintenance order for the next year
- Auto 13 weeks: Creation of Maintenance order for the next 13 weeks
- Auto 30days: Creation of Maintenance order for the next 30 days
- Auto 1 week: Creation of Maintenance order for the next 7 days
- **Manual**: Maintenance order to be created manually

3.3.1.3 Maintenance plan work order generation

Once we have set up the maintenance plan we can scheduled it. But for work order creation it necessary to run the deadline monitoring.



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3.3.1.4 Scheduling maintenance plan

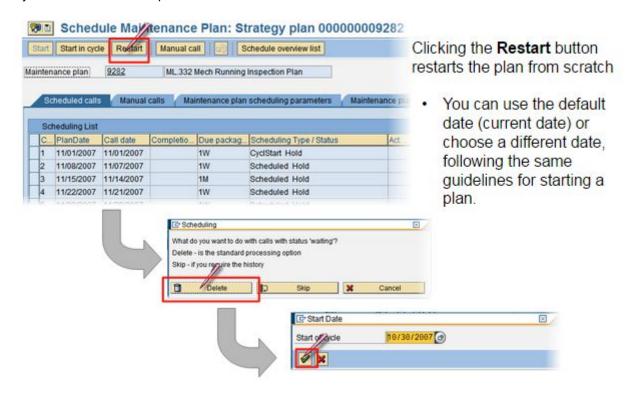
Main Menu	Logistic>Plant	Maintenance>Preventive
	Maintenance>Maintenance plans>Schedule	planings>Scheduling of maintenance
Transaction Code	IP10	

Select the maintenance plan you want to schedule

Click start and enter the date you want to start the plan



If you want to restart the plan



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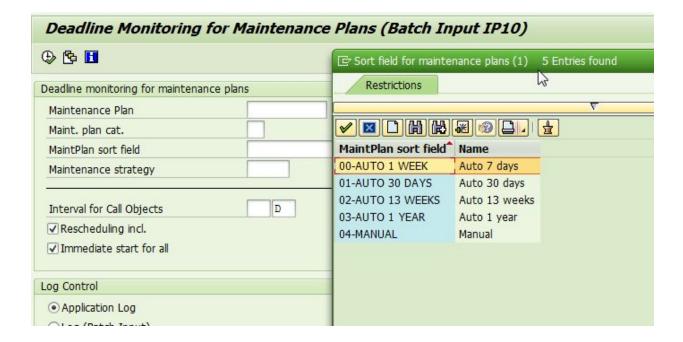


If the plan is already on going and you can call a task you can use the offset field. This will call the task closed to the offset data.

3.2 Maintenance deadline monitoring

The deadline monitoring is a tool that allow the generation of maintenance orders. Based on EBM agreement the deadline monitoring will be run based on sort field plan classification.

Main Menu	Logistic>Plant Maintenance>Maintenance plans>Dead line monitoring	Maintenance>Preventive planings>Scheduling of maintenance
Transaction Code	IP30	



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An automatic job will run based on time predefined framework (1 week, 30 days, 90 days, 1 year)

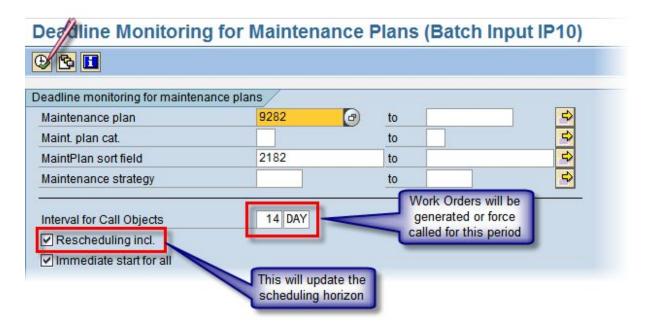
Depending how the plan has been set up, will be part of the job and the maintenance order will be created.

Also can be created manually selecting manual option.

Deadline monitoring essentially can run IP10 for multiple Plans

It has 2 basic functions:

- 1. To force call (generate) Orders from Plans through a specified number of days
- 2. To update the scheduling horizon

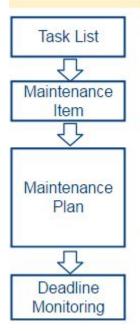


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3.3 Summary

Steps to create a maintenance plan



- Create a Task List IA05
 - Group Name Task always starts with: SH (max 8 Char)
- Create the Maintenance Plan IP01
 - · Maintenance Plan always start with SH
 - Create your Maintenance Item and assign the task list
- Schedule Maintenance Plan IP10
 - Start in Cycle
 - · Assign the last execution date of the task
 - Define which Package was executed
 - · Check the sequence of maintenance call

3.4 Indicators

A solid, understandable and comparable base of performance measurements is needed if an organization wants to understand where the opportunities lie for improvement, wants to capitalize on those opportunities and wants to evade slipping back. Comparing performance indicators - along the time axis or between organizations - creates a learning challenge and gives management a tool to follow up on the progress of ongoing as well as on the sustainability of completed projects.

During the planing process of the work order several indicators will be impacted, on the following lines you will find main indicators affected by this step and how indicators interact during planing process

Maintenance relevant indicators are structured based on their intention and on the relevant requirements on the different management levels. Two different types of indicators are defined:

• KPI: Key Performance Indicators (K)

Key Performance Indicators are quantifiable measurements, defined upfront, that reflect the critical success factors of an organization. Key Performance Indicators usually are long-term considerations and the definition of what they are and how they are measured do not change often. KPI's are typical lagging indicators that reflect on a high level (e.g. management level 1 and 2) the historical performance of an organization.

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A KPI is the necessary information to manage a particular part of the business on different management levels. In regards to maintenance relevant indicators, the maintenance KPI's shall focus on:

- Specific, uniform targets
- Long-term targets
- Shall be compared / benchmarked on a global level
- Typical lagging indicator (consequence of many leading indicators System and Process Performance indicator)

SPI: System & Process Performance Indicators (S)

Complementary to the KPI's, the SPI's are an additional set of leading indicators in which the local management can select the appropriate one. The SPI's are therefore useful as short-term predictors of the performance. In addition they shall provide indications how well maintenance processes are in use in order to provide most effective support to the maintenance management system. The SPI's are mainly used by the direct responsible at plant level and shall focus on:

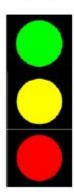
- Specific ranges or references
- Short-long term reference
- Local or regional review (e.g. audit)
- Reference to Quality of Maintenance
- SAP-Maintenance (old MAC SAP) standard compliance

The target and reference value define in this document has been defined based on Holcim experience. However some new indicators will need adjustment of target after analysis of actual results, for these indicators estimation has been discussed among LafargeHolcim maintenance community

S7.-PMR%

The PMR% is an indicator to measure the quantity of completed PMR's compared with all the maintenance work performed.

Target / Reference Value / Range



Range between 15% to 30%.

Between 30% and 50 % or between 10% and 15%

> 50%. Or < 10%

(K5) PMR efficiency (%)

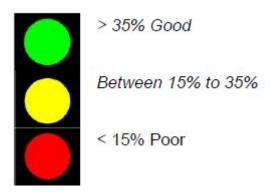
Number of maintenance work request from preventive maintenance vs. work requests.

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PMR Efficiency = # Maintenance request created from completed PM02
Work Orders x 100
of Maintenance request

Target / Reference Value / Range



S7.-PMR not performance

It is the number of PMR performed divided by the total number of PMR. The purpose is measure the quantity of PMR not executed. On an optimized preventive maintenance program all preventive maintenance tasks must be performed.

Reference Value / Range



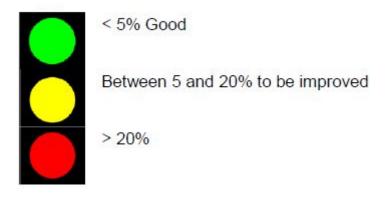
S11.-PM02 manual call ratio

Number of preventive maintenance work orders that were called or created manually in SAP (not using the Deadline monitoring) in reference to the total number of work orders.

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Reference Value / Range



4. Annexes

4.1 Table of transaction

Transaction	Description
IW21	Create a Maintenance Notification
IW22	Change a Maintenance Notification
IW23	Display aMaintenance Notification
IW27	Assign Deletion flag to Completed Notifications
IW28	Selection of Notification List (Change mode)
IW29	Selection of Work Order List (Display mode)
IH01	Technical Structure Display
ZPM001	Notification from Preventive
/N/PROGROUP/NAV	Prometheus Navigator

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