



From Theory to Practice: Applying FMEA for Reliability Centered Maintenance (RCM) with EAM360's RCM Add On for **IBM Maximo**











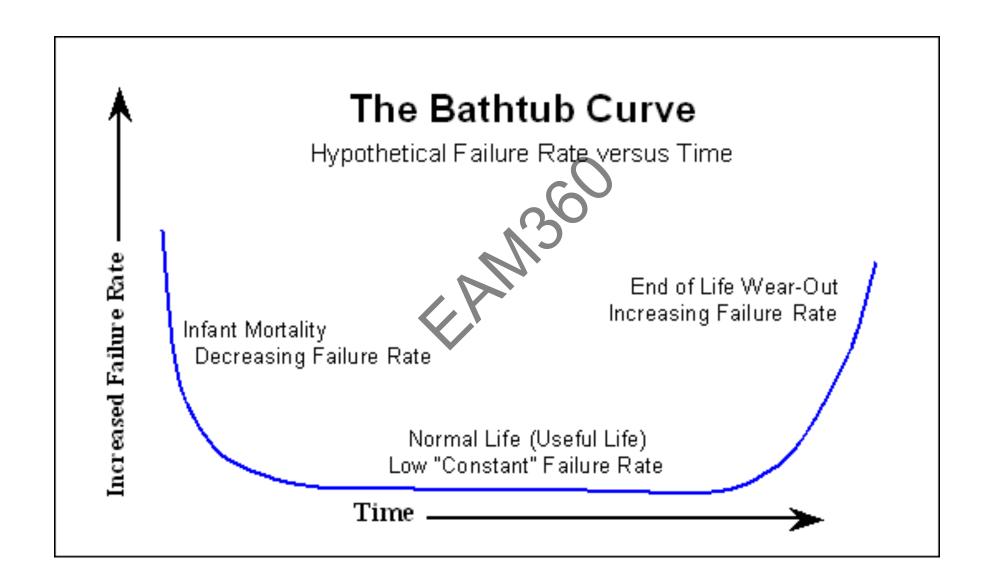
Presenter's Introduction



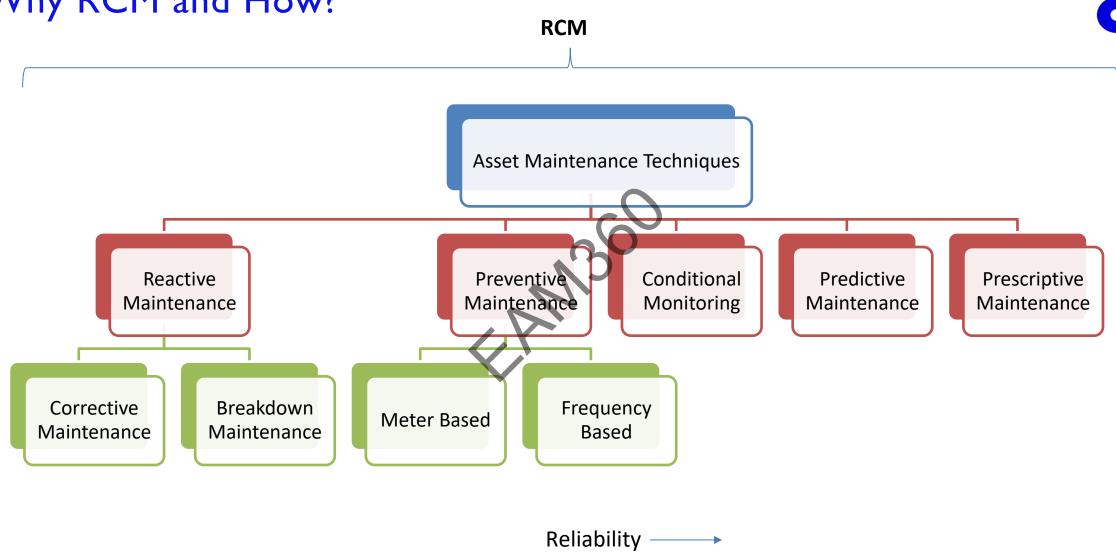
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The Bathtub Curve – Flatten the Curve



Why RCM and How?



FMEA for Asset Management





Failure

• Define Function and Failure – Map Failure Class, Criticality Analysis with each Asset/Location



Mode

• What cause each failure - Problem Identification



Effect

• What happen on each failure - CM/BD Work Order, Downtime, Incident,

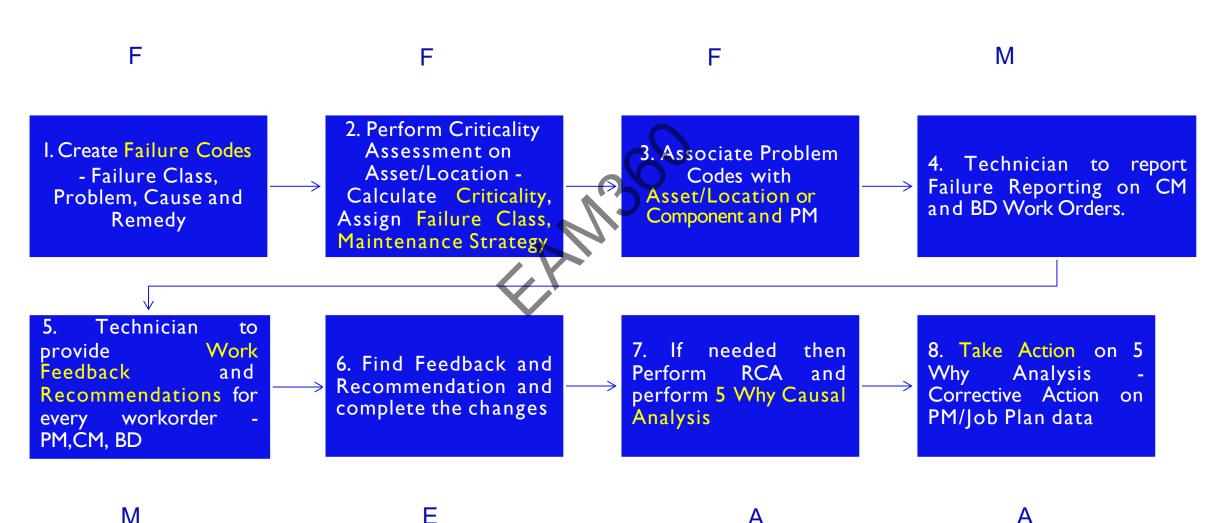


Analysis

• What should be done to Prevent/Predict Failure - Create New PM, Update

FMEA/FMECA Process Flow in Maximo - RCM

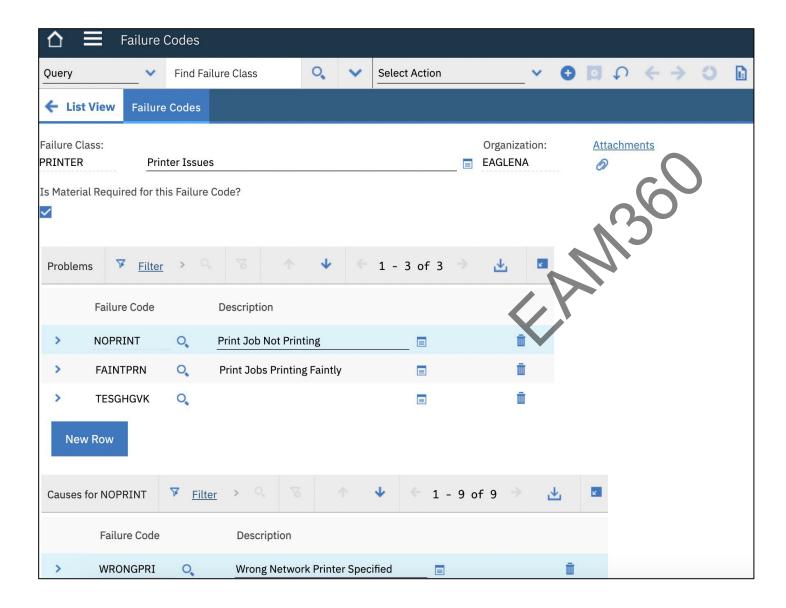




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Set up Failure Codes



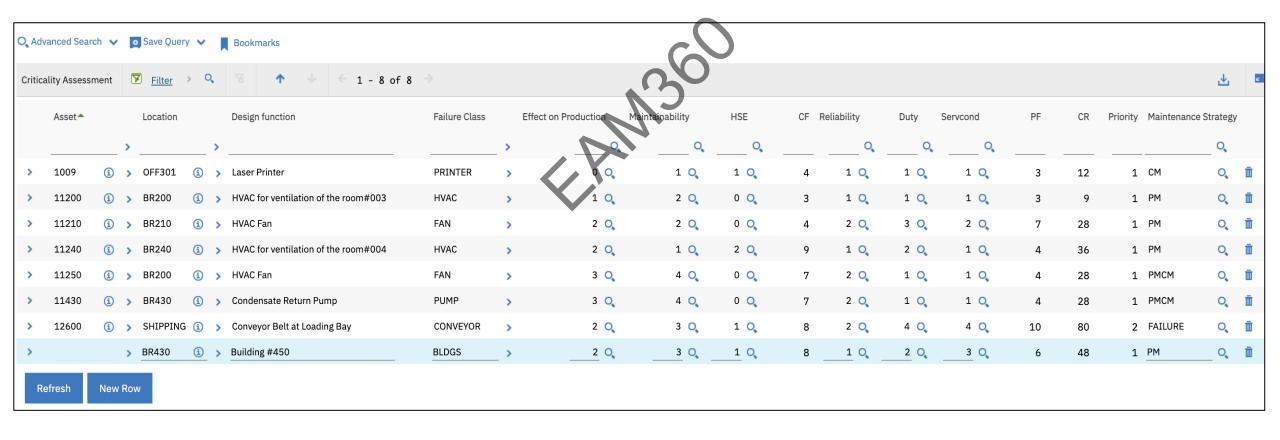


Create Failure Code –
Problem, Cause and Remedy
in Maximo EAM or Manage

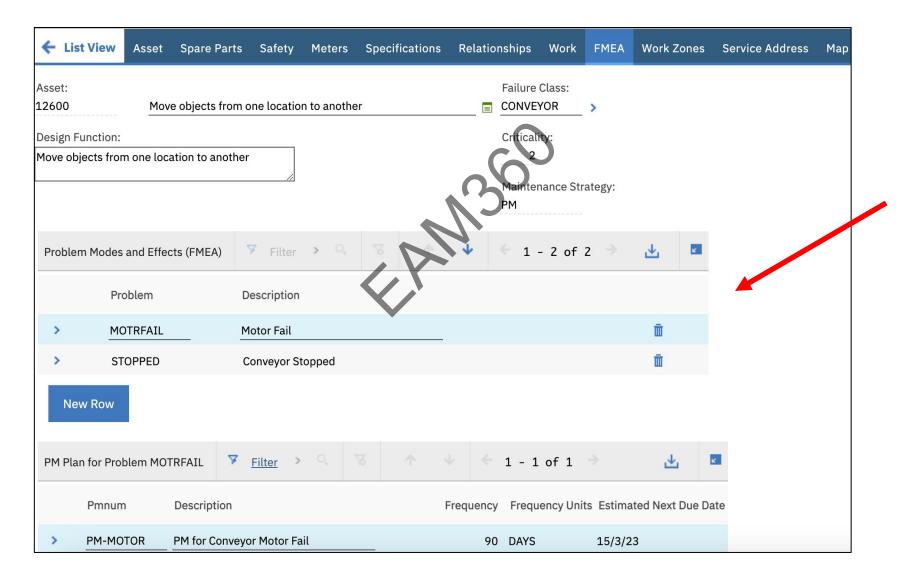
Criticality Assessment – Define Function, Calculate Priority, Assign Failure Class in Bulk



Priority (RPN - Risk Priority Number) calculation happens on basis of Consequences of Failure (CF) and Probability of Failure (PF). CF & PF to be calculated based on User I/P on related factor values and it can be bulk updated on similar assets or locations.

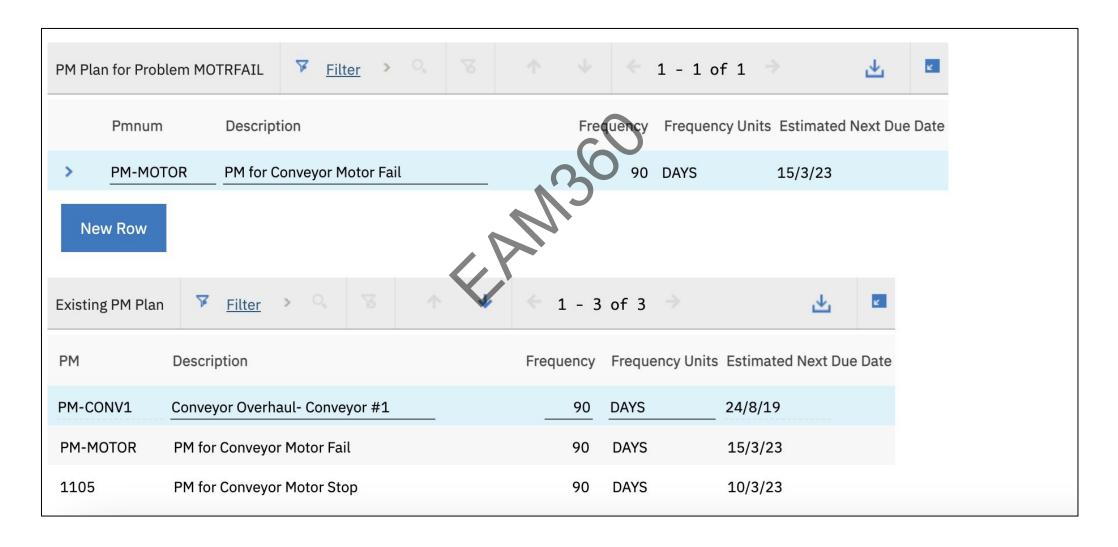


Option I. Associate Problem Code with Asset or Location (Well Defined Asset or Failure Hierarchy)

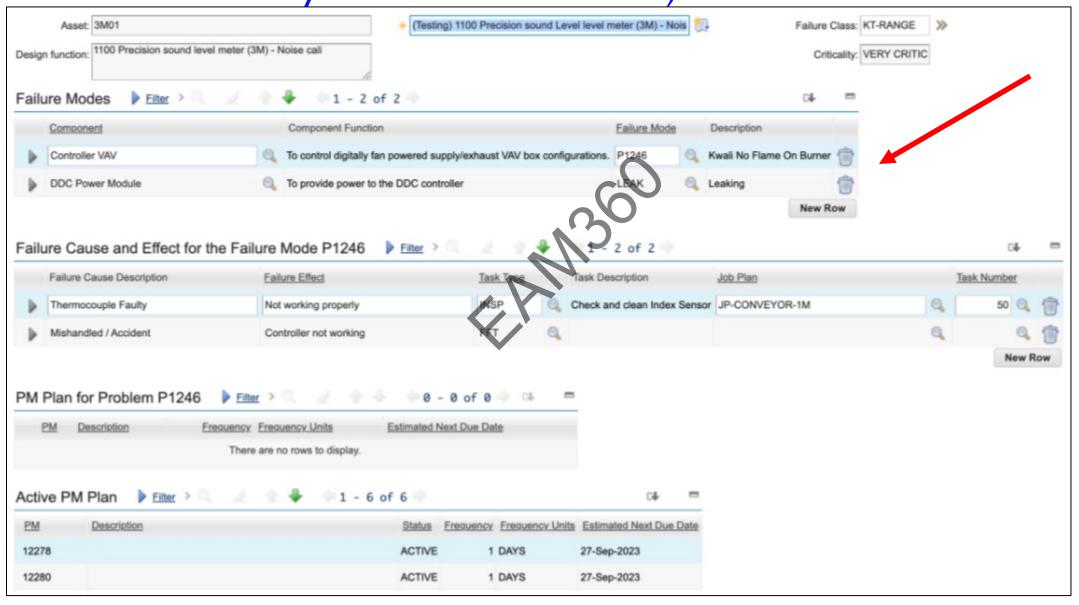




Associate new PM or View existing PMs

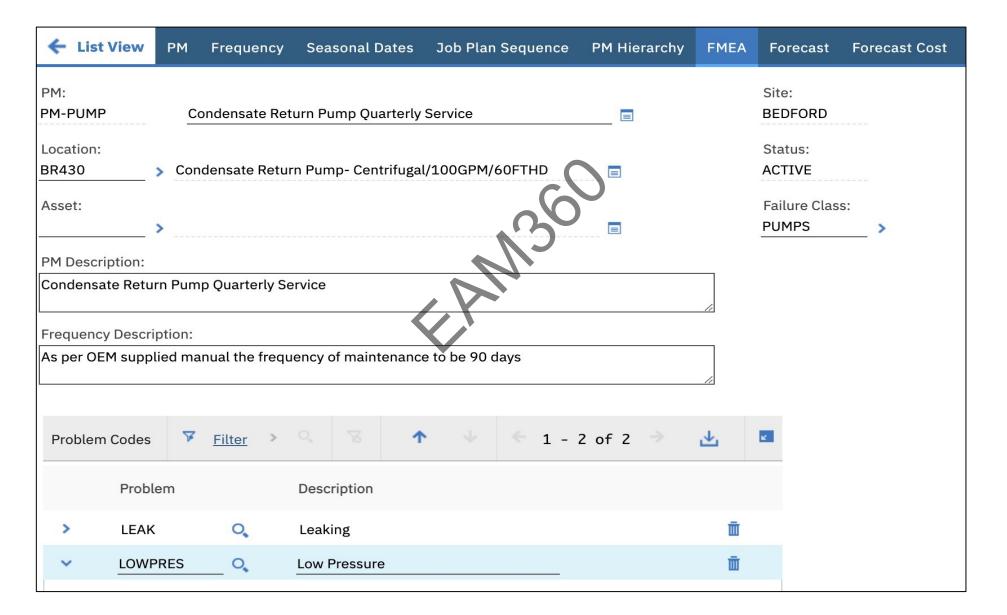


Option 2. Component specific Failure Mode (Asset & Failure Hierarchy is not well defined)



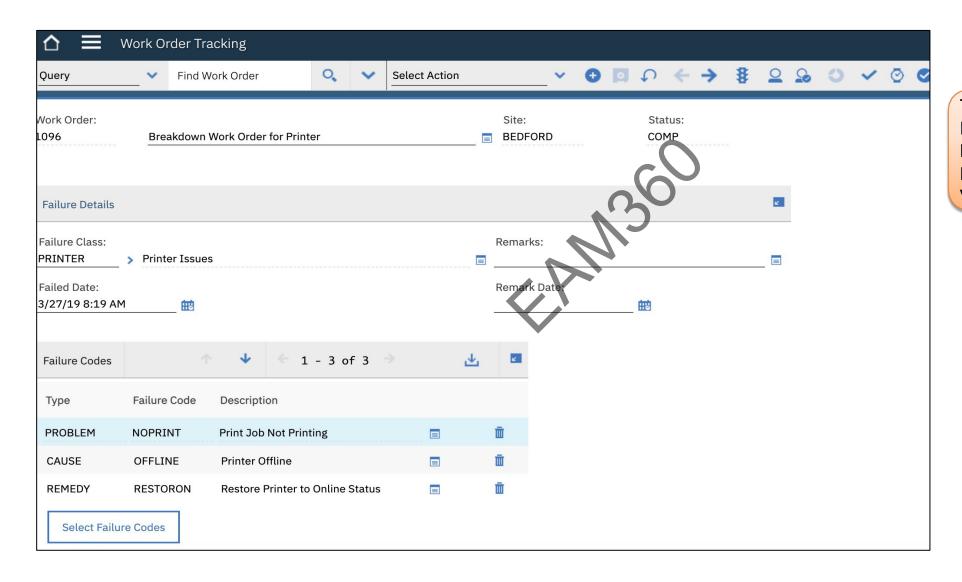
Associate Problem Code with PM





Failure Reporting on Work Order where Failure Mode is at Asset level

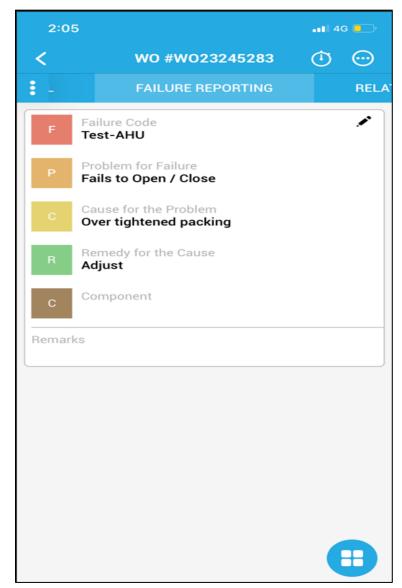


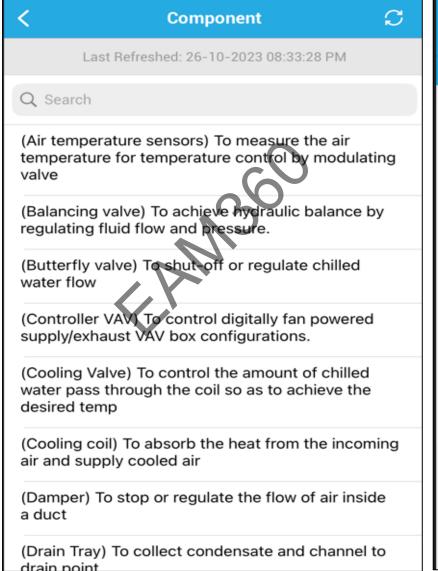


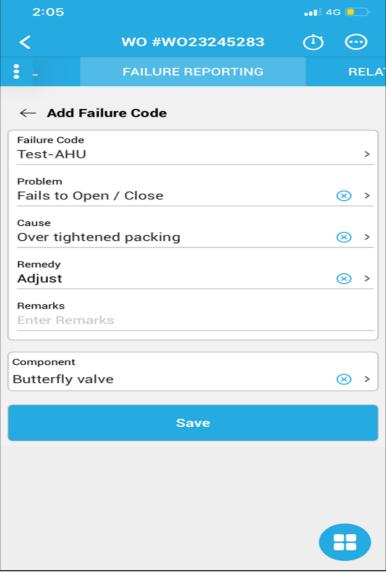
Technician to perform Failure Reporting on Corrective Maintenance (CM) or Breakdown Maintenance (BD) Work Orders.

Failure Reporting where Failure Mode is at Component level

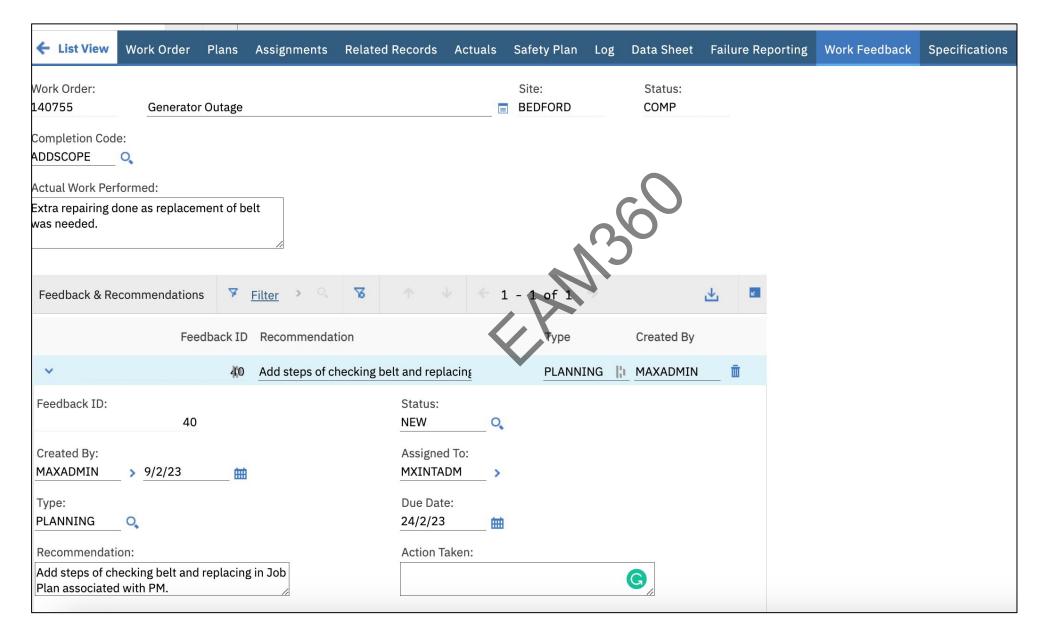






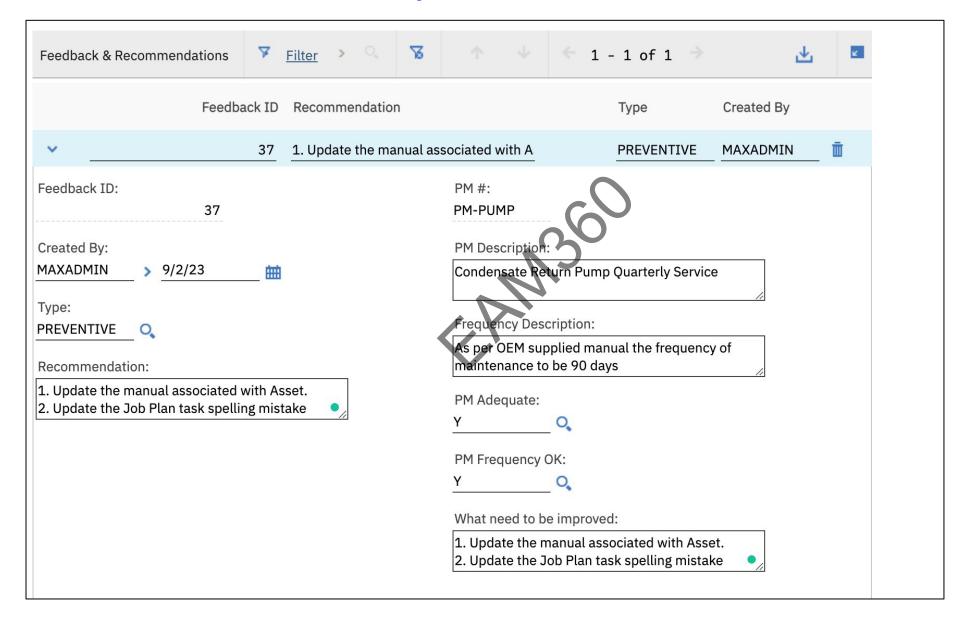


Recommendations on every Work Order - Planning



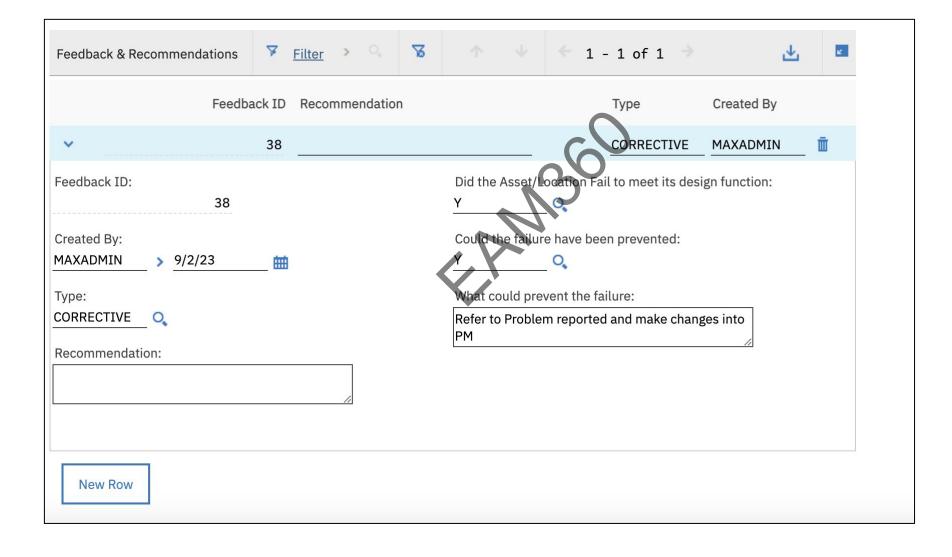


Recommendations on every Work Order - Preventive





Recommendations on every Work Order – Corrective/Breakdown





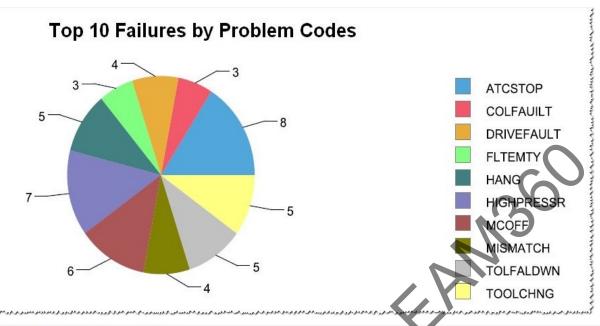
Action Possible-

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- ✓ Create PM or Modify PMs as per feedback and recommendation provided by Technicians.

 Compare with existing PMs and associate new PMs with Problem Codes at Asset/Location's FMEA tab.
- ✓ Go for further RCA analysis for Corrective & Breakdown Maintenance Work Orders Use reports given in next slides to find problem, effects and perform 5 Why Analysis.
- ✓ Act on the result of 5 Why Analysis and adjust Create/Modify PM or Create/Modify Job Plan.

Root Cause Problem Report – Identify Problem





The report will display top 10 problem codes at a Plant level or Unit level. The report will also display Asset, Downtime, Cause and Remedy details for the top 10 failures.

ATCINTRUP	I AUTOMATIC TOOL CHANGE CYCLE INTRUPTED						
ASSET	DESCRIPTION	LOCATION	WORKORDER	WO_DESCRIPTION	DOWNTIME	CAUSE	REMEDY
DMC1	DMG DMC-1-160FD	LEB-1	4420	Gripper undefined	0.25	POWERFAIL	RECOVERMA
COLFAUILT	FAULT IN COOLANT SYSTEM						
ASSET	DESCRIPTION	LOCATION	WORKORDER	WO_DESCRIPTION	DOWNTIME	CAUSE	REMEDY
DMC1	DMG DMC-1-160FD	LEB-1	4472	COOLANT LEVEL MAXIMUM	0.25	TRANSPUMP	CLEANPUMP
HANG	CONTROLLER WAS HANGED						
ASSET	DESCRIPTION	LOCATION	WORKORDER	WO_DESCRIPTION	DOWNTIME	CAUSE	REMEDY
DMC1	DMG DMC-1-160FD	LEB-1	4124	MACHINE HANG	0.17	NO	RESTART

Problem Reoccurrence Trend – Identify Problem



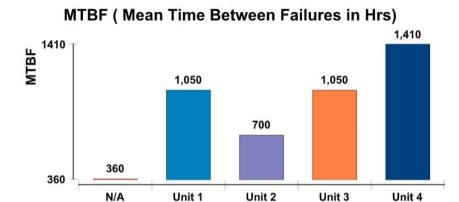


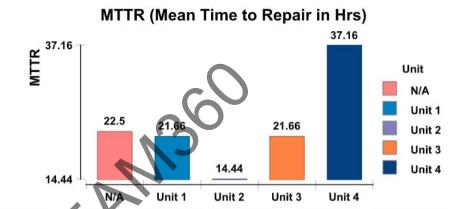
This report displays the trends of Top 10 problems and their occurrence for a period of time to give the holistic view

	2017						2018						
	July	August	Septembe	October	November	December	January	February	March	April	May	June	
Problem	WO#	WO#	WO#	WO#	WO#	WO#	WO#	WO#	WO#	WO#	WO#	WO#	
ATCSTOP	3	7	1	1	3	10	12	5		2	1	2.	
CHIPCONV	1	1	1			1	3	11	8	4	3	. 1	
COLFAUILT	5	2	3		2	3					1	1	
DRIVEFAULT	2		1		1	5	5	3	3	4		. 1	
HANG	4	4	1		1	4	2			2	9	7	
HIGHPRESSR	1	2				3	4	7	1	1	3	1	
HMI PROBLE									2	5	8	4	
PALLCHNG	2	3	2	1	1		1	2	1	2		1	
TOLCLMPMAL	2	2					2	3		5	2	4	
TOOLCHNG	2	1	1	1		3	6	6	1	2		1	

MTTR & MTBF Report – Identify Downtime







This report displays the total downtime during given period for Asset, MTBR and MTBF statistics.

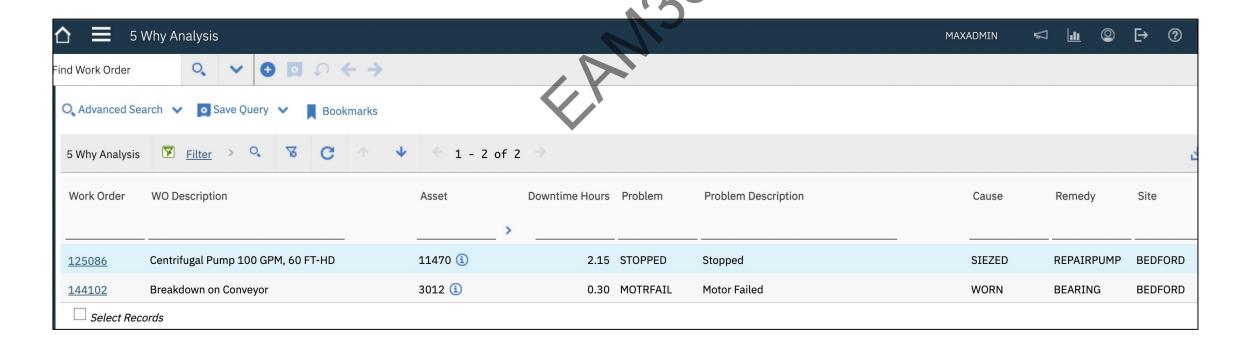
Asset #	Asset Description	Unit	MTTR(Hrs.)	MTBF(Hrs.)	Failure Rate	Availability	Dowtime Hours	Available Hours	No of Breakdowns
11360	TERMINAL	N/A	7.00		0.00%	98.18%	7.00	377.00	0
11381	Isolation switch	N/A	15.50	360.00	0.28%	91.93%	31.00	353.00	1
11253	BREAKER Unit 1	Unit 1	7.22	350.00	0.29%	87.76%	46.99	337.01	1
11254	COPPER BAR Unit 1	Unit 1	7.22	350.00	0.29%	87.76%	46.99	337.01	1
11255	COPPER BAR Unit 1	Unit 1	7.22	350.00	0.29%	87.76%	46.99	337.01	1
14881	TERMINAL Unit 2	Unit 2	7.22	350.00	0.29%	87.76%	46.99	337.01	1
14882	HEATING BOARD Unit 2	Unit 2	7.22	350.00	0.29%	87.76%	46.99	337.01	1
15152	BREAKER Unit 3	Unit 3	7.22	350.00	0.29%	87.76%	46.99	337.01	1
15153	BREAKER Unit 3	Unit 3	7.22	350.00	0.29%	87.76%	46.99	337.01	1
15154	COPPER BAR Unit 3	Unit 3	7.22	350.00	0.29%	87.76%	46.99	337.01	1
11359	UNIT 4 AC/DC DISTRIBUTION PANEL	Unit 4	15.50	360.00	0.28%	91.93%	31.00	353.00	1
15427	BREAKER Unit 4	Unit 4	7.22	350.00	0.29%	87.76%	46.99	337.01	1
15428	BREAKER Unit 4	Unit 4	7.22	350.00	0.29%	87.76%	46.99	337.01	1
15429	COPPER BAR Unit 4	Unit 4	7.22	350.00	0.29%	87.76%	46.99	337.01	1

Perform 5 Why Analysis

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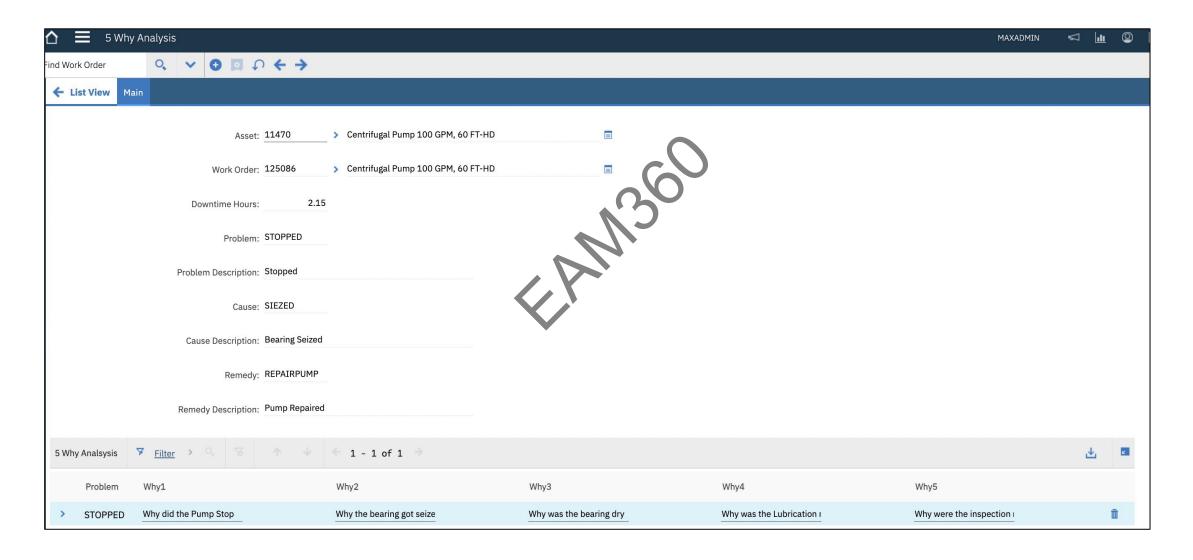
Identify top problems and perform 5 Why Analysis for each problem.

Identify 5 Why for each Problem and Reason for each Why.



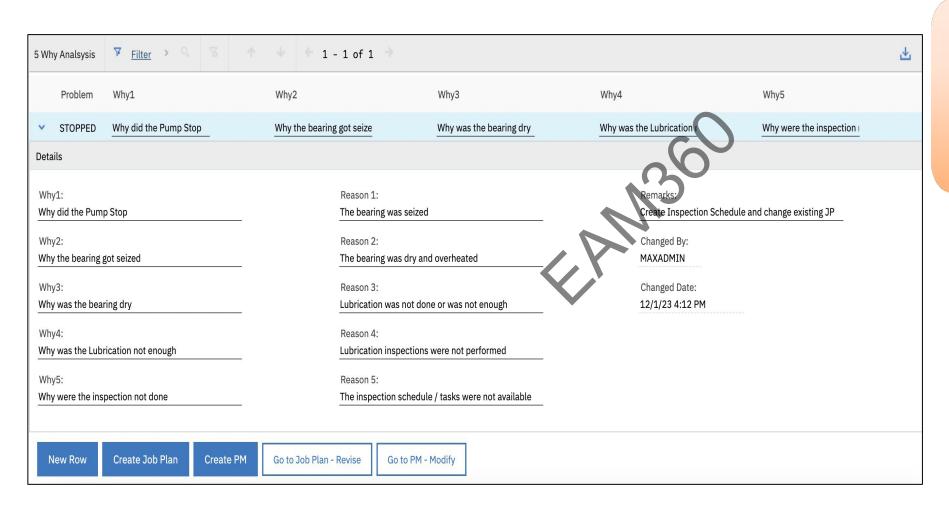
5 Why Analysis – Causal Analysis





Act on 5 Why Analysis





Per 5 Why Analysis take steps to prevent failure –

- . Create new Job Plan
- 2. Revise existing Job Plan
- 3. Create new PM
- 4. Modify existing PM.

Act on 5 Why Analysis – PM generated with Details for Problem



← List View	PM Frequency Seasonal Dates Job Plan Sequence	РМ Н	lierarchy Forecast Forecas	t Cost			
PM: 1100 Master PM:	Monthly Inspection for Pump - 11470		Override Updates from (laster)	PM?	Status: DRAFT Attachments		
Details			Forecast Dates Locked?		Forecast Exists?		
Location:	>	■	Lead Time (Days):	Counter:	PM Generation Details		
Asset: 11470	> Centrifugal Pump 100 GPM, 60 FT-HD		Lead Time Active?	Use Job Plan Sequences?	Problem Details: STOPPED		
Route:	>	=	Include this PM in the Forecast?	Has Children?	5 Why Analysis ID: 12873 Remarks from 5 Why: Create Inspection Schedule and change existing JP		

Other Supporting Components-

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- Escalation to find missing Failure Reporting on CM and BD Work Order to avoid missing data entry. Workflow can also be configured as per requirement.
- Deviation Report to find out missing PMs on Asset or Location.
- Report to fetch the work feedback provided by Technician.
- No Java Customization.

Questions?

