



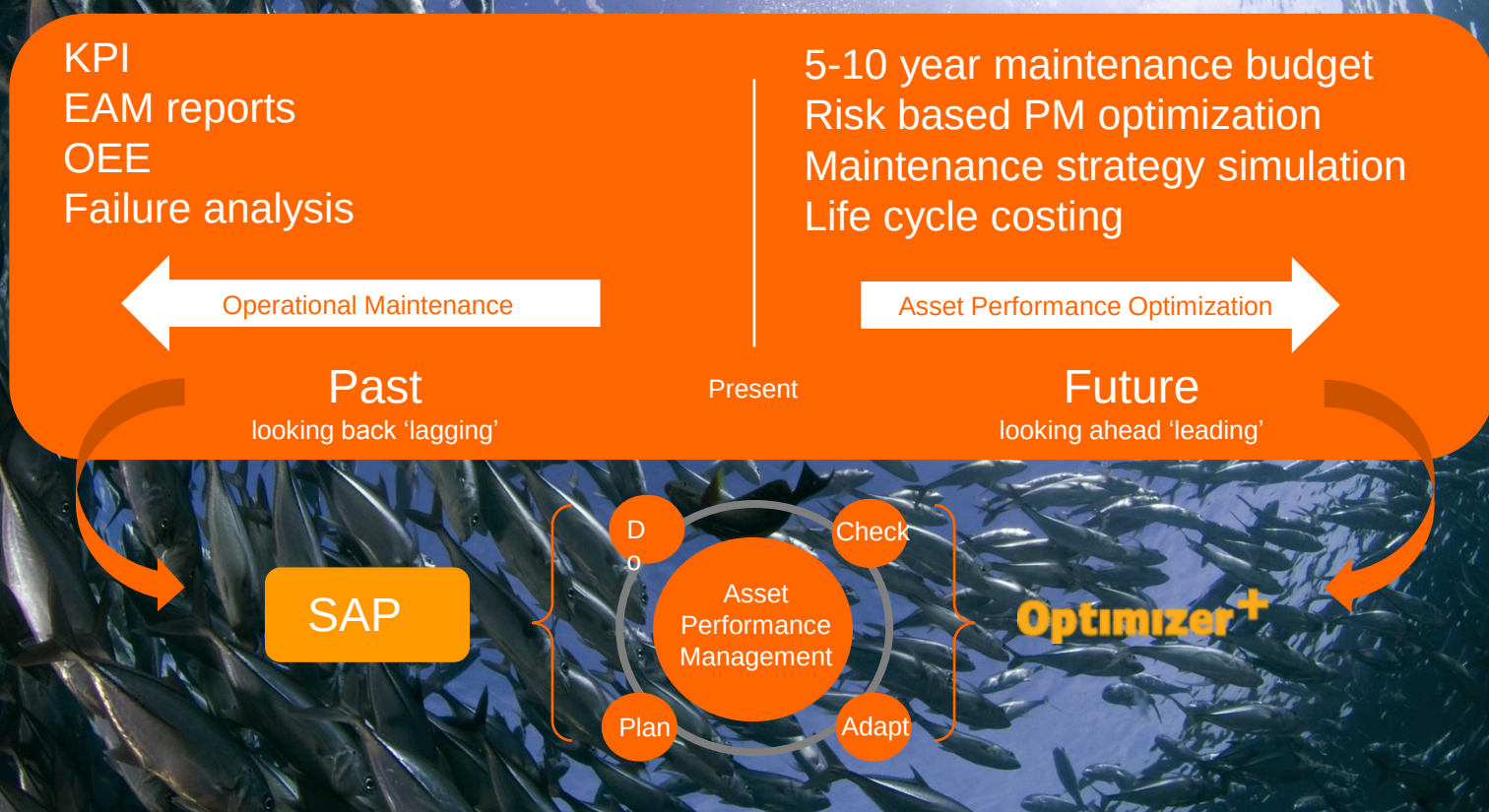
GiS – Gesellschaft für integrierte Systemplanung mbH

Asset Performance Management mit SAP & **Optimizer⁺**

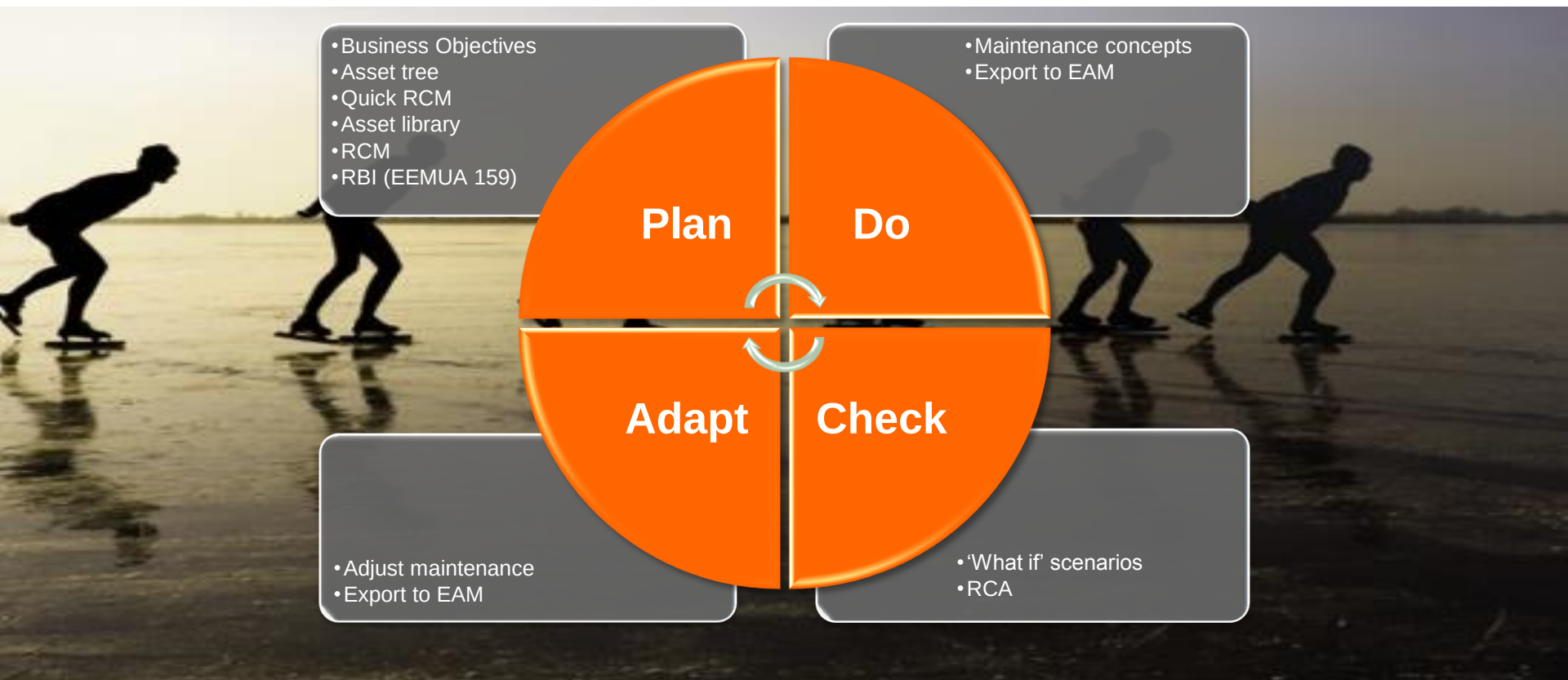
Why Optimizer+

- Risk based maintenance leads to preventative maintenance plans
- Use of 'generic maintenance strategies'
- Balance between financial results, operational results and risks
- Use of asset tree EAM system
- Maintenance plans lead in determining the yearly budget
- Sharing knowledge with other maintenance organisations
- Decisions have to be objective and reproducible
- Strives toward continuous improvement in the maintenance process

Relation between Optimizer+ and EAM

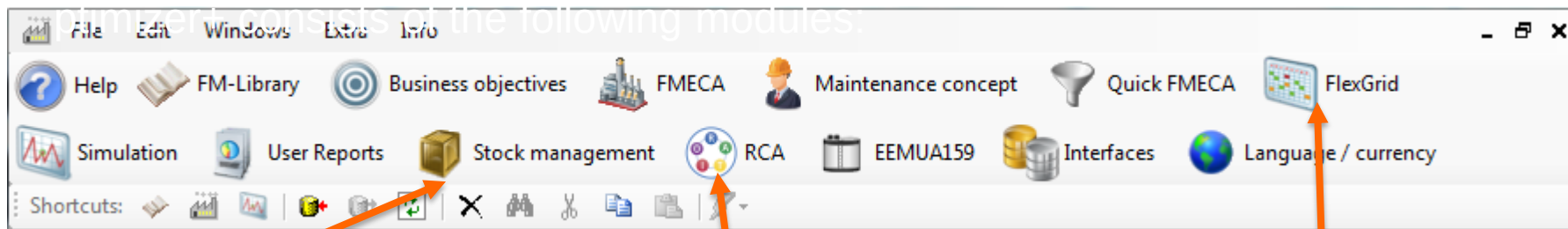


Process flow of Optimizer+



Functionalities of Optimizer+

Optimizer+ consists of the following modules:



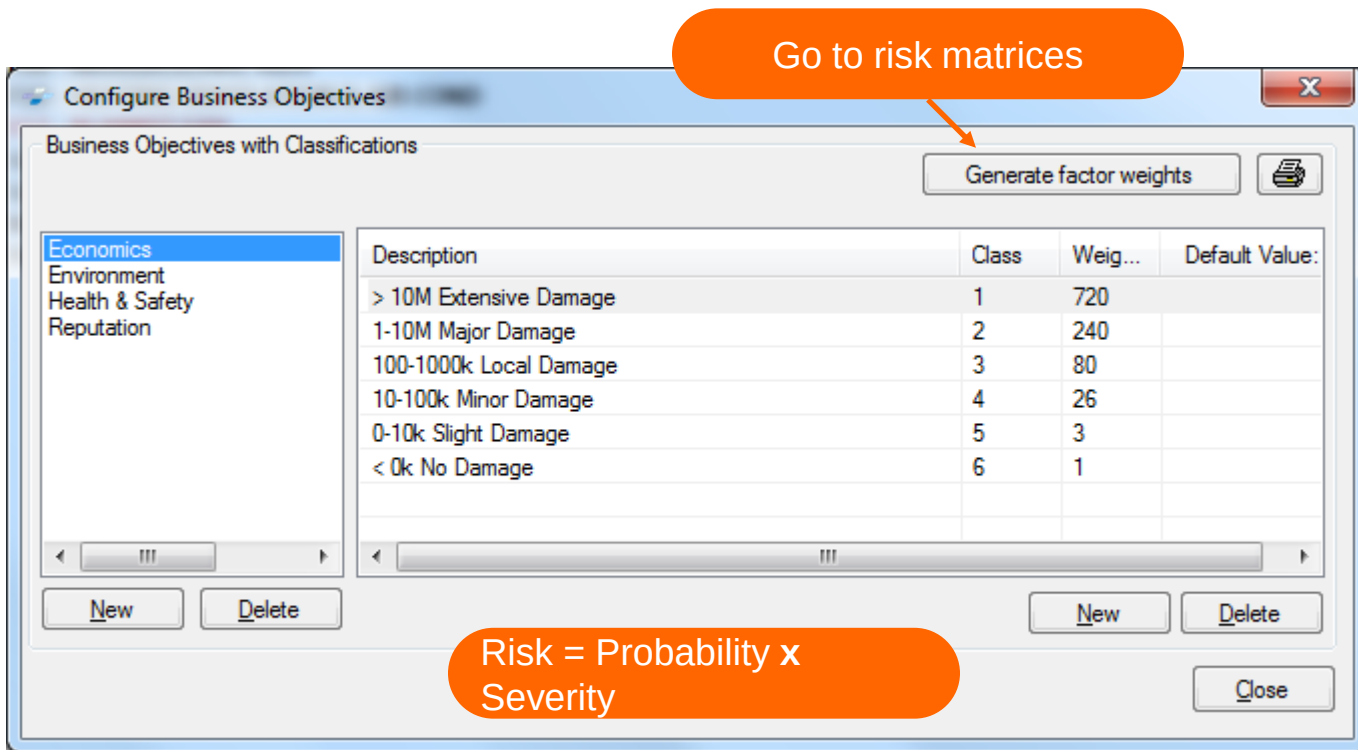
Stock management is used for optimization of spare parts

Root Cause Analysis uses problem solving to identify the root cause of faults or problems

FlexGrid is a user friendly functionality to review and edit mass data

Business objectives: severity

Go to risk matrices



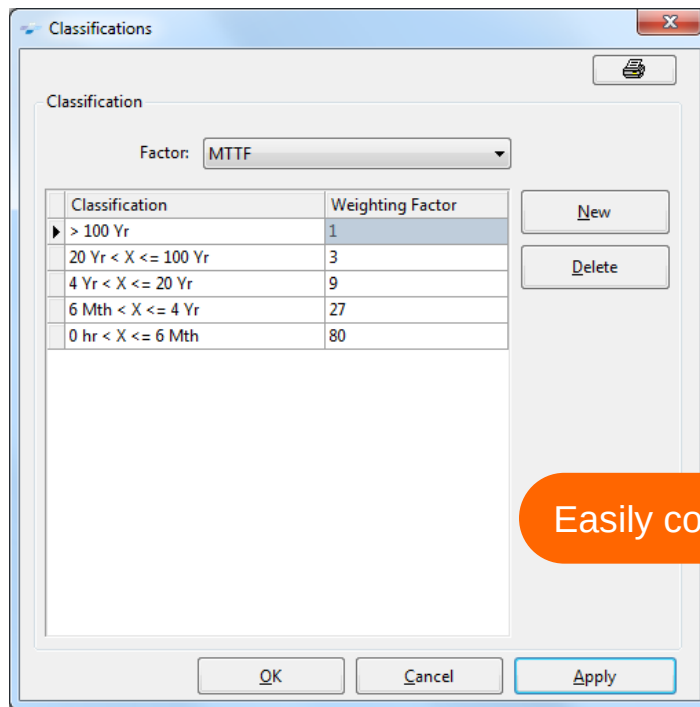
Business Objectives with Classifications

Generate factor weights

Description	Class	Weig...	Default Value:
> 10M Extensive Damage	1	720	
1-10M Major Damage	2	240	
100-1000k Local Damage	3	80	
10-100k Minor Damage	4	26	
0-10k Slight Damage	5	3	
< 0k No Damage	6	1	

Risk = Probability x Severity

Business objectives: probability



Classifications

Classification

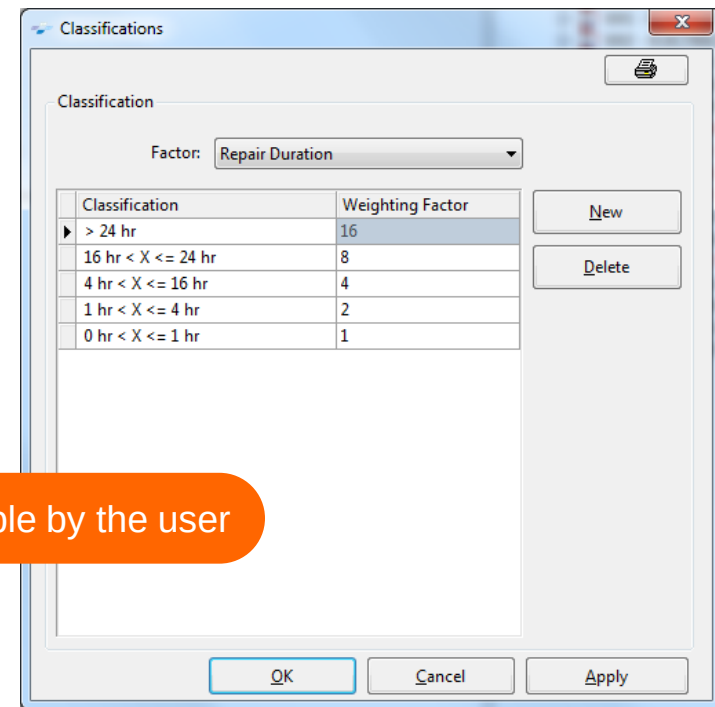
Factor: MTTF

Classification	Weighting Factor
> 100 Yr	1
20 Yr < X <= 100 Yr	3
4 Yr < X <= 20 Yr	9
6 Mth < X <= 4 Yr	27
0 hr < X <= 6 Mth	80

New

Delete

OK Cancel Apply



Classifications

Classification

Factor: Repair Duration

Classification	Weighting Factor
> 24 hr	16
16 hr < X <= 24 hr	8
4 hr < X <= 16 hr	4
1 hr < X <= 4 hr	2
0 hr < X <= 1 hr	1

New

Delete

OK Cancel Apply

Easily configurable by the user

Business objectives: risk matrix

Risk Matrix

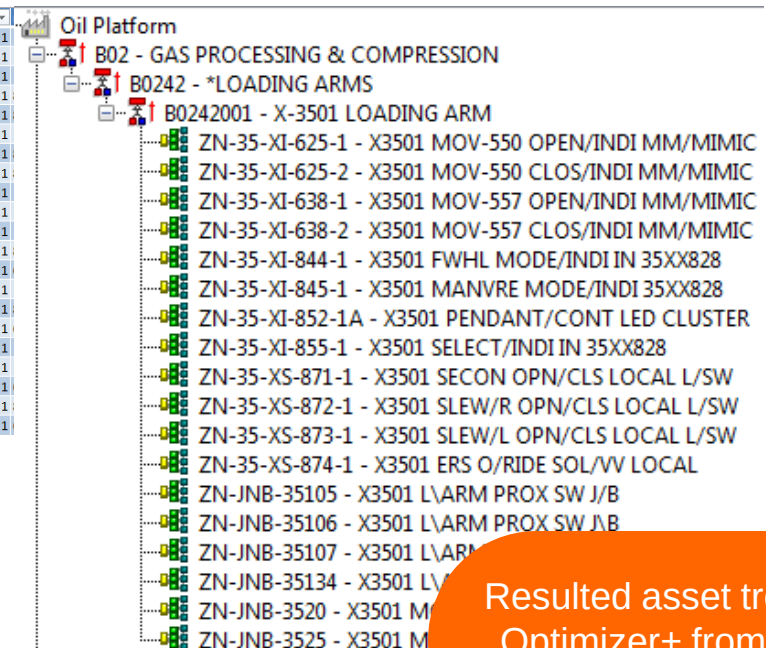
Selected businessobjective: ☐ Show risk numbers

Classifications Business Objective	> 100 Yr	20 Yr < X ≤ 100 Yr	4 Yr < X ≤ 20 Yr	6 Mth < X ≤ 4 Yr	0 hr < X ≤ 6 Mth
> 10M Extensive Damage					
1-10M Major Damage					
100-1000k Local Damage					
10-100k Minor Damage					
0-10k Slight Damage					
< 0k No Damage					

Easy to update from red
or green with the click of
a button

Asset tree: asset importer

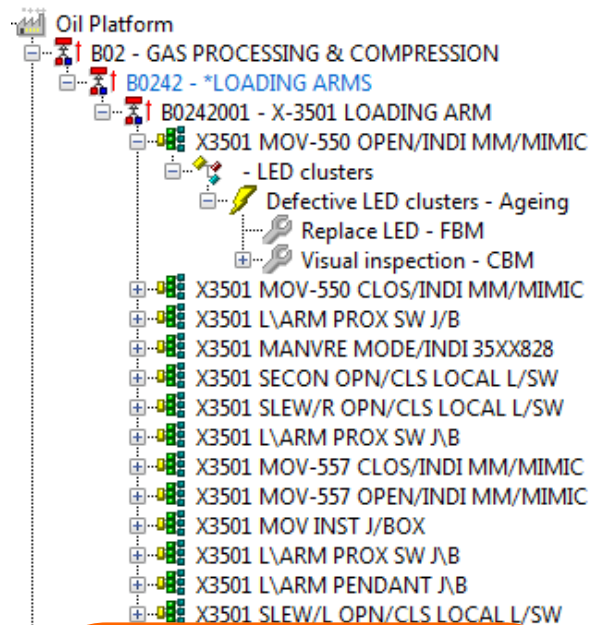
ns1:Tag	ns1:Name	ns1:Tag_Parent	ns1:Fun	ns1:Buf	ns1:StartDate	ns1:ML
B02	GAS PROCESSING & COMPRESSION			1	1-1-2000 0:00	1
B0242	*LOADING ARMS	B02		1	1-1-2000 0:00	1
B0242001	X-3501 LOADING ARM	B0242		1	1-1-2000 0:00	1
ZN-35-XS-873-1	X3501 SLEW/L OPN/CLS LOCAL L/SW	B0242001		1	1-1-2000 0:00	1
ZN-35-XS-871-1	X3501 SECON OPN/CLS LOCAL L/SW	B0242001		1	1-1-2000 0:00	1
ZN-35-XS-874-1	X3501 ERS O/RIDE SOL/VV LOCAL	B0242001		1	1-1-2000 0:00	1
ZN-35-XI-844-1	X3501 FWHL MODE/INDI IN 35XX828	B0242001		1	1-1-2000 0:00	1
ZN-35-XI-855-1	X3501 SELECT/INDI IN 35XX828	B0242001		1	1-1-2000 0:00	1
ZN-JNB-3520	X3501 MOV INST JUNCTION BOX	B0242001		1	1-1-2000 0:00	1
ZN-JNB-3525	X3501 MOV INST J/BOX	B0242001		1	1-1-2000 0:00	1
ZN-JNB-35134	X3501 L\ARM PENDANT J\B	B0242001		1	1-1-2000 0:00	1
ZN-35-XI-852-1A	X3501 PENDANT/CONT LED CLUSTER	B0242001		1	1-1-2000 0:00	1
ZN-35-XI-638-1	X3501 MOV-557 OPEN/INDI MM/MIMIC	B0242001		1	1-1-2000 0:00	1
ZN-JNB-35105	X3501 L\ARM PROX SW J/B	B0242001		1	1-1-2000 0:00	1
ZN-35-XS-872-1	X3501 SLEW/R OPN/CLS LOCAL L/SW	B0242001		1	1-1-2000 0:00	1
ZN-35-XI-625-1	X3501 MOV-550 OPEN/INDI MM/MIMIC	B0242001		1	1-1-2000 0:00	1
ZN-JNB-35107	X3501 L\ARM PROX SW J\B	B0242001		1	1-1-2000 0:00	1
ZN-JNB-35106	X3501 L\ARM PROX SW J\B	B0242001		1	1-1-2000 0:00	1
ZN-35-XI-638-2	X3501 MOV-557 CLOS/INDI MM/MIMIC	B0242001		1	1-1-2000 0:00	1
ZN-35-XI-845-1	X3501 FWHL MODE/INDI IN 35XX828	B0242001		1	1-1-2000 0:00	1
ZN-35-XI-852-1A	X3501 PENDANT/CONT LED CLUSTER	B0242001		1	1-1-2000 0:00	1
ZN-35-XI-855-1	X3501 SELECT/INDI IN 35XX828	B0242001		1	1-1-2000 0:00	1
ZN-35-XS-871-1	X3501 SECON OPN/CLS LOCAL L/SW	B0242001		1	1-1-2000 0:00	1
ZN-35-XS-872-1	X3501 SLEW/R OPN/CLS LOCAL L/SW	B0242001		1	1-1-2000 0:00	1
ZN-35-XS-873-1	X3501 SLEW/L OPN/CLS LOCAL L/SW	B0242001		1	1-1-2000 0:00	1
ZN-35-XS-874-1	X3501 ERS O/RIDE SOL/VV LOCAL	B0242001		1	1-1-2000 0:00	1
ZN-JNB-35105	X3501 L\ARM PROX SW J/B	B0242001		1	1-1-2000 0:00	1
ZN-JNB-35106	X3501 L\ARM PROX SW J\B	B0242001		1	1-1-2000 0:00	1
ZN-JNB-35107	X3501 L\ARM PROX SW J\B	B0242001		1	1-1-2000 0:00	1
ZN-JNB-35134	X3501 L\ARM PENDANT J\B	B0242001		1	1-1-2000 0:00	1
ZN-JNB-3520	X3501 MOV INST JUNCTION BOX	B0242001		1	1-1-2000 0:00	1
ZN-JNB-3525	X3501 MOV INST J/BOX	B0242001		1	1-1-2000 0:00	1



Generic Excel template
used to import asset
structures into Optimizer+

Resulted asset tree in
Optimizer+ from the
excel import

Asset tree: DIS importer for additional data

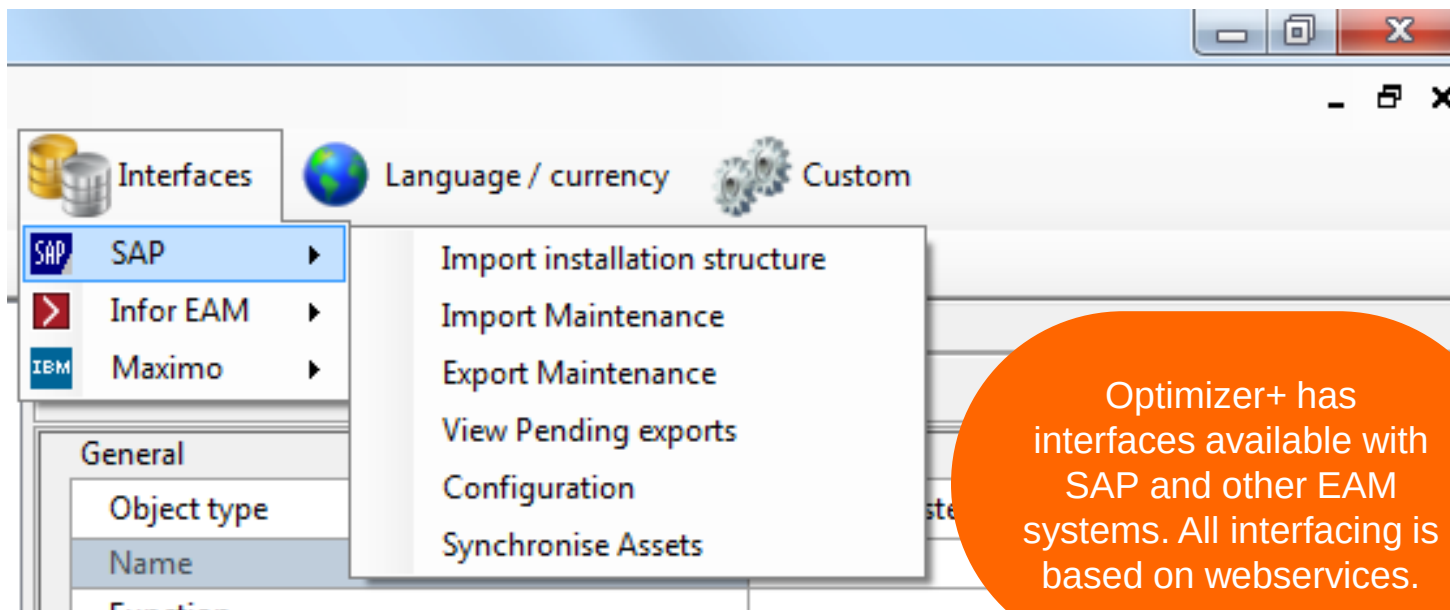


ns1:Part_Desc	ns1:Part_Function	ns1:Component_Desc	ns1:FailCause_Desc	ns1:FailCause_Condition	ns1:MTTF_Months	ns1:Maint_Desc	ns1:Maint_Strategy
X3501 SLEW/L OPN/CLS LOCAL L/SW		LED CLUSTERS	Defect Led clusters	Ageing	120		SAO
X3501 SECON OPN/CLS LOCAL L/SW		LED CLUSTERS	Defect Led clusters	Ageing	120		SAO
X3501 ERS O/RIDE SOL/VV LOCAL		LED CLUSTERS	Defect Led clusters	Ageing	120		SAO
X3501 FWHL MODE/INDI IN 35XX828		LED CLUSTERS	Defect Led clusters	Ageing	120		SAO
X3501 SELECT/INDI IN 35XX828		LED CLUSTERS	Defect Led clusters	Ageing	120		SAO
X3501 MOV INST JUNCTION BOX		LED CLUSTERS	Defect Led clusters	Ageing	120		SAO
X3501 MOV INST J/BOX		LED CLUSTERS	Defect Led clusters	Ageing	120		SAO
X3501 L\ARM PENDANT J\B		LED CLUSTERS	Defect Led clusters	Ageing	120		SAO
X3501 PENDANT/CONT LED CLUSTER		LED CLUSTERS	Defect Led clusters	Ageing	120		SAO
X3501 MOV-557 OPEN/INDI MM/MIMIC		LED CLUSTERS	Defect Led clusters	Ageing	120		SAO
X3501 L\ARM PROX SW J/B		LED CLUSTERS	Defect Led clusters	Ageing	120		SAO
X3501 SLEW/R OPN/CLS LOCAL L/SW		LED CLUSTERS	Defect Led clusters	Ageing	120		SAO
X3501 MOV-550 OPEN/INDI MM/MIMIC		LED CLUSTERS	Defect Led clusters	Ageing	120		SAO
X3501 L\ARM PROX SW J/B		LED CLUSTERS	Defect Led clusters	Ageing	120		SAO
X3501 L\ARM PROX SW J/B		LED CLUSTERS	Defect Led clusters	Ageing	120		SAO
X3501 MOV-557 CLOS/INDI MM/MIMIC		LED CLUSTERS	Defect Led clusters	Ageing	120		SAO
X3501 MANVRE MODE/INDI 35XX828		LED CLUSTERS	Defect Led clusters	Ageing	120		SAO
X3501 MOV-550 CLOS/INDI MM/MIMIC		LED CLUSTERS	Defect Led clusters	Ageing	120		SAO
X3501 SLEW/L OPN/CLS LOCAL L/SW		LED CLUSTERS	Defect Led clusters	Ageing	120		TAO
X3501 SECON OPN/CLS LOCAL L/SW		LED CLUSTERS	Defect Led clusters	Ageing	120		TAO
X3501 ERS O/RIDE SOL/VV LOCAL		LED CLUSTERS	Defect Led clusters	Ageing	120		TAO
X3501 FWHL MODE/INDI IN 35XX828		LED CLUSTERS	Defect Led clusters	Ageing	120		TAO
X3501 SELECT/INDI IN 35XX828		LED CLUSTERS	Defect Led clusters	Ageing	120		TAO

Enhanced Asset tree from DIS import into Optimizer+

Generic Excel template used to import additional information into Optimizer+ such as failure data, maintenance and costs.

Asset tree: interfaces



Quick RCM: goals

- Provide insight into the criticality of a (sub)system as a whole in a fast and efficient way
- Prioritize (sub)systems on criticality
- Deliver a fast and efficient Preventive Maintenance review

Spend time, money and energy on only important assets

Quick RCM: grid

QuickFMECA Grid

New X Delete rows X Clear cell range Max Depth 1

Excel Clear layout Save layout

Tag	Subsystem	Function	Failmode	Economics	Health & Safety	Environment	Reputation	MTTF	MTTR	Comments	Critical
F01	FIRE ANG GAS	Detection of fire/smok...	Technical unavailabl...	> 10M Extensive Dama...	Multiple Fatality	Massive Effect	National Impact	4 Yr < X <= 20 Yr	0 hr < X <= 1 hr		☒
F08	NAVIGATIONAL AI...	Aware ships and guide	Technical unavailabl...	0-10k Slight Damage	No injury	No Effect	Slight Impact	4 Yr < X <= 20 Yr	0 hr < X <= 1 hr		☐
E02	ELECTRICAL DISTRI...	Distribute	Technical unavailabl...	Name		fect	No Impact	4 Yr < X <= 20 Yr	0 hr < X <= 1 hr		☐
E02	ELECTRICAL DISTRI...	Distribute	Technical unavailabl...	> 10M Extensive Damage		t	Slight Impact	4 Yr < X <= 20 Yr	0 hr < X <= 1 hr		☐
G03	PROCESS CONTROL	Regulate	Technical unavailabl...	1-10M Major Damage		fect	Slight Impact	4 Yr < X <= 20 Yr	0 hr < X <= 1 hr		☐
E06	COMPRESSED AIR	Supply instrument air	Technical unavailabl...	100-1000k Local Damage		t	No Impact	0 hr < X <= 6 Mth	0 hr < X <= 1 hr		☐
E06	COMPRESSED AIR	Supply instrument air	Technical unavailabl...	10-100k Minor Damage		t	No Impact	0 hr < X <= 6 Mth	0 hr < X <= 1 hr		☐
B10	GAS PIPELINES	Inspection	Technical unavailabl...	> 10M Extensive Damage		fect	No Impact	6 Mth < X <= 4 Yr	0 hr < X <= 1 hr		☐
B10	GAS PIPELINES	Inspection	Leakage	0-10k Slight Damage		fect	Slight Impact	0 hr < X <= 6 Mth	0 hr < X <= 1 hr		☐
F06	WATER FIRE FIGHT...	Fire protection	Technical unavailable	< 0k No Damage		Effect	National Impact	4 Yr < X <= 20 Yr	0 hr < X <= 1 hr		☒
E03	SERVICE WATER	Supply water to the air ...	Technical unavailabl...			t	No Impact	4 Yr < X <= 20 Yr	0 hr < X <= 1 hr		☐
E03	SERVICE WATER	Supply water to the air ...	Leakage			t	No Impact	20 Yr < X <= 100 Yr	0 hr < X <= 1 hr		☐
G02	INSTALLATION M...	Inspection	Technical unavailabl...			fect	Slight Impact	6 Mth < X <= 4 Yr	0 hr < X <= 1 hr		☐
B02	GAS PROCESSING ...	Process & Compress	Technical unavailabl...			t	No Impact	0 hr < X <= 6 Mth	0 hr < X <= 1 hr		☒
E12	CLOSED CIRCUIT C...	Provide cold water for t...	Technical unavailable			fect	Slight Impact	6 Mth < X <= 4 Yr	0 hr < X <= 1 hr		☒
E12	CLOSED CIRCUIT C...	Provide cold water for t...	Leakage			fect	Slight Impact	4 Yr < X <= 20 Yr	0 hr < X <= 1 hr		☐
F10	HEATING VENTILA...	Cooling equipment an...	Technical unavailabl...			fect	Slight Impact	6 Mth < X <= 4 Yr	0 hr < X <= 1 hr		☐
K01	LIFTING EQUIPMENT	Pow.pk: transporting p...	Leakage	< 0k No Damage	No injury	Slight Effect	Slight Impact	6 Mth < X <= 4 Yr	0 hr < X <= 1 hr		☐
K01	LIFTING EQUIPMENT	Pow.pk: transporting p...	Technical unavailabl...	10-100k Minor Damage	No injury	No Effect	Slight Impact	4 Yr < X <= 20 Yr	0 hr < X <= 1 hr		☐
K01	LIFTING EQUIPMENT	Pow.pk: transporting p...	Technical unavailabl...	10-100k Minor Damage	No injury	No Effect	Slight Impact	4 Yr < X <= 20 Yr	0 hr < X <= 1 hr		☐
E01	ELECTRICAL GENE...	Generate	Technical unavailabl...	0-10k Slight Damage	Slight Injury	No Effect	Slight Impact	6 Mth < X <= 4 Yr	0 hr < X <= 1 hr		☐
K02	MARINE TRANSPO...	Positioning and moor...	Technical unavailabl...								☐
K02	MARINE TRANSPO...	Positioning and moor...	Technical unavailabl...								☐
B03	MARINE RESCUE...										☐

Apply

Easy to export to Excel

Configurable layout

Apply to (sub)systems
Assign effect to (sub)systems

Quick RCM: example

Gas processing & compression

Mean time to Failure = 4 months

Failure cause

Technically unavailable

Effect

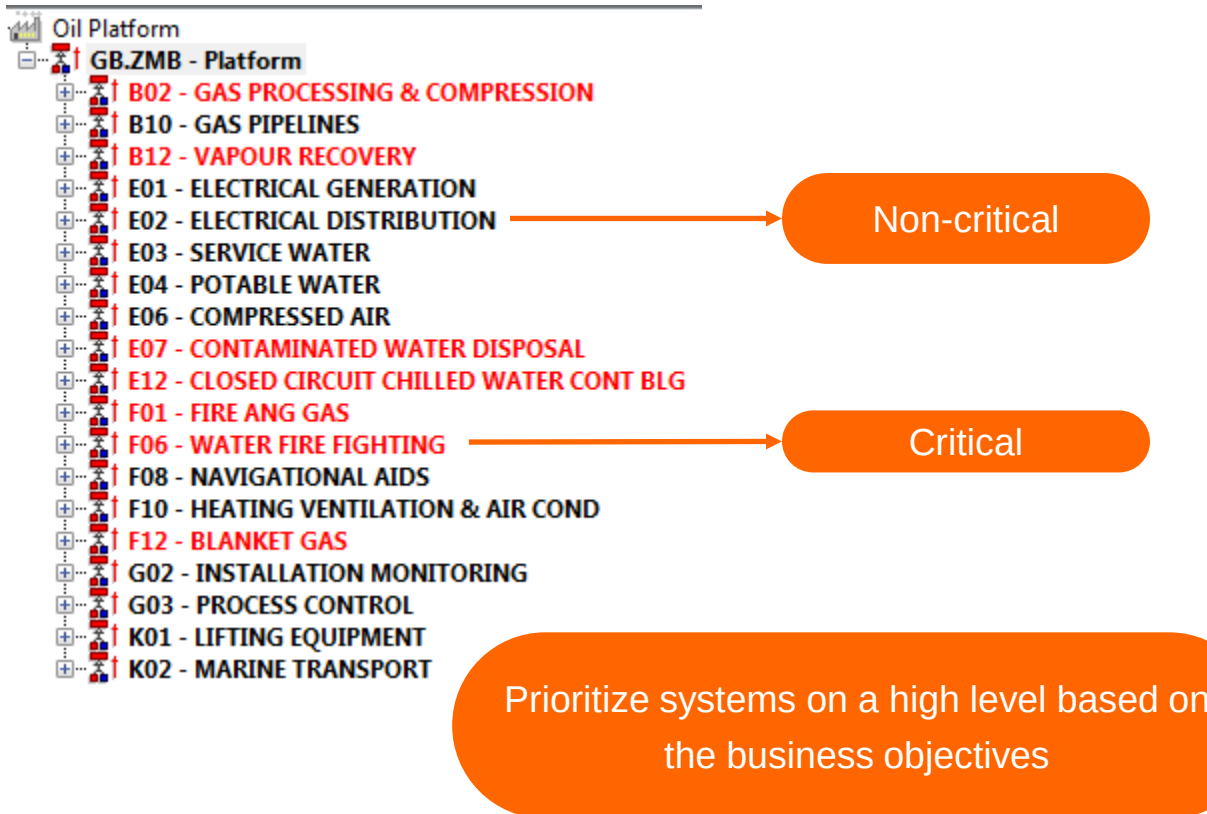
10 – 100K minor damage

Risk Matrix

Selected businessobjective: ☐ Show risk numbers

Classifications Business Objective	> 100 Yr	20 Yr < X ≤ 100 Yr	4 Yr < X ≤ 20 Yr	6 Mth < X ≤ 4 Yr	0 hr < X ≤ 6 Mth
> 10M Extensive Damage					
1-10M Major Damage					
100-1000k Local Damage					
10-100k Minor Damage					
0-10k Slight Damage					
< 0k No Damage					

Quick RCM: view in asset tree

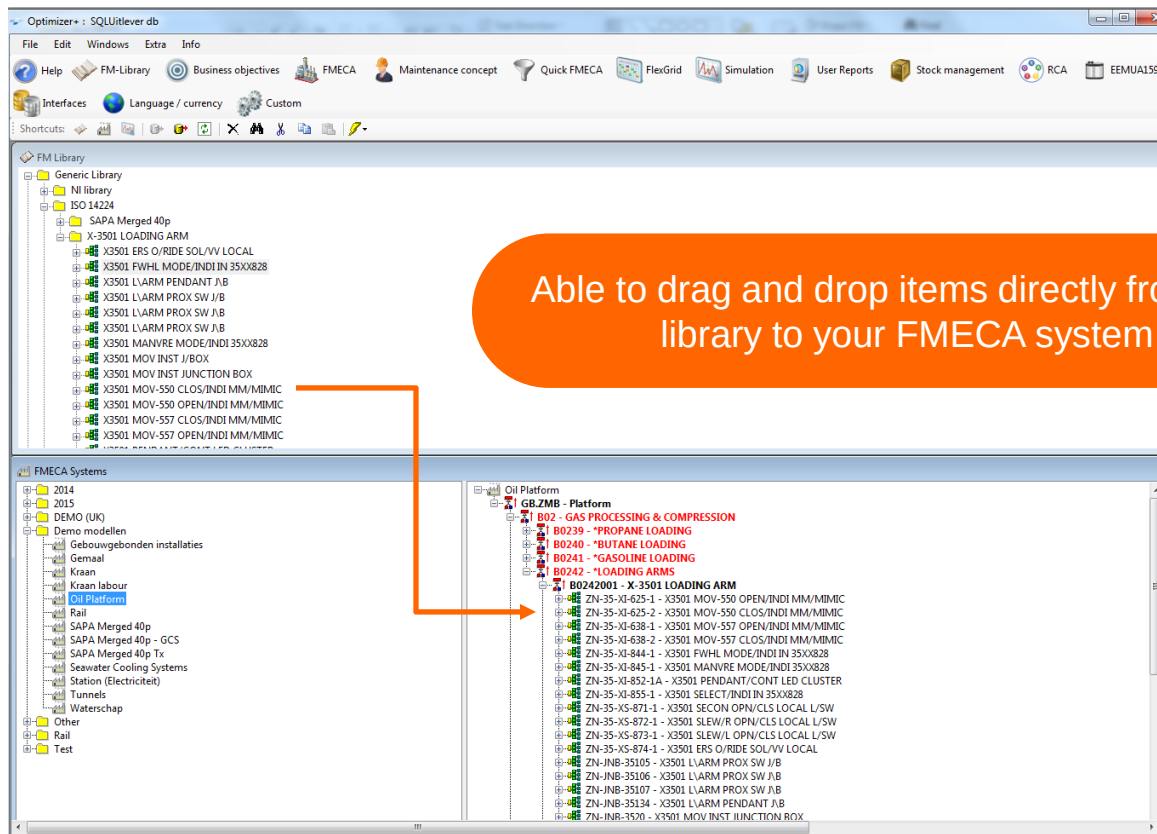


Asset library: content



- One-off building of Parts, Components, Failure behaviour & Preventive or corrective maintenance.
- Easy to build up asset registers with the help of the library
 - Create your own generic PM libraries

Asset library: drag and drop



Asset library: applying multiple FM library templates

Asset Tree View:

- X-3501 LOADING ARM
 - X3501 ERS O/RIDE SOL/VV LOCAL
 - X3501 FWHL MODE/INDI IN 35XX828
 - X3501 L\ARM PENDANT L/B
 - X3501 L\ARM PROX SW J
 - X3501 L\ARM PROX SW J
 - X3501 L\ARM PROX SW J
 - X3501 MANVRE MODE/INDI IN 35XX828
 - X3501 MOV INST J/BOX
 - X3501 MOV INST JUNCT
 - X3501 MOV-550 CLOS/INDI IN 35XX828
 - X3501 MOV-550 OPEN/INDI IN 35XX828
 - X3501 MOV-557 CLOS/INDI IN 35XX828
 - X3501 MOV-557 OPEN/INDI IN 35XX828
 - X3501 PENDANT/CONT
 - X3501 SECON OPN/CLS
 - X3501 SELECT/INDI IN 35XX828
 - X3501 SLEW/L OPN/CLS LOCAL L/SW
 - X3501 SLEW/R OPN/CLS LOCAL L/SW

Properties Part: 'X3501 FWHL MODE/INDI IN 35XX828'

Match Library 844MODE

Asset Details Table:

General		
Object type	Part	
Name	X3501 FWHL MODE/INDI IN 35XX828	
Function		
Tag	ZN-35-XI-844-1	
Buffer Time	0	
Buffer Time unit	Hours	
Begin Date		
M and L Counter	1	
Free Fields		
Match Library	844MODE	
Extra lookup lists		

Asset Tree View (Continued):

- Oil Platform
 - GB.ZMB - Platform
 - B02 - GAS PROCESSING & COMPRESSION
 - B0239 - *PROPANE LOADING
 - B0240 - *BUTANE LOADING
 - B0241 - *GASOLINE LOADING
 - B0242 - *LOADING ARMS
 - B0242001 - X-3501 LOADING ARM
 - ZN-35-XI-625-1 - X3501 MOV-550 OPEN/INDI MM/MIMIC
 - ZN-35-XI-625-2 - X3501 MOV-550 CLOS/INDI MM/MIMIC
 - ZN-35-XI-638-1 - X3501 MOV-557 OPEN/INDI MM/MIMIC
 - ZN-35-XI-638-2 - X3501 MOV-557 CLOS/INDI MM/MIMIC
 - ZN-35-XI-844-1 - X3501 FWHL MODE/INDI IN 35XX828

Match FM library data to FMECA data with a corresponding mark

Asset library: applying multiple FM library templates

Apply FM Library Templates

This screen will allow you to match all parts from the Fm library with all the parts in the current selection in fmea based on the value of the selected field.
After a match has been made, all properties of the matched library part can be copied to their FMECA counterparts.

Select the field to match on and press Search

Match Library (Free Field 1) Search

Library part name	FMECA part name	FMECA Part Tag	FMECA part id	Library part id	Field value
Library part name: X3501 ERS O/RIDE SOL/VV LOCAL					
X3501 ERS O/RIDE SOL/VV LOCAL	ZN-35-XS-874-1		20227	8580	874
Library part name: X3501 FWHL MODE/INDI IN 35XX828					
X3501 FWHL MODE/INDI IN 35XX828	ZN-35-XI-844-1		20228	8582	844MODE
Library part name: X3501 L'ARM PENDANT J/B					
X3501 L'ARM PENDANT J/B	ZN-JNB-35134		20232	8590	35134
Library part name: X3501 L'ARM PROX SW J/B					
X3501 L'ARM PROX SW J/B	ZN-JNB-35105		20235	8596	31505
Library part name: X3501 L'ARM PROX SW J/B					
X3501 L'ARM PROX SW J/B	ZN-JNB-35107		20238	8602	31507
X3501 L'ARM PROX SW J/B	ZN-JNB-35106		20239	8604	31506
Library part name:				8608	845MODE

Select which data from FM library should apply to FMECA data

Apply FM Library Templates Close

Property grid: failure cause & Maintenance data

Properties	
General	
Object type	Failcause
Description	Defective LED clusters
Condition	Ageing
Failure Type	Timebased
Failure Mode	No / reduced loading arm movement
New Failure Mode	New Failure Mode
MTTF	10
MTTF unit	Years
Distribution	Normal
Deviation	17520
Deviation unit	Hours
Function Loss	0
Hidden	☐
Failure Mode	
Description	No / reduced loading arm movement
Comments	No comments
Economics	100-1000k Local Damage
Health & Safety	No injury
Environment	Slight Effect
Reputation	Considerable Impact
Extra lookup lists	
Systemeffect	N/A
Detection	N/A
Source	N/A
Note	N/A
Req. Parts Stock	N/A
Costs	
Costs of quality loss	€2,000.00
Info	
Stock	N/A
Modification	N/A
Comment	N/A
Motivation	N/A
Link	C:\Temp\SKF\Led clusters.jpg

By navigating through the asset tree, it's possible to directly see all properties per asset

Properties	
General	
Object type	CBM
Number	
Description	Visual inspection
Maintenance Effect	No Effect
Maintenance Time	1
Maintenance Time unit	Hours
Distribution	Fixed
Maintenance Action	
Condition Loss (%)	0
Mandatory	☒
Preventive	
CLM	Yearly visual inspection
Strategy	Keep planning
To parent CLM	To parent CLM
Interval	1
Interval unit	Years
CBM Type	LeadTime
Lead Time	2
Lead Time unit	Years
Lead Time Distribution	Fixed
Chance of Failure	0
First inspection	0
First inspection unit	Hours
Costs	
Maintenance Category	
Generic	€0.00
Materials	€0.00
External	€0.00
Labour	€0.00
Total Costs	€225.00

Direct access to change data

RCM: grid

Optimizer+ : SQLUitlever db - [FMECA Grid]

File Edit Windows Extra Info

Help FM-Library Business objectives FMECA Maintenance concept Quick FMECA FlexGrid

Interfaces Language / currency Custom

Shortcuts: [Icons]

New X Delete rows X Clear cell range

Excel Clear layout Save layout

Tag	Part	Failmode	Economics	Environment	Reputation	Health & Safety
ZN-35-XS-873-1	X3501 SLEW/L OPN/CLS LOC...	No switching	0-10k Slight Damage	No Effect	No Impact	No injury
ZN-35-XS-871-1	X3501 SECON OPN/CLS LOC...	No switching	Name		No Impact	Minor Injury
ZN-35-XS-874-1	X3501 ERS O/RIDE SOL/VV LO...	No / reduced opening/closing	> 10M Extensive Damage		No Impact	No injury
ZN-35-XI-844-1	X3501 FWHL MODE/INDI IN 3...	No / reduced loading arm movement	1-10M Major Damage		Considerable Impact	No injury
ZN-35-XI-855-1	X3501 SELECT/INDI IN 35X828	No / reduced loading arm movement	100-1000k Local Damage		No Impact	No injury
ZN-JNB-3520	X3501 MOV INST JUNCTION ...	No electrical power transfer	10-100k Minor Damage		No Impact	No injury
ZN-JNB-3525	X3501 MOV INST J/BOX	No electrical power transfer	> 0-10k Slight Damage		No Impact	No injury
ZN-JNB-35134	X3501 L'ARM PENDANT J/B	No electrical power transfer	< 0k No Damage		No Impact	No injury
ZN-35-XI-852-1A	X3501 PENDANT/CONT LED ...	No / reduced loading arm movement			No Impact	No injury
ZN-35-XI-638-1	X3501 MOV-557 OPEN/INDI ...	No / reduced loading arm movement			Slight Impact	No injury
ZN-JNB-35105	X3501 L'ARM PROX SW J/B	No electrical power transfer			Limited Impact	Minor Injury
ZN-35-XS-872-1	X3501 SLEW/R OPN/CLS LOC...	No switching			No Impact	No injury
ZN-35-XI-625-1	X3501 MOV-550 OPEN/INDI ...	No / reduced loading arm movement			No Impact	No injury
ZN-JNB-35107	X3501 L'ARM PROX SW J/B	No electrical power transfer				Major Injury
ZN-JNB-35106	X3501 L'ARM PROX SW J/B	No electrical power transfer				No injury
ZN-35-XI-638-2	X3501 MOV-557 CLOS/INDI ...	No / reduced loading arm movement				No injury
ZN-35-XI-845-1	X3501 MANVRE MODE/INDI ...	No / reduced loading arm movement				Single Fatality
ZN-35-XI-625-2	X3501 MOV-550 CLOS/INDI ...	No / reduced loading arm movement				No injury

For each piece of equipment you are able to see the effect the failure has on the business objectives

Configurable layout

Easy to export to Excel

RCM: example

X3501 FWHL MODE/INDI IN
35XX828 (equipment)

Led cluster (component)

Defective Led clusters

Mean time to Failure = 10 years

↓ Failure cause

No / reduced loading arm movement

↓ Effect

10 – 100K minor damage

Risk Matrix

Selected businessobjective: ☐ Show risk numbers

Classifications Business Objective	> 100 Yr	20 Yr < X ≤ 100 Yr	4 Yr < X ≤ 20 Yr	6 Mth < X ≤ 4 Yr	0 hr < X ≤ 6 Mth
> 10M Extensive Damage					
1-10M Major Damage					
100-1000k Local Damage					
10-100k Minor Damage					
0-10k Slight Damage					
< 0k No Damage					

RCM: risk matrix

Risk Matrix

Classification (MTTF) ▾

Classification	> 100 Yr	20 Yr < X <= 100 Yr	4 Yr < X <= 20 Yr	6 Mth < X <= 4 Yr	0 hr < X <= 6 Mth
> 10M Extensive Damage	0	0	0	0	0
1-10M Major Damage	0	0	2	0	0
100-1000k Local Damage	0	0	3	0	0
10-100k Minor Damage	0	0	0	0	0
0-10k Slight Damage	0	0	5	1	0
< 0k No Damage	0	0	13	2	0

Summary

No. of Failure Causes under Threshold:	21	No. of Fail. Causes over Threshold:	5
No. of Failure Causes under Threshold after Simulation:	0	No. of Fail. Causes over Threshold after Sim.:	0

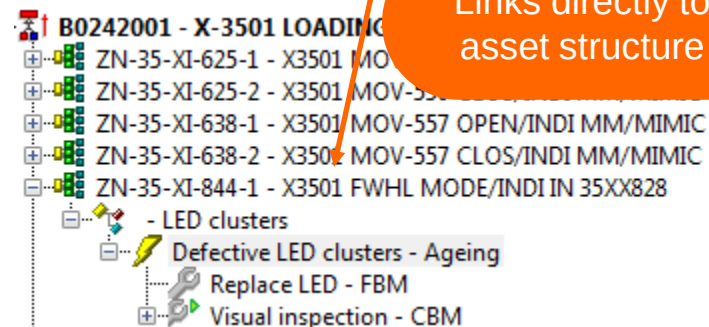
See where your critical assets rank in the risk matrix

Click to see which items

Failcauses in the selected risk category

Path	Part	Part Tag	Component	Component Tag	Description	Condition
X-3501 LOADI...	X3501 FWHL...	ZN-35-XI-844-1	LED clusters		Defective LE...	Ageing
X-3501 LOADI...	X3501 L'VAR...	ZN-JNB-35134	Seals		Defective Seals	Ageing
X-3501 LOADI...	X3501 L'VAR...	ZN-JNB-35134	Body		Defective Body	Corrosion

Links directly to asset structure



Clustering activities: CLM

B0242001 - X-3501 LOADING ARM

- ZN-35-XI-625-1 - X3501 MOV-550 OPEN/INDI MM/MIMIC
- ZN-35-XI-625-2 - X3501 MOV-550 CLOS/INDI MM/MIMIC
- LED clusters
 - Defective LED clusters - Ageing
 - Replace LED - FBM
 - Visual inspection - CBM
- ZN-35-XI-638-1 - X3501 MOV-557 OPEN/INDI MM/MIMIC
- ZN-35-XI-638-2 - X3501 MOV-557 CLOS/INDI MM/MIMIC
- ZN-35-XI-844-1 - X3501 FWHL MODE/INDI IN 35XX828
- LED clusters
 - Defective LED clusters - Ageing
 - Replace LED - FBM
 - Visual inspection - CBM
- ZN-35-XI-845-1 - X3501 MANVRE MODE/INDI 35XX828
- ZN-35-XI-852-1A - X3501 PENDANT/CONT LED CLUSTER
- ZN-35-XI-855-1 - X3501 SELECT/INDI IN 35XX828
- ZN-35-XS-871-1 - X3501 SECON OPN/CLS LOCAL L/SW
- ZN-35-XS-872-1 - X3501 SLEW/R OPN/CLS LOCAL L/SW
- ZN-35-XS-873-1 - X3501 SLEW/L OPN/CLS LOCAL L/SW
- ZN-35-XS-874-1 - X3501 ERS O/RIDE SOL/VV LOCAL
- ZN-JNB-35105 - X3501 L\ARM PROX SW J/B
- ZN-JNB-35106 - X3501 L\ARM PROX SW J/B
- ZN-JNB-35107 - X3501 L\ARM PROX SW J/B
- ZN-JNB-35134 - X3501 L\ARM PENDANT J/B
- ZN-JNB-3520 - X3501 MOV INST JUNCTION BOX
- ZN-JNB-3525 - X3501 MOV INST J/BOX
- Yearly visual inspection - CLM

Add/Delete Maintenance Actions

Maintenance Objects CLM

Maintenance Action	Type	Failure Cause	Component	Part/System	Interval	Interval unit	Effect	Maint Staff Type	Taskcode
Visual inspe...	CBM	Defective L...	LED clusters	X3501 MOV...	1	Years	No Effect		
Visual inspe...	CBM	Defective L...	LED clusters	X3501 MAN...	1	Years	No Effect		
Visual inspe...	CBM	Defective S...	Seals	X3501 LVA...	1	Years	No Effect		
Visual inspe...	CBM	Defective B...	Body	X3501 LVA...	1	Years	No Effect		
Check body									
Check body									
Visual inspe...									
Visual inspe...									

Maintenance Actions

Available Maintenance Objects

Maintenance Action	Type	Failure Cause	Component	Part/System	Interval	Interval unit	Effect	Maint Staff Type	Taskcode
Check level ...	CBM	Defective U...	Limit switch	X3501 SEC...	2	Years	No Effect		
Replace Seals	UBM	Defective S...	Seals	X3501 LVAR...	4	Years	No Effect		
Replace Seals	UBM	Defective S...	Seals	X3501 LVAR...	4	Years	No Effect		

Close

Able to consolidate maintenance actions into a CLM

Maintenance program: optimization

Purge Preventive Maintenance for Non-Critical Failcauses /Add PM for Critical Failcauses

Maintenance Actions Report: Non critical failcauses with PM

Non critical failcauses with PM | Critical failcauses without PM | All failcauses

Name	Tag	Component	Failure Cause	Failure Condition	Maintenance Action	Strategy	Mandatory
☐ X3501 MOV-550 OPEN/IND...	ZN-35-XI-625-1	LED clusters	Defective LED c...	Ageing	Visual inspection	CBM	Yes
☐ X3501 MOV-550 OPEN/IND...	ZN-35-XI-625-1	LED clusters	Defective LED c...	Ageing	Replace LED	CBM-follow	Yes
☐ X3501 MOV-557 OPEN/IND...	ZN-35-XI-638-1	LED clusters	Defective LED c...	Ageing	Visual inspection	CBM	Yes
☐ X3501 MOV-557 OPEN/IND...	ZN-35-XI-638-1	LED clusters	Defective LED c...	Ageing	Replace LED	CBM-follow	Yes

Cost savings: See all non critical failure causes with PM

Compliance: All critical failure causes without PM

Select All | Unselect All | Delete Preventive | OK

Maintenance program: report

FMECA Systems

CLM overview

Optimizer⁺

B0242001

X-3501 LOADING ARM

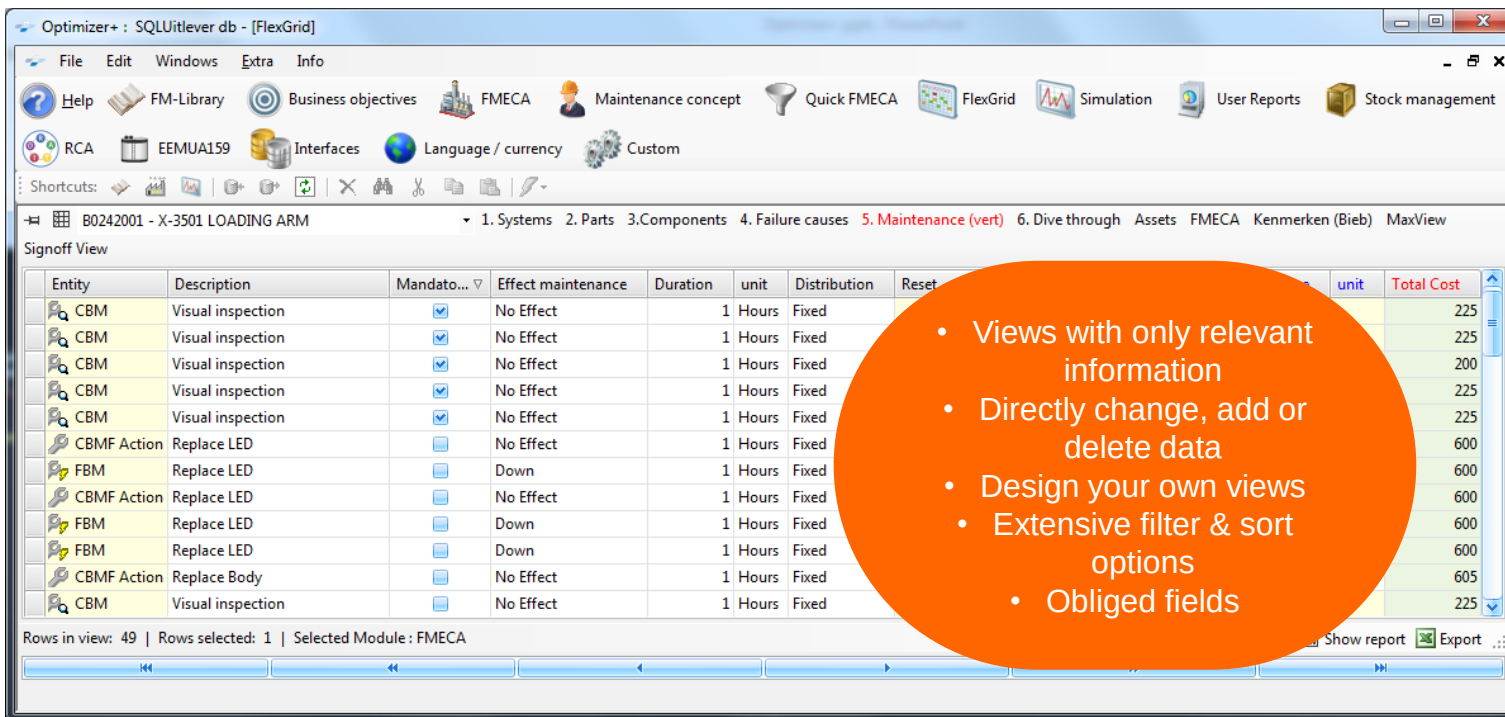
X-3501 LOADING ARM

CLM: Yearly visual inspection

Frequency: 1.00 yr. Duration: 2.00 h. Cost: € 500,00 Maintenance effect: No effect

<u>TAG</u>	<u>Part</u>	<u>Strategy</u>	<u>Maintenance action</u>	<u>Frequency</u>	<u>Duration</u>	<u>Cost</u>	<u>Effect</u>
ZN-JNB-35106	X3501 L'ARM PROX SW JIB	CBM	Visual inspection	1.00 yr.	1.00 h.	€ 225,00	N
ZN-JNB-35134	X3501 L'ARMPENDANT JIB	CBM	Checkbody	1.00 yr.	1.00 h.	€ 225,00	N
ZN-JNB-35107	X3501 L'ARM PROX SW JIB	CBM	Checkbody	1.00 yr.	1.00 h.	€ 225,00	N
ZN-35-XI-625-2	X3501 MOV-550 CLOS/INDI MM/MIMIC	CBM	Visual inspection	1.00 yr.	1.00 h.	€ 225,00	N
ZN-35-XI-845-1	X3501 MANVRE MODE/INDI 35XX828	CBM	Visual inspection	1.00 yr.	1.00 h.	€ 225,00	N
ZN-35-XI-844-1	X3501 FWHL MODE/INDI IN 35XX828	CBM	Visual inspection	1.00 yr.	1.00 h.	€ 225,00	N
ZN-35-XI-625-1	X3501 MOV-550 OPEN/INDI MM/MIMIC	CBM	Visual inspection	1.00 yr.	1.00 h.	€ 200,00	N
ZN-35-XI-638-1	X3501 MOV-557 OPEN/INDI MM/MIMIC	CBM	Visual inspection	1.00 yr.	1.00 h.	€ 225,00	N
ZN-JNB-35106	X3501 L'ARM PROX SW JIB	CBM	Visual inspection	1.00 yr.	1.00 h.	€ 225,00	N
Total:					9.00 h.	€ 2.000,00	

FlexGrid: customizable user interface



Optimizer+ : SQLUttleveler db - [FlexGrid]

File Edit Windows Extra Info

Help FM-Library Business objectives FMECA Maintenance concept Quick FMECA FlexGrid Simulation User Reports Stock management

RCA EEMUA159 Interfaces Language / currency Custom

Shortcuts: [Icons]

B0242001 - X-3501 LOADING ARM

1. Systems 2. Parts 3.Components 4. Failure causes 5. Maintenance (vert) 6. Dive through Assets FMECA Kenmerken (Bieb) MaxView

Signoff View

Entity	Description	Mandato...	Effect maintenance	Duration	unit	Distribution	Reset	unit	Total Cost
CBM	Visual inspection	☒	No Effect	1	Hours	Fixed			225
CBM	Visual inspection	☒	No Effect	1	Hours	Fixed			225
CBM	Visual inspection	☒	No Effect	1	Hours	Fixed			200
CBM	Visual inspection	☒	No Effect	1	Hours	Fixed			225
CBM	Visual inspection	☒	No Effect	1	Hours	Fixed			225
CBMF Action	Replace LED	☐	No Effect	1	Hours	Fixed			600
FBM	Replace LED	☐	Down	1	Hours	Fixed			600
CBMF Action	Replace LED	☐	No Effect	1	Hours	Fixed			600
FBM	Replace LED	☐	Down	1	Hours	Fixed			600
FBM	Replace LED	☐	Down	1	Hours	Fixed			600
CBMF Action	Replace LED	☐	No Effect	1	Hours	Fixed			600
CBMF Action	Replace Body	☐	No Effect	1	Hours	Fixed			605
CBM	Visual inspection	☐	No Effect	1	Hours	Fixed			225

Rows in view: 49 | Rows selected: 1 | Selected Module: FMECA

Show report Export

- Views with only relevant information
- Directly change, add or delete data
- Design your own views
- Extensive filter & sort options
- Obligated fields

Simulation: what if analysis

What if analysis are performed with the available data in Optimizer+.

Scenarios are performed with a time frame, for example of 10 years. During the simulation Optimizer+ calculates data like costs, numbers of failures, availability in production.

The simulations are based on the Monte Carlo Method.

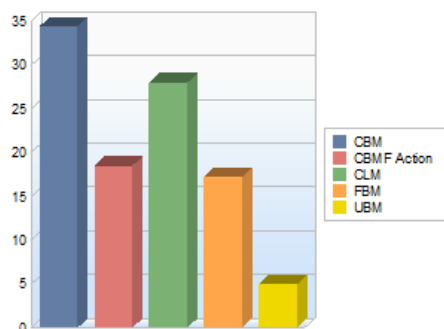
Possible scenario's

- What is the impact of redundancy?
- What is the cost of maintenance and what will happen when less maintenance is performed?
- Where to start when the maintenance budget is 10% lower?
- What are the performance outliers and how can they be reduced?
- What is the influence of a modification?
- How can availability be increased?

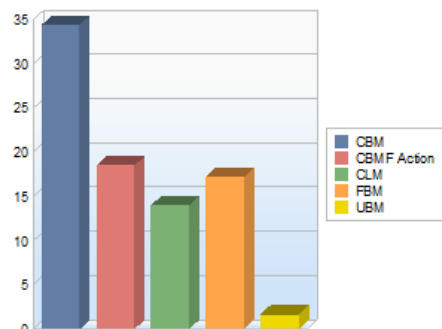


Reports: totals

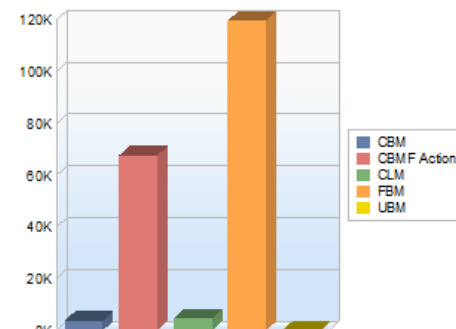
Maintenance Duration



No. of Maint. Actions

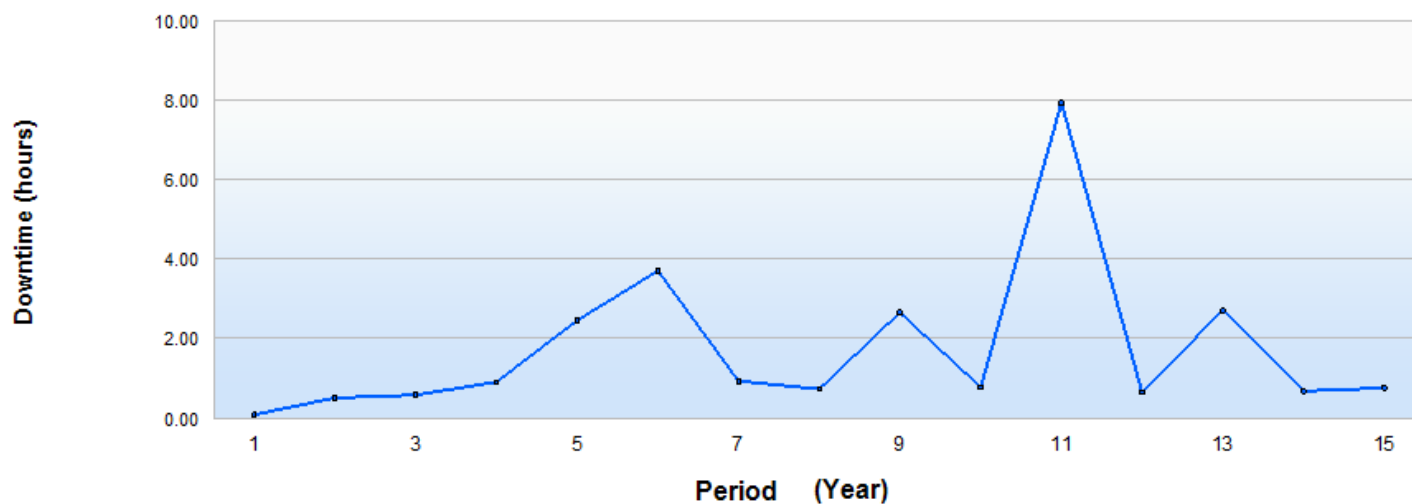


Costs



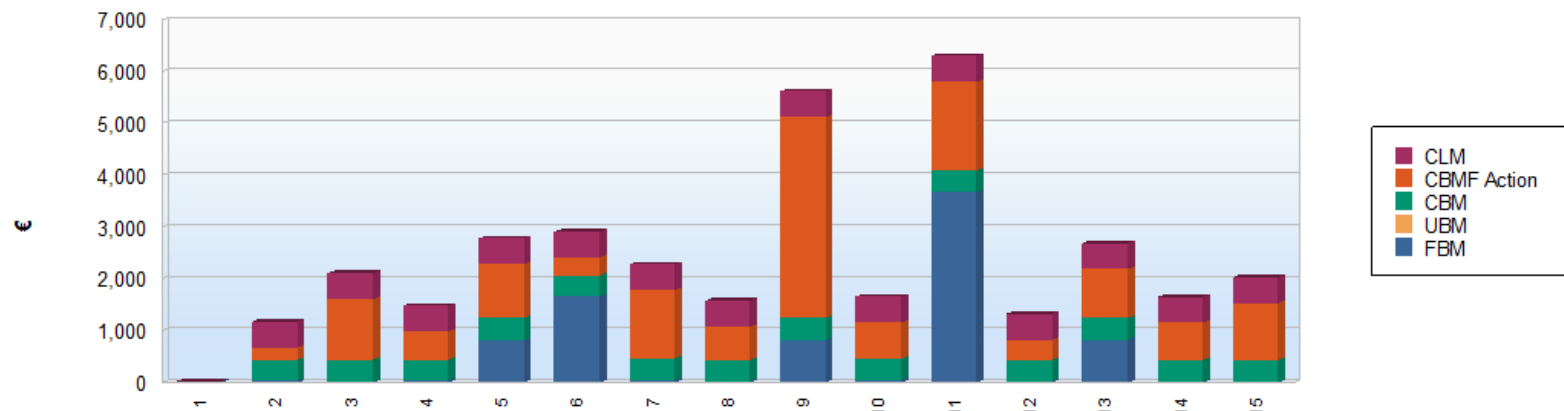
Strategy	Total(hr) Duration	Avg.(hr) Duration	Total No. of Actions	Avg. Quantity	Maintenance Costs	Avg Costs	Production Loss	Avg Costs	Total Costs	Avg Costs	Total NPV Costs	Avg. NPV Costs
CBM	34,43	2.30	34,43	2.30	5.831,30	389	0	0	5.831	389	3.846	256
CBMF Action	18,53	1.24	18,53	1.24	14.724,50	982	87.500	5.833	102.225	6.815	67.636	4.509
CLM	28,00	1.87	14,00	0.93	7.000,00	467	0	0	7.000	467	4.617	308
FBM	17,23	1.15	17,23	1.15	8.090,00	539	172.250	11.483	180.340	12.023	119.724	7.982
UBM	4,95	0.33	1,65	0.11	0,00	0	0	0	0	0	0	0
	103,13	6.88	85,83	5.72	35.646	2.376	259.750	17.317	295.396	19.693	195.823	13.055

Reports: downtime



Total Availability:	99.98%
Total No. of Maintenance Actions:	25.98
Total Downtime (hr):	25.98

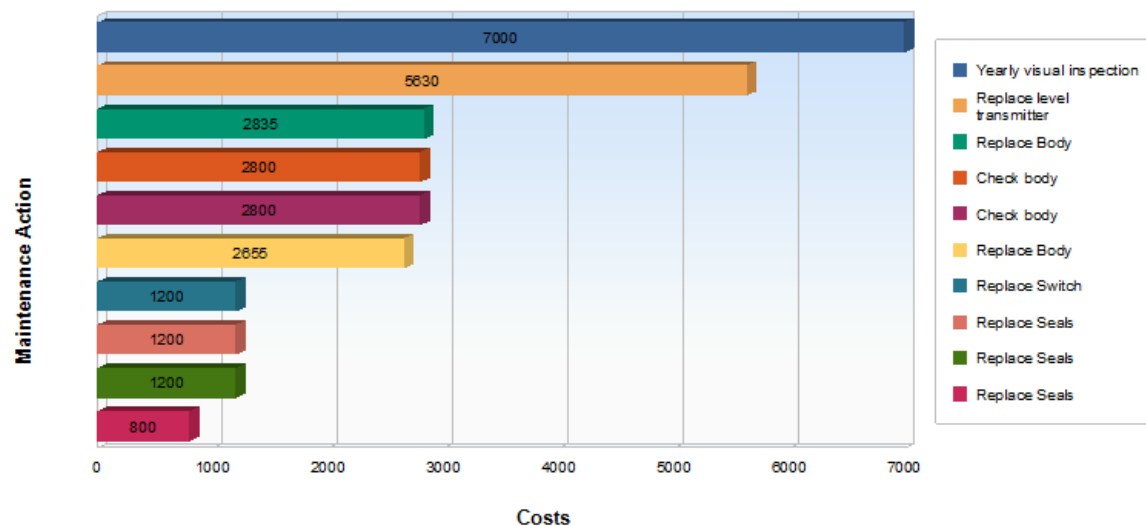
Reports: maintenance cost per period per strategy



Period (Year)

Total No. of Maint. Actions (Entire Period)	85.83
Total Maintenance Duration (hr) (Entire Period)	103.13
Total Maintenance Costs (Entire Period)	35,645.80
Average Maintenance Costs (Entire Period)	2.376,39

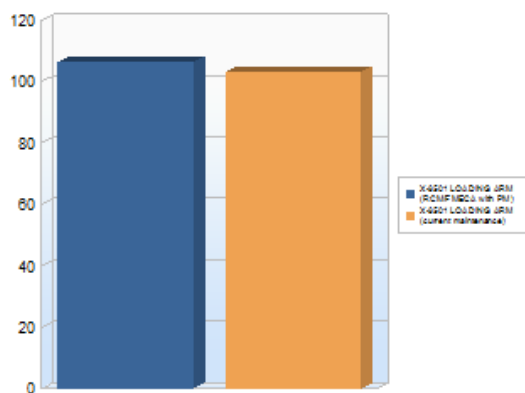
Reports: maintenance costs - top 10



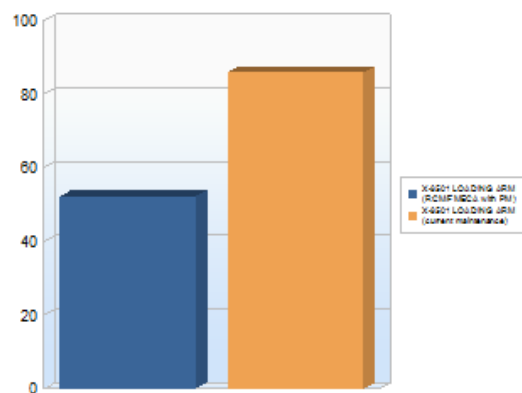
Location	Part Tag	Description	Strategy	Quantity	Duration (hr)	Costs	% of Total
X-3501 LOADING ARM(B0242001)	B0242001	Yearly visual inspection	CLM	14.00	28.00	7,000.00	(19.64%)
X3501 SECON OPN/CLS LOCAL L/SW(ZN-35-XS-871-1)/Limit switch/ Defective Limit switch/Ageing / Water ingress	ZN-35-XS-871-1	Replace level transmitter	CBMF Action	3.38	3.38	5,629.50	(15.79%)

Reports: scenario comparison, totals

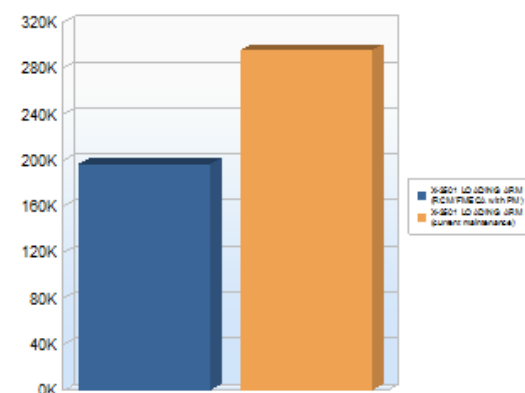
Maintenance Duration



No. of Maint. Actions

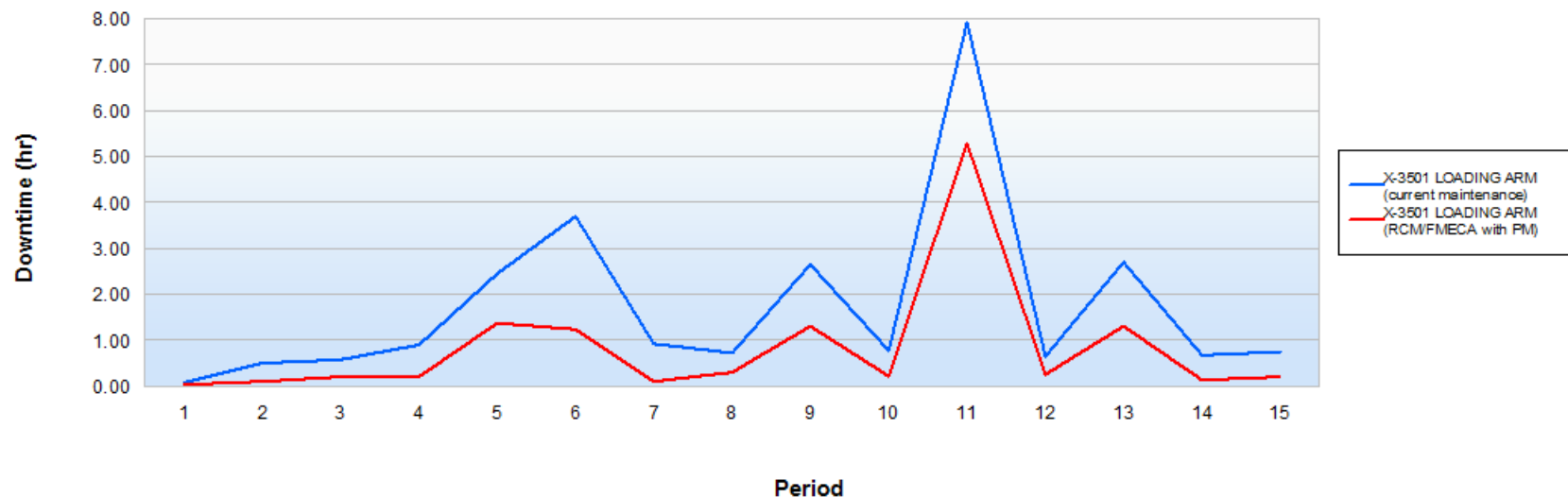


Costs



Scenario	Total(hr) Duration	Total No. of Maint.	Maintenance Costs	Production Loss	Total Costs	Total NPV Costs
X-3501 LOADING ARM (RCM/FMECA with PU)	106.27	52.27	73,908.47	122,711.86	196,620.34	130,525.00
X-3501 LOADING ARM (current maintenance)	103.13	85.83	35,645.80	259,750.00	295,395.80	195,823.07

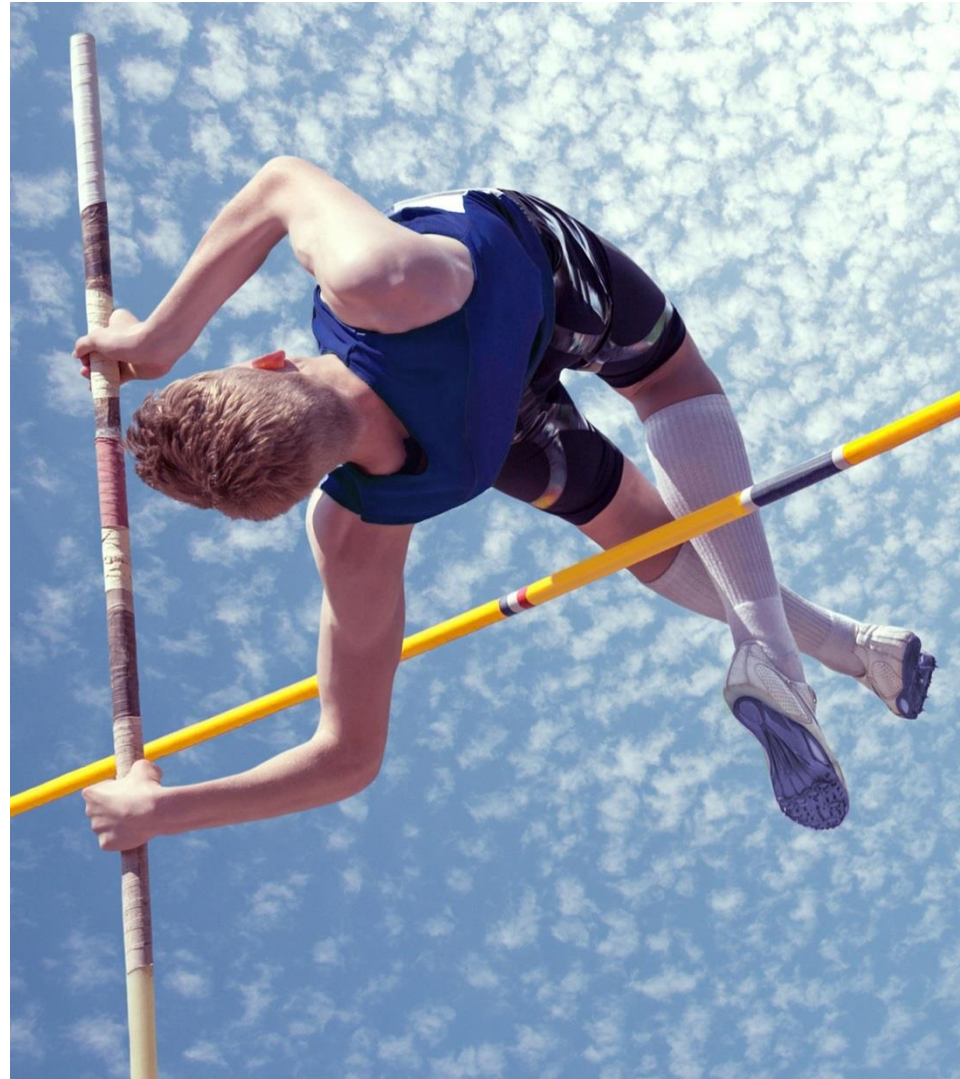
Reports: scenario comparison, downtime



Scenario	Maintenance Actions	Downtime Totals (hr)
X-3501 LOADING ARM (RCM/FMECA with PM)	12,27	12,27
X-3501 LOADING ARM (current maintenance)	25,98	25,98

Unique Selling Points

- Covers the whole FMECA process in a natural way
- PM-library functionality that enables users to accelerate and standardize the RCM process
- Simulation/ optimization functionality to perform what-if analysis and scenario comparison
- Web based interfacing with SAP EAM, Infor EAM and IBM Maximo
- Integrated RCA and RBI modules
- Professional development, support and roadmap
- Strong (technology) partners





Seit 1984 Beratungs- und Integrationspartner im Bereich Instandhaltungs- und Betriebsführungssysteme für komplexe Anlagen.

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