



NEPLAN Maintenance (Reliability Centered Maintenance)

A good overview over different maintenance strategies and the NEPLAN-Maintenance philosophy can be found on this web-site:

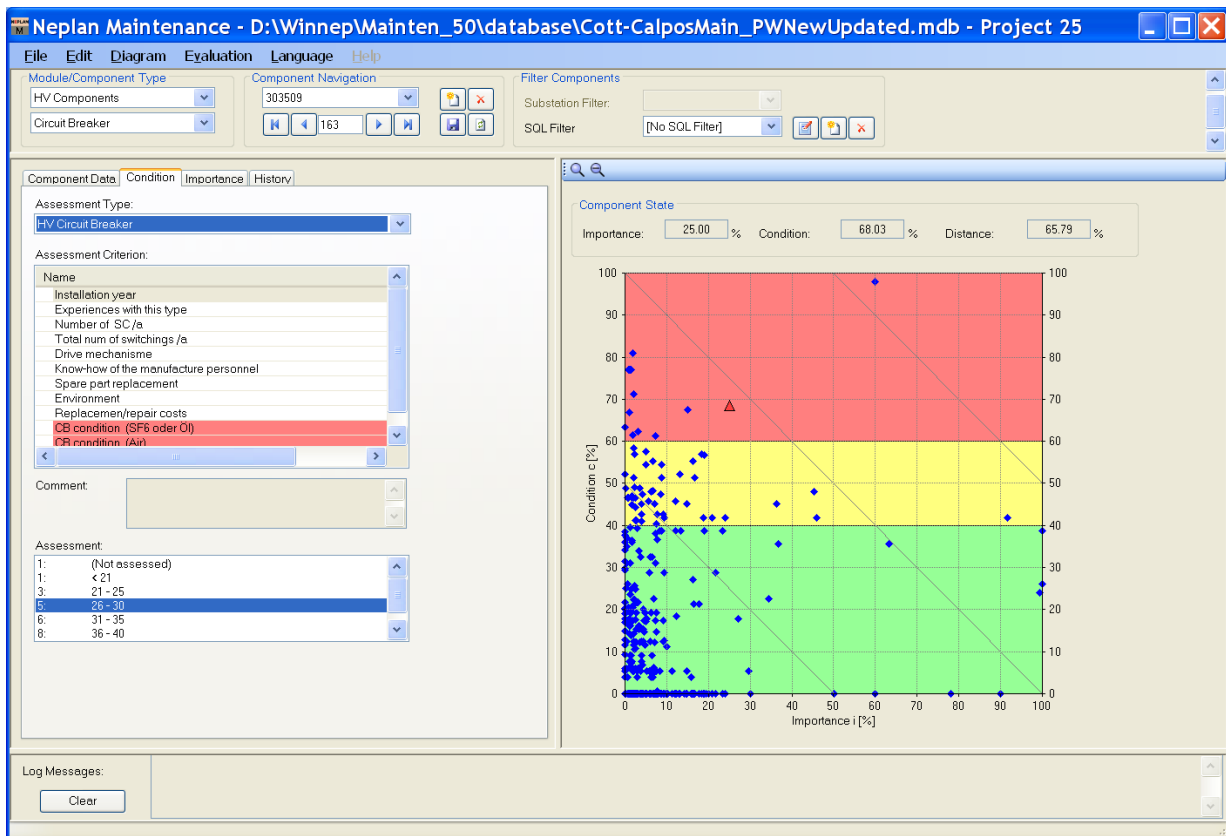
www.neplan.ch/downloads/public/NEPLAN-Maintenance-Strategies_e.pdf

The main features of the NEPLAN-Maintenance module are:

- Available sub-modules are:
 - o HV Components
 - o HV AIS Substations
 - o HV GIS Substations
 - o HV/MV Overhead line
 - o MV Substations
 - o MV Local Substations
 - o MV Cables
- Data can be stored in any database (e.g. Oracle, MS-Access, SQL Server etc.)
- Allows easy integration to existing ERP systems (e.g. SAP)
- Assessment criterion can be added or changed by the user
- Allows quickly to assess the conditions of the components
- Different charts give a useful overview over the overall conditions of the components
- A budgeting evaluation tools is available, which calculates the costs for the following maintenance strategies:
 - o TBM Estimation (estimated time based maintenance)
 - o TBM (time based maintenance)
 - o CBM (condition based maintenance)
 - o RCM (reliability based maintenance)
- **Integrates smoothly with our famous NEPLAN-Reliability module**
- Can be excellently used a for reinvestment strategies

Component Assessment in NEPLAN-Maintenance

The picture below shows on the left side the assessment sheet of the current component. The diagram shows all condition (y-axis) and all importance (x-axis) of all components (in this case circuit breakers). The actual circuit breaker to assess is colored differently. The user can define any filter to reduce the amount of displayed components.

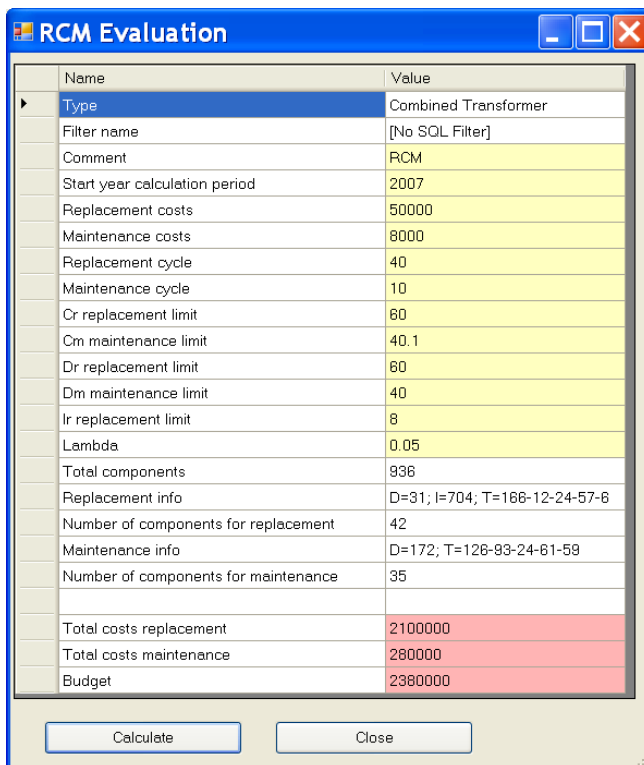


The condition of each component can easily be assessed with the freely configurable assessment sheets.

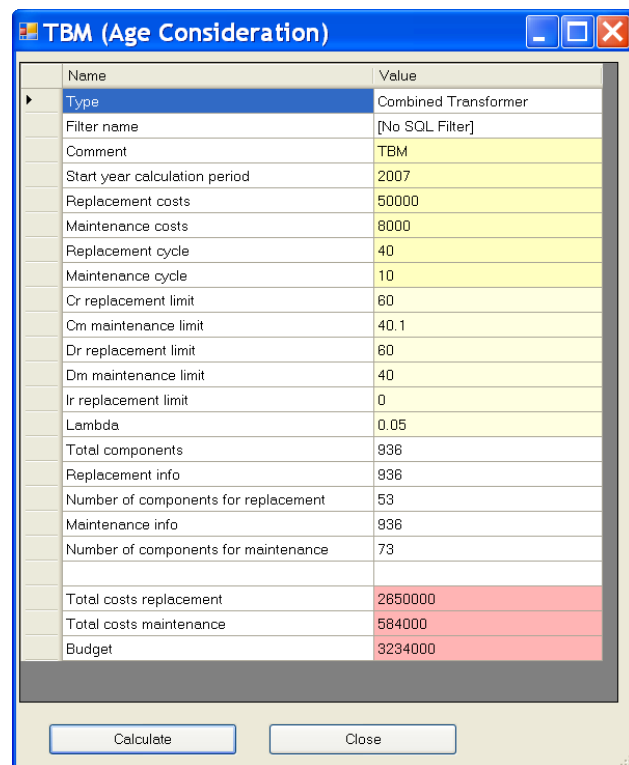
Budgeting Evaluation Tool in NEPLAN-Maintenance

In NEPLAN-Maintenance a budgeting tool is included, which allows evaluating the costs of the different maintenance strategies:

- TBM Estimation (estimated time based maintenance)
- TBM (time based maintenance)
- CBM (condition based maintenance)
- RCM (reliability based maintenance)



Name	Value
Type	Combined Transformer
Filter name	[No SQL Filter]
Comment	RCM
Start year calculation period	2007
Replacement costs	50000
Maintenance costs	8000
Replacement cycle	40
Maintenance cycle	10
Cr replacement limit	60
Cm maintenance limit	40.1
Dr replacement limit	60
Dm maintenance limit	40
Ir replacement limit	8
Lambda	0.05
Total components	936
Replacement info	D=31; I=704; T=166-12-24-57-6
Number of components for replacement	42
Maintenance info	D=172; T=126-93-24-61-59
Number of components for maintenance	35
Total costs replacement	2100000
Total costs maintenance	280000
Budget	2380000

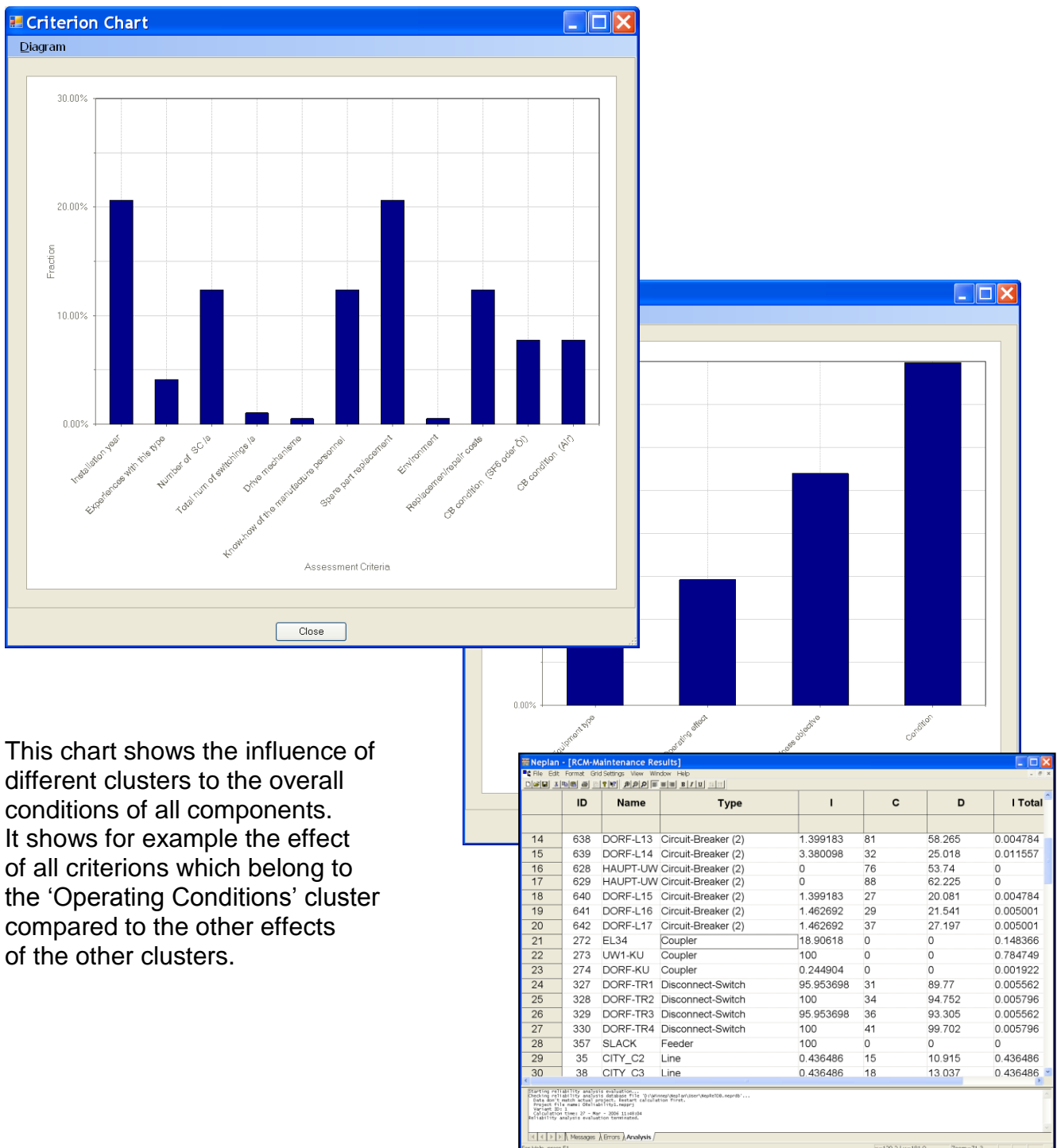


Name	Value
Type	Combined Transformer
Filter name	[No SQL Filter]
Comment	TBM
Start year calculation period	2007
Replacement costs	50000
Maintenance costs	8000
Replacement cycle	40
Maintenance cycle	10
Cr replacement limit	60
Cm maintenance limit	40.1
Dr replacement limit	60
Dm maintenance limit	40
Ir replacement limit	0
Lambda	0.05
Total components	936
Replacement info	936
Number of components for replacement	53
Maintenance info	936
Number of components for maintenance	73
Total costs replacement	2650000
Total costs maintenance	584000
Budget	3234000

At your fingertips: budgeting evaluation of RCM and TBM can be easily compared

Chart Evaluation Tool in NEPLAN-Maintenance

The integrated chart manager shows for example the influence of each criterion to the overall conditions of all components. Each criterion can be assigned to a cluster (e.g. operating condition, component type, etc.). NEPLAN allows evaluating the overall conditions according to these clusters.



This chart shows the influence of different clusters to the overall conditions of all components. It shows for example the effect of all criteria which belong to the 'Operating Conditions' cluster compared to the other effects of the other clusters.

Integration with NEPLAN-Reliability Module

The NEPLAN-Maintenance module can make use of the calculated results of our famous NEPLAN-Reliability module. The NEPLAN-Maintenance module integrates smoothly to the NEPLAN single line diagram. The conditions C, importance I and the distances D (function of condition and importance, $D = f(C, I)$) can be displayed on the single line diagram. The coloring according to C, I and D shows very quickly which components must be replaced or maintained first.

The NEPLAN-Maintenance module is at the moment the only RCM module on the market, which integrates, with a robust network reliability module.

