Assess the reliability of electric distribution networks

The Predictive and Historical Reliability Assessment module of the CYME power engineering software computes reliability indices for the overall system and their corresponding protection zones, as well as customer point indices. The predictive model can be calibrated based on historical data. The module is fully integrated in the CYME software and provides a high degree of flexibility for analyzing distribution system configurations.

Reliability System Data
In addition to the equipment data already modeled in the CYME software (ratings, impedances), the outage data for the different components are to be specified as follows:

- Failure rate (sustained and momentary)
- Repair time
- Switching / isolation time
- Stuck probability (on protective and switching devices)

The outage data can be computed and calibrated (adjusted) using historical data and can be furthermore modified graphically in various ways to reflect the impact of a tree trimming campaign by defining environmental factors that affect failure rates, and repair times at specific locations.

With it you can also display all historical failure data on the diagram and color code it based on the number of outages, the causes, the type of failures, etc.
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**Calculation of the Reliability Indices**

Using either historical data or user-defined failure data, the program can compute the different system and load point indices taking into consideration the re-closing scheme (fuse saving or fuse clearing) and the re-closer settings (single-phase trip, three-phase trip, individual phase lock-out, all phases lock-out, etc.).

Restoration may be enabled by using the pre-contingency load flow. The automation of some switching devices will impact the restoration time.

Indices are automatically calculated at the feeder level, zone level (start of a protected zone) and customer level.

The network one line diagram can be color coded based on any of the computed indices as a reference.

This allows the visual identification of areas where the number of interruptions or the outage time exceeds the predefined standard limits.

It also features a mode to compare the results of two studies and present the differences graphically. This allows the user to evaluate the improvement in reliability due to the installation or relocation of equipment, effect of tree trimming, etc. as compared to the base case.

**What-If Scenarios**

The module provides a high degree of flexibility for analyzing various distribution system configurations ("what-if" scenarios). The effects of network modifications can be analyzed to measure the improvement in reliability indices. The reports include numerous graphics showing the reliability indices by color as well as customizable tabular reports.

Reliability assessment has become more important for utility planners in recent years. Improved service reliability might be motivated by government regulation or by market competition, but providing superior service at an attractive price is in the interest of both the utility and the customer.