



Switching Optimization and Single Contingency

The Switching Optimization module determines the optimal feeder configuration in order to minimize losses, improve the voltage profile and balance the load between feeders. It also can recommend switching schemes and determines the optimal location of tie points. The Single Contingency Analysis module is designed to study the impact of single forced or planned outages on the electrical distribution system. It finds the optimal switching plan to restore electrical power to priority customers and to recover the maximum possible load in the affected areas.

Program Features - Switching (Tie-point) Optimization

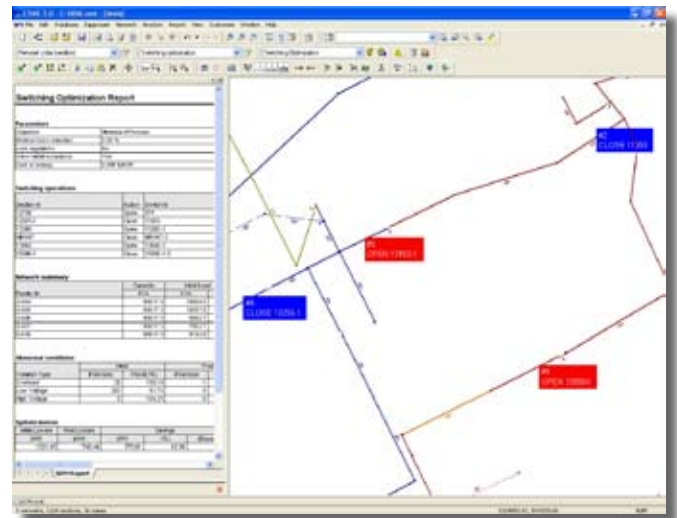
The Switching Optimization module is an add-on to CYME that is designed to help distribution engineers determining the optimal feeder configuration in order to minimize losses, improve the voltage profile and balance the load between feeders. This module can determine the optimal location of the tie points by suggesting new locations (addition of switching devices) or recommended switching for existing devices in order to achieve the selected objective.

This module will suggest the closing/opening of existing switching devices or to place new ones to find the configuration that will minimize losses, hence lower the operating cost, while respecting the user-defined constraints such as voltage thresholds and loading limits. The module may also be used to recommend switching in order to minimize abnormal conditions such as overloaded equipment and low voltage conditions, and to minimize unbalanced loading among interconnected feeders.

Objective Functions

The module offers the following objective functions to the user:

- Minimize overload exceptions to reduce the most severe overloads
 - Minimize voltage exceptions to reduce the most severe voltage problems
 - Minimize unbalanced loading to balance the loading among interconnected feeders
 - Minimize service interruption frequency to transfer portions of circuits among interconnected feeders
- Minimize KW Losses by either:
 - Global branch exchange: the program transfers the load by modifying the configuration of the tie points simultaneously in order to find a more efficient way to feed local customers. With this method the user can activate the option of adding new switches, which implies that CYME will recommend new locations for the tie points.
 - Local branch exchange: the program transfers the load by modifying the configuration of tie points individually in order to find a more efficient way to feed local customers.



Switching Optimization and Single Contingency

Determine the optimal feeder configuration and study the impact of outages.

Program Features - Single Contingency Analysis

The Single Contingency Analysis module is designed to study the impact of single forced or planned outages on the electrical distribution system. It finds the optimal switching plan to restore electrical power to priority customers and to recover the maximum possible load in the affected areas.

This module is fully integrated with CYME and assumes the initial starting state (loading and connectivity) to be defined by the active study in CYME. Restrictions may be set on selected switching devices so they are not considered in the switching plan. Contingencies may be set at the substation, circuit or component level, meaning that you may study the impact of losing a transformer-bank in the substation or simply simulate a damaged component on the main feeder.

Objective functions

The optimal selection criteria and priority path of the module is defined by a ranking-based search method that handles multiple objective functions. In order to define the relative importance of each objective for your particular case, a weight is assigned to each of the following objectives:

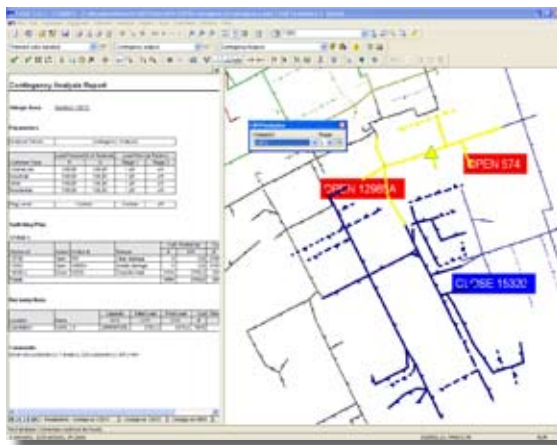
- Minimize the number of switching operations
- Maximize the total load restored
- Maximize feeder spare capacity
- Maximize component spare capacity
- Minimize restoration path (distance)

Proposed Restoration Plan

The best switching plan is selected from all the alternatives (based on customer count, priority of the customers and number of operations required) while ensuring that the user-defined constraints are respected, such as there are no abnormal conditions (overloading of equipment and voltage violations) on the system. The program provides a report that identifies the weak points on the feeders (limiting components) and the total customers exposed beyond these points. This allows you to modify the components and replay the simulation without the limiting components.

The restoration mode provides the options to either pick-up the un-served customers through “switching” (switching plan) or through “repair”. The main difference is that the “repair” option does not transfer load to the adjacent circuit. Instead, it uses the “cold load” pick-up factors of the different type of loads in order to suggest a two-step sequence to restore the customers without power. For both options, the proposed switching plan is shown graphically and you may replay (undo/redo) the proposed scheme and make modifications if desired.

The proposed switching plan may be saved in a study file for later replay, and a detailed customizable report is generated for in-depth analysis.



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