Medium voltage products

Field Application Support
Analysis and calculations in Medium-Voltage electrical networks

Power and productivity
for a better world™

Concept

The electrical installation of an industrial site is a complex structure. Analyzing behavior in a transient condition allows optimum selection of the operation and protection devices in the installation design phase.
Highlighting possible weaknesses and critical points in advance allows prevention of potential problems, damage to machinery, and costly periods of down time.

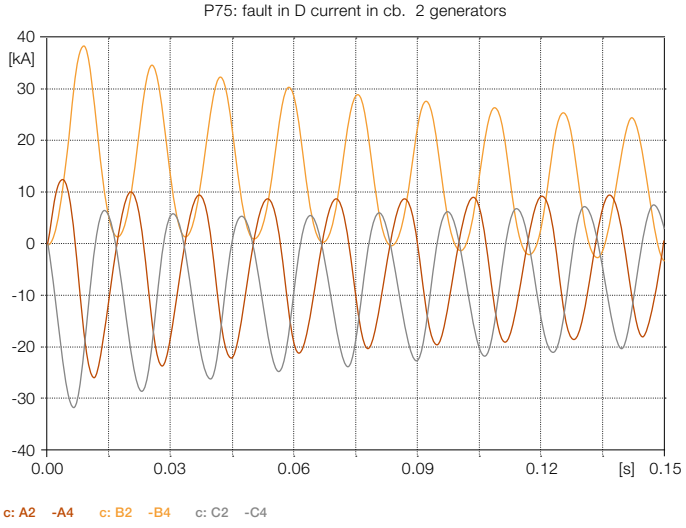
Therefore, in order to completely satisfy the needs and expectations of the customer, an important role is played by analysis and consulting services offered thanks to the skill and experience of our qualified technicians.

The customer can maximize the economic return on their investment thanks to better knowledge of the system and by selecting the best installation solution.
The solutions are documented in detailed reports that become part of the electrical installation's technical file.

Simulations and accurate technical analyses performed with the most up-to-date modern calculation systems ensure the adequacy of the selected devices.

Services

Choose ABB as partner in order to verify the behavior of electrical networks. A team of qualified technicians is able to provide a wide range of technical analyses and simulations, creating complex models of the customer's network, with the goal of identifying the most dangerous transient phenomena for the electrical installation.



The following services are offered:

Short-circuit current calculation

This analysis consists in the calculation of short-circuit current that occurs in the event of faults in various points of the installation. This allows the choice of appropriate circuit breakers, panel and other equipment, optimizing the solution in both technical and economic terms.

Optimum circuit breaker selection to protect generators

The selection of a generator circuit breaker is a very delicate choice and requires careful analysis over time of the short-circuit currents and their asymmetry thanks to physical-mathematical models of the circuit breaker, the generator itself and the installation. Strong asymmetries may lead to the current zero-missing phenomena, a lack of current zeros for a number of cycles. Opening in these conditions places the circuit breakers and the plant under stress with consequences for the set-up of the protection relays.
Analysis allows optimum circuit-breaker selection and indicates the required measures that should be taken for the protection and good operation of the plant.

Calculation of transient overcurrent due to insertion of capacitor banks

The purpose of this analysis is to calculate current transients that occur during insertion of a capacitor bank, with or without another charged in back-to-back mode. The criteria to be followed in order to contain the maximum value of the transient current are also proposed, as well as offering advice on selecting suitable apparatus to turn the capacitor bank on and off e.g. using synchronous switches that eliminate the transients, or circuit breakers which are suitable and approved for operating this type of load.

Calculation of power-transformer inrush transients

The purpose of this calculation is to check the behavior of the installation during commissioning. Certain phenomena, such as closing on off-load transformers, can in fact cause stress to the transformer itself and other components of the installation. Through a detailed and accurate electromagnetic model of the machine, it is possible to assess the behavior of the magnetizing current and suggest the most suitable actions to minimize effects on the plant.

Calculation of transient overcurrent due to insertion of filter banks

The filter bank is an extremely delicate element, where the presence of current harmonics must be appropriately considered during the operation phase of the bank itself. The purpose of analysis is to model the installation and the circuit breaker in order to select the most suitable apparatus for this application, assessing the relative switching transients.

Services

Calculation and analysis of the “Transient Recovery Voltage”

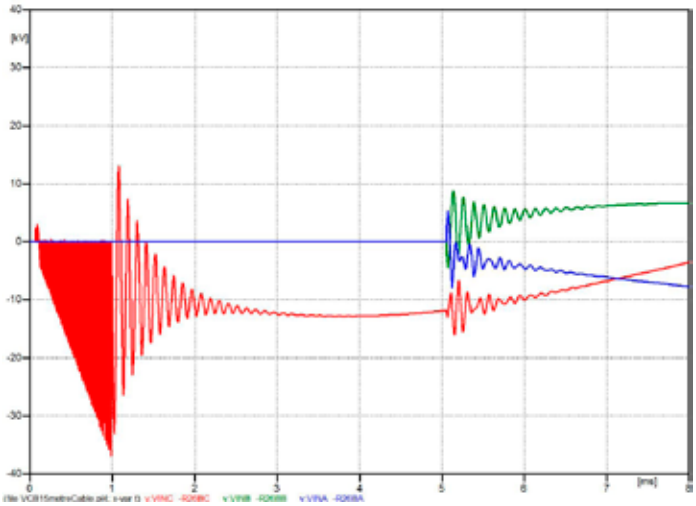
The purpose of this analysis is to check the recovery voltage trend over time after the circuit breaker opening phase in order to assess the possibility of restrike and to suggest optimum selection of the circuit breaker itself suggesting solutions to avoid exceeding this value.

Ferroresonance calculations

Particular installation conditions and particular operation sequences can lead to phenomena known as ferroresonance. These phenomena cause damage in power and instrument transformers that can be very serious and require their replacement.
Analysis, through electromagnetic modeling of the machine and the installation conditions allows identification of the limits and values and evaluation of countermeasures in order to prevent down time.

Calculation of switching overvoltage and suppression methods

Switching operations of highly inductive loads must be carefully studied. Overvoltages that may be generated are sometimes very high and can damage the insulation on the plant’s components such as power transformers, motors or even worse, generators. Analysis checks these phenomena, proposing appropriate solutions if necessary.

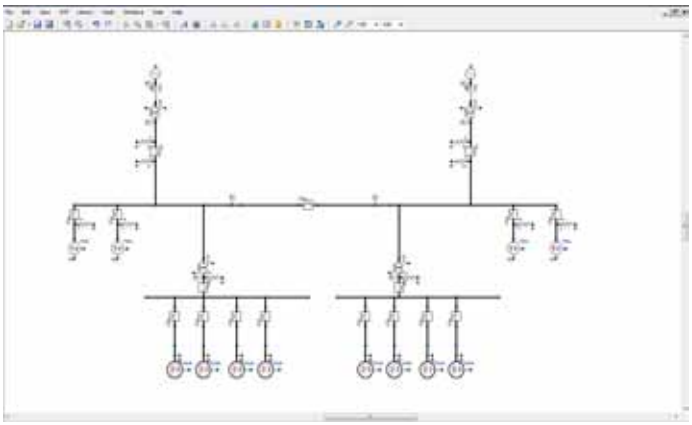


Critical motor start-up current calculation

This analysis aims to assess the starting transient of electrical motors, with critical dimensions and parameters, in terms of effects on the plant during the start-up phase and its effect on the voltage drops. Where necessary, power factor correction systems are proposed which are designed ad hoc for the purpose of optimizing use also from an economic point of view.

Network Analysis

The purpose of this study is to conduct a general analysis on the fault conditions that may occur in the system, identifying the critical points to be checked based on skills and experience acquired by our technicians over many years through numerous analyses conducted on various types of electrical installations.



The unavailability of an electrical installation is often more than a simple glitch. Knowing the limits and critical points ahead of time and making the right choices in selecting the protection components can be a determining factor.

Contacts

ABB S.p.A.
Power Products Division
Unità Operativa Sace-MV
Via Friuli, 4
I-24044 Dalmine
Telefono: +39 035 6952 111
Fax: +39 035 6952 874
e-mail: info.mv@it.abb.com

www.abb.com

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