ENSURING THE FLOW.

Case study
Locating a cable fault in the world's largest "clock tower"

Advanced Vision relies on BAUR cable test van

When discussing medium-voltage cables, most people immediately think of the local distribution network or the infrastructure of an industrial enterprise. However, medium voltage is also used in tower blocks to distribute electricity efficiently around the building, such as the Mecca Royal Clock Tower Hotel, for example. At 601 metres, the hotel is one of the tallest buildings in the world. However, in one respect, this property is unique: it houses the largest clock in the world. The four clock faces have a diameter of 43 metres each and can still be identified at a distance of several kilometres, making the "clock tower" located next to the Sacred Mosque an important landmark.

Rectifying a cable fault quickly with SIM/MIM

When a fault occurred in one of the medium-voltage cables in the tower in February 2013, it was up to the technical experts of Advanced Vision to find the fault as quickly as possible. Engineer Mamoun Al Shaher decided to use a BAUR cable test van to locate the fault. The van contains all the technical equipment needed to quickly identify and locate all typical types of defects, from short-circuits to broken cables.

In this case, a more than 900-metre-long, 3xSC XLPE-insulated 13.8-kV cable was faulty. The electrical engineer knew that the SIM/MIM method (Secondary Impulse Method/Multiple Impulse Method) would quickly identify the target as it not only reveals intermittent faults but high- and low-resistance faults, too. He therefore connected the BAUR cable test van and started the measurement process. Shortly afterwards, the IRG 3000 time domain reflectometer software provided a graphical evaluation which indicated the location of the cable fault. According to the diagram, the fault lay 792.6 metres from the start of the cable – right between the hotel's royal suite and the clock level.

Thanks to the exact mapping with the SSG 1100 surge voltage generator built into the cable test van and the BAUR pin-pointing set (UL 30 and BM 30) it was possible to confirm the graphical evaluation just a few minutes later and the team from Advanced Vision was able to locate the fault immediately and rectify it quickly.

You can find other case studies on our website:
www.baur.at/cases

The user

↗ Mamoun Al Shaher of Advanced Vision having successfully located the fault in the Royal Clock Tower

Advanced Vision Testing & Commissioning, Jeddah (Kingdom of Saudi Arabia), is active throughout the gulf region. It is a division of Advanced Vision Co., operating under the Constructions Products Holding Company (CPC), specialized on projects with multi-million electro and mechanical installations. The company installs, tests and commissions power plants, MV network from cabling to switch gear, ring main units, power transformers, chillers, and MV/LV soft starters as well as all LV networks such as distribution boards, capacitor banks, active harmonic filters, cross bar switches and DC systems. Load flow analysis study for power system is available.

In this example, the fault was located using a cable test van (image). The preliminary location of the cable fault was identified using the IRG 3000 time domain reflectometer and pin-pointed with the SSG 1100 surge voltage generator in conjunction with an acoustic location method (description overleaf). This pinpointing was achieved using the UL 30 audio frequency receiver and BM 30 ground microphone on site.

Time domain reflectometer IRG 3000

The computer-aided IRG 3000 time domain reflectometer is used in combination with the BAUR system software for cable fault prelocation in single and three-phase cable systems. Together with the easy-to-operate BAUR system software, the IRG 3000 can be built into a complete system for cable testing and diagnostics.

Depending on the system coupling unit components, in addition to time domain reflectometry, the IRG 3000 is also capable of using the secondary/multiple impulse method and the decay and impulse current method, including the differential impulse current method and differential decay method. Another option with the IRG 3000 is to take a resistance measurement.

The combination of the IRG 3000 with the PHG 70 or PHG 80 (70 or 80 kV) high voltage generator and the viola cable testing and diagnostics device is particularly suitable for use in a cable test van. This combination of devices allows cable testing and dissipation factor and partial discharge measurements.

Other features at a glance:

- Initial level of transmitting pulse: 20 – 160 V
- Display area up to max. 1000 km
- Pre-programmed measuring sequences, fully automated measurement and display of the fault distance
- Menu navigation in 21 languages

Surge voltage generator SSG 1100

Surge voltage generators enable precise location of high and low resistance as well as intermittent faults. They are suitable for use with high, medium and low voltage cables. The output voltage of the SSG 1100 is infinitely controllable and, depending on the setting, is capable of reaching up to 8 kV, 16 kV or 32 kV. The charge of the high voltage capacitors is discharged to the defective cable in cycles with an electromagnetically controlled surge switch. When it is switched off, the device ensures a safe environment by automatically discharging the connected high-voltage cable and the internal surge capacitors separately from one another.

The most important features at a glance:

- High surge voltage up to 32 kV
- Continuously adjustable voltage
- High surge energy
- Automatic discharging unit
- Electromagnetically controlled surge switch with heat-resistant tungsten calottes
- Four selectable operating programs:
  - Single pulse
  - Low pulse frequency
  - High pulse frequency
  - DC output
- Thermal overload protection device
- Control output for SA 32 system coupling unit (SIM-MIM)

You can find data sheets and further details on these products on our website:
www.baur.eu/cablefaultlocation.