Cable Fault Location

LIVE HV

CASE STUDY

INTRODUCTION

LIVE HV has developed several methods for pinpointing the location of a cable fault without placing any additional stress on the asset. Depending on the type of fault, the appropriate technique is applied, pinpointing the location of the fault with confidence.

The following article provides three case studies where specific methods were used on different types of cable faults:

1. Subsea Cable - Time Domain Reflectometry (TDR) Method
2. Rail Network - Arc Reflection Method
3. Windfarm - Bridge Method

KEY OUTCOMES

Cable Fault location identified

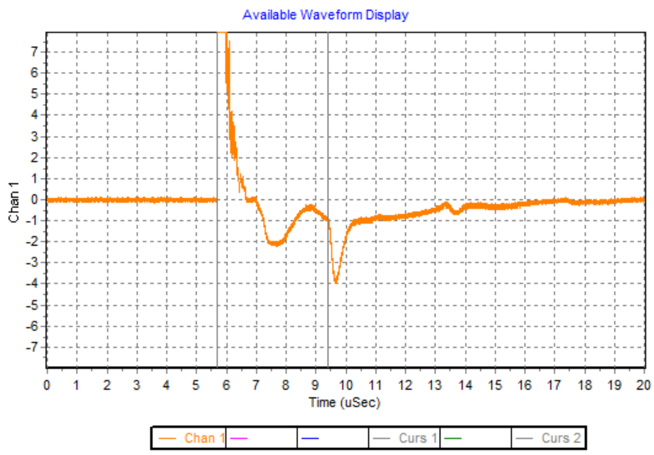
High resistance, core to earth and core to screen all able to be identified

No additional stress placed on the cable

SUBSEA CABLE

A research company generating electrical power from the ocean had a low Insulation Resistance (IR) reading on their 750m subsea cable.

LIVE HV conducted Time Domain Reflectometry (TDR) testing to determine the location of the fault. The TDR technique was carried out by injecting a pulse onto each phase of the cable with the timing of the reflected pulses calculated to determine the cable length and fault locations. A low impedance reflection was detected at 346m.



Divers investigated at this location and the fault was clear to see:

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RAIL NETWORK CROSSING SIGNAL CABLE

Cables suppling crossing signals are extremely important. When one faulted on a rail network LIVE HV mobilised immediately to site.

In this case Time Domain Reflectometry (TDR) testing was not an adequate method due to the high impedance of the fault. Applying techniques learned from Partial Discharge testing LIVE HV was able to cause the fault to arc and measure the arc reflection time. This method provides an extremely accurate distance to the cable fault and does not place any stress on the cable.

A cable tracer plotted the location of the fault and digging commenced. As is often the case, the cable had faulted at an undocumented cable joint. The following photos tell the story:

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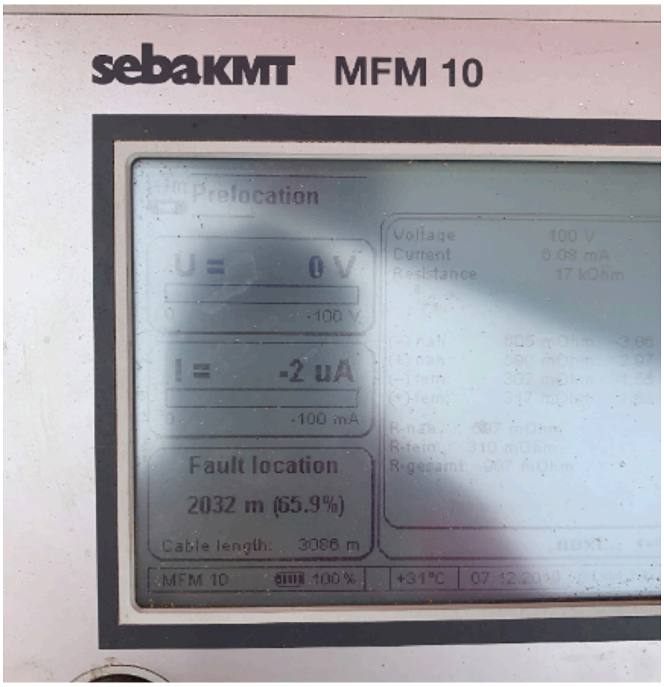
WINDFARM SCREEN TO EARTH FAULT

A large Victorian windfarm performed IR tests between the earth screen and earth during the commissioning phase of their new cables. The outer sheath of a cable is important as it provides protection against moisture ingress which can affect the dielectric properties of the primary insulation over time.

The fault was pre-located by LIVE HV using an HV bridge which provides a distance to the fault. Pinpointing of the exact location was then performed using stakes which detect a voltage signal injected onto the earth screen and emanating into the earth.



The sheath damage was immediately identified when the cable was exposed at the predetermined location: