Loss measurements with the LOR for POF

Introduction

A new POF system has been added to Luciols LOR range of high resolution OTDRs. This instrument allows testing fiber losses and insertion losses of large core PMMA fibers. It is working with a fixed pulse width of 1ns enabling high spatial resolution testing. The standard operating wavelengths are 650 and 520 nm. The LOR for POF is available as a single wavelength or a double wavelength system.
Some typical applications and measurement examples are shown in the following paragraphs.

Insertion loss measurements

The LOR for POF simplifies insertion los measurements e.g. for fiber optic connectors. The single-sided test operation can precisely characterize several events in a fiber assembly. The trace in Figure 1 represents a PMMA fiber assembly consisting of 3 fibers of 15 m, 20 m and 5 m length, respectively. The test wavelength is 650 nm.

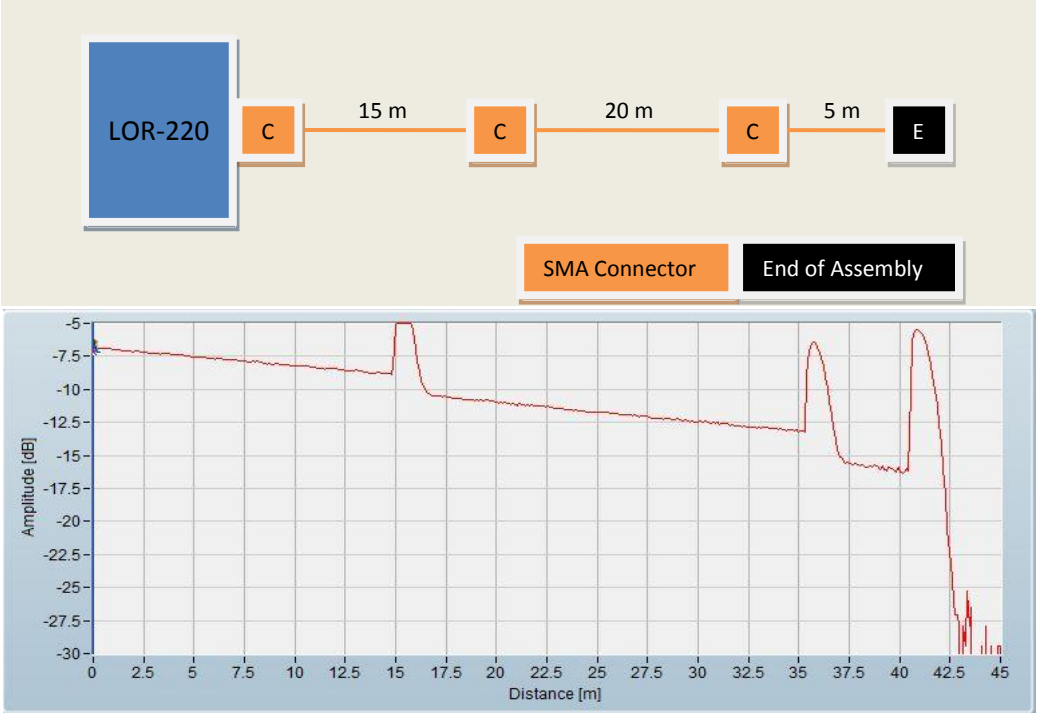

Figure 1: Testing a POF assembly – Insertion loss at fiber connectors

The LOR software has a built-in semi automatic insertion loss test function. After positioning the cursor and the markers as in the example from Figure 2, the insertion loss is calculated automatically. In this example the insertion loss of the first connector at 15 m from the OTDR output is measured. The loss is 1.38 dB.

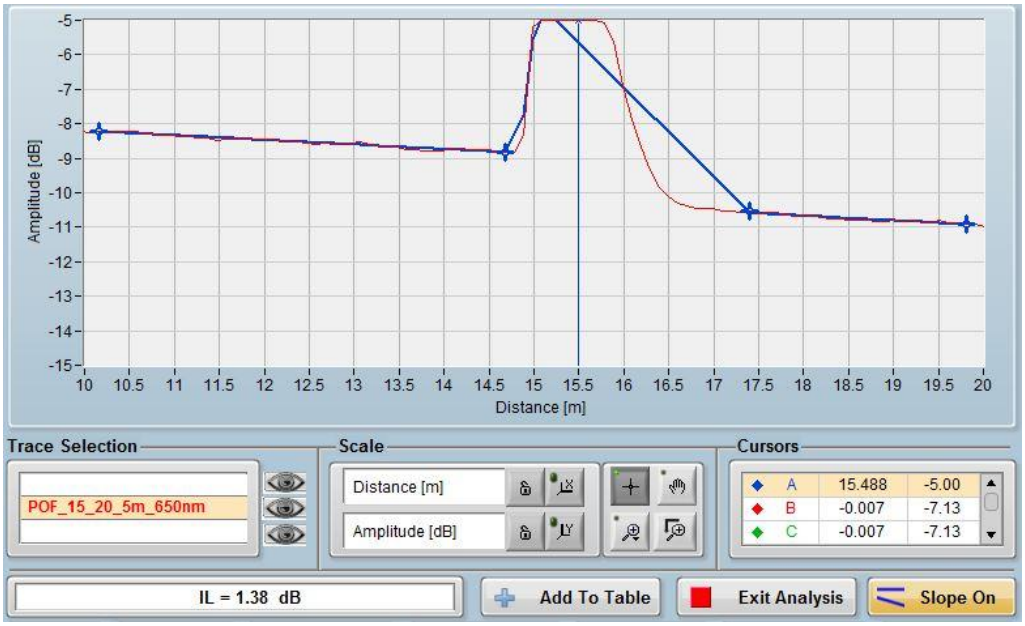

Figure 2: Insertion loss measurement of a SMA POF fiber connector.

If a higher distance reach is required, the test can be performed with the green laser at 520 nm. The trace at 520 nm for the same fiber assembly can be found in Figure 3.

Figure 3: Insertion loss measurement at 520 nm.

The results of the insertion loss measurements do not depend on the wavelength, only a decreased slope of the OTDR trace is found at 520 nm. See the next paragraph for details.

Fiber loss measurements

The high dynamic range of the LOR for POF makes long distance testing of PMMA fibers possible. Despite the high losses in this type of fiber the LOR can characterize a single fiber up to over 100 m at 650 nm or even up to more than 200 m with the optional green laser at 520 nm. Typical traces for both wavelengths are shown in Figure 4.

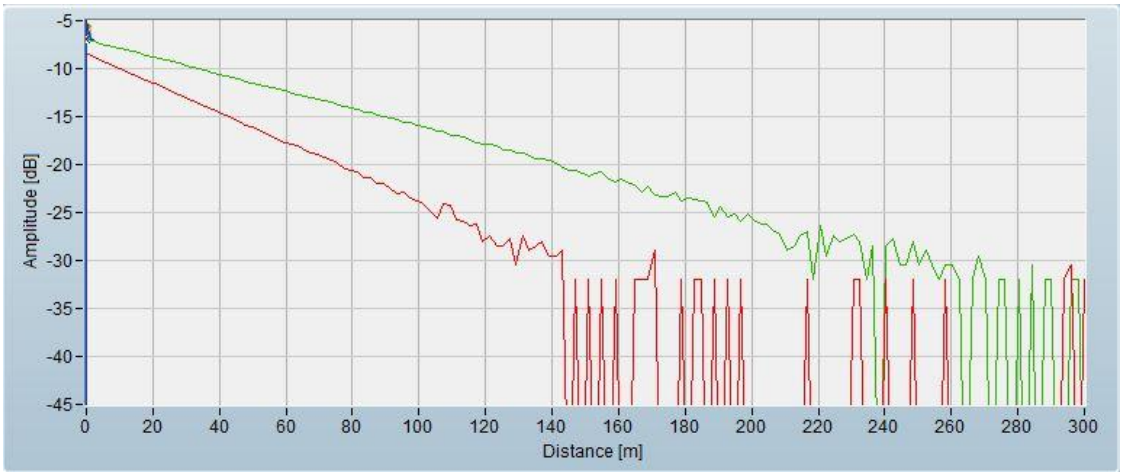

Figure 4: A long PMMA fiber tested at 520 and 650 nm.

Typical losses are 90 dB/km at 520 nm (green trace), and 155 dB/km at 650 nm (red trace). This type of test is easily done by a built in analysis function of the LOR software. See Figure 5 for an example.

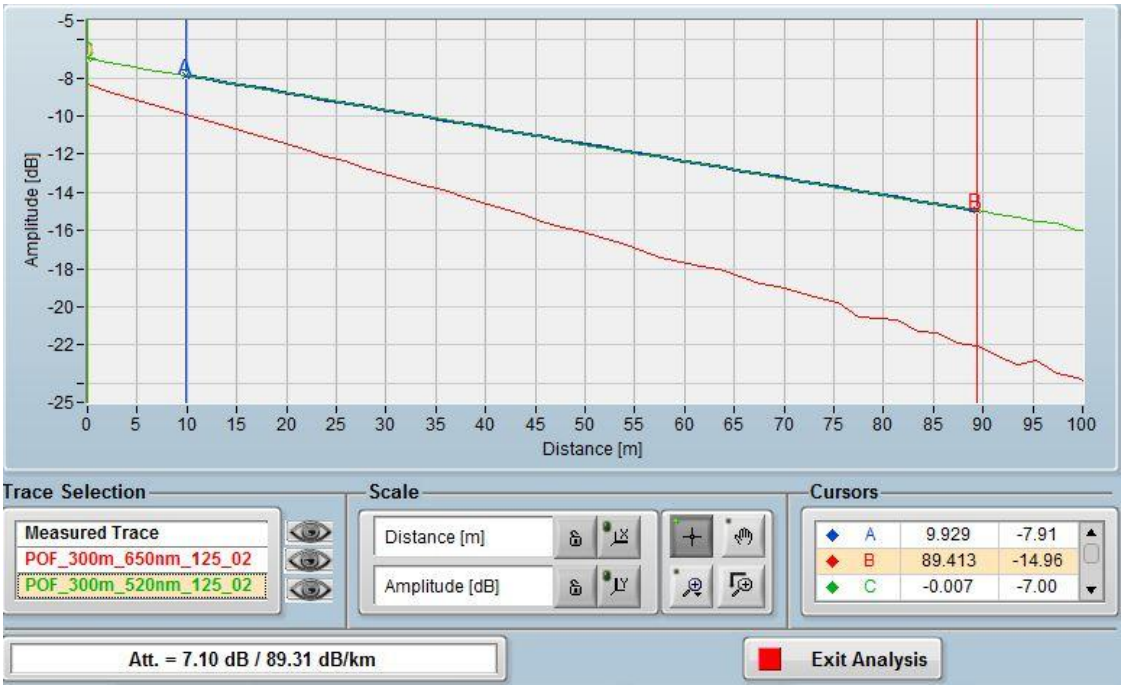

Figure 5: Fiber loss testing with the LOR software.

The software makes a LMS fit to the data and calculates the total loss between the cursors (here 7.1 dB) and the slope (here 89.31 dB/km).
In addition to measuring the fiber loss per kilometer, the homogeneity of the fiber can be controlled and the exact localization of fiber defects can be found.