SYNOPSYS®
Silicon to Software™

RSoft Application: Advanced Driver Assist Systems

Intermodal Dispersion in Large-Core Plastic Optical Fiber

Overview

An automotive manufacturer in Asia needed efficient simulation-assisted prototyping for development of new Advanced Driver Assist System (ADAS) solutions, since conventional development methods lead to considerable time-to-market delays.

The Challenge

Large-Core, Step-Index (LC-SI) Plastic Optical Fiber (POF) is cost effective for simplex and duplex deployment in ADAS, but conventional simulation-assisted prototyping is computationally expensive. High-frame-rate, high-resolution image sensors demand tenfold increase in communication speed every five years, requiring rigorous simulations in photonic design software. Successful product launches rely on efficient simulation algorithms, since legacy radial mode solvers are not efficient for LC-SI POF-based auto-drive applications. The RSoft™ ModeSYS™ tool is an ideal solution for this design challenge.

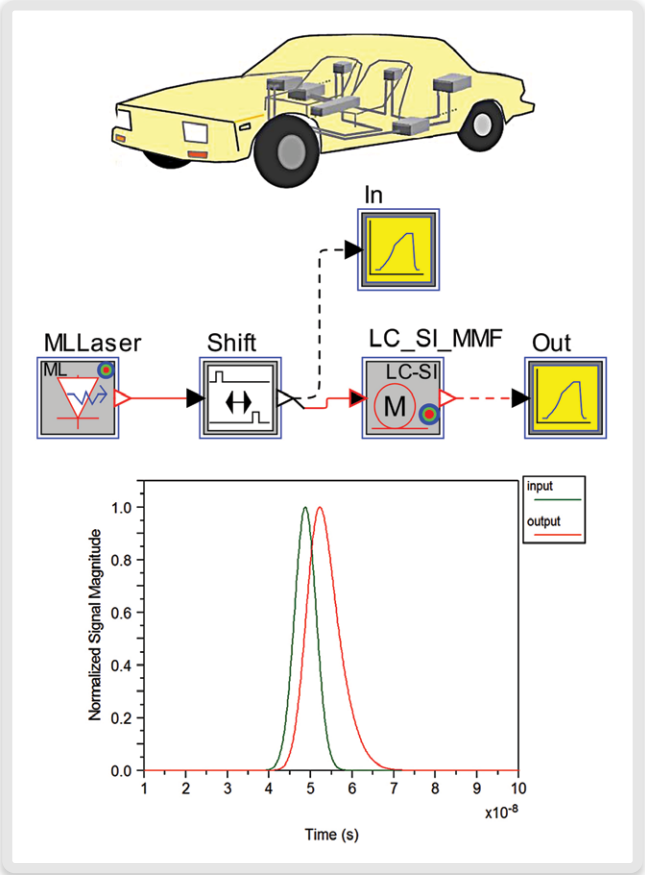

Figure 1. ModeSYS analysis of the impact of intermodal dispersion on data transmission in POF

The Solution

ModeSYS offers an efficient, unique approach based on the Gloge power flow equation. No other photonic software vendor offers this solution. ModeSYS models the power flow inside the fiber as a function of the internal angle. This allows studies of fiber transmission for different transmitter launch conditions.

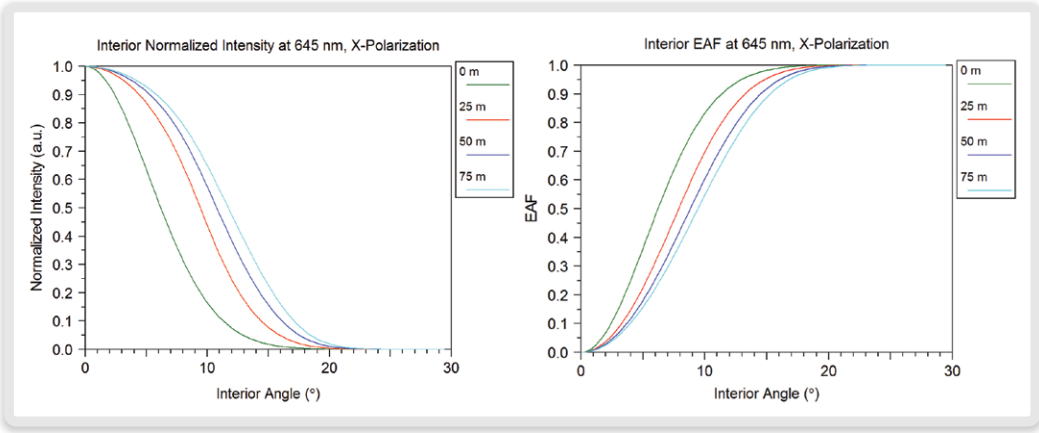

Figure 2. ModeSYS analysis shows the evolution of intensity (left) and EAF (right) versus interior angle as transmission data increases

The Result

Figure 1 shows peak-normalized input and output pulses illustrating the effect of intermodal dispersion. The intermodal dispersion results in inter-symbol interference at the receiver and adversely affects the link performance. Figure 2 shows the evolution of intensity and EAF versus the interior angle as the transmission distance increases. As can be seen, propagation down the fiber causes intensity to evolve towards what will eventually be steady-state profile. Computationally, this power flow approach is efficient for large-core fibers with core diameters as large as 200-μm and 1-mm; for the latter, conventional mode-based solutions become computationally infeasible.

For more information, please contact Synopsys' Optical Solutions Group at (626) 795-9101, visit http://optics.synopsys.com/rsoft/, or send an e-mail to rsoft_sales@synopsys.com.

SYNOPSYS® Silicon to Software™

Synopsys, Inc. • 690 East Middlefield Road • Mountain View, CA 94043 • www.synopsys.com

06/21/16.CS7391_RSoft App_AutomotiveADAS_CS.