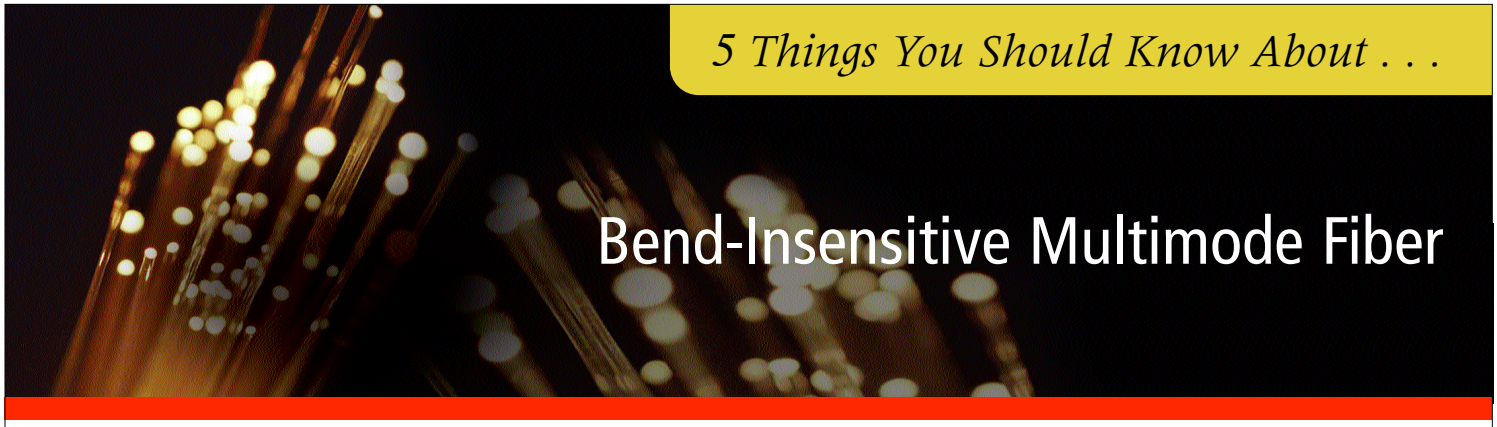

5 Things You Should Know About . . .

Bend-Insensitive Multimode Fiber

1. Bend-insensitive multimode fibers (BI-MMF), first introduced in 2009, were developed to mitigate link failures when optical cables undergo small diameter bends, particularly in jumper and module applications in data centers. These are technically complex optical fibers in which the multimode core, or "waveguide," of the fiber has been altered to improve macro-bend performance. Making changes to the waveguide impacts many other fiber properties that must be optimized.

   What you should know: The simplistic notion that BI-MMF is just a bend-insensitive version of standard OM3 or OM4 multimode fiber is incorrect, as demonstrated by OFS studies and contributions by us and others to the TIA BI-MMF study group.

2. To improve macro-bend performance in BI-MMFs, fiber manufacturers have altered the multimode core, or "waveguide," of the fiber. These changes impact many other fiber properties such as bandwidth and numerical aperture that then must be optimized. All BI-MMFs use a different profile design compared to the graded-index profile used in standard multimode fiber for more than 30 years. This causes BI-MMF to behave differently in systems. For example, all BI-MMFs guide more modes, which can reduce system bandwidth. BI-MMFs also increase connection loss when mated to standard multimode fiber.

   What you should know: These issues need to be studied and accounted for in standards requirements. The additional modes traveling in BI-MMFs are of particular concern, as the major reason that the industry moved from 62.5 µm fiber to a 50 µm core was to reduce the number of guided modes, allowing higher bandwidth.

3. Some fiber manufacturers claim that full conversion to BI-MMF throughout the enterprise network or data center is beneficial, but systems testing shows otherwise. While BI-MMF has lower tight bending loss, it has been shown to lower system bandwidth and increase connection loss, resulting in reduced overall systems performance. OFS has seen significant penalties in system performance because of additional guided modes found in BI-MMF made with the OVD process.

   What you should know: While BI-MMF has lower tight bending loss, it may also have lower bandwidth and higher connection loss, resulting in reduced overall systems performance.

4. BI-MMF is currently designed only for niche applications such as specialty jumpers and modules where tight bending is possible. Before widespread deployment can take place, there are many technical issues that need to be resolved in the standards bodies. As a leader in multimode fiber technology and standards, OFS will chair a TIA study group established for this purpose. Meanwhile, we believe that systems bandwidth and the number of connections supported in real systems are of far greater importance than bend insensitivity.

   What you should know: OFS and most other leaders in the enterprise cabling market currently see very little value in the wholesale deployment of bend-insensitive multimode fiber.

5. There are currently no standards for BI-MMFs. OFS and other industry leaders believe strongly that more detailed study is critical prior to widespread deployment of these products in place of standard OM3/OM4 fibers. Without it, the uncertainty in the performance of bend-insensitive multimode fiber outweighs the limited benefit they may provide to structured cabling systems.

   What you should know: Given the fundamental differences between BI-MMF and standard multimode fiber, OFS strongly supports thorough technical evaluation and analysis of BI-MMF in standards forums' ongoing initiatives to understand its performance and ensure that systems performance is not negatively affected.

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