Corning® ClearCurve® OM2/OM3/OM4 Multimode Optical Fiber

On January 13, 2009 Corning announced a new ClearCurve® ultra-bendable multimode optical fiber for use in data centers and enterprise networks. Corning ClearCurve multimode fiber is the world's first laser-optimized multimode fiber that meets the high bandwidth requirements of today's enterprise networks and also delivers significantly improved bend performance at bend radii below 10 mm.

Bend the Rules.

Corning's latest fiber innovation broadens the ClearCurve product family into a whole new world … enterprise networks. Corning ClearCurve OM2, OM3 and OM4 multimode fiber is designed to withstand tight bends and challenging cabling routes with substantially less signal loss than traditional multimode fiber. This new optical fiber allows designers, installers and operators of enterprise networks (including local area networks, data centers and industrial networks) to use optical fiber in more places by delivering all of the bandwidth benefits of laser-optimized multimode optical fiber in a package that is easier to handle and install and offers more robust system performance than copper cabling.

Corning's new fiber delivers this improved bending without sacrificing critical bandwidth capability or requiring any adjustments to standard field installation, termination monitoring, or maintenance procedures.

The Future is Fiber

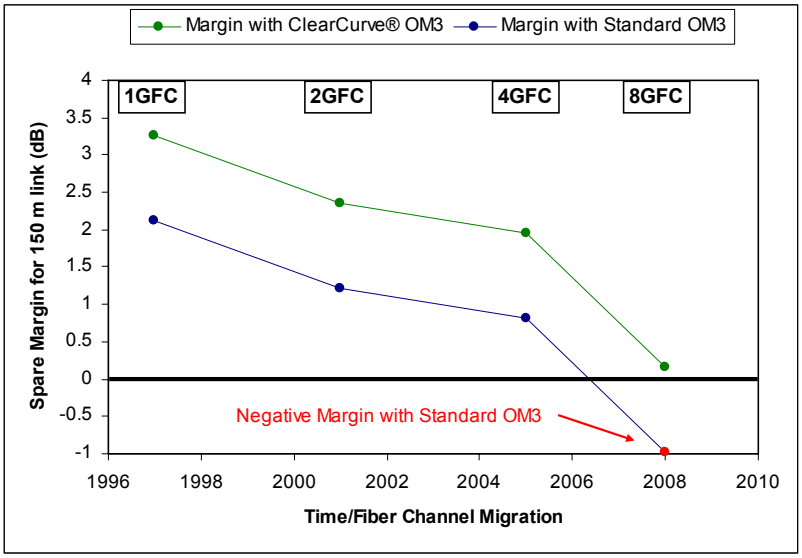
As bandwidth demands continue to grow, more and more links are requiring the superior bandwidth and high data rate capabilities of multimode optical fiber. End users expect this performance to come with easy installation, low cost and long life-cycles. Fiber already offers significant space savings when compared to copper. With ClearCurve multimode fiber not only do these space savings increase but installation of optical fiber becomes easier, cheaper and more reliable than ever.

With ClearCurve multimode fiber it is possible to get the bandwidth performance of OM3/OM4 fiber without worrying about tight bends due to challenged installations, fiber caught in cabinet doors or cable ties that are pulled too tight. It is now possible to bend cables to significantly tighter bend radii without fear of impacting the performance of your optical fiber system.

The Smart, Reliable, Cost-Effective Enterprise Network Choice

As the need for information transfer continues to grow, data transmission rates are increasing at a rapid rate. Each new incremental speed places increased demands on the quality and performance of link components in order to provide positive spare margin (defined as the difference between the power budget and the total of the link component losses plus the induced

power penalties). The chart below shows the spare margin for a typical 150 m link through several generations of Fibre Channel standards.



Calculations based on 1.5 dB/connector pair loss; Bend loss based on 20 ¼ turns (typical data center link deployment)

The spare margin in an optical system can be used to extend the link distance, accommodate additional connectors or splices, or provide insurance against the unplanned attenuation that is induced into the system as a result of tighter than expected cable bends. As the available margin gets smaller and smaller, the reliability of the system becomes less certain and system outages become more likely. In fact, the graph above shows that with standard OM3 fiber it is possible to get into a situation where the margin is negative – meaning that the link will fail.

Downtime means real dollars. A few key downtime statistics are as follows:

- The 80 largest US companies experience downtime costs for all enterprise applications equal to 3.6% of annual revenues (Infonetics Research – 2004)
- Medium sized businesses (101-1000 employees) lose an average of 1% of their annual revenues ($867,000) in network downtime (Infonetics Research – 2006)

Corning ClearCurve multimode fiber allows you to minimize the bend induced attenuation, freeing up spare operating margin. This helps maximize system reliability and minimize downtime. Less attenuation (including bend induced attenuation) means more assurance that the information you send gets where it's going every time without delay. In this era of increased connectivity, reducing stress on the power budget becomes even more critical.

Bend the Rules with Corning ClearCurve Multimode Fiber

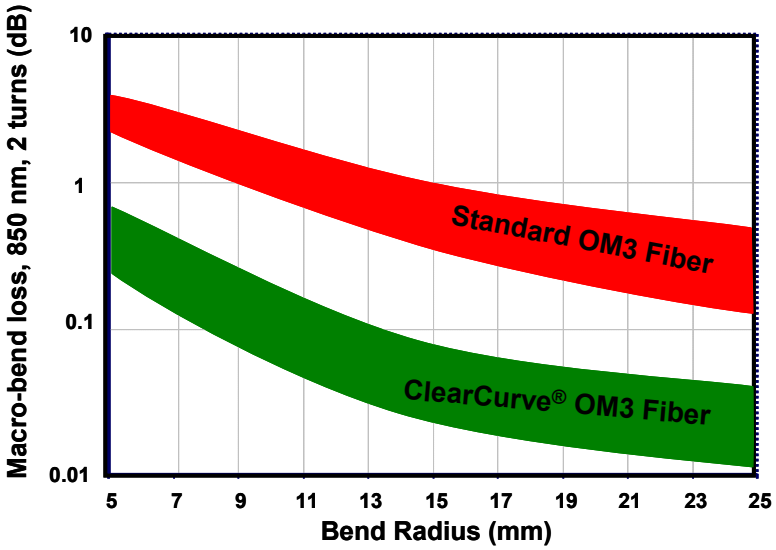
Multimode optical fiber has many modes of light traveling through the fiber. As each of these modes moves closer to the edge of the core it is more likely to escape, especially if the fiber is bent. As the bend radius is decreased, the amount of light that leaks out of the core increases. Lost light reduces the signal to noise ratio and increases optical system attenuation. Corning's new multimode optical fiber is designed to keep these modes confined in the core, while maintaining the strength of the optical signal.

Previous attempts to address bend in multimode fiber were not able to support information and bandwidth intensive applications with the bend radii they require. In yesterday's world, IT managers were unable to get both the superior bandwidth performance required for high speed applications and the superior bend performance that would allow for increased margin and reliability and reduced cost. Corning's ClearCurve OM3 and OM4 multimode fiber bends the rules and delivers superior bandwidth performance in an ultra-bendable package.

Corning ClearCurve Multimode Fiber Delivers up to 10x Better Bend Performance

The existing IEC multimode macrobend standard is based on a 37.5 mm radius mandrel. There is also an ITU multimode macrobend standard that requires testing around a 15 mm radius mandrel. ClearCurve multimode fiber outperforms standard multimode fiber by up to 10x at both of these radii. The macrobend performance of ClearCurve multimode fiber is also specified at an even tighter bend radius of 7.5 mm.

After studying enterprise network designs and limitations and talking to experts in the field, it quickly became apparent that there was a need to accommodate tighter bends than what is specified in the current (and proposed) standards. Therefore, much of Corning's testing to date on ClearCurve multimode fiber has been focused on bend radii between 5 mm and 10 mm. The chart below shows the performance of ClearCurve versus standard OM3 multimode fiber for various bend radii.



30+ Years of Optical Fiber Leadership in Action

In 2007, Corning introduced ClearCurve single-mode fiber which solved the technical and physical challenges faced by telecommunications carriers installing fiber-to-the-home (FTTH) networks. On the heels of that innovation, Corning identified a need to provide an ultra-bendable fiber that would be better suited for data centers and other enterprise network applications. While ClearCurve single-mode fiber is based on an invention that is the best solution for optimum bend performance in single-mode fibers, the bend loss problem in multimode fibers requires a different technology. The combination of the larger core that is present in multimode fiber, the behavior of the different modes and the application space in which this fiber is meant to be used led to a unique solution. The result is a new innovation that is specifically targeted at multimode fiber and utilizes a specially engineered optical trench to trap the many modes within the fiber core.

This optical trench ensures that the outer modes, which traditionally have a tendency to "leak" out of a multimode fiber when it is subjected to bends, stay put. By keeping these modes within the core of the fiber, much less of the information carrying signal is lost and therefore more information gets to the end user without any dropped packets or corrupted data.

Performance and Specifications

Corning ClearCurve multimode fiber meets or exceeds all the requirements of the existing multimode fiber standards. It is fully backward compatible with standard 50 µm fibers. It also provides additional benefits such as lower attenuation and lower chromatic dispersion as compared to Corning's existing InfiniCor® SX*i* (OM2), InfiniCor® SX+ (OM3) and InfiniCor® eSX+ (OM4) fibers.

	InfiniCor® OM2/OM3/OM4 Fiber	ClearCurve® OM2/OM3/OM4 Fiber
IEC 60793-1-47 Macrobend radius (37.5 mm) ITU-T G651 Macrobend radius (15 mm)	**100 turns ≤ 0.5 dB** **850 nm** **2 turns ≤ 1 dB** **850 nm**	**100 turns ≤ 0.05 dB** **850 nm** **2 turns ≤ 0.1 dB** **850 nm**
New level of performance	**N/A**	2 turns < 0.2 dB 850 nm
Tighter Radii (5-10 mm)	**N/A**	√++
Attenuation at 850 nm	√	√+
Attenuation at 1300 nm	√	√+
Bandwidth at 850 nm	√	√
Bandwidth at 1300 nm	√	√
Chromatic Dispersion	√	√+
Geometries	√	√
Comprehensive Environmental Specifications	√	√
Compatible with standard field procedures (including connectorization/splicing)	√	√
Suitable for large-volume manufacturing processes	√	√

Comparisons are based on typical values

With Corning ClearCurve multimode fiber you get the benefit of significantly improved bend without any sacrifice on bandwidth or other performance specifications. Like Corning InfiniCor fibers, Corning ClearCurve multimode fiber performance is guaranteed through the best-in-class minEMBc measurement.

Incredible Innovation. Remarkable Reliability. ClearCurve OM3/OM4 Multimode Fiber.

ClearCurve multimode fiber maximizes system reliability, minimizes system downtime and provides opportunities for cost reduction. In addition, cablers and system integrators can take advantage of the improved bend in smaller and lighter cable, hardware and equipment designs. These new designs will enable smaller, denser, more "green", and easier to install data centers and enterprise networks.

Top Needs of Enterprise Network Operators	Addressed by ClearCurve® Multimode Fiber
Lower total system loss	√
Future-proof systems	√
Easier and cheaper system installation and maintenance	√
Robust designs that protect against challenged installation environments	√
Smaller cable designs resulting in improved airflow and increased density	√

ClearCurve multimode fiber delivers performance you can count on in an innovative design. Multimode continues to be the fiber of choice for enterprise networks (with typical link lengths up to 600 m) as compared to single-mode fiber. Corning ClearCurve multimode fiber makes the choice even clearer.

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CO1144 Issued: August 2009, Supersedes: January 2009