

The Corning logo consists of the word "CORNING" in white, uppercase, sans-serif font, centered within a solid blue square.

## China's Network Operators Feel the Pain of Counterfeit Goods

Ivan Chan

*Recently, Corning Optical Fiber received inquiries from some Chinese operators having problems in the field with what they believed to be Corning fiber. After investigation and series of tests, Corning's findings startled customers: the problem fibers were not the Corning fiber that the customer had specified and purchased from their cabler, but instead were imitations from other manufacturers. Today, Corning continues to support customers affected by the substitutions, as well as improving the awareness of potential customers to the potential for counterfeit in the Chinese fiber-optic market.*

### **The power of a trusted name**

In The People's Republic of China, the power of brand equity -- when a brand is so favorably viewed by the marketplace that the name itself becomes synonymous with tangible benefits to the consumer -- is no small thing.

China's 1.3 billion inhabitants were largely ignored by the global economy until the last quarter of the 20<sup>th</sup> century, when China's market reform and improving economy made them very popular at home and abroad. Since then, China's consumers have been courted aggressively and, for the most part, the result has been brand-conscious consumers and a market where a familiar, trusted name goes a long way.

However, this brand sensitivity may also contribute to another Chinese economic phenomenon: a glut of counterfeits.

The proliferation of counterfeit products in China -- from cigarettes to pharmaceuticals to electronics -- has gained media attention recently with China's entrée into the World Trade Organization (WTO), which holds each member nation to a minimum standard for trademark and counterfeiting laws, standards that China's pre-WTO regulations didn't meet. Counterfeiting is so widespread a problem in China that, according to *Forbes.com*, one fifth of all brand-name goods sold there are believed to be fakes. While China has since launched campaigns to crack down on counterfeit products in most markets, the size and scope of the problem have many analysts unable to predict the government's success.

Perhaps it was inevitable, then, that counterfeiting would invade even the fiber-optic arena, despite the highly specialized and technical nature of its manufacture. Recently, Corning received a number of inquiries from Chinese operators who were having unprecedented deployment issues, such as splicing difficulties, with what they believed

to be cabled Corning® optical fiber. Corning quickly volunteered to test the fibers and the results were startling to the customer: the problem fibers were **not** Corning fiber. They were impostors.

**"Our customers were as surprised as we were to see this."**

For more than 15 years, as China's communications infrastructure has evolved to fiber-optic networks, Corning has enjoyed an exceptional reputation in the Chinese telecommunications market. The Corning name has become synonymous with high-quality products and tangible customer service, making Corning's fiber the preferred optical medium for many of the nation's network builds.

Corning fiber is at the foundation of most of China's nationwide backbones, connecting the wild and rugged north, usually via Beijing, to the more tropical southeastern section of the country, where Guangzhou, Wuhan and Shanghai form an urban troika. Already recognized at the national and provincial networks level, Corning fiber has begun to experience similar recognition in smaller and more rural markets.

"Customers in China view Corning fiber as world-class," said Ivan Chan, director of commercial operations -- Greater China, Corning Optical Fiber. "They know it, they trust it, they trust us because of our experience and our heritage. They know that the fiber will be of the highest quality."

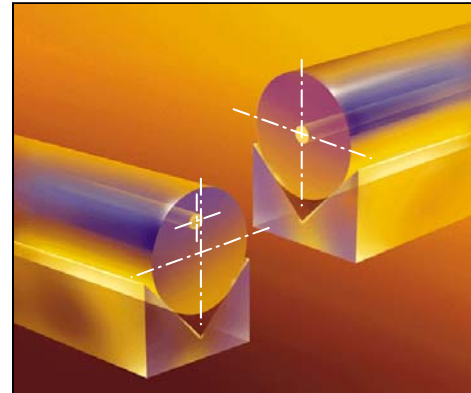
Given the outstanding performance history and popularity of Corning's optical fiber in China, then, staff at the Hong Kong and Shanghai sales offices were startled when, in 2002, they began receiving calls from end users who were having problems with their cabled Corning fiber.

"It was very strange, as customers were reporting problems that we had never seen with our fibers in 15 years of deployment in China," said Chan. "The fibers were not splicing well. Installers were having difficulty achieving acceptable splice loss figures in the field. And with our fiber geometry, we have come to expect excellent splice performance from our fibers. Our customers were as surprised as we were to see this."

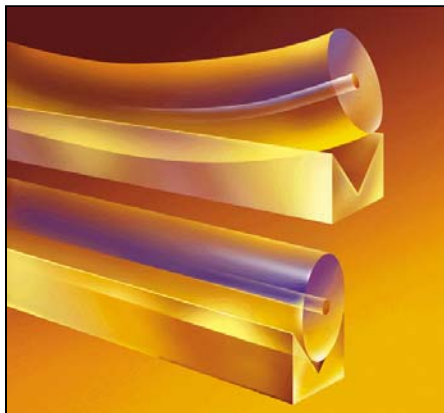
## Exact geometry for precise performance

The splicing capability of an optical fiber is directly related to its geometric properties, including cladding diameter (outside diameter of the glass portion of the fiber), fiber curl, core/clad concentricity and non-circularity within the core or cladding. When two fibers are spliced together, aligning their cores meticulously and fusing them, there is inevitably a degree of signal loss along the link.

Today's advanced splicing methods and the geometric excellence of high-quality fibers typically make any impact of this splice loss on the network insignificant. However, less precise geometry can make it more difficult or even impossible to achieve a splice with acceptable losses. Corning has placed the costs associated with splicing at 9 percent of a fiber-rich network's price tag, and about 30 percent of the labor costs. Clearly, more splicing difficulties in the field will increase installation costs. Should the fiber prove impossible to splice to acceptable loss levels, it also may negatively affect system performance.



Core/clad concentricity refers to the alignment of the fiber core within the cladding glass. The fiber on the left demonstrates a misalignment of these two aspects; this phenomenon is the largest contributor to splice loss.



Fiber curvature is the amount of curve along a specified length of fiber.

An optical fiber's design and characteristics are first determined in the early stages of manufacturing, making consistency, quality control and precision throughout the complex process critical. The outside vapor deposition (OVD) process, in which all layers of the fiber dopants are deposited in their purest form -- vapor -- to ensure fiber strength and integrity, was patented by Corning and has been shown in tests to deliver a more uniform product. Corning's Quality Architecture system also uses precisely calibrated computers during OVD to control the exact flow of raw materials used to create the fiber preform, building quality and consistency into every layer of the fiber. [Additional information on Corning's quality management process can be found in the feature

article "Everything Old Is New Again," in this issue of GuideLines® Online.]

Anything less than this kind of rigorous control typically results in an optical fiber with relaxed design characteristics and will likely lead to splicing problems, not to mention the risk of the fiber losing integrity over time and endangering future system performance. Low-quality fibers also have an increased risk of distortion from polarization mode dispersion (PMD), a spreading of light signals and an impediment to future upgrades to higher-data-rate equipment.

All in all, it was a puzzling situation, given Corning's history. This was not how Corning optical fiber was known to perform. And ultimately, that was the answer. Precise testing performed both in China and in the United States proved that it wasn't Corning fiber at all, but another manufacturer's product -- or multiple manufacturers in some cases -- substituted in its place.

**"We were not going to disappoint them."**

Upon hearing that supposed Corning fiber was behaving in a decidedly unlikely manner, the customer support teams in China flew into action, both to support the customers who were reporting problems as well as to protect other customers or potential customers who may not yet be aware of the hazard.

For operators who had already reported problems, Corning Optical Fiber sent any cables containing suspect fibers for testing at a Corning facility in China, as well as Corning's flagship research facility, Sullivan Park, in Corning, New York. Corning additionally worked with the operators and their cablers to trace the distribution channel and supporting documentation carefully, to further verify the fiber's origin and determine where, if anywhere, the fibers may have been substituted.

In those cases where fibers have been found to not be authentic Corning fiber, Corning has offered additional support to customers, including detailed testing and documentation data, to help them work through appropriate channels and receive the Corning fiber they specified.

"Corning has a reputation in China -- around the world, really -- for supporting the customer before, during and after our fiber is installed," said Moution Lee, manager of international applications engineering, Corning Optical Fiber, who led the China technical team at the peak of this issue. "That kind of dependability is especially important to the customers in China and we were not going to disappoint them."

It was still unclear, however, to Corning Optical Fiber personnel how widespread the counterfeiting fiber problem was. Alerting past customers as well as operators who might be considering a purchase of Corning optical fiber in the future was a priority. With this in mind, Corning launched a two-pronged campaign to get the word out. In addition to contacting past end users to advise them of the potential problem and advise them how to authenticate their fiber Corning worked with the local Chinese media to alert the market, particularly in rural and provincial areas where the problem was suspected to be most pervasive.

After the second wave of the campaign, Corning engineers tested additional customer cables -- while the fibers submitted had not always demonstrated problems or even been installed yet, customers were obviously in need of reassurance. Once all testing was complete, the scope of the problem was all too clear: more than 75 percent of all the fibers tested for customers -- who assumed they had submitted 100 percent Corning fiber -- were found to be non-Corning substitutions. Corning estimates that about 10 percent of all cabled fiber in the China market sold under a particular brand name may, in fact, be counterfeit.

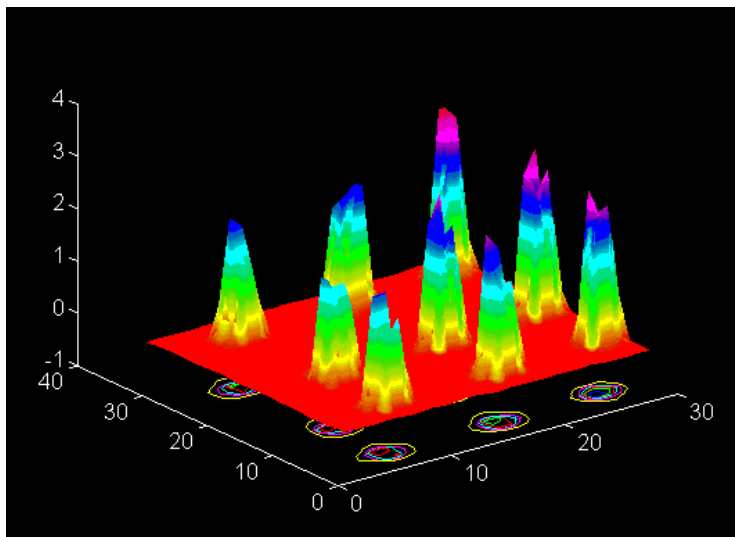
### The proof is in the testing

The challenge for operators and cablers in determining the authenticity of their optical fiber is that, unlike many goods susceptible to counterfeiting, it cannot be determined through inspection by the naked eye. As optical fiber is the size of a human hair, it cannot be easily "branded" with any type of visual imprint that might provide an effortless clue to its origin. Two optical fibers will look virtually identical in appearance upon close visual scrutiny by an expert, even when worlds apart in quality.

The only ways to determine the authenticity of an optical fiber's origin are through laboratory testing and, in Corning's case, with detailed per-fiber documentation that Corning provides to authorized cablers. While Corning used this documentation, or lack of it, in many cases to corroborate the possible authenticity of the fiber, most fibers were tested at the customer's request.

Every fiber manufacturer imbues their optical fibers, including the coating of the fibers, with a unique signature through the combination of materials and manufacturing processes they select. Highly trained Corning engineers in both locations analyzed each submitted fiber using the Fourier Transform Infrared (FTIR) method, which tests the chemical properties of the optical fiber coating and then compares them against Corning's unique coating profiles. FTIR testing, a standard and widely accepted method in the industry, has a 95 percent confidence rate when performed by an experienced operator. The fibers' primary and secondary coatings were tested -- at both Corning's U.S. and China facilities -- for additional assurance of accuracy.

Corning then notified customers of the results and provided documentation to help them try to identify where any substitution had occurred. Results were diverse: sometimes a



In the Fourier Transform Infrared testing method, spectrometers monitor the absorption rate and intensity of samples bombarded with infrared radiation. As chemical functional groups have known frequencies for absorption of light, this creates a unique "biofingerprint." FTIR is widely used for testing in industrial and biological fields -- in this image; a spectrograph shows the concentration of an ampicillin, a biologic sample.

*(Courtesy of the Institute of Biological Sciences, University of Wales.)*

few fibers within one cable were not authentic, but in other cases, every fiber believed to be Corning's was an imposter. In most cases, the victim of the substitution was a local or rural network operator.

## **The road ahead in China**

Nearly a year after it all began; Corning has concluded testing and continues to support affected customers with documentation, technical support and assistance in accessing authentic Corning fiber through trusted channels. Corning is working with its trusted distribution channels to ensure that operators who choose Corning fiber can feel confident in their supplier.

The teams in China are also driving continued awareness in the market of this widespread counterfeiting problem -- China is a massive, densely populated nation and local markets can be quite insular. And despite the Chinese government's increased focus nationwide on counterfeiting, Corning will continue its efforts to assist customers in resolving these problems, and educating the market about the potential for counterfeit substitution. That means educating end users about what to look for when specifying a fiber brand for their network and evaluating potential suppliers:

- ▶ In general, a dramatic price difference between cablers claiming to offer the same optical fiber may warrant closer evaluation. In many cases, customers told Corning that the cables containing substitute fiber while claiming to contain Corning fiber had been offered at a drastically lower price than other suppliers
- ▶ Corning provides detailed per-fiber documentation to its authorized cablers and distributors -- if this documentation is not provided or made available to the customer upon request, an operator should look more closely
- ▶ Lee recommends to his customers to "manage by prevention": while a lower quality fiber may be offered at a bargain rate in the short term, its impact on the network can be negative and long term. Prevent problems by managing the quality of your network in its earliest installation phases, from the fiber selected to the chosen supplier

### **GuideLines Online Work Saver:**

*Let us save you time and effort – we did the work for you! Here are related links and additional data we found while researching this article.*

- [Fourier Transform Infrared \(FTIR\) Spectrograph at the University of Wales](#)
- [China in the 21<sup>st</sup> Century: Sleeping Dragon Joins the Club – Forbes.com](#)