Optical Adapters Untangle the Web within WDM Fiber Optic Systems

A solution to the dilemma of meeting complex and demanding packaging requirements in optical networking systems.

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As pressure for smaller, higher capacity optical networking systems mounts, today's system designers are continuously presented with the recurring problem of organizing and routing cable runs within their cabinet. Where to hang the cables, how to adapt and interconnect various channels and how to offer assembly and maintenance personnel a clear path to follow cable routings in assembly and repair processes are all driving concerns &#151 not to mention a designer's pride to show an aesthetically pleasing layout rather than a tangled unsightly mess. Looking at available products on the market today, the designer will find a plethora of standard, cookie-cutter adapters that provide the interconnect function between cable runs, and they may also find a few tethering harnesses.

Figure 1. SM FC-FC Duplex adapter

In order to satisfy these increasingly complex and demanding packaging requirements within optical networking infrastructures, Compel Electronics, a leading European manufacturer of interconnection systems and cable assembly products, has created an innovative system that allows for multiple adapting of in or between series interfaces and, at the same time, provides organized routing of associated hanging cables. This novel approach is available for varied combinations of FC, SC and MU optical interfaces and all duplex and multiport angled adapters discussed herein are currently in production and available for high volume manufacturing.

Figure 2. SM SC-FC Duplex adapter

The new series of FC-FC and SC-FC duplex adapters (see Figure 1 and Figure 2 respectively) make use of a custom plastic frame for TX/RX fiber cable pair handling and management, while still maintaining the original FC and SC coupling design and performance. Smaller square metal flanges were applied for the FC-FC version. SC interfaces on the SC-FC type were integrated into the mold of the plastic adapter body for size and cost reduction purposes, with plastic over-mold techniques used to hold the FC flange in place. The plastic frame shape incorporates a unique hinge approach, which allows for two alternative assembling and mounting methods related to a customers specific choice inside their systems' cabinet. To facilitate handling and maintenance, this approach leaves the adapter, when hung, to either hinge upon the pivot after the cable pairs have been terminated or to be fixed in a more stable position by using a screw through the available mounting hole opposite the pivot end. These two types of duplex adapters allow for standard TX/RX module manufacturing with only one connector type termination (FC) and adding the alternative FC or SC connector interface in conjunction with the final customer requirement.

Figure 3. SM angled MU 2-port adapter

While this hinge approach is a design created for a certain perception of customer needs, in-house injection molding technology permits the shape to be changed upon request in order to accommodate any specific mounting requirements.
For high count WDM channels there is a particular market trend towards smaller components and multiport compact connectors and, in particular, adapters. In order to address this market demand, two modular adapters were developed to accommodate the small form factor MU connector. The first is a two port MU adapter, shown in Figure 3 and the second is a four port MU adapter as shown in Figure. 4. Unit design of both incorporates a 40 degree angle input-output

arrangement for optical fiber cable, in order to reduce mechanical fiber stress and to maintain the required value of radius curvature. The female-female push-pull mechanism is fully compliant with JIC-C-5973 and, being the same fastening mechanism as the SC-type fiber connector, comes standard with a single mode grade Zirconia Ceramic sleeve. These adapters are fully compliant to and can be used with NTT MU-type optical fiber connectors. Mounting technique of either MU adapter configuration is via two metal locking tabs attached to the sides of the plastic body.

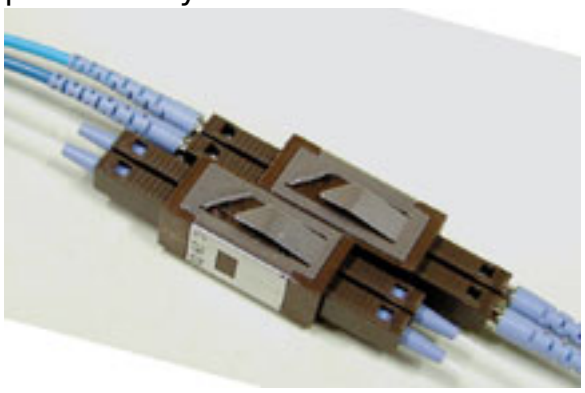

Figure 4. SM angled MU 4-port adapter

The two-port unit is mainly intended for TX/ RX system channel monitoring and a self-closing cap is provided for safety reason. The four port unit facilitates the grouping of multiple channels. When fully equipped, 24 operating input-output channels (6 4-port adapters) plus 2 channels (1 2-port adapter) for monitoring can be arranged in a standard 19" metal rack slot as shown in Figure 5. A Patent has been filed and is pending on this angled MU adapter arrangement.
In order to insure structural integrity and robust handling, all adapters are made from 10% glass fibre reinforced polycarbonate (Pc 10% GF VO). This is also a flame retardant grade plastic to comply with various manufacturers cabinet propellant codes.

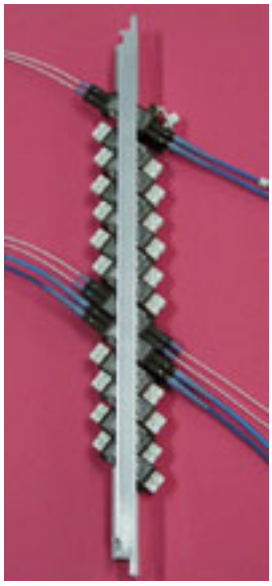

Figure 5. SM angled MU 6x4-port+1x2-port adapter arrangement

Besides optical connectors, adapters and assembly, Compels' current fiber optic activities range from components to optical sub-assembly through electronic modules for multi-demultiplexing, thin film circuitry for transmitter and receiver

design, laser diode and PIN (APD)-FET functional testing. Custom hybrid designs incorporating adapting technology and other functionality into a single package design is available.

As an ISO9001 company, Compel prides itself on being a leader in meeting not only the quality and performance requirements of the fiber optic telecom and datacom markets, but also providing flexibility for custom mechanical design needs in terms of specially shaped and sized plugs and adapters required when designing new system architectures.

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