The Fibreoptic Industry Association

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It is no secret that the rail network not only delivers passengers and freight to their correct destinations – it also provides the right of way for a significant element of today's long haul, optical fibre based, telecommunications infrastructure. In parallel with the land owned by other national utilities, trackside routing of high capacity telecommunications cabling provides a profit centre for the authorities that was undreamt of only a few years ago.

During the 1980's, the large national telecommunications service providers typically produced the specifications for such long-haul systems. These service providers, such as BT, using their in-house expertise, produced clear standards and specifications to which all suppliers to the wide area network (WAN) telecommunications industry had to adhere. However, in recent years the long-haul carrier market has fragmented with the creation of multiple providers. In parallel with the evolution of the long-haul market, there has been a significant growth in optical fibre systems being installed in private data, entertainment and telecommunications networks that are separate from the national telephony and data carrier systems.

Despite their different applications for optical fibre technology, both the short and long haul sides of the industry are served by a large number of relatively small company participants - albeit supplying large corporate clients with products and services. In the early 1990's, an organizational focus was required for both suppliers and users in the industry in order to ensure the quality and reliability of design, installation practice and methods of training.

The Fibreoptic Industry Association (FIA) was formed to provide such a focus. The FIA has been involved in the development of national standards for over ten years and has also been publishing its own, highly regarded, Technical Support Documents but has been reluctant to step too far into the long-haul market. This started to change last year with the publication of documentation covering safety of optical fibre and the power transmitted along it. In May 2004, the FIA published its first "long-haul" Technical Support Document (TSD) covering the specification of joint loss in carrier systems – a document directly relevant to those working within the telecommunications sector of the rail industry.

Before reviewing the information contained with the FIA TSDs it is opportune to review the role of the Fibreoptic Industry Association. The FIA is a trade association to which any company, organization or individual involved with optical fibre cabling and/or networking can subscribe. This includes the user community as well as suppliers.

The overall aims of the FIA can be summarised as follows:

- to promote an awareness of the benefits and applications of fibre optic technology;
- to promote an awareness of the existence of a professional fibre optics industry fully capable of meeting the needs of users or, so benefiting both suppliers and their customers;
- to promote and adopt standards to which professional participants within the fibre optic industry should be expected to adhere;
- to provide a central source for information on wide ranging aspects of the fibre optic industry;
- to provide a single voice to promote and represent the interests of the industry obtained by consensus and debate amongst FIA members;
- to develop and promote codes of practice within the industry - both operational and ethical - to which members will be expected to adhere and thus offer an assurance that the highest quality of service will be provided.

The FIA provides four principle services in support of users and suppliers alike. These are the Approved Installer Scheme, the Approved Training Provider Scheme, the Arbitration Service and the Audit Service.

Although membership of the FIA is open to all, the Approved Installer Scheme was designed to differentiate those installers of optical fibre cabling that had met specific quality assurance and competency criteria. Although originally based on ISO9000 and NVQs, this scheme has now been revised and will be based upon the implementation of the recently published BS 6701:2004 and a series of revised FIA approved qualifications. This should provide users with tangible and verifiable evidence that minimum requirements of quality assurance and competency are being met for each installation contract.

In support of competency targets in the field of optical fibre cabling installation, the FIA has operated an Approved Training Provider Scheme for many years. This scheme aims to differentiate those training companies that meet specific requirements in terms of facilities, equipment and qualified trainers.

Unfortunately there are occasions, despite the best efforts of all involved, when the service delivered by an FIA member does not meet the expectations of the customer. There may be any number of reasons for this ranging from incompatibility between components supplied through to incorrectly specified requirements. The FIA can help via its Arbitration Service which is operated via its Technical Directorate under the management of Mike Gilmore, FIA Technical and Standards Director (mike.gilmore@btinternet.com).

In contrast to the Arbitration Service, the FIA Audit Scheme is a technical rather than contractual service. The scheme acknowledges that procurement should always be made against an appropriate specification. Those who do not fully specify their purchase may be taking very high risks if a dispute arises later as they may have no recourse open to them. However, even where specification has, to all intents and purposes, been correctly stipulated, there will be occasions when controversy arises.
The Audit Scheme is able to provide independent verification of specification compliance for those products and services supplied by FIA members to other FIA members as well as external organisations. The Audit Scheme is managed by the Audit Committee that is chaired by the FIA Technical Director. The assessment of compliance will be undertaken by independent personnel using agreed UK, United States, European or international standards and/or codes of practice. The use of this means of assessing conformance allows the service to be provided using fixed and highly economic rates.

Details of these services can be is accessed via the FIA web-site at www.fibreoptic.org.uk. In keeping with the technology that the FIA supports, the main point of access to the FIA is the web-site. Non-members can access a variety of services including members details, newsletters and information relating to upcoming events. A password-protected section on the web-site allows members to access most of the FIA services, including the Technical Support Documents, at no additional cost.

As was outlined above, in the past long haul telecommunications systems were the preserve of the few and utilised technologies that were far removed from the type of networks that dominated corporate enterprise. Over the past five years enterprise networks have caught up with a somewhat dormant carrier networking market and the data rates flying around corporate head-offices are not dissimilar to those routed alongside the permanent way. As a result the technological barrier between the enterprise and the carrier networks has begun to disappear and much of the work of the FIA has become directly relevant to those involved in the long-haul environment.

The FIA has produced a number of Technical Support Documents that have begun to cross the divide. Part of the reason for this is the demise of BS 7718 that, from 1991 to 2003, defined recommended practices for the installation of optical fibre cabling. The British Standard has been replaced by BS 6701:2004 but much of the guidance has been removed and placed in the FIA TSDs. The other reason for the publication of TSDs is the rapid change of technologies and associated equipment within the industry. In some respects, these changes are happening too quickly for national, European

and international standards to keep up with. The FIA TSDs on topics such as testing of installed cabling are good examples of this and are now being used as the basis for future standardisation.

	TSD	
DESIGN	2000-1-1	OPTICAL FIBRE CABLING: LAN APPLICATION SUPPORT GUIDE
OPERATION	2000-3-2-2	ADMINISTRATION: CORDS
	2000-3-3	POLARITY MAINTENANCE
INSTALLATION	2000-4-1-1	INSTALLATION PRACTICE: SPLICING
	2000-4-2-1	TESTING OF INSTALLED CABLING: ATTENUATION USING LSPM EQUIPMENT
	2000-4-2-2	TESTING OF INSTALLED CABLING: ATTENUATION USING OTDR EQUIPMENT
SAFETY	2000-5-1	OPTICAL POWER: SAFETY LEVELS
	2000-5-2	OPTICAL FIBRE: HANDLING OF PROCESSING CHEMICALS
	2000-5-3	OPTICAL FIBRE: DISPOSAL OF WASTE

The TSD that is most applicable to the rail industry is TSD-2000-4-1-1 that defines recommended performance levels for the joints used to create very long haul systems. The jointing of optical fibres using fusion splicing techniques is a long established approach to the provision of high performance, environmentally stable connections between optical fibres. Over the years, the capability of fusion splicing equipment has improved substantially as has the control over the tolerances of optical fibres at each side of the joint. This has led to a steady reduction in achievable splice loss. However, there is a point at which significant improvements in spliced loss performance can no longer be made without direct influence over the optical fibres themselves and it is generally recognised that such a point was reached a number of years ago.

Unfortunately, certain clients continue to place unrealistic demands for splice loss performance on installers. Such demands may be flawed in terms of what is specified and/or how it is specified. In some cases, clients may be influenced by the claims of fusion splicing equipment manufacturers, who rightly provide specifications for how well their machines can perform - generally in favourable, best case, conditions - rather than recognising the fundamental limits defined by the tolerances of the optical fibres that are “seen in the field”.

In other cases, clients fail to recognise the range of, and differences between, optical fibres that may be encountered and their influence on the performance of splices made between them. For example, the ITU specifies no less than thirteen different single mode optical fibre types - between which fusion splicing will result in modified performance as compared with splicing between singlemode optical fibres of the same type.

The impact of specifying overly ambitious, or incorrectly defined, splice loss requirements should concern both the client and the installer alike. Typical levels of rework are calculated where the FIA limits are not adopted, and the cost implications are discussed. The installer may be faced with a considerable degree of rework that can have dramatic commercial consequences. The client may be faced with considerable project delays - the resolution of which will add further costs to the project.

This FIA Technical Support Document establishes, in a commercially neutral manner, the most appropriate way in which to specify and verify the performance of optical fibre fusion splices. It then proceeds to define reasonable and commercially acceptable limits for the splices under specific conditions. In addition, a technical checklist of the correct splicing and fibre preparation procedures required is provided to ensure that these recommended maximum splice loss limits are achievable.

To find out more about the FIA and its activities the web-site at www.fibreoptic.org.uk is a good starting point. Joining, either as a supplier or a user of optical fibre technology is neither complex or costly – if you need access to good clear and unbiased information, look no further than the Fibreoptic Industry Asssociation.