

## Fiber Optic Services And Products



### On Fiber Optic Communications

#### Seven Questions for Choosing Fiber Optic Training

#### A Guide to Getting the Most From Your Investment

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Fiber optic transmission technology is complex and subtle. Because of this complexity and subtlety, training is essential for successful implementation and use. In addition to being essential, training is a cost-effective investment, since the properly-chosen training program will more than pay for itself in lower material costs, in lower labor costs, and in improved network utilization. This view of training is supported by the comments of trainees. Three of these frequent comments have been: that the trainees wished they had attended a training program before they used FO products; that they were not certain that all the important questions were asked prior to implementing FO; and that they could have saved money by attending a training program prior to using FO.

In this article, we will present seven basic questions you will want to answer before choosing fiber optic training (See Table 1).

Table 1: The Seven Questions to Answer

What Specific Skills and/or Knowledge Do I Need?

What Training Organization Should I Choose?

How Much Hands-On Training Do I Need?

What Depth of Training Do I Need?

Do I Receive Detailed Notes?

Does the Trainer Have a Bias?

What is the Equipment to Student Ratio?

The basic first question is: what specific knowledge and/or skills do you need? This first question is relatively simple to answer: your goals will determine the specific training you choose. If you will be involved in connector installation, testing, and maintenance, you will want such training, but not fusion splicing training. If you will be involved in system design and component specification, you will want training on how to determine specifications for cables, connectors, and optoelectronics.

Training is available in all the sub-technologies of fiber optics (See Figure 2). Such sub-technologies are: cable installation; connector installation, inspection, and testing; fusion splicing; mechanical splicing; cable testing; and troubleshooting. Each of these sub-technologies requires different understanding and skills. Each of these sub-technologies requires different equipment, operating procedures, and sensitivities.

Table 2: The Sub-Technologies of Fiber Optics

Cable installation and Testing (OTDR interpretation)

Connector installation, inspection, and testing

Fusion splicing and mechanical splicing

Cable testing

Troubleshooting

The second basic question is: from what type of organization will you obtain training? You can answer this question after reviewing the three basic options. Training is offered by manufacturers and distributors of FO products; by FO consulting, training, and installation organizations; and by marketers

of training programs for various technologies. Each of these sources of training has advantages and disadvantages.

The manufacturers and distributors of FO products tend to create training programs around their products. This is to be expected. If you have standardized on products from a single company, then such training will be adequate. However, there is a potential danger here. If you receive training from a manufacturer and later change to products from a different manufacturer (perhaps to benefit from lower costs), you may need additional training (at an additional cost) or may incur unexpected costs while learning the subtleties of the new products.

If you have not standardized, or if you expect to use products from various manufacturers in the future, the training provided by manufacturers or distributors may be too narrowly focused to be of long-term value. An additional, potential disadvantage is that a manufacturer training may be provided exclusively at its facilities, or at a limited number of geographical sites. Thus, your traveling costs may be higher than with other options.

Training offered by FO consulting, installation, and training firms has four advantages. First, it can be, and is at its best when it is, generic and less focused on specific products from specific manufacturers. Second, consulting and FO training organizations can and do present multiple products, assessments of advantages and disadvantages, and descriptions of situations which favor the use of each alternative. This type of presentation enables you to evaluate your situation and determine, for yourself, the products best suited for your use. In short, training from a FO consulting or FO training firm, when unbiased, will enable you to improve your decision-making process.

An example of training in multiple products is the Pearson Technologies programs on connector installation. In these programs, we provide training with connectors requiring three different installation techniques: epoxy, crimp, and polish SMAs; preloaded, preheated, and polish STs; and epoxy less/adhesive less STs. Through the experience gained from these three commonly used techniques, you will experience the advantages and disadvantages. From this experience, you can make improved connector selection decisions.

A third advantage is the depth of field experience that consulting and training organizations bring to the training situation. This depth can be greater than that from other sources, since such organizations tend to work with a wider range of products than do manufacturers and distributors.

A fourth advantage comes from the motivation of FO consulting and training organizations. This motivation is to provide training programs in which trainees are successful. To achieve this success, some of these organizations develop improvements to the procedures recommended by manufacturers. For instance, the connector installation procedures that we use in our training programs are different from those recommended by manufacturers. We have developed and evaluated these unique procedures in order to achieve a high probability of success in the training environment (in addition to achieving low-loss and high reliability).

Training offered by installation organizations may, or may not, be as valuable as from other sources. The key in evaluating such training is the depth of experience of the person presenting the training. Some organizations do some fiber work, but it is a small part of their business. In this case, the trainer may not have the depth of experience required to present the subtleties, to answer questions thoroughly and realistically, and to identify potential causes of high loss in the procedures followed by the trainees.

Training offered by training marketers may, or may not, be as valuable as the previous two types. The key factor with training marketers is the has depth and breadth of FO experience of the trainer. The greater the depth and breadth of the fiber optic experience of the trainer, the more valuable the training will be to you. Unfortunately, some training marketers are offering programs presented by trainers who have some, limited experience in FO. In order to obtain the most for your training investment, carefully review the description of the experience the trainer. This description should include not only the time spent exclusively in FO, but quantitative identification of his level of experience. To provide training that includes the subtleties, a trainer must have at least 1000 repetitions of each sub-technology he teaches. For instance, a highly experienced trainer must have installed at least 1000 connectors, made 2000 OTDR measurements, made 1000 splices, and 1000 power meter insertion loss measurements.

To offer an excellent return for the investment of its clients, the Pearson Technologies programs are presented by trainers with 10-15 years of experience in the sub-technologies listed above in the first paragraph and at least 2000 repetitions, with some experience as high as 12,000 repetitions.

A final advantage is that the training marketer usually provides publicly presented programs in a variety of locations. This type of training can result in reduced travel costs. If the trainer has extensive experience, this type of training will be as valuable as that obtained from FO consulting and training organizations.

The third basic question is: How much of the training should be hands-on training? FO training consists of lecture and of hands-on training. In all programs, some lecture is required in order to establish a common understanding of the language/terminology that the trainer will use. However, the amount of hands-on training depends on the needs of the trainees. Some trainees, such as managers and engineers, require a limited amount of hands-on training in order to learn how to choose products for their FO systems. Limited hands-on training provides such trainees with enough exposure to the products to learn the major advantages and disadvantages. Such exposure enables such trainees to make improved decisions. In our 12 years of developing and delivering FO training, we have found that a minimum of 50% hands-on training meets the needs of such trainees.

Other trainees, such as technicians and those tasked with system installation implementation, and maintenance need increased hands-on training. For such trainees, hands-on activities should consume up to 75-90% of the program. The advantage of increased time spent in hands-on training is increased experience. This increased experience with FO products results in increased proficiency and lower costs from on-the-job training. Pearson Technologies offers 20 programs with 50-90% hands-on training.

The fourth question you must answer is: what depth of training do I need? There are three easily identifiable levels: introductory, advanced, and certification. In introductory programs, which can last from 1 to four days, you are introduced to the sub-technologies and understanding and/or skills required to successfully implement a fiber optic system. In the advanced training programs, you develop your understanding or skills by spending one to three days focused on a narrowly defined set of subjects and/or skills. The level of skill you can achieve will enable you to perform with some supervision. In certification programs, you spend two to five days per sub-technology practicing and being tested on your mastery of the knowledge and skills. The level of skill you can achieve will enable you to perform without supervision.

At this time, many of the programs offered are introductory programs. These programs meet the basic need of identifying the concerns, the terms/language, and sensitizing the attendee to the many aspects of FO. However, we have observed that fiber optic networks are increasing in size. Because of this trend, advanced and certification training is becoming increasingly important to reducing the cost of implementation. For instance, if you attend an introductory program, you may achieve a connector installation yield of 70-80%. However, if you attend a certification program, you will achieve a yield of 90-95%, which is the level at which professional installers operate.

The fifth question you must answer is: does the trainer have a bias? This is an important consideration in choosing a program in order to receive the most value from your investment in training. There are two types of bias. Manufacturers and distributors will provide training for their products. Such training can be, but is not always, biased. Such training may not be applicable to products from other manufacturers.

Some installers and trainers exhibit a second form of bias. They provide training with products from a single manufacturer. For instance, some trainers use cables from a single manufacturer or with connectors from a single manufacturer. Such training may, or may not, represent a bias. In fact, such training may represent a hidden and/or unintentional bias: the trainer is training only what he knows (which is to be desired). However, the trainer may not have adequate knowledge or experience to relate the training to the other products that are not included in the program. In this situation, you will not be able to experience or learn about the advantages and/or disadvantages of alternative products.

Such training may meet your needs, but is not as valuable as training that exposes you to products from multiple manufacturers. Such training enables you to compare the advantages and disadvantages of competing products before you decide/choose the products. Such training enables you to make better decisions. Our programs include products from over 40 manufacturers.

The sixth question you must answer is: Do I receive a set of detailed class notes? The better programs provide well-organized and extensive notes. These notes provide added value to the program by allowing you to relax, listen, and focus on understanding the information being presented. You are able to do so because you are relieved from the need for taking extensive notes. Finally, a well-developed note package will serve as a useful reference in the future.

A seventh question is: What is the equipment to student ratio? In a skills training program, the benefit of the program and the amount you learn are directly proportional to the equipment to student ratio. If you are waiting for equipment (because you are sharing equipment), you cannot be learning. Therefore, the better the equipment to trainee ratio, the more you will learn.

In addition to these seven questions, you will want to ask questions about the program design. These questions are designed to determine how the program design supports the training process. For instance, the use of detailed notes and good equipment to trainee ratio enhances the learning process. In addition, examples and conclusions drawn from the experiences of the trainees in the program will reinforce statements of fact presented in the lecture program. For instance, our connector installation programs include reviews of the results of the trainees. In this review, we examine the seven rules of thumb that were presented during the lecture program. This review is designed to determine whether the experience of the trainees supports the use of these rules.

Another feature of the design is the sequence and length of lectures. From 12 years of training, we have observed that the lectures should not be so long as to overload the audience and that alternating lectures and hands-on training activities results in minimum saturation (and loss of attention) of and maximum learning by the trainees.

The answers to these program design questions will let you evaluate how well you will learn. Knowledge of the subject matter is important. But so is the structure: it will either support or work against your learning.

Choosing a fiber optic training program is not an extremely complicated task. Neither is it a simple task. By asking these 7 basic questions, and listening carefully to the answers, you will be able to identify a training organization and program that meets your needs and provides the best return for your investment.

Mr. Eric R. Pearson, a Certified Professional Consultant, is President of Pearson Technologies, a fiber optic consulting and training firm. Pearson Technologies has been providing fiber optic design, installation, and training services for 14 years. Pearson Technologies offers more than 20 practical, hands-on, fiber optic training programs. For Mr. Pearson contact information, [click here](#).

Respectfully submitted for your consideration,

A handwritten signature in black ink that reads "Eric".

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