

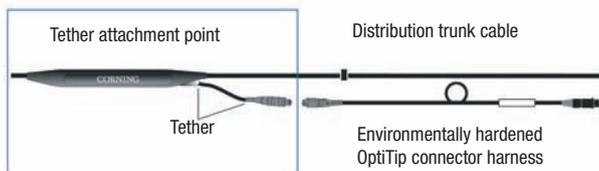
# Preterminated fibre optics cut both costs and installation time

The risks to revenue and safety occurring during the installation process of industrial networks are well known. Many unfamiliar with fibre technologies may believe it to be too complex, fragile or expensive to consider. However, innovations taking place with industrial fibre optics – including preterminated multifibre, IP-rated connectivity – offer fast, simple and reliable deployment. Such systems install in half the time of traditional field-installable systems together with installation cost savings. Mike Fuller of Corning Cable Systems discusses new termination systems which can ease the installation process for industrial fibre.

WHILE THE TECHNOLOGIES for monitoring and controlling industrial devices have evolved dramatically over the last 20 years, the methods used for the installation and deployment of the communications backbone and infrastructure have barely changed. Traditional premise fibre optic cables, hardware, fusion splicing and connection in the field have remained more or less the same over that time. Trying to hurry the installation process using these old methods carries a risk that quality and reliability can suffer. As a result, the final deployment can be more costly and slower, and can significantly affect the production environment. Generally speaking, it all becomes more complex and costly than is strictly necessary.

In an effort to provide greater control of the process and to offer those involved a greater likelihood of success, our company has been working with preterminated fibre optic solutions (Figure 1). Such solutions increase deployment speed, quality and reliability. They offer a path to better future-proofing and, in most cases, lower overall system costs.

Typical configuration for distribution network



All elements shown here are preterminated in the factory

Typical configuration for a point-to-point network

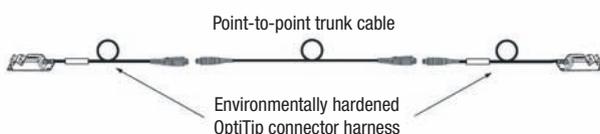


Fig. 1. Preterminated fibre optic solution. All the elements described are part of Corning's AnyLAN Plug&Play cabling system

Traditional industrial deployments involve single-mode 50µm, or 62.5 µm multimode optical fibres, and loose tube outside plant or flame-retardant indoor/outdoor cables carrying from two to 144 fibres. Whether configured in a star, ring or daisy chain, cables are field-terminated with field-installable connectors or factory-terminated pigtails by specially trained personnel. They may also be fusion spliced in the field into splice closures and termination hardware using a variety of personnel and specialised equipment. Termination can be in the open on the factory floor, in trays, ducts or man-holes in the outside plant.

Additionally, at local automation or control cabinets, low-fibre-count drop cables (two to 12 fibres) are terminated by field connecting' and perhaps hand polishing, a variety of connectors or fusion splicing. This type of installation is complex and increases the risk of downtime due to improper installation.

Clearly, all this translates into an impressive amount of time; time to deploy and, potentially, the time required for repair in the case of errors. The traditional route to deployment often involves subcontracting separate installation and termination services and requires very narrow maintenance downtime windows as installation is rarely done during production. Fibre cable installation and termination is often late in the construction or overbuild process and is often delayed, narrowing the window of opportunity when time is certainly of the essence.

Further, if the budget for a project is tied to a specific funding cycle or influenced by some other external pressure, there is a greater possibility of errors, shortcuts or cost run-ons. And ultimately, when preparing, connectorising and splicing 12, 24 or 144 fibres, hours quickly turn into days, and days quickly turn into weeks. This added time creates frustration for all involved.

Yet another consideration has to be that precision work often has to be undertaken in environmentally unfriendly and unsafe conditions. High heat, extreme cold, dust, electrical fields, high noise, radioactive environments and wind... These industrial conditions are not conducive to technically precise, labour-intensive techniques such as field terminating or fusion splicing. Due to this complexity and potential for error, labour rates have increased and, in many cases, are now far greater than material costs.

While many advances have been made in fibre optic technology, the truth is that the termination and splicing task remains a specialised one, which requires training to be performed correctly. Minor oversights in choosing the proper equipment, procedures and personnel can lead to major failures from day one, which will have a lasting effect throughout the project lifecycle and will greatly increase total system cost. Year-round temperature cycling and daily use require the highest levels of both installer competency and product capability in order for a system to ever have a chance to perform as designed. Failure is not an option.

## Pretermination works for other industries

Innovation in preterminated solutions have now removed many of these costly, time-dependent and unsafe variables from the communication network deployment process, leading to timely, reliable, consistent and cost-effective solutions. Preterminated solutions have evolved and grown from traditional local area network (LAN) solutions via data centre solutions to today's most advanced fibre-to-the-home (FTTH) solutions.

Preterminated solutions, factory-engineered solutions that are modular and built to exact, customer-specified requirements, have been deployed globally for years. While these latest advances are new to the industrial market, they are not new to telecommunications networks. FTTH providers have used this technology since 2004 to deliver advanced voice, data and video services. Hundreds of millions of dollars have been invested, and millions of homes have been passed by these providers in North America in an effort to deliver the most modern telecommunications networks. As the products have matured, additional markets have been

identified that have requirements that robust and rugged preterminated solutions could solve. Therefore, many of the 'early-adopter pains' felt by those adapting to new technologies can be put aside as the product technology and manufacturing has matured significantly since its initial launch.

In addition to using standard fibre optic cables, connectors are pre-installed, completely eliminating the need for any field termination. These connections can be standard single-fibre connectors or new environmentally hardened MT (12-fibre) connectors. These environmentally hardened solutions can be connected in under a minute and are able to withstand both high and low temperatures, vibration, dust penetration and prolonged submersion.

For example, Corning Cable Systems' OptiTip MT connector (Figure 2) is both IP68- and IP69K-rated, offering the highest level of protection. Additionally, these connectors have optical loss levels that rival traditional fusion splicing, and their small footprint allows them to be installed in ducts as small as 2cm or in open environments. Space-saving and cost-effective preterminated solutions at industrial control cabinets



Fig. 2. IP69K rated: Corning Cable Systems' OptiTip MT connector

also eliminate the need for field terminations. These control cabinet solutions (Figure 3) can be integrated into cabinets, accelerating initial deployments as well as dramatically reducing the time required to repair damaged or destroyed cabinets.

Specifically, these installation strategies save both time and signifi-



Fig. 3. Preterminated fibre optics for the control cabinet

cant money making preterminated solutions a sensible choice to consider. Deployments are accomplished in a fraction of the time without the need for specialised labour, training or concern. Many of the companies that have already purchased and installed preterminated solutions for industrial networks have done so using their own crews and personnel without introducing additional personnel into secure and protected areas. This ability to install these networks with minimal training has proven to be valuable. Compare the value of terminating 12 fibres in under a minute in an environmentally hardened connector to spending eight to 10 hours with multiple personnel preparing cables and a splice

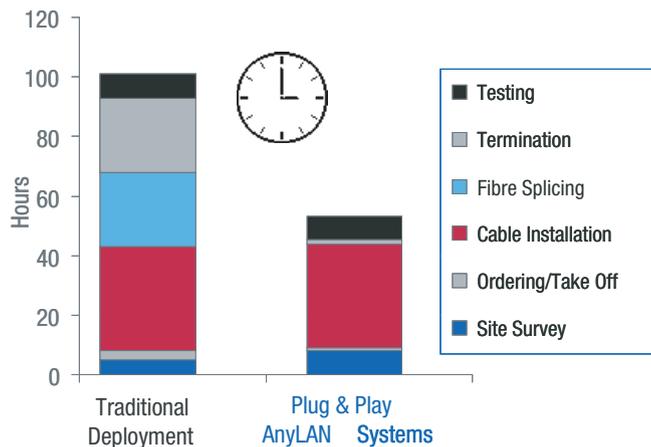


Fig. 4. Working against the clock: Typical time savings obtained with preterminated solutions

closure, and then connectorising or splicing 12 fibres. Figure 4 shows the typical savings.

### Time for the design phase

Preterminated solutions require slightly more time in the design phase spent in determining and measuring appropriate lengths, spacing and technical requirements. However, future growth and expansion can be easily planned at the same time. The time spent early in the design phase results in dramatically reduced time spent in the deployment phase. These design requirements are sent to the factory to be built to customer specifications. Preterminated solutions involve highly-trained factory staff performing splices and/or terminations under controlled conditions where cleanliness and consistent processes are reflected in the target installation. Such controlled conditions permit some manufacturers to provide guaranteed results upon delivery and extended warranties – up to 25 years – upon deployment.

While these types of solutions may, at first, seem rigid and inflexible in the event of unforeseen circumstances, slack and future network growth are easily built in at minimal cost. The small footprint of the solution is both user-friendly and environmentally robust. Whether a design includes rings, daisy chains, star topologies or some combination of any or all, preterminated solutions can meet the many needs of a diverse range of installations.

Time is money in the industrial environment, and both are often in short supply. Solutions that allow quick, reliable installation while reducing rework decrease the overall cost of variable labour and easily offset increased material costs. Connections of locations, cabinets and equipment can be made three to four times more quickly, and complete network installations can be carried out in half the time needed with traditional cable-and-splicing methods. Reliability and risk avoidance are both high, as the products are manufactured and tested by experts in environments conducive to the highest levels of reliability.

Rugged systems are now capable of being deployed that are independent of installer skill level without the risk of unforeseen downtime and are now capable of carrying extended warranties up to 25 years. Labour costs can be dramatically reduced by speeding installation and eliminating the need to terminate in the field and splice. Additionally, this labour cost and time can be appropriately planned and accounted for due to the reduced variability that exists today. And, ultimately, scalability is easily built into the design so the same deployment speed and reliability can be enjoyed as the network grows.

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