

# White Paper

## Benefits of Pre-Terminated Solutions



Pre-terminated cabling systems have been around since the beginning of computing, well before the inception of Structured Cabling. Early IBM System 36 and 38 computers used to be connected to its peripherals by way of factory terminated twin-ax assemblies, very similar to the ones still used today for 40 & 100Gb connectivity within the Data Centre.

The use of pre-terminated solutions fall into a few key areas, one as previously mentioned is the Data Centre and the other increasingly used option is in commercial office fit-outs, as the project timescales are constantly being reduced by the competitive nature of the market.

Another area that we are starting to witness is the use of pre-fabrication within the construction industry. By that we mean not only the construction, but the partial fit-out of wall sections. This method of construction is increasingly popular for Hospitals and Schools, and involves levels of first and second fix being done in a factory and the completed wall craned into position onsite and effectively 'plugged in'. This includes not only the voice and data cabling but other systems such as electrical and plumbing and in the case of Hospitals, gas services as well to the 'bed heads'.

By way of continuing to innovate, Excel has continued to keep abreast of these developments by producing new ways of deploying both Copper and Fibre Pre-terminated solutions.

### Data Centres

This is the one area that is very competitive, not only the cost but also the delivery schedules required to satisfy the very quick turn-around of the modern Data Centre deployment. It is not uncommon for a DC operator to want to turn an empty data hall into a fully functioning and revenue generating suite in a matter of weeks, time is money, and as soon as the decision is made they want to start earning revenue.

Therefore the time pressure quite simply dictates that pre-termination is essential for the rapid commissioning of new data halls. This involves both copper and fibre connectivity, MPO/MTP fibre is fast becoming the de-facto system for both single and multimode connectivity in this space due to ease of use and speed, not to mention the high density.

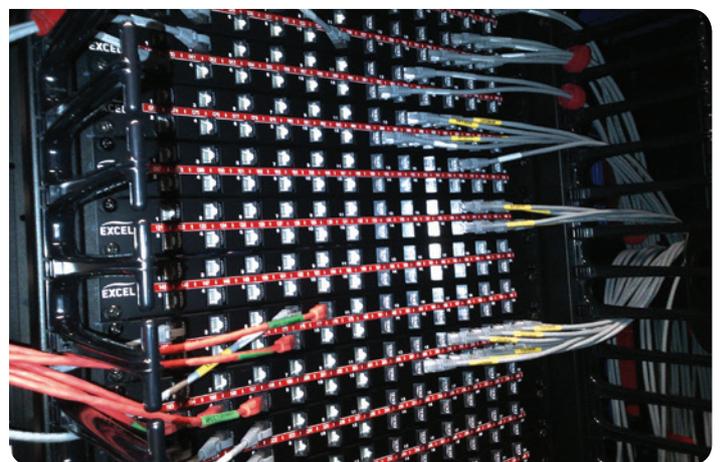
Copper Pre-terminated cassettes have been traditionally restricted to Category 6 and below due to the potential problems of Alien Cross Talk. Category 6<sub>A</sub> is usually installed by way of individual screened jacks, that are then mounted into patch frames. These assemblies typically involve harness links from switches to a central patching field and then further assemblies that emanate from there to provide connectivity to

the cabinets, both server and storage. On top of this there is sometimes the need for direct inter-cabinet links.

One of the traditional drawbacks of copper is the density that can be achieved, especially within the main patching field. The use of traditional outlets and patch management bars every 2U can be very restrictive and waste a lot of space. To get around this manufacturers have come up with a wide range of angled options, from angled V style panels, standard outlets mounted at an angle within a flat panel, an angled modular panel that houses a standard presentation outlet in groups of 6 etc.

All of these options have one drawback or another, some need the front profiles to be moved back to accommodate the angle of the V style panel, with the traditional outlet mounted at an angle, the problem appears at the rear with the cables having to crossover.

Excel has come up with a unique approach by having the front presentation of the jack itself at 45 degrees, this means the patch cables lie flat at the front of the panel with standard presentation at the rear, meaning the profiles do not need to be adjusted and the dressing of the cables within the cabinet can be optimised.



The image above shows a main patching field deployed within a DC, that is fully patched in a 45U 2post frame containing 960 outlets, almost 50% more than a traditional approach, all of which were pre-terminated and labelled off-site and then just plugged in and tested.

Whilst traditional termination of fibre is still used, increasingly using a fusion splicer within a DC is mainly restricted to rectifying faults. Almost all fibre assemblies are pre-terminated whether that is conventional construction fibre that is terminated at both ends with SC or LC connectors, or more commonly used, MPO/MTP 12 fibre assemblies that are used as inter-cabinet links (Trunk Cables) which are then connected to cassettes housing the fan-out cables to LC presentation.

Each approach has seen a 'step-phase' in the time to deploy. Using conventional and fusion splicing pigtailed within patch panels, can take days if not weeks, pre-terminated conventional fibre, can take days, whereas the time taken to deploy MPO/MTP can be measured in just a day or so, if not hours.

### Commercial Office Pre-terminated Assemblies

The completion of the handover of a project is critical, mainly due to the fact that the lease deadline of the end user client's existing facilities, have to be met to avoid the costly penalty of having to extend their previous lease by a further 3-6 months. This is then compounded by protracted negotiations to get the best price.

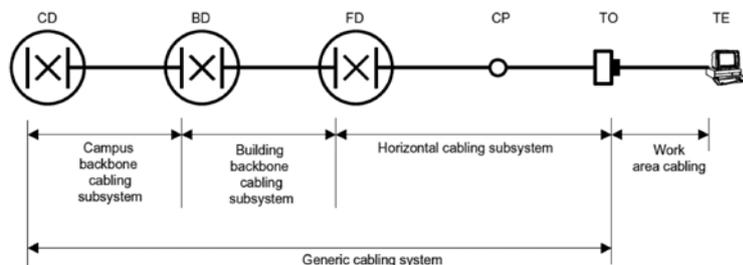
Therefore pre-termination for commercial office installations is becoming increasingly popular as the project timescales are being constantly shrunk. Some integrators have even taken the step to invest in their own facilities to keep up with the demand.

Whilst it is basically the same product set being used, there are a few key additions and techniques being utilised. One key difference is the lengths involved, they are usually much longer, and if there is a concern about the accuracy of drawings or measurements provided, some companies are opting to minimise their risks by just pre-terminating the floor outlet end at the factory. In effect producing extremely long outlet to outlet assemblies, that are tested fully if they are below 90m. If over this length, they are tested for continuity before being cut in half, labelled, packed and shipped to site to be pulled into position onsite.

This approach is being seen almost as a two visit approach, to the floor locations. First stage is to 'pull' or lay the loom, usually from the floor location back to the SERs (Secondary Equipment Rooms/Floor Distributors) at which point 'the floor' can be handed back to the main contractor for other trades, with the outlets or GOP (Grid Outlet Point) box bagged and coiled for safety under the raised floor and the termination of the other end can continue in the SERs. On some projects a two-shift process is used for speed, with the assemblies being pulled in overnight when the Data Installer has free access to the floors and the termination and testing is done through the day.

Along with the Solid Core Harness links used in the Data Centre we also see the use of longer versions of these assemblies being used as Consolidation Cables in coordination with Consolidation Points that are used to service zones or service areas within a floor or building.

Consolidation Points have been a building block within the standards for a long time however they have only recently started to come into their own due to the additional flexibility they provide in a dynamic office environment that undergoes a lot of moves and changes.



### The structure of a generic cabling installation as per EN50173-2

Pre-terminated cable assemblies can be produced for each element outlined above.

**BD = Building Distributor and Solid Core Harness Links**

**Building Backbone Cabling Subsystem = Backbone Cabling (pre-terminated fibre)**

**Floor Distribution Cabling Subsystem = Horizontal Cabling**

**CP = Consolidation Point and Solid Core Consolidation Cables**

**EO (Equipment Outlet) = Including those housed in GOP boxes**

We mustn't forget that most backbone cabling systems between the MER (Main Equipment Room) and the SERs on each floor are typically fibre, with the occasional copper links as back up.

There is an increasing demand for conventional tight buffered fibre to be pre-terminated offsite. This approach not only saves a great deal of time, it may be essential due to the lack of power onsite for a fusion splicer. The days of 'glue and polish' are gone especially with the lower losses of OM4 fibre, certainly I don't know of anyone who is attempting the manual approach for singlemode.

### Pre-fabrication

Another area on the increase is that of Pre-Fabrication where complete sections of buildings are being constructed in a factory style environment and all services are being 'pre-plumbed in' initially it used to just be the power and water but now complete walls for schools and hospitals are having all their services installed in a factory environment including items such as gas/oxygen and IT cabling. The completed wall is then wrapped up taken to site by lorry and craned into position.

Once delivered, it's a fairly quick and simple task to plug them together and test.

This approach moves the resources to where they are needed and where they perform best. The easy question is where do people perform their best work, a purpose built factory that is dry and warm or a building site open to the elements in the middle of winter?

This approach takes the use of Consolidation Points and Solid Core Consolidation cables to the next logical stage. By running Horizontal Cabling from the SER or Floor Distributor out to a consolidation point close to the location of the final position for the wall or walls for when they are craned into position. The solid core consolidation cables that have been installed within the wall, in the factory are just connected and tested.

This means the time and resources required onsite are dramatically reduced. If everything is labelled correctly it takes a fraction of the time and cost required for a traditional installation, hence the large number of construction companies that operate in the education and healthcare sectors who are looking to invest heavily in this approach.

### Considerations

With all things of this nature, there are some serious 'Pros and Cons' to take heed of one size does not fit all, however the Pros certainly outweigh the Cons.

#### Pros:

- Time Saving
- Cost Saving
- Less Wastage, both packaging and cable off-cuts
- Concentration of valuable resources
- Pre-Tested
- Less Failure onsite

#### Cons:

- Accuracy in measurement required
- Lacks on-site flexibility for change in program

### Benefits of Pre-Terminated Solutions

As can be seen throughout this paper if used correctly Pre-Terminated solutions can bring a raft of benefits to both the installer and the end-user.

It all comes down to money and all the Pros listed above have a 'Cash' value. Yes the assemblies have a higher initial cost as they include the factory termination time, however the savings go beyond this.

Time Saving which in itself brings benefits of cost saving, if you buy the assemblies pre-terminated you don't need as many onsite engineers pulling cables in and terminating them for as long, saving on the labour bill.

Cost Savings include all the other items of equipment that have to be hired, such as podiums and lifts, if the turnaround is quicker they don't need to be on hire as long.

Less Wastage, the installer in a lot of cases still has to pay for his waste to be removed from site on many projects, especially if they include cable drums, more importantly the installer is purchasing a more accurate quantity of cable, they are buying by the metre and not by the drum, how many installers have their facilities cluttered up with odd lengths of cables in boxes hoping for a project that will use them up.

Concentration of Resources, rather than having teams of engineers in pulling and terminating in less than ideal environments, have a select group of specialists pull the assemblies in the right manner, in a controlled environment and then test. This leads to smaller teams for a shorter time and subsequently a smaller labour bill.

Testing on this subject, if they have been tested in the factory sometimes means less testing onsite, Excel has one Data Centre customer who accepts the factory test results for warranty purposes. All he asks for onsite is random testing within the looms to validate the factory test data, if this is within an acceptable tolerance he is then happy to accept all of them, this has led to a reduction of testing time by as much as 75%.

### Conclusion:

Pre-termination is not a fad, it is an increasingly popular way of delivering a project in a more timely and cost effective manner. It should not just be confined to the major projects delivered by the large integrators, this approach can provide benefits for all sizes of project.

Excel Networking is investing and will continue to invest in both products and services that can support any level of project with many different variations of product presentation, panel to panel, solid core harness links, panel to GOP, Panel to CP etc. including both copper and fibre, both traditional and MTP.

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