How to Save Up to 60 Percent on Your Next Cable Installation Project

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Electrical conduit has been used for routing cables in buildings and other structures since the early 20th century. While conduit is still required for some applications, installation costs and cable management flexibility have contributed to the increased adoption of cable trays. Today, cable trays have become vital cable management components for supporting and routing electrical power distribution and control, instrumentation signals and communication fiber optics, wires and cables. Cable tray installations appear in industrial plants, server rooms, hospitals, educational campuses, office buildings, airports and other structures all over the world.

Limited-width cable trays are a cost-effective alternative to conduit for most cable installations and offer other benefits as well.

Cable Trays

Cable trays provide protection to cables from the control room to the instrument and all points in between and allow easy access to cables that require frequent changes and flexibility for future cable runs. Cable trays are also an easy and effective way to separate data and communication cables from power lines.

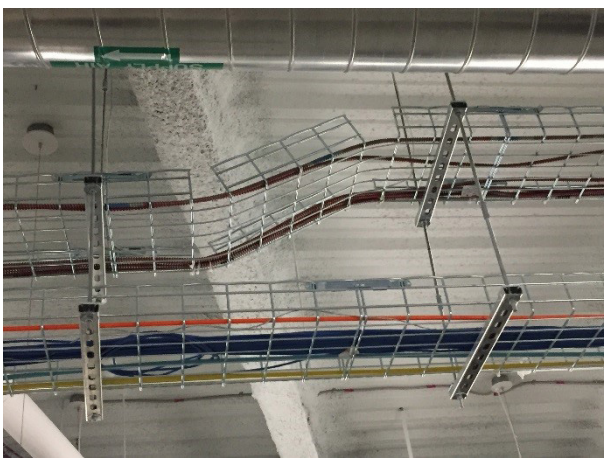

Figure 1: Wire mesh trays showing separation of power and data cables in an office building.

Most cable tray systems are open, which facilitates easy access and allows efficient heat dissipation. While cable tray systems are typically overhead or attached to walls, some cable trays are suitable for underfloor applications as well.

Several cable tray styles are commercially available.

- **Ladder cable tray** — Constructed from two longitudinal rails connected by a series of traverse bars, resembling rungs on a ladder. Ladder cable trays permit maximum ventilation around cables and are suitable for support spans from 10 to 20 ft.
- **Wire mesh (also referred to as wire basket)** — Manufactured from welded steel wire and have become popular for telecommunications and fiber optic applications.
- **Solid bottom cable tray** — Provides the most protection for cables, however, they have no openings for cables to enter or exit. Applications for solid bottom cable trays include telecommunication applications and cables that do not generate much heat.
- **Channel cable tray** — Generally used for single power or several smaller cables when conduit is not preferred. Channel trays may be available with covers and may have ventilated or solid bottoms.
- **Trough cable tray** — Solid bottom or ventilated trays, at least 6 inches in width with two longitudinal side rails.
- **Single rail cable tray** — Consists of a single center-supported rail with rungs for light-duty cable support applications.

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Cable Trays vs. Conduit

When transitioning from wire baskets or ladder trays in large runs to specific instruments, cable management options include conduit and limited-width cable trays. Conduit may be required for high traffic areas or critical equipment applications; however, limited-width cable trays are a cost-effective alternative for most installations and offer other benefits as well.

Ventilated limited-width cable trays share the air circulation traits of other open-wire systems, such as ladder trays and basket trays, and do not have the same heat dissipation concerns that an enclosed conduit system has. In addition to airflow around the cables, metal cable trays act as a heat sink to facilitate heat dissipation. In the event of a fire, damage to cable tray systems is generally restricted to the area around the fire itself. Conduit can also act as a heat sink in these circumstances; however, instead of dissipating the heat, they can actually transfer the heat along the conduit, damaging the cable for much greater distances.

The open nature of cable trays also allows any moisture to evaporate. Condensed moisture in conduit cannot escape, and accumulates in the conduit system and attached electrical enclosures. This will eventually lead to corrosion of the metallic components and may cause other issues, including equipment failure.

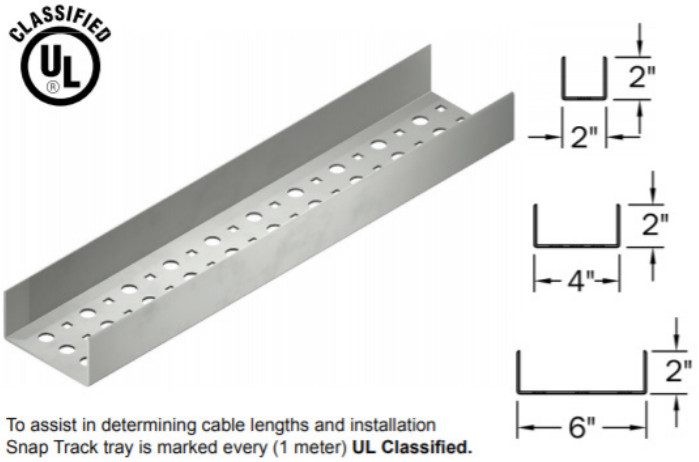

Figure 2: Snap Track limited-width cable tray from TechLine Mfg. Source: TechLine Mfg.

Cable used with conduit is unarmored, however, feeding it through conduit is labor-intensive and if sealing fittings are required there is the additional cost of installation and inspection. In some cases, cable trays may require the use of an armored cable. While these cables were historically more expensive than the unarmored cable used in conduits, they have become more prevalent in industry, which has reduced costs.

Changes in the National Electrical Code (NEC) and Underwriters Laboratories (UL) requirements in the 1990s resulted in a new exposed run (ER) rating for unarmored, but rugged instrumentation, control and power tray cables. The rating is specifically designed for tray cables (TC) and cables meeting the requirements and they carry an "-ER" suffix as follows:

- TC-ER for tray cables
- ITC-ER for instrumentation tray cables
- PLTC-ER for power-limited tray cables

Limited-width cable tray standard widths are typically 2 in., 3 in., 4 in. and 6 in., and offer many advantages over conduit, including cost savings and access to cables for easier installation, repair or reconfiguration. For these reasons (and others), industry has been moving away from conduit in favor of cable trays in recent years, where permissible by code.

NEMA, NEC and UL publish standards for the proper shipping, handling, storage and installation of metallic and non-metallic cable trays. Take care to research and follow these standards before selecting any cable tray or conduit.

Cable Tray Cost Savings

In addition to regulations dictating the use of conduit in specific applications, other factors to consider when selecting the proper cable management solution include design, material, labor and maintenance costs.

Installation costs of cable trays are significantly lower than conduit, and these labor savings of cable trays can more than offset any additional cable costs.

As opposed to conduit, cable trays allow cables to enter or exit anywhere along the run. In addition, cable trays do not need to be mechanically continuous, simplifying the design and installation. These features make designs simpler and permit easy revisions when needed. When conduit is used, revisions require running additional conduit lines, which results in higher costs.

Conduit requires more components than cable trays, which means higher purchasing costs. This is evident when comparing the capacity of a 6-in. ventilated tray to that of a 2-in. conduit. Three conduits would be required to obtain the same capacity of a single 6-in. wide cable tray (3.8 sq. in.). Selecting conduit, in this case, would require purchasing additional material as well as increased installation costs.

Figure 3: Example cost savings of Snap Track cable trays compared to conduit. Source: TechLine Mfg.

Snap Track Cable Trays

Cost savings exceeding 50 percent are attainable by installing cable trays compared to conduit. Snap Track Cable Trays, by TechLine Mfg., are an innovative, limited-width cable tray solution that can provide an additional 15-20 percent cost benefit on top of these savings.

Patented in 2009 and developed by contractors for contractors, Snap Track cable trays conform to UL, NEMA and NEC standards. Snap Track is a limited-width ventilated channel tray that provides adequate cable protection while dramatically reducing installation costs.

Figure 4: TechLine Mfg.'s patented Snap Track push-pin fastener. Source: TechLine Mfg.

Snap Track can attain these cost savings by several methods, including patented push-pins, extruded longer trays and innovative fittings, among others. First, Snap Track uses a unique, patented push-pin fastener design. Two sections of cable tray are joined by simply pushing the pin through holes in the bottom of the trays, eliminating the need for tools, nuts and bolts. The pin's tapered insertion ramp allows easy insertion and pushing into place and the dual spring-loaded plungers prevent it from backing out once engaged.

Secondly, TechLine Mfg.'s Snap Track cable trays are extruded from marine grade aluminum. Extrusion provides significant advantages over rolled cable trays. Compared to the roll form process typically used for manufacturing cable trays, extrusion can produce intricate shapes in a single pass. In addition, there is no springback associated with extruded parts. Roll-formed parts will spring back slightly, while extruded parts keep their original shape and dimensions. The extrusion process also allows fabrication of channel sections up to 20 ft. in length versus common lengths of 10-12 ft. Longer sections require fewer supports than shorter competitive products, resulting in material and installation labor savings. The resulting longer spans (up to 18 ft. depending on load requirements) can reduce the number of required supports by up to 50 percent.

Additionally, Snap Track has a number of innovative fittings, including long radius elbows up to 36 in., long radius crosses up to 36 in., as well as a number of exit fittings that reduce field fabrication. Any time that fittings are available, field fabrication is reduced, trimming labor costs and time as well.

TechLine Mfg. offers on-site training for contractors and installers who may be more familiar with mechanical fastener (nuts and bolts) cable tray assembly methods or conduit. Due to the simple push-pin fastener, this training typically only takes an hour. If any questions arise post-training, TechLine Mfg. application engineers are available to help and will return to the job site as many times as needed until the installation is completed. Once contractors realize the substantial cost savings associated with Snap Track cable tray installations, they become committed and repeat customers.

Snap Track Load Data

NEMA does not specify loading requirements for ventilated bottom cable trays less than 150 mm (6 in.) in width and 50 mm (2 in.) in depth. TechLine uses the guidelines and standards indicated under IEC 61537, which states that a safe working load is the load applied when the deflection equals a span divided by 100. For example, a 10 ft. span would be allowed a maximum of 1.2 in. of deflection. The table below displays Snap Track loading information.

Figure 5: Snap Track short radius cross fitting. Source: TechLine Mfg.

Snap Track Span (feet)

Note: Do not confuse span with tray length. The distance between supports is called SPAN.

Tray		6 feet		8 feet		10 feet		12 feet		14 feet		16 feet		18 feet	
W	H	Load (lbs/ft)	Deft (inch)	Load (lbs/ft)	Deft (inch)	Load (lbs/ft)	Deft (inch)	Load (lbs/ft)	Deft (inch)	Load (lbs/ft)	Deft (inch)	Load (lbs/ft)	Deft (inch)	Load (lbs/ft)	Deft (inch)
2"	2"	70.93	0.72	24.15	0.96	11.7	1.2	6.1	1.44	3.5	1.68	2.5	1.92	1.3	2.16
4"	2"	67.12	0.63	31.4	0.96	13.7	1.2	7.3	1.44	4.2	1.68	3.4	1.92	2.5	2.16
6"	2"	73.19	0.63	34.21	0.80	17.7	1.2	9.7	1.44	9.7	1.68	3.8	1.92	2.1	2.16

Informational Note - Typical Foundation Fieldbus cable with a spiral wound armor (SWA) cable = .06 lbs./ft.

Table 1: Cable tray deflection. Source: TechLine Mfg.

Value Added Services

An additional service that TechLine Mfg. offers is the willingness to develop unique fittings that are not available from competitive products, which reduces fabrication in the field. TechLine Mfg. creates new fittings on almost every job site based on client feedback. Many of these new components become part of the TechLine Mfg. catalog, resulting in a constantly expanding product line.

To help engineers incorporate Snap Track into their designs, AutoCAD models are available for download from the Resources section of the TechLine Mfg. website.

In addition to aluminum Snap Track cable trays, TechLine Mfg. also manufactures traditional cable trays in stainless, aluminum and galvanized materials.

Conclusion

The adoption of exposed run tray cables in recent years, combined with the substantial cost savings compared to conduit has led to cable trays becoming the preferred method for running cables in Europe. Despite the significant advantages, the United States is lagging behind the rest of the world in moving away from conduit. This is largely due to old habits, designers leaving the decision up to the contractor and the feeling that cable tray systems are more complex. Electricians learn to run conduit during their apprenticeships and unless otherwise specified, will turn to what they know best.

Usage in the U.S. is growing, however, and once contractors and electricians realize the time and cost benefits associated with cable trays they will become their cable routing method of choice.

TechLine Mfg. personnel are available for on-site visits to help meet your needs and train your personnel. Contact a TechLine Mfg. application engineer today to learn more about the advantages of Snap Track cable trays.

Developed by contractors for contractors, TechLine Mfg.'s Snap Track trays are easy to install and require a minimum amount of training. Choose Snap Track for your next job and realize material and installation cost savings as high as 65-70 percent compared to conduit.

Visit the Snap Track product page on the TechLine Mfg. website for additional information: https://www.TechLinemfg.com/snap-track-cable-trays.html

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ABOUT TECHLINE MFG.

TechLine Mfg. is a domestic manufacturer of instrumentation and electrical supports and provides quality products to industrial job sites and facilities around the world. The company has proven capabilities for supplying products to instrument and electrical bulk package providers for large-scale domestic and export projects in sectors including LNG, oil and gas, power and petro-chem, among others. Established in 1982, TechLine Mfg. has about 50 employees working in its headquarters and factory located in Spanish Fort, Alabama, and in its Regional Service Center in La Porte, Texas.

As part of its commitment to customer service, TechLine Mfg. is constantly listening to the needs of its customers and providing solutions. Through this process, TechLine Mfg. was encouraged by contractors, engineering firms and end users to develop Snap Track, an innovative ventilated channel tray system. It is used as an alternative to costly conduit runs while providing the level of cable protection desired in the industrial market.

Based on the overwhelmingly favorable response to Snap Track, TechLine Mfg. has evolved into not only a leading tubing and instrument support manufacturer but also an innovative leader in the electrical cable tray market.