

Track Busway Now Offers a Customizable,  
Flexible, and Scalable Power Distribution  
Option for Harsh Environments



## ABSTRACT

Power distribution systems must combine flexibility and robust protection for environments with dust or water, such as an electric vehicle (EV) charging stations, dusty manufacturing environments, indoor cultivation centers, and any facility with sprinklers.

Unfortunately, traditional pipe and wire systems don't have the flexibility to handle quick changes in layout and equipment.

When manufacturers must move, add, or replace machines or facility managers add additional infrastructure such as charging stations, they must often reconfigure electrical conduit and wiring to bring power to their new locations or to support increased power loads.

These changes are often expensive and time-consuming, resulting in lost profits due to lower productivity.

## THE FLEXIBILITY OF TRACK BUSWAY

Allows you to make quick changes in your power distribution layout, to support changes in assembly line layout and new equipment locations. Track busways provide localized power to the machines, and you can quickly scale up power to handle higher electrical load requirements. Also, track busways offer significant long-term savings in the Total Cost of Ownership (TCO) of your power distribution system.

## INTRODUCTION

An effective and reliable power distribution system is essential for manufacturing or industrial facilities. For decades, manufacturers and other industrial companies have relied on traditional electrical conduit and wiring systems—informally known as “pipe and wire systems”— to deliver power to manufacturing equipment, such as assembly line machinery. Effective power delivery allows those machines to produce the goods the company needs to fill orders for consumers or B2B customers.

But traditional pipe and wire systems have numerous drawbacks, the chief one being their lack of flexibility in adapting to changes. Whenever facilities must move, add, or replace equipment, they must often reconfigure their power distribution system. They must tear out electrical conduit and wiring, and rewire the system to bring the requisite power to the equipment in their new locations. These changes are often done at great trouble and cost to the company, with a potential loss of profits due to decreased productivity and increased downtime.

Fortunately, there is an alternative. A track busway system provides the same high-performance power delivery as traditional pipe and wire systems. But track busways also offer the flexibility to make quick and easy changes in your power distribution layout and the scalability to accommodate additional or higher power loads. A track busway system lets you adapt your power distribution to the changing needs of your facility with far less trouble and cost.

Although track busway systems are commonly used in data centers, many manufacturing and industrial companies and other facilities have yet to discover their benefits. In this white paper, we'll examine how track busway systems can be used in these types of facilities and their advantages in flexibility and reduced TCO over the long term.

While this white paper mainly focuses on manufacturing, numerous other settings can benefit from using a track busway power distribution system. These include:

- Automotive manufacturing and supply facilities
- Aerospace and defense manufacturing
- Airports, truck terminals, and other transportation centers
- CNC machining and additive manufacturing (3D printing)
- Distribution centers
- Food and beverage manufacturing and processing plants
- Indoor agricultural cultivation & greenhouse facilities
- Medical device and biopharmaceutical manufacturing
- Research laboratories
- University, trade school, or public school laboratories

## THE CHALLENGES FACED BY MANUFACTURING AND INDUSTRIAL FIRMS

Change is a constant factor in today's manufacturing and industrial facilities. Production and facilities managers frequently need to rearrange their assembly lines and workstations on the factory floor, swap out old machines for new ones, and modify their manufacturing process flows to increase productivity and meet customer demands.

A recent survey by Starline shows that manufacturing companies make at least one significant change to their production environment every 6–12 months. The most common reasons for these changes include those below.

### NEW/UPGRADED EQUIPMENT

An older manufacturing machine reaches the end of its useful life or becomes obsolete and must be replaced with a newer, more advanced model.

Or your company may create a new product or a new version of an existing product or offer customized products based on customer needs. This requires adding assembly lines, work cells, or new machines to your manufacturing process to handle mass production or product customization.

### PRODUCTION LAYOUT CHANGES

Your company may decide to reconfigure its manufacturing environment to improve productivity or smooth out production problems. For example, your manufacturing engineers may determine that they can increase production efficiency by 30% by modifying or combining various production or assembly lines.

### FACILITY CHANGES

Your manufacturing operations have outgrown your current facility, requiring you to either (1) build an addition to that facility or (2) build a second manufacturing facility to keep up with anticipated growth over the next few years.

### GEOGRAPHIC CHANGES

Your company may move its manufacturing operations to another facility, city, or state for various reasons. Maybe your company builds a second facility and consolidates manufacturing of a particular product. Or perhaps another state offers tax breaks and cheaper real estate for manufacturers or is less likely to be affected by weather events due to climate change.

### MARKET CHANGES

Market trends and conditions, new competitors and products, or acquisitions and mergers may force you to make manufacturing changes. Maybe your company acquires a global corporation as a new customer, and you must expand production lines to meet that customer's orders. Or maybe one of your competitors goes out of business, giving you a larger market share for certain products, and you must increase production to keep up with higher demand.

## UNEXPECTED EVENTS

The COVID-19 pandemic is a classic example of an unexpected event that required companies to rethink their business models. The pandemic forced many manufacturers to reorganize their facilities and operations around employee safety.

This included staggering shifts, rescheduling non-critical services, requiring employees to wear safety masks and protective gloves, and providing cleaning supplies for workstations and equipment. A big challenge was introducing the concept of social distancing into manufacturing work environments. For some companies, this required them to reorganize equipment and workstations to provide a safe distance of six feet between employees as they were working.

## THE CHALLENGES OF RECONFIGURING POWER DISTRIBUTION SYSTEMS

When manufacturers move machines and reconfigure assembly lines on the factory floor, they must also typically reconfigure the power distribution system that serves this equipment. In doing so, manufacturers face several challenges.

First, the installation window for these changes is often very tight, and work must be done quickly and efficiently. Operations managers request or schedule downtime in the production environment, and equipment and power distribution reorganizations often occur under official or unofficial deadlines.

Second, any scheduled downtime often results in a loss of productivity, negatively impacting the company's bottom line. During the reconfiguration, assembly lines are shut down, and production is halted or at a reduced capacity. Idle equipment severely hampers the company's ability to respond rapidly to customer demands. Operations managers must carefully plan, schedule, and manage the reorganization to minimize the impact on the overall business.

Finally, there is the problem of "future-proofing." It's tough for manufacturers to predict how or when business growth, technology innovations, or unexpected events will affect their production environment, requiring them to change machinery, floor layout, and power distribution all over again.

## INTRODUCING THE TRACK BUSWAY SYSTEM

A track busway system offers high-performance power distribution for machines and equipment with high power needs. Think of track busways as a better, more sophisticated version of the track lighting you may have in your home. The components of this system include:

### Track Busway Sections

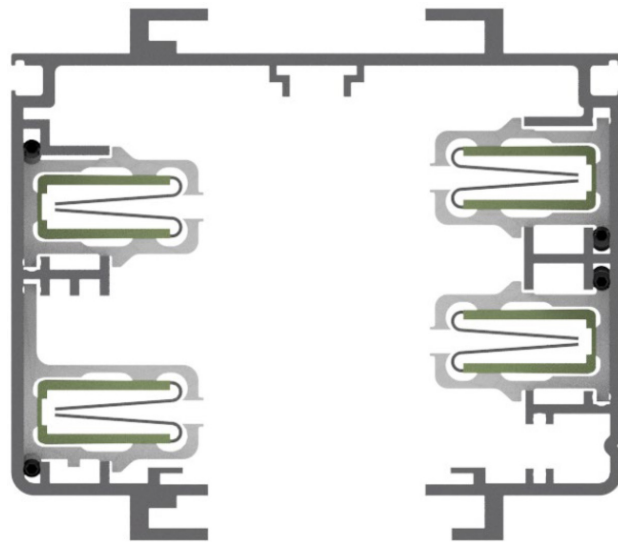


Figure 1. Open channel track busway

An open channel track busway (Figure 3) consists of a U-shaped aluminum shell, with copper or aluminum busbars mounted along its interior walls. A continuous access slot (the “open channel”) runs along the bottom of the busway to insert plug-in units.

Figure 2 shows the different types of busway components:

**Straight sections (a.)**— The main busways that deliver power to your assembly line equipment, workstations, etc. Standard lengths are 5, 10, and 20 feet (or 1.5, 3, and 6 meters).

**Elbows (b.)**— Used to join two straight sections in a horizontal 90-degree turn on a busway run.

**Tee Sections (c.)**— Used to connect three straight sections in a 90-degree branch leg on a busway run.

**Power Feed Units (d.)**— A power feed unit is usually placed at the beginning of a busway run and supplies incoming power from the panelboard or other power source. The unit may also include power monitoring equipment, an Infra-Red (IR) window for thermal scanning, and a serial, Ethernet, or Wi-Fi connection for reporting data.

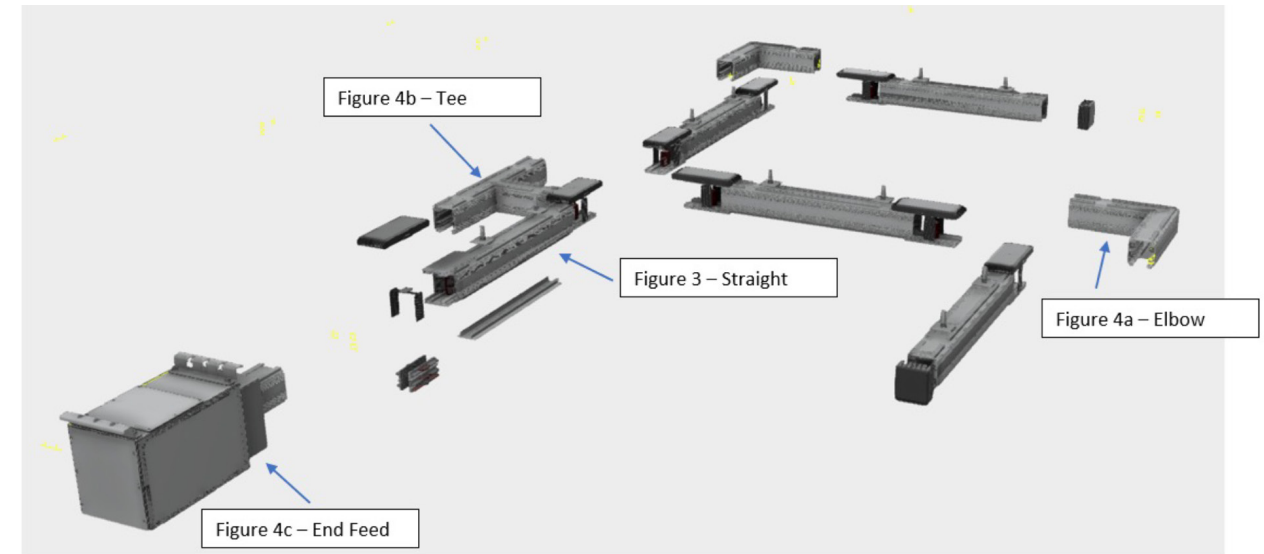


Figure 2.

Figure 3 shows a typical layout of a track busway system. You can create a custom busway that fits your manufacturing facility’s power distribution needs using a combination of straight sections, elbows, and tees. The busway sections are suspended from the ceiling, wall-mounted, or mounted on vertical support poles directly above or near the equipment they serve.

## PLUG-IN UNITS

The plug-in unit integrates the circuit breakers and the electrical outlets you use to supply power to machines on the factory floor.

You insert the plug-in unit’s upper paddle into the open channel at the bottom of a track busway and turn the unit to lock it into place (Figure 4).

This connects the paddle to the electrical busbars that are mounted inside the busway section. Installing a plug-in unit on a busway only takes a minute, and no tools are required. You can then plug your machine’s power cord into the unit’s outlets and flip the breaker switch to the ON position to supply power to the equipment.

You can order custom-made plug-in units with features that fit the needs of your specific work environment. Available custom features include:

- The number and type of outlets
- Circuit breakers of particular brands or ratings
- Drop cords with custom lengths, retractable cord reels, and power metering
- Safety features such as finger shrouds prevent accidental breaker turn-off during maintenance.

Figure 5 shows three examples of custom plug-in units, but many combinations exist.

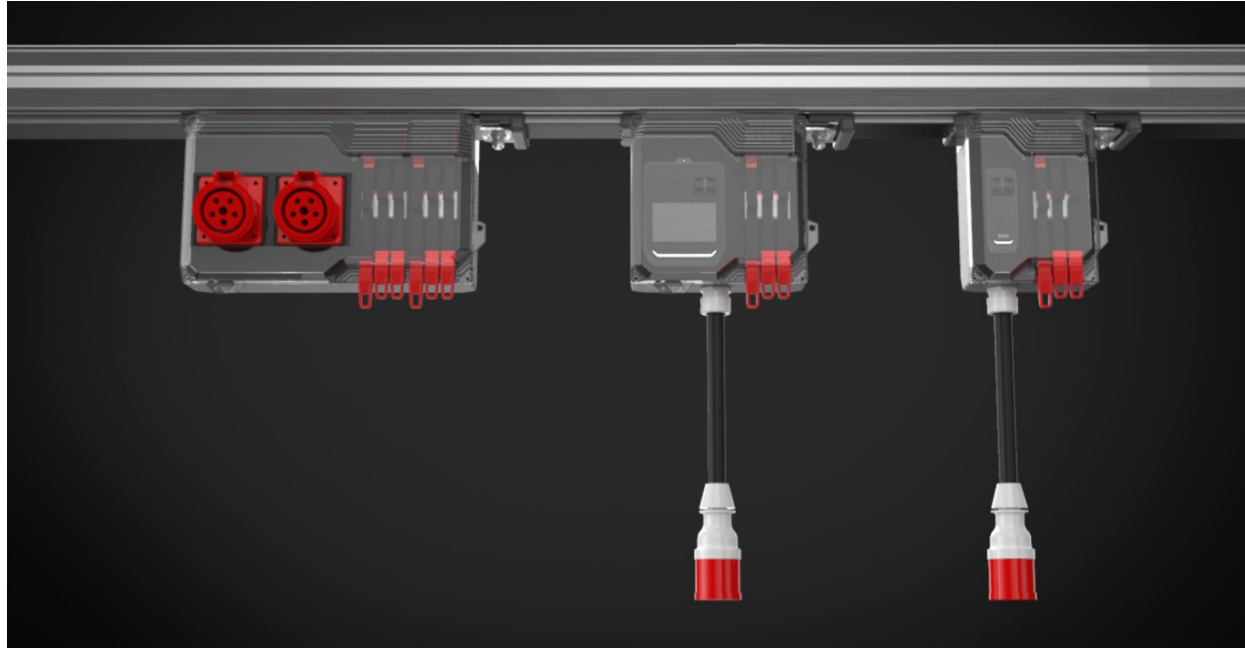


Figure 5.

## BUSWAYS VS. BUSDUCTS

The terms “busway” and “busduct” are often used interchangeably to describe two types of conductor-bar-based power distribution systems.

However, there are significant differences between track busways and busducts that you should understand.

Busducts are enclosed metal ducts that convey copper or aluminum electrical busbars. Like air ducts, busducts are often permanently mounted on or attached to the ceiling or walls. Unfortunately, this gives busducts the same lack of flexibility as a traditional pipe & wire system. If you reconfigure your assembly line or move equipment, you often have to take down the busduct system and move it at great trouble and cost.

Busducts usually provide a limited number of fixed ports as outlets for electrical plugs, limiting the number of machines the busducts can serve. Depending on the layout of your factory floor, you often have to move the machines closer to the busducts, or use long extension cords to connect equipment back to the ports.

As with a traditional pipe & wire system, you have to bring the machines to the power source instead of getting the power source to the equipment.

## ADVANTAGES OF A TRACK BUSWAY SYSTEM

### FLEXIBILITY FOR CHANGE

Since a track busway system is not hard-wired into the ceiling or walls, it gives you the flexibility to make quick changes in the layout of your power distribution system. If you need to reconfigure assembly lines on the factory floor, you can easily reorganize your track busway grid to accommodate the new equipment locations. All you have to do is take down the track busway sections, move them to the new positions, and reconnect the busway sections and plug-in units above the machines they serve. You can often do this in hours or overnight, instead of days or weeks, with little or no production downtime.

### SCALABILITY

A track busway system grows with you. If you need to expand the layout of your assembly lines, you can add additional busway sections to your existing grid to distribute power to the new machines. If you build a new manufacturing facility or add an extra wing, you can easily install a new track busway system to support it.

If you need to scale up power (i.e. for a new machine that requires 40 amps instead of 30 amps), simply replace the old plug-in units with new ones that are designed to support higher power requirements. It only takes a few minutes to swap out plug-in units, and this can be done safely on a live busway.

### EASY INSTALLATION

Track busway systems can be installed up to 90% faster than traditional pipe & wire systems, with far less installation labor. Where installing electrical conduit and wiring may take days or weeks, a track busway system can be installed in just a few hours or overnight.

(If you’re replacing a pipe & wire system with a track busway system, and the assembly lines and workstations are already in place on the factory floor, you may be able to install the track busway systems with little or no downtime to the production environment.)

## LOCALIZED POWER DELIVERY

With track busway systems, all the necessary components in a complete electrical distribution system — breakers, connectors, power outlets, metering, surge protection, etc.— are incorporated into the plug-in units. By installing busway systems and plug-in units directly above your assembly lines and workstations —that is, above or near the machines they feed— you can deploy power throughout your facility and position it at the exact point of use. In other words, you are bringing the power source to the machines instead of trying to wire the equipment back to the power source at a distant panelboard or outlet receptacle.

Track busways can deliver power levels between 40 and 1200 amps and up to 600 VAC or VDC, single-phase or three-phase. (100–225 amp busways are the most common in manufacturing facilities.) Depending on length and power delivery rating, a single busway section can support multiple plug-in units. Also, depending on the number of outlets, a plug-in unit can support multiple power cords. These features allow you to provide power to multiple machines in one location.

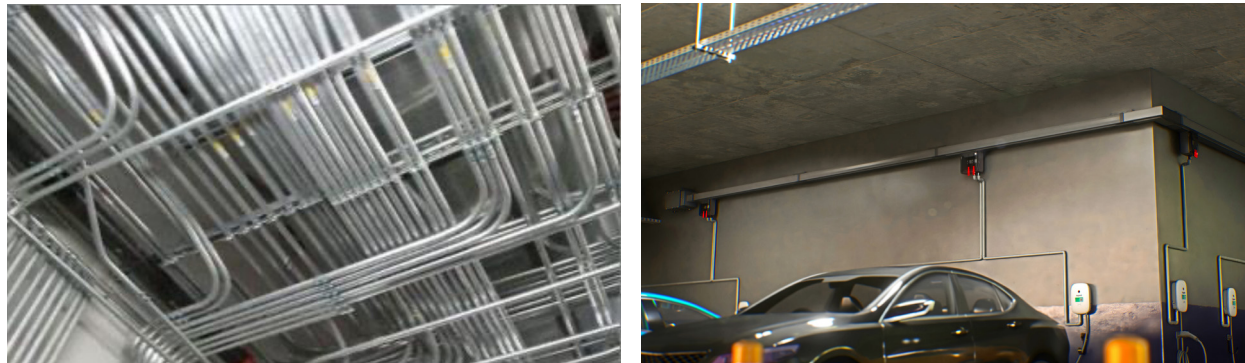


Figure 6. Conventional pipe & wire system (left) vs. track busway power distribution system (right)

## LINEAR DESIGN

Looking at the two photos (Figure 6), you can see the difference in layout design between a conventional pipe & wire system (left) and a track busway power distribution system (right). The simple linear design of track busways is much more organized, making it easier to design, install, maintain, and make changes to the system layout.

## REUSABLE COMPONENTS

Track busway sections and plug-in units are reusable and can be moved from one location to another. Unlike traditional conduit and wiring, when you change your track busway system, you don't have to recycle or discard the old components and start over again.

## EASIER MAINTENANCE AND REPAIR OF EQUIPMENT

A track busway system makes it easier to do maintenance and repair on individual machines on the factory floor since breakers and fuses are located within the plug-in units instead of at a distant panelboard. To turn off equipment, you simply have to flip the corresponding breaker switch on the plug-in unit for the machine you need to service. This cuts power to that one piece of equipment while the other apparatus powered by that plug-in unit remains operational. (This also reduces the chance of accidentally unplugging the wrong machine because you know which devices are served by which plug-in unit breakers.)

If a fuse blows, you can easily remove the plug-in unit from the track busway, replace the fuse, and return the unit to operate. You can switch out the plug-in unit while the track busway is live without cutting power to other plug-in units or machines powered by that busway.

## SAFETY

All track busway systems have built-in safety features. For example, the track busway grid includes a ground path (earthing) system throughout its enclosure. All plug-in units have a grounding feature that connects to the ground path when you insert the unit into the busway's open channel—ensuring that the plug-in unit is grounded before the electrical connection is made to the power busbars.

Additionally, since the plug-in units provide localized power to your machines, you don't need to run power cables and extension cords across the factory floor to plug them into a distant, overloaded receptacle. This eliminates a potential fire hazard and an OSHA violation (i.e., tripping threat) that could result from using these cords.

An IP54 rating means that the busway system is protected against contamination from limited amounts of dust and other particles. Additionally, you can be confident that it will be protected from water sprays from above and parallel (180 degrees). In addition, its all-aluminum busway and end feed enclosures are provided with a highly corrosion-resistant coating to protect it from the environment, ensure it lasts, retain the aesthetic appearance, and maintain proper grounding.

## A FUTURE-PROOF SYSTEM

If your factory floor requires frequent changes, you don't have to worry if your power distribution system will need to be reconfigured six months or a year from now. The flexibility of the track busway system guarantees that you will be able to make quick and inexpensive changes to your power distribution layout to accommodate any future changes in machinery and assembly lines.

## INSTALLATION COST AND TIME SAVINGS WITH TRASK BUSWAY

There are two types of costs that you should look at when comparing pipe & wire vs. track busway systems: (1) Cost of Installation and (2) Total Cost of Ownership (TCO) over the life of the system.

While traditional electrical conduit and wiring systems have a low cost for materials, they result in a high labor cost for installing those materials and maintaining the system over time.

With track busway systems, the opposite is true.

Initially, there is a higher cost for the materials but a much lower labor cost over the system's life cycle. In general, the installation costs for both methods are almost equal.

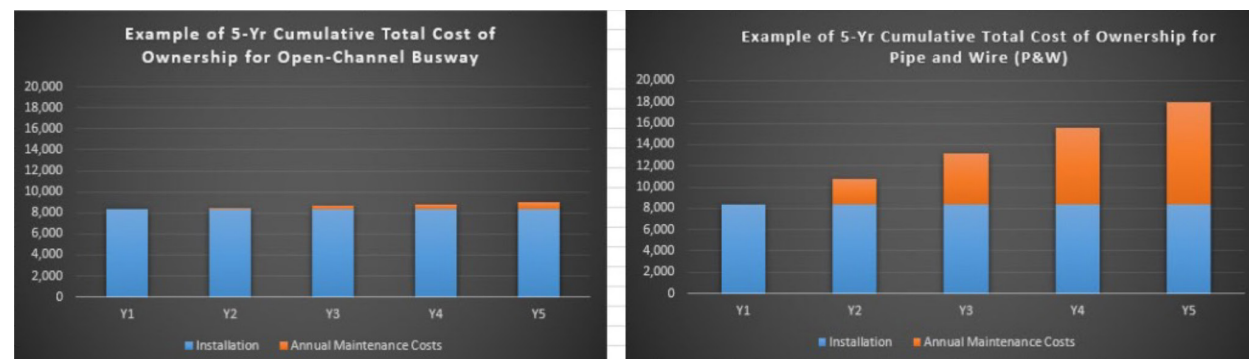


Figure 7. A five-year cumulative TCO comparison between Pipe & Wire vs. Open-Channel Busway

Figure 7 shows a five-year TCO comparison between a traditional pipe & wire system and a track busway system—including the initial cost of a new 100A installation and assumes one circuit relocation per year.

As the graph shows, the TCO of an electrical conduit and wiring system rises steadily over five years, primarily due to labor expenses for relocating circuits. And this graph doesn't consider opportunity costs — or losses due to assembly line downtime while circuit renovations are taking place.

But over that same five-year period, the TCO of the track busway system remains lower than the TCO of the traditional pipe & wire system. The flexibility of the track busway significantly reduces your labor costs, which results in a much lower TCO over time.

## WHAT TO LOOK FOR IN A TRACK BUSWAY SYSTEM

### RELIABILITY

Look for a busway system that has been installed in multiple manufacturing and industrial facilities. It should have an established reputation for reliable and efficient power distribution, a long, useful service life, and a minimal component failure rate. Furthermore, system components should be engineered with features to ensure reliability (i.e. busway sections should be held together with maintenance-free compression-fit joints).

### FLEXIBILITY

A busway system should offer flexible design and power distribution options. It should enable you to build up, scale out, make quick layout changes, and quickly increase power densities according to the changing needs of your manufacturing facility.

### SAFETY

The elements of a busway system should guarantee protection for your employees, your machinery, and your facility. Look for a solution where the track busways are “finger safe”—if a worker accidentally inserts a finger into the open channel, the inside insulation protects them from shock—and where you can safely insert plug-in units while the busway is live. Your track busway solution should have multiple safety certifications, such as UL.

### ROBUSTNESS

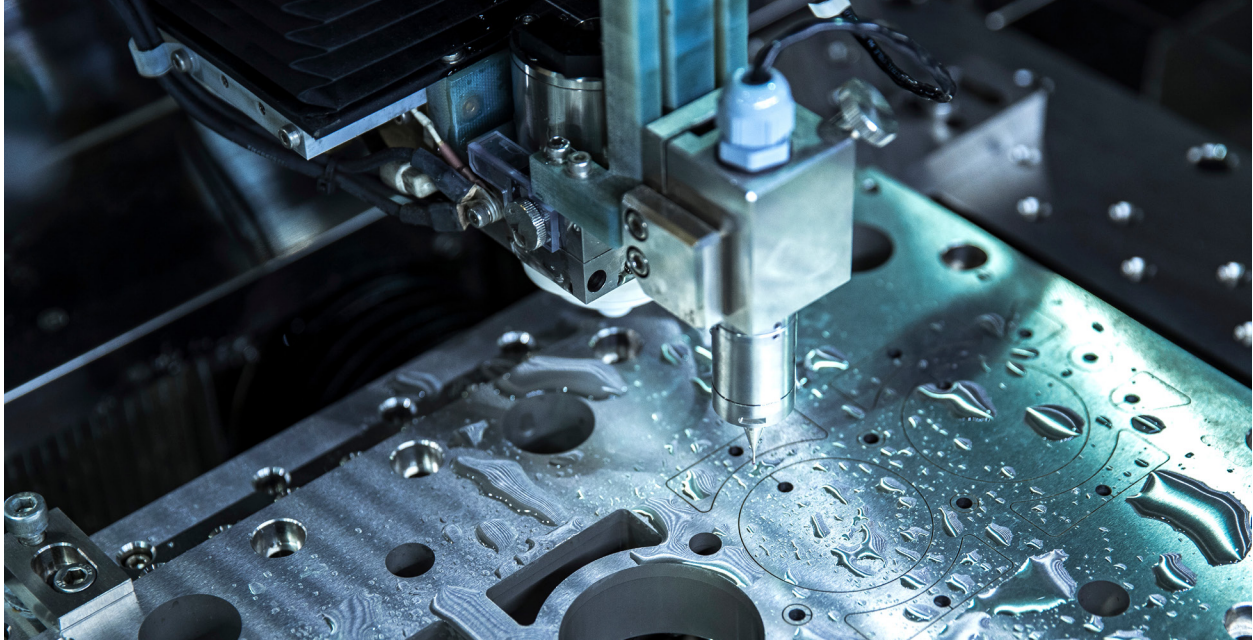
An IP54 rating that allows users to place the system anywhere that additional water, dust, or other containments. The protection level should extend to the plug-in units. These plug-in units should be available in various IEC and NEMA-rated enclosures.

Additionally, it would be best if you looked for a track busway systems provider that offers the following features and services:

**Experience**— Look for a busway solutions provider focusing solely on manufacturing track busway systems. It should be the core of their business, not just one of many electrical products they sell. The provider should have a list of clients, including manufacturing and industrial companies and clients in other industries (government organizations, universities, hospitals, etc.).

**Custom Solutions**— Your provider should be able to engineer and manufacture customized busway products, such as plug-in units that fit the specific power needs of your facility. Also, they should offer custom solutions, such as color-coded components (i.e., outlet receptacles on a plug-in unit are marked with red, blue, and black covers or labels to indicate different voltages).

**Technical Services**— Your solutions provider should offer various technical services, such as on-site installation support, system start-up, meter programming, troubleshooting, and routine maintenance. The provider should also provide 24/7 support from a global team of engineers, technicians, and sales representatives.



## CONCLUSION

A track busway system provides a competitive edge for many applications, allowing you to quickly change power delivery in your production environment with little disruption. If you are reconfiguring machinery, using track busways enables you to return to full productivity with minimal trouble and downtime quickly. If you're scaling up your operations with a new or expanded facility, a track busway system allows you to open that facility faster because the busway system installs up to 90% more quickly. Either way, using track busways helps you to maintain or increase profitability while reducing the long-term costs of your power distribution system. A track busway solution will be an asset that will serve the needs of your manufacturing operations over the long run.