



Industrial Circuit Board Repair – Saving Downtime in Commercial Facilities

Circuit boards lie at the heart of most industrial equipment – from drive controllers to PLCs and instrument panels. When one of these boards fails, **every minute of downtime costs real money**. In fact, **lost production can exceed \$100,000 per hour** in some industries [48] . This is why **industrial circuit board repair** services are crucial for commercial and manufacturing facilities. In this guide, we'll explore how professional board repair works, the challenges involved (like conformal coatings and testing), real-world examples, and best practices to **minimize downtime and cost**. We'll also highlight how Precision Electric's services can help get your systems back up and running quickly.

Common Failures in Industrial Circuit Boards

Industrial circuit boards operate in **harsh conditions** – high heat, electrical stress, vibration, and contamination. Over time, these stresses take a toll on components and solder joints, leading to failures. Some **common failure modes** include:

- **Discrete Component Failures:** Parts like capacitors, resistors, diodes, IC chips, etc., can fail due to **excessive heat, voltage surges, or age**. For example, electrolytic capacitors dry out and their ESR (resistance) rises, causing erratic power issues [16] . Power semiconductors like transistors or IGBTs may short out from over-current events. Often these failures are not visually obvious – a board might look fine but requires meter testing of each suspect part [16] . Replacing these **aged or damaged components** is usually far cheaper than scrapping the entire board [16] .
- **Power Component & Connector Failures:** High-power parts (transformers, rectifiers, MOSFETs) can burn out due to **overloads or end-of-life**. Connectors and terminal strips may loosen from constant heat cycles and vibration, causing arcing and intermittent faults [23] . Technicians will inspect for **burn marks, blown fuses, or loose connections** as clues. Tightening or re-soldering connections and swapping in new power devices often restores function.
- **Trace Damage and Solder Joint Cracks:** Surges (e.g. lightning strikes or short circuits) can **burn open copper traces** on the PCB, cutting off signals [16] . Likewise, mechanical flexing or thermal cycling can crack solder joints. Both issues are sometimes visible (burned trace or a ring crack around a pin) and can be repaired by soldering jumpers or reflowing joints. **Vibration-prone machines** (like heavy presses or vehicles) commonly suffer cracked solder joints that a skilled technician can re-solder under a microscope [17] . Proper **solder rework techniques** (per IPC standards) ensure the repaired joint is robust.
- **Physical Damage:** Sometimes the board is simply **physically damaged** – for instance, a forklift collision or dropping the unit can break a PCB or snap components. Minor physical damage (like a chipped corner or broken connector) is often repairable by splicing in new material or replacing the



connector. However, if a board is **cracked through multiple layers**, it may be beyond repair and require replacement [16] . In general, industrial repair shops will evaluate the extent of damage to advise if a fix is feasible.

Key takeaway: Industrial PCBs usually fail from **component aging, electrical stress, or environmental factors**. The good news is that **most faulty boards are repairable** with the right expertise [16] . A thorough failure analysis by a technician can pinpoint bad components or connections, many of which can be replaced to bring the board back to life. This avoids the high cost and delay of sourcing a brand new board – especially for **obsolete models** that manufacturers no longer support.

The Industrial Board Repair Process

Repairing a complex printed circuit board is a multi-step “surgery” that requires skill, proper tools, and methodical testing [16] . Reputable repair centers follow a structured process:

- 1. Initial Inspection:** The technician begins with a careful **visual inspection** of the board under magnification. They look for **obvious signs of failure** – e.g. burnt components, bulging capacitor tops, charred PCB areas, blown fuses, or corrosion. Any **conformal coating** (protective film) is noted here, since it will need special handling (more on that later). Technicians also identify the board's make/model and check if schematics or documentation are available.
- 2. Component Testing & Diagnosis:** Next comes **electrical testing of suspected components**. Using multimeters, LCR meters, and oscilloscopes, the technician will **check each suspect component in-circuit**. For example, they test semiconductors (diodes, transistors, IGBT modules) with a diode check or curve tracer to find shorts or opens [35] . They measure resistors and coils for correct values, and capacitors for capacitance and ESR. Any part that tests bad or outside tolerance is flagged for replacement. If available, a **schematic or an identical board** can greatly speed this step by guiding the technician on what readings to expect [10] . **Functional tests** may also be done: for instance, powering certain sections of the board with a bench power supply to see if regulators output the right voltages. This diagnostic phase is meticulous – experienced techs know that **99% of problems can be found with a meter and patience** (especially if no schematic is available).
- 3. Component Replacement and Rework:** Once the failure points are identified, the repair tech proceeds to **replace the faulty components**. This could involve desoldering and soldering through-hole parts, or doing delicate **surface-mount rework** for IC chips and capacitors. Advanced shops have tools like **hot-air rework stations, soldering microscopes, and BGA reflow ovens** to handle all package types. For instance, **BGA (ball-grid-array) chips** can be replaced by carefully heating and re-balling as needed [17] . During this phase, **care is taken to follow IPC rework standards** – ensuring solder joints are clean and shiny and no damage is done to PCB pads or traces. Technicians also use proper **ESD (electrostatic discharge) protection** (wrist straps, antistatic mats) throughout the repair to avoid inducing new damage to sensitive chips [26] . In many cases, the repair isn't just a 1:1 swap of the bad part – the tech may also **proactively replace associated components** that are prone to failure. For example, if a shorted transistor is found, they might also replace its driver IC or the gate resistors, to ensure the whole circuit is renewed. **Preventive replacement** of aging parts (like all electrolytic capacitors if one is found bad) is a hallmark of high-quality industrial repairs. This



approach means the **refurbished board can actually outlast a brand new one**, since weak links have been refreshed [48] .

4. **Cleaning and Restoration:** After components are replaced, the board is often **cleaned of flux residue and debris**. Any **broken PCB traces or pads** are repaired at this time – for instance, soldering a small wire jumper to bypass a burnt trace, or using epoxy to rebuild a lifted pad. The repair center may apply **conformal coating touch-ups** if they had to scrape some off for soldering (using a matching coating pen to re-seal the area) [2] . The goal is to leave the board in **like-new condition**, with all repairs neatly done.
5. **Bench Testing:** Here is a critical step – the technician will test the repaired board **as far as possible on the bench**. They power the board up with a suitable supply (often using a variac or current-limited source for safety [35]) and check that **power rails come up to the correct voltages** and nothing is drawing excessive current. If the board has indicator LEDs or a display, they verify it boots up without error codes. In the case of a drive or motor controller board, repair shops often have **test jigs**: for example, Precision Electric's drive repair process includes slowly powering up the drive and even **running a motor with a basic program** once the power section passes checks [35] . The technician will monitor for any abnormal behavior like overheating or erratic signals. **However, it's important to note:** outside of the full system, the testing is inherently limited. Many industrial boards rely on the larger machine or PLC to provide feedback, load, or commands. So the bench test covers only the basics (powering on, no faults, outputs toggling, etc.). We'll discuss this limitation further in the next section.
6. **Quality Checks and Burn-in:** For critical boards, some repair centers perform a **burn-in test**, running the board or drive for several hours in a simulated operation to catch any intermittent issues. They may also do a **thermal imaging scan** to ensure no component is running abnormally hot after the repair. All test results are recorded. Finally, the board is re-inspected and any connectors or moving parts (fans, relays) are double-checked. Many shops have a second technician or a supervisor do a **quality review** before packing the unit. When everything passes, the board is certified ready to return to the customer.

Throughout this process, adherence to **industry standards** is crucial. Reputable facilities follow guidelines like **IPC-7711/7721** for rework/repair and **IPC-A-610** for soldering quality, ensuring that the repaired board meets high reliability criteria. They also maintain **ESD-safe workstations** and calibrate their test instruments regularly [26] . All of this diligence means the repaired board, once reinstalled, should perform as reliably as originally intended – if not better, thanks to refreshed components.

Challenges in Repairing Industrial PCBs

Repairing industrial circuit boards is not always straightforward. There are a few **special challenges** that technicians and customers need to be aware of:

Conformal Coating – A Repair Technician's Nightmare

Many boards used in **harsh or outdoor environments** are coated with a protective varnish called **conformal coating**. This is a thin layer of non-conductive polymer (acrylic, silicone, urethane, etc.) applied



over the entire assembled board to seal out moisture, dust, and corrosion. While conformal coating greatly improves a board's durability in service, it **creates major difficulties for repair**. The coating covers components, solder joints, and test points – exactly the areas a technician needs to access to diagnose and resolder.

In fact, **boards with heavy conformal coating are often considered “non-repairable”** by many shops. Removing the coating without damaging the board can be *extremely* labor-intensive or downright impossible. As one industry expert bluntly put it, *“any board conformal coated is almost unrepairable”* [37] . This is especially true for coatings like **silicone or epoxy**: silicone-based conformal coatings, for example, **are nearly impossible to remove once cured** [39] . Urethane (polyurethane) coatings are also **very difficult to rework** and tend to require aggressive solvents or abrasion to strip, which can harm the PCB [39] .

If a board has a light acrylic coating, a skilled tech **may** be able to scrape or chemically soften a small area to replace a component [2] . There are specialized conformal coating removal techniques – such as localized chemical peelers or micro-abrasive blasting – but these are used only on **high-value boards** where the effort is justified [3] . In most commercial scenarios, the cost and risk of removing a robust coating exceeds the cost of simply replacing the entire board. Therefore, **repair centers often decline jobs for conformal-coated boards** (or at least warn the customer that success is unlikely). It's an unfortunate trade-off: the coating that protected the board in service may seal its fate when it fails.

Bottom line: If your failed board is shiny or has a rubbery clear layer on it, be prepared that it might not be repairable. Always inform the repair provider if a board is conformal coated. And if coating *is* removed for a repair, ensure the shop will **re-apply the proper coating** before returning the board, especially if the equipment will go back into a harsh environment [2] .

Testing Outside the Original System

Another challenge with third-party board repairs is **limited testing capability**. Industrial boards rarely operate stand-alone; they plug into a larger system or machine. For example, a drive control board might need the rest of the drive (power section, sensors, motor load) to truly verify every function. A PLC module might require a PLC rack and program to test its I/O fully. **Repair shops generally do not have the entire machine or system** to connect the board to – especially for proprietary or very large equipment. This means after repair, the board can only be partially tested in isolation.

Professional repair technicians mitigate this as much as possible. They will test all **sub-circuits** that they can: power supplies, analog outputs with dummy loads, communications ports with loopback tools, etc. For instance, if repairing a drive board, the shop may have a generic motor to hook up and ensure the drive can power it at least in open-loop mode [35] . They might use a PLC simulator to check that a PLC output card's channels turn on/off. But these tests may not catch every scenario that could occur in the real machine.

As a result, **there are cases where a repaired board works fine on the bench but exhibits an issue once installed in the actual equipment**. Perhaps a particular input reading wasn't tested, or a high-load condition causes a component to overheat only in the machine. When this happens, it's not necessarily due to a “bad repair” – it's simply the limitation of not being able to do a full functional test without the original system. Industrial repair providers acknowledge this and typically offer warranty support for such situations.



Repeated Repair Attempts: It's not uncommon that a board might need to be sent back for additional repairs if an underlying problem surfaces later in operation. For example, the tech may have fixed a obviously fried section of the board, but after installation an unrelated sensor circuit on the board also proves faulty. Without the full system, that sensor circuit issue wasn't detectable in the lab. The best approach is to treat the first repair as the major overhaul, then handle any minor follow-up issues promptly under warranty.

To minimize surprises, good repair centers will communicate with the customer about what **functions could not be fully simulated** during testing. They may also ask for details on the failure symptoms observed in the machine, to help target specific areas during repair. Whenever possible, **providing the mated components** (e.g. the whole drive, not just the control board) can allow a more complete test. Precision Electric, for instance, can test many drives under load if the entire unit is sent in, or may use compatible test harnesses for common brands. But for a one-of-a-kind controller, the ultimate test will be in the actual equipment.

In summary, **lack of full-system testing is an inherent risk** in board-level repair. Customers should plan for a cautious startup when re-installing the repaired board – have a technician on standby and monitor the machine closely. The upside is that reputable repair firms **back their work with warranties**, so if further issues are found, they will continue troubleshooting at no extra cost.

Obsolete Parts and Documentation

Industrial electronics can stay in service for decades, which means a failed board might contain **obsolete components**. Repair techs sometimes encounter **integrated circuits that are long out of production**, or custom ASICs made only for that OEM. Sourcing replacements can be tricky – it may involve finding “new old stock” or salvaging from a donor board. In worst cases, a particular chip (like a proprietary microcontroller) can't be obtained, making the repair unfeasible. However, many industrial boards are built from relatively standard components (op amps, regulators, logic gates) that have modern equivalents. Experienced repair firms maintain a large inventory of **legacy parts** and can often substitute parts that meet the same specifications.

Likewise, the **lack of schematics** is a challenge – manufacturers rarely release circuit diagrams. Technicians thus rely on experience and reverse-engineering skills. They might trace out part of the circuit by hand to understand it, or compare with a similar board. Fortunately, the **circuit functions in industrial boards are often known** (power supply section, input sensing section, processor section, etc.), so a skilled tech can deduce what should be happening even without official documentation. Still, repairs on very old or obscure boards may take extra time due to this detective work.

Ensuring Quality and Safety

Once a board is fixed and passes basic tests, it's important that it **meets safety and performance standards** when put back in service. Industrial equipment often has to comply with standards for electrical safety, electromagnetic interference, etc. A repair shop must be mindful not to compromise these compliance aspects. For example, if they replace a component, it should be of equal or higher voltage/current rating. If they repair isolation barriers (opto-couplers, isolation slots in the PCB), those must preserve the required **creepage distances** and insulation integrity (per standards like **IEC 61800-5-1 for drives** [48]).



Professional centers will often test the **high-voltage isolation** after repair and use OEM or authorized replacement parts when safety is involved. Following **IPC-A-610 class 2 or 3 workmanship** ensures the solder joints and rework won't cause reliability issues. Also, maintaining **ESD protection and cleanliness** avoids latent damage that could show up later [26] . These quality steps may be invisible, but they significantly reduce the chance of a repaired board failing prematurely or causing a hazard. Always choose a repair provider that emphasizes **quality controls, standards compliance, and warranty** on their work.

Real-World Example: Repair vs Replacement in Action

Consider a real-world scenario: A manufacturing plant's **packaging line** went down when the **control board of an ABB variable frequency drive (VFD)** failed. This drive controlled a conveyor critical to production. The OEM quoted a **6-week lead time** for a new replacement board (since the model was older), which would result in catastrophic downtime. Instead, the maintenance team sent the board to an **independent repair center**.

- **Initial state:** The drive showed a blank display and would not run, indicating the control board wasn't functioning. Every hour of that conveyor downtime was costing the company an estimated \ \$5,000 in lost output.
- **Repair process:** The repair center's technicians quickly identified a blown power regulator and two bad capacitors on the board. They also noticed heat stress on some other components. They replaced all these parts, cleaned the board, and tested it. Within **3 days**, the board was repaired and shipped back, far faster than waiting for new.
- **Outcome:** Once reinstalled, the drive powered up normally and the conveyor was back online. In total, the plant endured 4 days of downtime (including shipping time) instead of 42 days. **Production resumed** much sooner, preventing an estimated \ \$200,000+ in losses (vs. the longer outage). The repair cost was about \ \$1,200, whereas a new board plus rush shipping was quoted over \ \$7,000. In this case, board repair saved roughly **80% of the cost** and dramatically reduced downtime.

This example illustrates the typical **value proposition of circuit board repair: significant cost savings and faster turnaround**. Industry analyses back this up – according to the Reverse Logistics Association, repairing electronic components (including PCBs) can save **up to 50% of the cost** compared to buying new replacements [26] . Some case studies even report **83% cost savings** by fixing a board at component level rather than replacing it [19] . Of course, results vary by situation, but it's clear that the economics often favor repair, especially when the alternative is an extended production outage or an expensive equipment upgrade.

Additionally, the repaired board in this example had **preventive maintenance** done as part of the service: all aging capacitors were renewed and weak relays replaced. This means the board likely has an extended life ahead. In fact, repaired boards can **outlast fresh ones**, because technicians address the known wear-out components during the refurbishment [48] . By contrast, a brand-new board of the same design would have the same original capacitors and might fail in the same way a year down the line. Thus, a thoughtful repair can **improve reliability** going forward.



Benefits of Professional PCB Repair (vs OEM Replacement)

To summarize, here are the key **benefits of using a professional industrial PCB repair service** for your facility's needs:

- **Dramatic Cost Savings:** Repairing a board at component level is usually far cheaper than buying a whole new board or equipment. You're paying only for the parts replaced and the labor, not the entire assembly. Companies routinely save **50% or more** by opting to repair electronics instead of replacing them [26] . Why scrap a \ \$5000 board if a \ \$500 repair brings it back to life?
- **Minimized Downtime:** Time is money, and independent repair shops often turn things around faster than OEM channels. Many third-party repair centers offer **expedited service** – some can diagnose and fix common issues within days. For example, certain drive repair specialists advertise 48-hour turnarounds on urgent jobs [48] . Even when a repair takes a week, that can be much faster than waiting 6-8 weeks for an OEM to deliver an obsolete replacement. **Every hour saved in downtime is production earned.** Also, using a repaired board means you avoid reprogramming a new board or re-integrating a new system – often you can just slot it in and go.
- **Support for Obsolete or Multi-Brand Equipment:** OEMs are focused on selling new products and often discontinue support for older models. A great advantage of independent repair providers is that they **service a wide range of manufacturers and vintages**. They can work on boards from **ABB, Siemens, Allen-Bradley, Hitachi, Eaton, Lenze, Yaskawa, Fanuc, GE** and many others – even if the OEM says “no longer supported.” In fact, third-party technicians pride themselves on keeping legacy systems running. As an example, **Lenze 8200 vector drives** were discontinued years ago, yet repair techs still rebuild them with equivalent modern components [48] . Similarly, a good repair shop can troubleshoot a Yaskawa or Hitachi drive board when the OEM would simply upsell you to a new series [48] . This capability to **extend the life of older equipment** is invaluable for plants trying to avoid a costly full system upgrade.
- **Component-Level Improvements:** Repair isn't just patching the single failure; it often involves a comprehensive refurbishment. Technicians will **replace not only the failed part but also other aging components** (capacitors, fans, relays, etc.) while the board is apart [48] . They may also apply any factory design mods or **firmware updates** if available. The result is a board that has fresh life and possibly **enhanced reliability**. It's like giving your machine a rebirth – without changing any settings or processes, since it's the same board back in place.
- **Preservation of Setup and Compatibility:** Using the original board (repaired) means you don't have to worry about **software compatibility or calibration** differences that sometimes come with new hardware. Any custom firmware or parameters on the board can often be preserved. For instance, many drives store calibration data on the control board; a repair will keep that intact, whereas a new board might need reprogramming. This avoids the risk of new integration bugs. Essentially, repair **fixes the hardware but keeps the brain** of your system consistent.
- **Environmentally Responsible:** There is also a sustainability angle – repairing electronics reduces electronic waste. Rather than tossing a faulty board into scrap (and ultimately a landfill), repair returns it to service. This lowers the environmental footprint of your operations. A **sustainability-**



minded facility can cite board repair as part of their green initiatives, aligning with circular economy practices. (One repair provider's study noted how their PCB repair services help **reduce e-waste** while saving costs [17] .)

Of course, there are cases where replacement makes sense – if a board is **burnt beyond repair or there are safety upgrades** in newer hardware, the OEM route might be the better option. But in the vast majority of everyday failures, a capable repair service can get you up and running faster and cheaper. The key is to **choose the right repair partner** with the experience, tools and integrity to do the job right.

Best Practices for Industrial Board Repair and Maintenance

To maximize success with circuit board repairs, keep these best practices in mind:

1. Keep Spare Boards or Units: For any critical equipment, always try to keep a **spare circuit board or spare drive** on hand if possible [12] . That way, if one fails, you can swap in the spare immediately to restore production. The failed one can then be sent for repair without time pressure. Once it's repaired, that board becomes your new spare. This rotation strategy ensures you aren't waiting for a repair while the line is down. As Precision Electric recommends, always maintain spares for crucial production lines to achieve *"little to zero downtime."* [12]

2. Use Qualified Repair Services: Do your homework on the repair provider. Look for those with **decades of experience and a track record** in industrial electronics. A reputable shop will have certified technicians familiar with boards from **plc controllers to AC drives to servo amplifiers**. They should also have proper equipment (oscilloscopes, simulators, rework stations) and follow standards (IPC, ESD, ISO, etc.) [26] . Don't be afraid to ask if they perform the repairs in-house or outsource – some companies that advertise PCB repair actually send the work to third parties [13] . Dealing directly with the **actual repair lab** can improve communication and turn-around. Precision Electric, for example, highlights that they perform PCB repairs in-house with an experienced team and back every job with an in-service warranty [13] .

3. Communicate Symptoms and History: When sending in a board, provide as much detail as possible about **what happened and how the board was behaving**. Did it blow a fuse? Was there smoke? Did only one channel fail while others worked? The more info the technicians have, the faster they can pinpoint the issue. Also share any **maintenance history** – e.g., if the board was repaired before or if the equipment was moved (which could jar connections). This can give clues (for instance, repeated failures might indicate an underlying cause like a bad motor drawing excessive current and frying the drive each time). A good repair service will also reach out with questions if needed – treat it as a collaboration to solve the problem.

4. Plan for a Thorough Repair (not just a patch): Encourage the repair shop to **fully refurbish the board**, not only address the one failed part. Most will do this anyway, as it's in their interest to avoid comebacks. But it's worth mentioning that you want any weak components changed. For example, if one capacitor blew, you'd likely want all similar-aged capacitors replaced on that board. This might add a small cost but pays off in reliability. Quality-focused shops routinely *"replace ageing capacitors, fans and relays during refurbishment"* as part of their process [48] . This ensures the board isn't a ticking time bomb with another old part ready to fail. Essentially, you get a **reconditioned board** with a fresh life.



5. Verify and Reinstall Carefully: When you receive the repaired board, take care in installation. Verify that the board matches the original (same settings or jumper positions, etc.). Follow ESD precautions when handling it. If applicable, back up any configurations *before* powering up – though ideally the repair shop preserved all data. Power up the machine slowly if possible, and watch for any error codes or abnormal behavior. It can be useful to have a scope or thermal camera on hand to monitor during the first trial. In the rare case something isn't right, **stop and contact the repair provider** – don't force the equipment to run if it's showing faults. Most providers will instruct to return the board under warranty rather than risk damage. That said, a properly repaired and tested board will usually slide into the system and function perfectly on day one.

6. Address Root Causes: Lastly, think about **why the board failed** and address any root causes in the system. Was it due to **over-voltage spikes**? Consider improving surge suppression or adding line reactors [48] . Was it **overheating**? Check cooling fans and air filters on your equipment. Perhaps the failure was due to age – if so, plan to refurbish similar boards preemptively. Repairing the board fixes the symptom; fixing the underlying cause ensures longevity. Many repair services will offer insights – for example, if they find tons of dust inside a drive or evidence of voltage transients, they'll mention it. Take those recommendations seriously to avoid repeat incidents.

By following these practices, you'll get the maximum value out of industrial circuit board repairs and keep your operations running smoothly.

Precision Electric's Repair Services and How to Get Started

Precision Electric, Inc. is a leading provider of **industrial electronics repair** with over 30 years of experience [12] . We specialize in **commercial and industrial circuit board repair**, servicing equipment from a wide range of manufacturers – **Siemens, Allen-Bradley, ABB, Hitachi, Yaskawa, Eaton, Lenze, Fanuc, GE** and many more [12] [48] . Whether it's a drive control board, a PLC module, an HMI display, or a power supply board, our skilled technicians have likely seen it and fixed it before.

What sets our service apart? For one, **all repairs are done in-house by our expert team** (we are not a middleman) [13] . Our facility in Mishawaka, IN is equipped with advanced diagnostic and testing equipment. We perform thorough component-level repairs and **full functional testing** on all units we receive. In cases where we cannot fully simulate your system, we use our extensive knowledge to test every possible aspect and will communicate any limitations.

Precision Electric stands by the quality of our work with a **12-Month In-Service Warranty** on every repair [12] [35] . "In-service" means the warranty period **does not even start until you install the board back into operation** [13] . This way, if you keep the repaired board as a spare on the shelf for a while, you still get a full year of coverage from the time it's actually put to use. This warranty covers the entire repaired unit, giving you peace of mind that we will resolve any related issue should one arise.

We also recognize that when a critical machine is down, speed is vital. **Fast turnaround** is a top priority – in emergencies we offer rush service to get you back online as quickly as possible. Our **repair process** is streamlined from receiving the item, through evaluation, quoting, repair, test, and return shipment. Most standard repairs are completed in days, not weeks. And because we stock a large inventory of common



components (IGBTs, capacitors, resistors, chips, etc.), we can replace parts without waiting for long supplier lead times.

Real-world success: We have helped countless clients save money and avoid downtime. For example, Precision Electric has repaired Eaton SVX9000 drive boards that the OEM had deemed “not repairable,” extending the life of expensive compressor systems [34] . We’ve serviced Yaskawa servo drives that restored production for customers who were facing costly replacements [23] . Our technicians have even performed **on-site PCB repairs** in a pinch, when sending the equipment in was not feasible, saving customers thousands in avoided downtime [13] . This depth of experience across industries – automotive, food processing, packaging, energy, you name it – means we’re prepared to tackle your toughest electronic problems.

Getting started is easy: We offer **free evaluation and quotes** on repairs. You can simply fill out our online repair request form to **generate a packing slip instantly** [48] . This packing slip provides shipping instructions to send your circuit board or device to our facility. **There is no upfront cost** – we will evaluate the item and then provide you a no-obligation quote for the repair. If you decide not to proceed, we can return the item to you. In most cases, however, once you see the quote versus the cost of new, the decision is straightforward.

☞ **Ready to request a repair?** [Fill out Precision Electric’s repair form to print a free packing slip](#). Send your item in and our team will take it from there. We’ll diagnose the issue, contact you with a quote (usually within 24-48 hours of receiving the item), and upon approval, complete the repair promptly. Before you know it, your repaired board will be on its way back to you, backed by our one-year warranty.

Don’t let a failed circuit board bring your production to a halt. With professional repair services, even complex industrial electronics can be restored to full function – **saving you time, money, and the headaches of long downtime**. Precision Electric is here to partner with you in keeping your operations running efficiently. **Industrial circuit board repair** is not just about fixing electronics; it’s about supporting your business continuity and success.

Feel free to **contact Precision Electric** for any questions about our repair capabilities or to discuss a specific issue. We are passionate about what we do and always happy to guide you to the best solution – be it repair or replacement – for your situation. With the right expertise just a phone call or form submission away, you can turn that problematic circuit board from a liability back into a productive asset.

References (for Further Reading):

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- Precision Electric, Inc., *Circuit Board Repair* – Company Blog (Describes advantages of third-party repair and list of supported manufacturers) [12] .
- Precision Electric, Inc., *PCB Repair Service* – Company Blog (Highlights in-house repair expertise and warranty practices) [13] .
- Precision Electric, Inc., *VFD Repair Services – Cut Downtime & Save Costs* – Company Blog (Provides insight on repair vs replace decisions, standards, and multi-brand support) [48] .



- Precision Electric, Inc., *Yaskawa Servo Drive Repair* – Company Blog (Example of repair process for servo drives and importance of connections and testing) 【23】 .
 - Renova Technology Blog, *Boosting PCB Repair Demand: Cost-Effective Solutions...* (Industry report noting 50% cost savings from PCB repair and importance of standards IPC-A-610, ESD) 【26】 .
 - ACS Industrial Blog, *Top Four Reasons for Circuit Board Failure* (Explains common failure causes like component stress, aging, etc., and cost benefits of replacing worn components) 【16】 .
 - **Forum** – Northern Arizona Wind & Sun, *Applying Conformal Coating* (Discussion confirming conformal-coated boards are “almost unrepairable” due to rework difficulty) 【37】 .
 - Titoma Inc., *Conformal Coating: Pros & Cons of 7 Methods* (Technical overview of coating types; notes that silicone and polyurethane coatings are very difficult to remove or repair) 【39】 .
 - EC&M Magazine, *Circuit Boards: Repair or Replace?* (Article discussing when board-level repair makes sense, including an example of 83% cost savings) 【19】 .
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