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Repairs and Maintenance

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GIVE KITCHEN TECHNOLOGY A NEW LIFE

Rebuilding food equipment electronics is both sustainable and smart

Today, commercial kitchens are full of electronic circuit boards and controllers. Everything contains electronics, from timers and deep fryers to ovens, grills, coffee makers, food warmers, ice cream machines, frozen fry dispensers, panini presses, proofers and toasters. In fact, the kitchen in a typical quick-service restaurant has, on average, about 65 circuit boards. In many cases, the circuit boards are among the most expensive parts to replace in commercial food equipment.

Commercial food equipment is usually maintained and serviced by technicians who work for the restaurant or, more likely, for an independent service company. These techs are experts at diagnosing equipment problems and identifying defective mechanical or electromechanical parts or electronic circuit boards to replace. Their aim is to get the equipment up and running as quickly as possible and minimize down time.

Few independent service companies or in-house technicians have component-level circuit board repair capabilities. Professional circuit board repair requires significant capital investment and trained, experienced board repair technicians. Fortunately, restaurant facility managers do not have to be concerned about this, as there are companies that provide circuit board repair services to the industry.

Professionally rebuilt and repaired electronics can extend the life and improve the reliability of commercial food equipment without compromising its integrity. Rebuilding or repairing printed circuit boards (PCBs), controllers and computers offers an opportunity for significant cost savings and increased equipment life, and it is very environmentally friendly.

The Lifecycle of Electronics

The lifecycle of electronics can easily be visualized using a graphic called "The Bathtub Curve." It shows the hypothetical relative failure rate of electronics versus time. There are three distinct phases in the life of an electronics circuit board.

The first phase is called the "Infant Mortality Phase." This is the period early in the circuit board's life when electronics, such as capacitors, semiconductors and other components, experience higher failure rates due to manufacturing or material defects. This phase starts when a circuit board is first powered up and generally is of short duration. During the Infant Mortality Phase, failures are normally covered under warranty by the manufacturer. If a circuit board has been operating in the field for a while, it has probably already passed the Infant Mortality Phase.

The second phase is referred to as the "Normal (Useful) Life," and it runs from the end of the Infant Mortality Phase to the "End of Life Phase." The Normal (Useful) Life Phase is the period with the lowest failure rate and is the longest of the three phases. Your goal during the Normal (Useful) Life Phase should be to keep the commercial food equipment reliable and operating as intended. During most of this phase, the electronics in commercial food equipment are not covered by the manufacturer's warranty.

Repairing or rebuilding electronics during the Normal (Useful) Life Phase increases the life of the commercial food equipment, reduces capital equipment and replacement part expenses and maintains product consistency. These cost savings go directly to your bottom line.

At some point, whether 10 or 15 years out, a piece of equipment will reach End of Life. It has paid for itself, but mechanical and electronic parts are wearing out, reliability and availability have decreased, and it is time to move on to newer technology and replace worn-out equipment. This is the "End of Life Phase."

The Repair Process

Testing and Diagnosis

The engineers in a professional repair company must understand what the commercial food equipment does and how it works. This knowledge is essential when designing a functional test for the circuit board. Proper functional testing exercises the circuit board as if it were operating in the commercial food equipment. The circuit board should be functionally tested with loads identical to those in the commercial food equipment. Testing under high-temperature conditions is sometimes necessary to find intermittent failures.

Repair/Rebuild Procedure

When the defect in the circuit board is determined, the defective part or parts are unsoldered and removed to be replaced with new parts. Additionally, for a professional repair, components such as batteries and electrolytic capacitors are also replaced, as these are the components most likely to fail along with any obviously distressed components. A rebuild of this magnitude considerably extends the effective service life of the circuit board.

Cosmetic and Moisture Protection

After the defective parts and other likely-to-fail parts are replaced, the board is functionally tested again to make sure everything works properly. The next step is to conformal coat the circuit board. Conformal coating is a clear sealant that is applied to the board to protect the components from moisture in the operating environment of commercial food equipment. A professional repair company always conformal coats the circuit board after repair.

Controllers used in fryers, ovens, timers and other equipment often have a plastic overlay that fits over the control buttons on the circuit board. Sometimes, the switches are built into the overlay; these are called membrane switches. These panels can be worn from use and soiled from oil and other contaminants. A professional repair includes replacing the overlay and the membrane switches.

Environment, Processes and Equipment for Professional Repair

ISO Certification of a facility ensures that processes and procedures for all repairs and rebuilds are carried out in the same way each time. All processes, repairs, functional tests and shipping procedures are controlled and maintained by a quality manager. ISO 9000 Certification is the hallmark of a professional repair facility.

An Electrostatic Discharge (ESD) controlled environment is essential in maintaining the highest-quality electronic repairs. Some electronic components are highly susceptible to static discharge damage. Proper calibration of all equipment used for repairing electronics is also essential. Oscilloscopes, multi-meters and all custom engineered/ fabricated functional testers must be calibrated on a regular basis to ensure proper function and accuracy.

A professional repair company should be capable of performing repairs on RoHS circuit boards. RoHS, also known as lead-free, stands for Restriction of Hazardous Substances. This means that the circuit board does not contain lead, cadmium or other banned substances. RoHS parts replacement requires special soldering equipment and higher temperatures, and must be segregated from the regular leadbased replacement stations. RoHS repairs ensure that circuit boards remain RoHS compliant.

The Sustainability Impact

Approximately 70 percent of the toxic materials in a landfill comes from electronics, according to Global Futures Foundation. Electronic waste (e-waste) is only a very small percentage of the volume of material in the landfill, but the truly toxic materials with long-term consequences, such as lead, mercury, cadmium and arsenic, largely

come from the electronics.

The environmental benefits of repairing circuit boards and controllers are obvious. Rebuilding/repairing electronics greatly reduces the risk of defective circuit boards and controllers from being sent to a landfill. It prevents the harmful toxic materials from contaminating our soil, animals and water sources. In 2014 there were about 635,000 QSRs in the United States. If each restaurant replaced just three circuit boards per year, it would represent about 1.9 million potential sources of landfill contamination.

Some circuit boards are disposed of properly, but many are not. Repairing and rebuilding circuit boards not only prevents landfill contamination, but also avoids the manufacturing process required to make new circuit boards.

Consider Downtime

Down time is expensive and problematic. The goal is always to get equipment back up and running and generating revenue as quickly as possible. When the problem is a defective circuit board, the fix is to replace it with a new one.

Sometimes the technician has a replacement circuit board on hand, and the defective circuit board can be replaced immediately. In other cases, a replacement circuit board must be ordered for overnight delivery. In this instance, the equipment is down for an additional day, or longer, if the replacement board is out of stock.

Professional repair companies are aware of the importance of minimizing downtime. Some can expedite repairs and even provide same-day turnaround service. Same-day repair allows the equipment to be up and running on the third day. When replacement circuit boards are obsolete and no longer available from the manufacturer, this is often the only way to get the equipment back up and running.

Most professional circuit board repair providers also offer advanced exchange. In this instance, the repair provider will have a rebuilt circuit board on the shelf, ready to be sent out. When the field tech needs a replacement circuit board, he or she contacts the repair provider, and a rebuilt board is shipped overnight. The tech uses the same box and a return label provided by the repair provider to ship the defective board back for repair.

How to Find Repair Providers

While there are many companies that repair electronics, there are only a few that specialize in the repair of commercial food equipment circuit boards.

The best place to locate one is on RFMA Marketplace on the RFMA website: <http://restaurantfacilitymarketplace.com/>. Search for keywords such as circuit board repair, frymaster repair, Hobart repair, timer repair or controller repair.

Get Started

Getting started is simple. Repairing circuit boards for half the cost of buying new ones is a business activity that realizes payback the same day. To get started:

- (1) Identify a professional circuit board repair company that specializes in commercial food equipment electronics.
- (2) The next time a circuit board fails, ask your service technician not to trash the defective circuit board, but to send it to the professional repair facility for repair/rebuild. If you need it immediately, ask for same-day service or advanced exchange.
- (3) When the repaired board is received, install it in the down equipment, or keep it on the shelf for the next time a replacement is needed.

Commercial kitchens are harsh environments for electronic circuit boards. This equipment must be kept functioning properly and consistently to reduce waste, downtime and produce quality products for the customers.

The benefits of professionally repairing or rebuilding electronics in commercial food equipment are straightforward: reduced costs, increased equipment life and improved reliability. In addition, many QSRs have instituted green and sustainability goals to reduce their impact on the environment. While decisions are not totally based on environmental considerations, it is a plus that repairing/rebuilding circuit boards can not only reduce costs, but also reduce a company's environmental impact.

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