Tyco Electronics

PLASTIC MOLD CLEANING CASE STUDY
CLEAN MOLDS WHEN THEY ARE HOT, WHILE IMPROVING EFFICIENCY AND INCREASING PRODUCTIVITY

COMPANY
Tyco Electronics

APPLICATION
Cleaning injection molds, injection blow molds and injection stretch blow molds

COLD JET SYSTEM
i3 MicroClean®

BENEFITS
To clean one long-run machine mold:
• Cleaning time reduced from 6-12 hours to one hour
• Cleaning crew reduced from multiple people to a single person

Eliminates traditionally abrasive cleaning methods and the need to disassemble and move large pieces of equipment. Also enhances worker safety by eliminating the need to use harmful chemicals and work closely with hot equipment.

Tyco Electronics established an investment return hurdle rate of 18-months and saw benefits immediately as the system paid for itself in just over one month. It is now able to clean its 10 largest, most frequently used molds while they are still hot, improving the efficiency of the plants’ cleaning process and increasing productivity.

THE SITUATION
Keeping mold cavities clean is a major concern for molded metal, rubber and plastic product manufacturers in maintaining today’s high quality standards and ensuring maximum productivity. The build-up of unwanted surface residues from either the product mix itself, mold releases or the labeling process can create a number of problems, ranging from product release (“knock out”) to inferior product quality and possible damage to tools from overpacking and straining.

Today, most injection molding companies still clean their equipment by hand, opting to maintain their molds with wire brushes and wire wheels, sandpaper and chemical cleaners. These methods are time prohibitive and dangerous to employees because they require employees to work in close proximity to hot metal surfaces and with potentially harmful solvents.

Other companies have tried abrasive media blasting such as sand, beads and Teflon. These methods can be messy and have a significant impact on production time. Sand blasting, for example, requires cleaning crews to remove the hot molds from the mold presses and transport the equipment to a completely contained area in order to reduce the chance that the blasted sand will get into any of the other machine parts. Once cleaned, the molds need to be recoated, reassembled in the presses and reheated before production can be restarted. For some cleaning projects, this process can take a cleaning crew an entire work shift or longer to complete.

In addition to impacting production and being time prohibitive, sand blasting is an abrasive process that can dull molds and wear down equipment over time. Molds are perhaps the most important and expensive investments that molded metal, rubber and plastics manufacturers make in their business. Reducing any risk of damage to the equipment is critical to ensuring the quality of the end product, as well as protecting and prolonging the life of their investments.
Each of these conventional methods impact the bottom line by reducing production time and increasing maintenance costs— including labor, materials and secondary waste disposal.

For Tyco Electronics, the world’s largest supplier of passive electronic components for the automotive industry, conventional cleaning processes for its injection molding equipment were cutting into vital production time.

“Our conventional cleaning process was in some cases simply taking too much time and requiring too much effort,” said Jan Schotte, Process Technology – Plastics, Tyco Electronics Belgium EC N.V., Global Automotive Division. “The molds are vital to our business, and the fact that we had to remove them and transport them around the plant places them at risk of being damaged. To protect the molds and improve our productivity, we recognized that we needed a better cleaning solution.”

One particular Tyco Electronics plant in Belgium, for instance, which manufactures automotive connectors for air bags and other safety component has more than 300 molds, 10 of which are used on Tyco Electronics’ heavy duty, long run machines. The long run machine molds are used to make three to four products that range in size from 1 cm to 15 cm and weigh approximately 5 to 200 grams.

During production, these molds must be cleaned once every 48 hours. Plastic material builds upon the molds during manufacturing and can cause blemishes on the parts, making the molds dirty and blocking the molds’ small vents. When the vents are clogged, the material cannot outgas, which results in burn marks on the molded parts.

To clean the molds, Tyco Electronics has tried a number of cleaning methods, including ultrasonic, Teflon blasting, solvents and hand scraping. While these processes helped to remove the plastic build-up, they were very time consuming. The methods presented risks to both equipment and people, and required long periods of production stoppage.

THE PROBLEM

Following the lean evaluation, Tyco Electronics was introduced to Cold Jet’s i³ MicroClean® system, a lightweight, compact, single-hose, low pressure, cleaning system that features Cold Jet’s patented shaved dry ice technology. The system uses a dry ice block with as little as 12 cfm and blasts at variable air pressures from 20 to 125 psi. The combination of noise restrictions, as well as the size of the small cavities in Tyco Electronics’ molds made the MicroClean patented shaved ice system an ideal solution for the parts manufacturer.

“Our focus on lean manufacturing and the Cold Jet machine’s capability of improving total production process was one of the main reasons that dry ice cleaning captured our attention,” said Schotte. “In addition to cleaning our molds faster and more frequently, we no longer need a team of people to help us disassemble, clean and reassemble molding equipment.”
enabling it to be used to clean equipment while it is still hot, eliminating timely cool-down and reheating periods. Dry ice cleaning is also non-abrasive and will not damage or dull molds. Cleaning with Cold Jet’s MicroClean system reduces risks to equipment and people associated with pre- and post-cleaning processes because it eliminates the need to disassemble or move hot equipment.

Cold Jet’s MicroClean system uses recycled carbon dioxide (CO₂), in the form of solid dry ice particles that are accelerated through high-velocity nozzles to impinge upon the surface being cleaned. The combination of the kinetic energy and thermal gradient effects of the dry ice breaks the bond between the residue and the surface. The residue falls away from the surface and is easily disposed of. The dry ice particles sublime on impact, eliminating the added cost and inconvenience of secondary waste treatment and disposal, as well as any downstream contamination.

Cold Jet dry ice cleaning systems can clean entire injection mold cavities completely and effectively in a fraction of the time as conventional methods. In fact, leading metal, rubber and plastic molding product manufacturers have discovered that dry ice systems cut their daily mold cleaning time by as much as 80% simply by cleaning molds hot and in place. With the MicroClean system, cleaning one of the molds for Tyco Electronics’ long-run machines takes one person less than an hour, reducing the actual cleaning time using scraping or abrasive media blasting by as much as 11 hours.

Since introducing the MicroClean at the Belgium plant, Tyco Electronics has deployed dry ice cleaning systems at 12 of its locations in Europe and five locations in North America. Tyco Electronics is also finding other areas within its plants where dry ice cleaning can help, including the metal stamping departments to quickly clean metal scraps from stamping machines.

Current economic conditions are placing extreme demands on plant management to increase productivity, reduce costs and eliminate waste, all without impacting product quality. As more molding products companies embrace lean manufacturing principles or abide by the philosophy of Total Preventative Maintenance (TPM), they will recognize the benefits of dry ice cleaning as an effective, environmentally responsible cleaning process that will allow them to do more with less time, less resources and with less impact on production.

By deploying Cold Jet’s i³ MicroClean solution, Tyco Electronics was able to reduce a 6-12 hour cleaning process to one hour, and reduce a cleaning crew of multiple people to a single person. The company established an investment return hurdle rate of 18 months, but saw benefits immediately as the system paid for itself in slightly more than one month. Cold Jet is helping manufacturers like Tyco Electronics to become more efficient by supporting their lean and TPM initiatives, reducing cleaning costs and times by eliminating unnecessary steps in the cleaning process and increasing productivity. In addition, dry ice cleaning supports an organization’s green initiatives by delivering a more environmentally responsible cleaning solution that is safe and non-toxic, does not create downstream contamination, and reduces or eliminates employee exposure to dangerous chemical cleaning agents.