

The cool way to clean

Carbon Dioxide (CO₂) pellet blasting is a technique that is being effectively used in a spectrum of applications, from paint removal to delicate semiconductor and circuit board cleaning. The system can be used on-line without damaging equipment or necessitating the disassembly of a machine.

Unlike conventional cleaning methods, such as chemicals, high pressure water blasting and abrasive grit blasting, CO₂ blasting uses dry ice particles in a high velocity air flow to remove contaminants from surfaces without the added costs and inconvenience of secondary waste treatment and disposal. The system is environmentally friendly, improves system reliability and lowers maintenance costs.

Dry ice is the solid form of carbon dioxide, which is a colourless, tasteless, odourless gas found naturally in the atmosphere. The CO₂ pellets have a surface temperature of -78°C, providing an inherent thermal energy ready to be tapped. At atmospheric pressure, solid CO₂ evaporates directly into vapour, which means that only the original contaminant is left for disposal. Carbon dioxide is non-conductive and non-flammable and as it is non-toxic, it is suitable for using in the food and beverage industries.

Dry ice blasting is similar to sand blasting, plastic bead blasting, or soda blasting, where the medium is accelerated in a pressurised air stream to impact the surface to be cleaned or prepared. With dry ice blasting, the medium that impacts the surface is solid carbon dioxide. The combined impact energy dissipation and extremely rapid heat transfer between the pellet and the surface causes instantaneous vaporisation of the solid CO₂ into gas. The gas expands to nearly seven hundred times the volume of the pellet in a few milliseconds, in what is effectively a "micro-explosion" at the point of impact.

Unlike other blasting techniques, the low temperature of the CO₂ particles in contrast with the surface being treated, creates a kinetic effect, which causes the ice particles to break up the contaminants being removed.

Pellets are fed into a mobile dry ice blast-cleaning unit, which introduces the pellets in a low-pressure compressed air stream (transport air). This transport air long with a second high pressure compressed air stream (blast air) is led up to the blastgun with a two hose system. In the blastgun the blast air accelerates the pellets carried by the transport air are accelerated by the blast air stream

and projected through the blast nozzle upon the surface to be cleaned.

The pellets are produced by a pelletiser, which converts liquid CO₂ into solid CO₂ pellets. With the Cryonomic, customers have the option of either being supplied with pellets or having their own pelletiser on site. The pellets are stored in an insulated container, until they are used in a mobile CO₂ blasting machine.

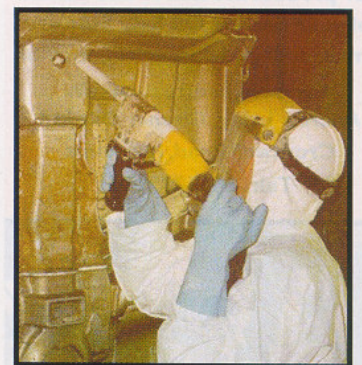
The natural evaporation of dry ice particles eliminates the cost of collecting the cleaning medium for disposal. In addition, containment and collection costs associated with water/grit blasting procedures are eliminated.

Because CO₂ blast systems provide on-line maintenance capabilities for production equipment, timely and expensive disassembly procedures are kept to a minimum. Dedicated cleaning cycles are no longer required, as preventive maintenance schedules can be adopted which allow for equipment cleaning during production periods. As a result, throughput is increased without adding labour or production equipment.

Unlike sand, plastic beads and other abrasive material, dry ice particles are non-abrasive. Cleaning with dry ice will not wear tooling, textured surfaces or damage bearings or machinery. In addition, online cleaning eliminates the danger of moulds being damaged during handling from press to cleaning area and back. CO₂ blast systems will not damage electrical wiring, controls or switches and will help improve power system reliability. They are far less likely to cause rust and when used in the food industry, reduce the potential for bacteria growth inherent in conventional water blasting. Carbon dioxide is a non-toxic element, which meets EC and HSE guidelines. By replacing toxic chemical processes with CO₂ blast systems, employee exposure and corporate liability stemming from the use of dangerous chemical cleaning agents can be materially reduced or eliminated completely. Applications include: Moulds & Dies, Food Industry, Tooling and Printing.

Today's environmental issues are only the beginning. Legislation on air and water quality will continue to impose stricter regulations on general industry and dry ice blasting is continually moving towards meeting these new demands. One thing is certain, the successful shopfloor of the future will have fully incorporated the CO₂ blast process into its operation. **IM**

*Mike Martin, MSM,
distributor of "Cryonomic"
Dry Ice Cleaning
Equipment, explains the
advantages of using dry ice
to clean components.*



MSM

Reader Reply Number: 731