



INTERNATIONAL JOURNAL FOR ENGINEERING APPLICATIONS AND TECHNOLOGY

DRY ICE BLASTING TECHNOLOGY

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Abstract

Dry ice is a solid form of carbon dioxide, and blasting is nothing but the explosion so, In dry ice blasting, where dry ice which is in solid form get accelerated with a pressurized air stream and directed at a surface in order to clean it. Dry ice blasting is the process of Abrasive blasting in which the operation of forcibly propelling a stream of dry ice against a surface under high pressure to clean and smooth a rough surface, shape of a surface, or remove surface contaminants. In this process the Mechanical force is used to propel blast media at the surface to be cleaned and remove contaminants. In abrasive blasting, There are several variants of the process, using various media; some are highly abrasive, whereas others are milder. The most abrasive are shot blasting and sand blasting or wet blasting. Commonly abrasive materials include glass bead blasting (with glass beads) and media blasting with ground-up plastic stock or walnut shells and aluminium grit. Generally a pressurized fluid, compressed air, or a centrifugal wheel is used to propel the blasting media.

Keywords: Dry Ice, Vaporization, Compressed air, blasting.

1. INTRODUCTION

1.1 Basic Principles of Operation

Dry-ice particle blasting is similar to sand blasting, or wet blasting where a media is accelerated in a pressurized air stream (or other inert gas) to impact the surface to be cleaned or prepared. With dry-ice blasting, the media that impacts the surface is solid carbon dioxide (CO₂) particles. The main advantages of this process is that the particles vaporize when it get impact on the surface. The combined impact energy dissipation and extremely rapid heat transfer between the pellet and the surface cause instantaneous sublimation of the solid CO₂ into a gas. The gas expands to nearly eight hundred times the volume of the particle in a few milliseconds that is we can say "microexplosion" at the point of impact that aids the coating removal process. Because of the CO₂ vaporizing, the dry-ice blasting process does not generate any secondary waste.

1.2 Working of DRY-ICE BLASTING

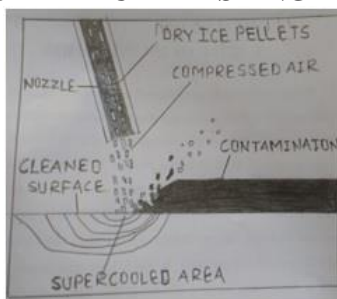


Fig-1. Dry Ice Blasting

Dry ice-blasting is a solid form of carbon dioxide cleaning, where dry ice which is in the form of pellets is accelerated with the help of a pressurized air stream and directed at a surface in order to clean it. An alternative media for non-abrasive blasting is water-ice, known as ice blasting.

Dry ice plastic, there are two types of nozzle we can use 1st is single hose nozzle in which the compressed air and pieces of dry ice get pass through the one hose and 2nd is double hose nozzle in which the compressed air is passed through the one hose and dry ice pellets are passed through the other hose, when the pellets of dry ice with compressed air is passed through the nozzle then the pressure energy gets converted into kinetic energy and strike to the surface of work piece. Dry-ice particles as a blast media gets vaporize due to the impact with the surface. The combined impact energy dissipation and extremely rapid heat transfer between the pellet and the surface cause instant vaporization of the solid carbon dioxide into a gas. Because of the carbon dioxide vaporizing, the dry-ice blasting method does not generate any secondary waste. The temperature of dry ice is -78°C (-108°F) and must be handled with insulated gloves. Eye and ear protection are required to safely use dry ice cleaning equipment. Compared to other blasting-cleaning methods, dry ice blasting generates fewer waste products and does not require clean-up of a blasting medium. The waste products can

be swept up, vacuumed or washed away depending on the containment.

2. APPLICATION

- Paint Removal plastic mould cleaning.
- Production machine & production line cleaning & maintenance.
- Mixer and machinery cleaning.
- Injection molding, Blow molding & Compression molding cleaning.

3. ADVANTAGES

Cost Reduction due to the natural vaporization of dry-ice particles is reduced the cost of collecting the cleaning media for disposal.

Improved Productivity, Because CO₂ blast systems provide on-line maintenance capabilities for production equipment, timely and expensive tooling procedures are kept to a minimum

Extension of Equipment's Useful Life Unlike sand, aluminum grit, silicon carbide, and other abrasive grit media, dry-ice particles are non-abrasive. Cleaning with dry ice will not wear tooling, texture surfaces, or damage of bearings or machineries. Blast nozzles and hoses do not wear and need to be replaced.

A Dry Process it is not steam or water blasting, CO₂ blast systems will not damage electrical wiring, controls, or switches. Also, it produces less rust formations when compared to steam or water blasting. When used in the food industry, dry-ice blasting reduces the potential for bacteria growth.

4. DISADVANTAGES

- The loud noise.
- It requires protective earphones.
- May cause irritation to other people nearby
- Large amounts of carbon dioxide are released which can be harmful if not ventilated out of the space.

5. CONCLUSION

- These new types of technology are widely used for removing unwanted materials or impurities.
- This report discussed the process of dry ice blasting. Also how the dry ice blasting is better than any other blasting process.
- Accuracy of this process is high as compared to sand blasting or wet blasting.
- Also this dry ice blasting is very easy and has more advantages over the other blasting i.e. wet and dry blasting process.

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