



# ***Characteristics of Dry Ice Blasting***

- ***Blast Media***
- ***Equipment***
- ***Scientific Principles***



# ***Blast Media – Dry Ice***

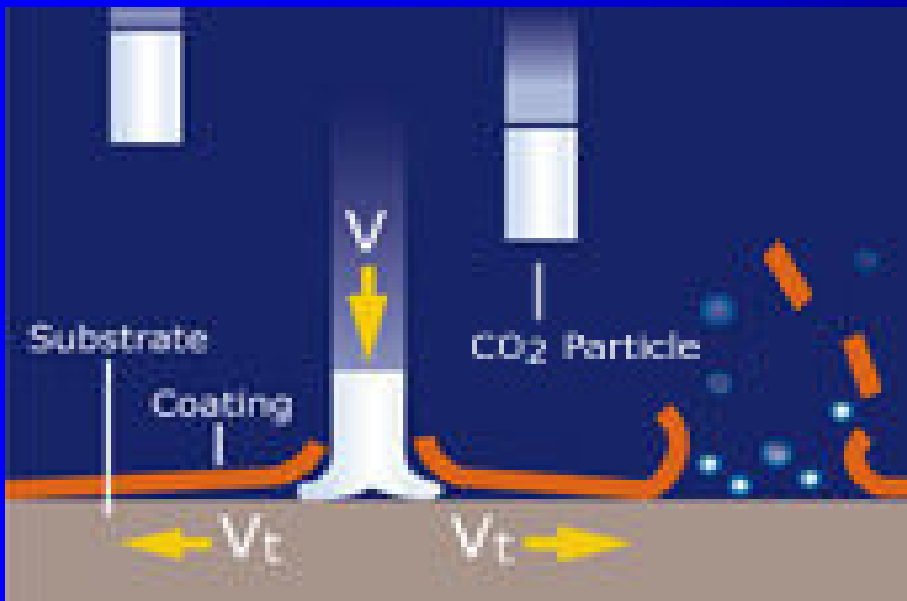
- ***Solid form of Carbon Dioxide***
- ***Available in Pellets and Flakes***
- ***-109°F***
- ***Inert (non-combustible)***
- ***RECYCLED - Man-made bi-product of hydrocarbon and ammonia production***
- ***0.03%/Vol in normal atmosphere***



***Equipment***



# *Scientific Principles*



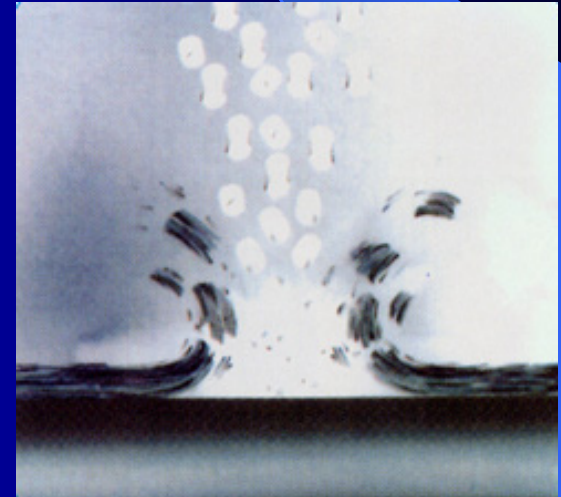
## **DRY ICE BLAST CLEANING**

Impact Flushing  
Action of CO2  
Particles Uses kinetic  
energy effectively  
sublimates on  
impact.



# ***Scientific Principles***

- ***Thermal Effect***
- ***Kinetic Effect***
- ***Sublimation Effect***





## ***Thermal Effect***

***Dry ice particles have a temperature of  $-109^{\circ}\text{F}$ . When these particles impact the impurities on the surface, the impurities are cooled down tremendously, shrink and then loosen from the surface. In most cases the surface temperature will fall below most impurities freeze point. As impurities freeze they lose their adhesion.***



## ***Kinetic Effect***

***When dry ice particles exit the nozzle, they have kinetic energy. As in commercial blast cleaning the impurities are dislodged from the surface. Unlike sand, dry ice has a lower hardness characteristic and therefore greater kinetic energy can be used to break impurities from the surface without damage occurring.***



# ***Sublimation Effect***

***When dry ice particles strike the surface, they immediately phase into gas from solid. The effect increases the gas volume approximately 700 times. The sudden increase in volume assists in moving the brittle fragments of impurities away from the surface.***





# ***Types of Applications***

- ***Organic/Biological Contaminants***
- ***Man-made/Industrial Contaminants***
- ***Surface Preparation & Coatings Removal***



# ***Types of Applications***

## ***Organic/Biological Contaminants***

- ***Mold***
- ***Mildew***
- ***Dirt/Mud***
- ***Algae***
- ***Bird Droppings***
- ***Soot***
- ***Moss***
- ***Bacteria***
- ***Decaying Matter***
- ***Fruits & Vegetables***
- ***Sugars/Syrups***
- ***Flours & Grains***



# ***Types of Applications***

## ***Man-Made/Industrial Contaminants***

- ***Manufacturing Residue***
- ***Soot/Carbon Build-up***
- ***Adhesive Overspray***
- ***Welding Slag***
- ***Cement/Plaster***
- ***Grease & Grime***
- ***Chemical Polymers***
- ***Hydrocarbons***
- ***Paper/Pulp***
- ***Scale***
- ***Ink***
- ***Gum***



# ***Types of Applications***

## ***Surface Preparation and Coatings Removal***

- ***Surface Rust & Oxidation***
- ***Paint/**Graffiti*****
- ***Sealers***
- ***Lacquers***
- ***Urethanes***
- ***Adhesives***
- ***Resins***
- ***Poly. Foam***
- ***Plaster***
- ***Tar***



# What Surfaces Can Be Cleaned With FreezeBlasting?

- Steel
- Glass
- Aluminum
- Wood
- Fiberglass
- Tile
- Plastic
- Rubber
- Brick/Stone
- Cement



# What Can Be Cleaned?

- Belts and Hoses
- **Co-Generators**
- Compressors/Condensers
- Escalators/Elevators
- Food Processing/Packaging Lines
- High Polished Molds
- Hydro-Electric Generators
- Mfg. Equipment & Tools
- Printing Presses
- Relays/Bearings/Cylinders
- **Turbines**
- Trucks/Engines/Boilers/Tanks
- Wood – Mold Remediation



# DRY ICE BLASTING VS. TRADITIONAL CLEANING PROCESSES

Method	NON-Abrasive	Hazardous Material <sup>1</sup>	Performance	Toxicity	Conductivity
<b>Dry Ice Blasting</b>	<b>YES</b>	<b>NO</b>	<b>Superior</b>	<b>NO</b>	<b>NO</b>
<b>Sand Blasting</b>	<b>NO</b>	<b>YES</b>	<b>Moderate</b>	<b>YES</b>	<b>NO</b>
<b>Glass Bead Blasting</b>	<b>NO</b>	<b>YES</b>	<b>Moderate</b>	<b>YES</b>	<b>NO</b>
<b>Walnut Shell Blasting</b>	<b>NO</b>	<b>YES</b>	<b>Limited</b>	<b>NO</b>	<b>NO</b>
<b>Steam Jet Blasting</b>	<b>YES</b>	<b>NO<sup>1</sup></b>	<b>Inferior</b>	<b>NO</b>	<b>YES</b>
<b>Water Jet Blasting</b>	<b>YES</b>	<b>NO<sup>1</sup></b>	<b>Inferior</b>	<b>NO</b>	<b>YES</b>
<b>Chemical Solvents</b>	<b>NO</b>	<b>YES</b>	<b>Limited</b>	<b>YES</b>	<b>YES</b>
<b>Hand Scrubbing</b>	<b>NO</b>	<b>NO<sup>1</sup></b>	<b>Inferior</b>	<b>NO</b>	<b>NO</b>

<sup>1</sup> Any characteristic of hazardous material being removed becomes the characteristic of the media used for removal



# Benefits of Dry Ice Blasting

New technology breeds new phrases – *"Clean Cleaning"*

Unlike all other surface preparation technologies, there are:

- **NO** Residual chemicals;
- **NO** Residual abrasives;
- **NO** Residues of any kind;
- **NO** Excessive moisture;
- **NO** Additional mess to clean up;
- **NO** Hazardous materials to dispose of;
- **NO** Headaches.

**There is NO other environmentally safer alternative.**





# Benefits of Dry Ice Blasting

Dry Ice Blasting **SHOULD** Be Used When There Is A Concern For:

- Surface Abrasion
- Avoidance of Drainage into Watershed/Storm Drains
- Avoidance of Sand/Grit Entrapment
- Difficult or Excessive Cleanup
- Complexity of the Surface
- Critical Production Downtime
- Elimination of Solvents/Chemicals
- Elimination of Rinsing and Drying
- Delicate Electrical Wiring



## **Benefits of Dry Ice Blasting?**

New technology breeds old phrases – “Bottom Line”

In today's business environment, cost cannot only be measured in the amount of capital outlay. Many other factors are considered.

- Increasingly important to lower the bottom line to maximize the top line.
- Labor costs, workman's comp insurance, and environmental requirements are only small examples of the burden many companies experience.
- Important to find and use new technology that can relieve these burdens.

**Dry Ice Blasting is a cost effective means of reducing overhead.**



# Environmental Concerns

## Green House Effect – Global Warming

It has been established by EPA studies that CO<sub>2</sub> emissions are contributory to the global warming problems of the world.

**Our process** uses CO<sub>2</sub> that would otherwise be vented to the atmosphere.

Therefore, our process does not add any additional CO<sub>2</sub> emissions. Our process uses, in essence, recycled waste product, then converts it into a usable phase. It is applied as a replacement for traditional hazardous material such as solvents and chemicals.



# ***Industries Served by Dry Ice Blasting***

- Aerospace
- Automotive Mfg.
- Construction
- Energy/Nuclear
- Food/Agriculture
- Foundry/Smelting
- General Mfg.
- Marine
- **Oil/Petrochemical**
- Printing/Publishing
- Semi-Conductor



# Results / Examples



**Cleaning Hydro-Electric Turbine**



**Cleaning Turbine Dovetails**



**Cleaning Turbine Blades**





**Cleaning Other Turbine Components**



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