

## CRYOCLEAN® snow+. Dry Ice Combined With Abrasive Blasting For Flexible Cleaning.



**Challenge** Cleaning challenges can vary dramatically within a given process flow. Relatively clean areas may be followed by heavily soiled, chemically altered or even corroded zones. This calls for a flexible cleaning method that lets the operator adjust the level of abrasiveness depending on the condition of the surface. An adaptable solution improves environmental performance and lowers operating costs by reducing the volume of abrasive material required along with the associated disposal costs.

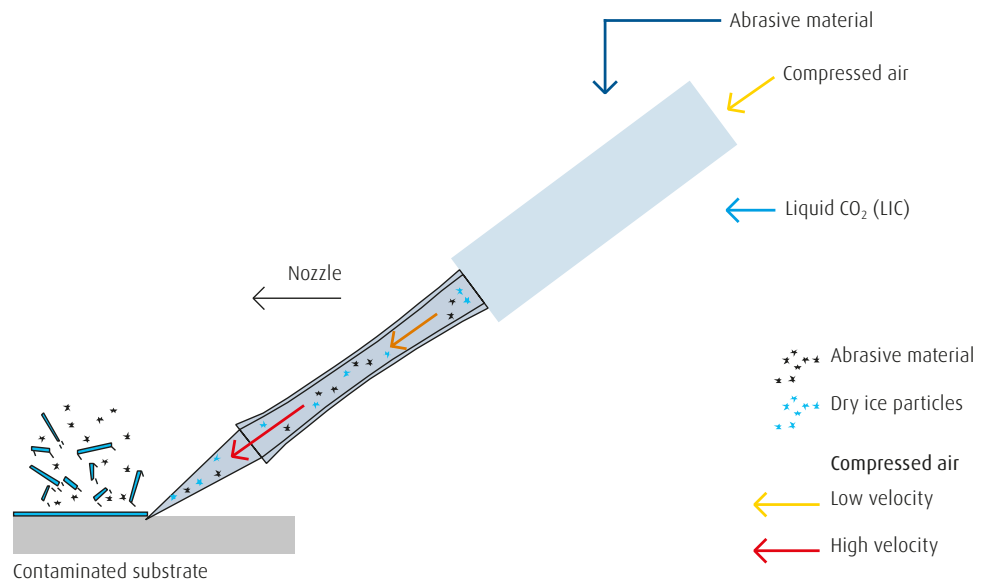
**Solution** Linde has developed the CRYOCLEAN snow+ solution to maximise cleaning flexibility. The patented process enables the operator to adapt the CO<sub>2</sub> snow/abrasive material ratio from gentle to abrasive. This achieves the required cleaning results at any time. The unique technology combines the benefits of dry ice and sand blasting in one flexible and cost-saving system.

The CRYOCLEAN snow+ device creates dry ice particles by direct expansion of liquid CO<sub>2</sub>. The particles are accelerated in a Laval nozzle up to sonic velocity using compressed air and shot onto the surface to be cleaned. The cleaning effect of this procedure relies on flash cooling, kinetic energy, embrittlement and gas impact.

For heavy-duty cleaning operations, an abrasive agent can be mixed in with the dry ice particles. With this process, much less abrasive material is needed to remove the dirt than with conventional sand blasting.

- Benefits**
- Flexible cleaning power for seamless adjustment without interrupting the process flow
  - CO<sub>2</sub>-based cleaning means less abrasive material to consume and dispose of
  - Operating costs are often lower than conventional cleaning processes and offer comparable cleaning results
  - Lower jet pressure emits less noise compared with conventional dry ice cleaning
  - Pneumatic system does not require electrical power
  - Low environmental impact
  - CO<sub>2</sub> particles ensure clean results down to microstructure of the surface

**How CRYOCLEAN snow+ technology works**



**System parameters**

- Options for supply of liquid CO<sub>2</sub> (LIC) depending on cleaning power required:
- Low-pressure supply (20 bar) in tank in combination with a Linde pressure booster (PRESUS™ C)
  - High-pressure supply (55 bar) via cylinders and bundles

A wide range of abrasives can be used in combination with dry ice, including CRYOCLEAN sand, which is available in different quality grades all the way up to food grade.

Compressed air supply:

- Compressed air at pressures from 2 to 16 bar, air supply 2-12 Nm<sup>3</sup>/min

**Examples of typical applications**

- Cleaning operations that require different degrees of intensity depending on the surface, e.g. initial removal of peeling paint with dry ice followed by removal of underlying rust by adding an abrasive agent
- Tasks where a blasting abrasive is classified as problematic waste to be disposed of with the removed material so that operators are keen to keep this waste to a minimum
- The removal of rust and wear-resistant paint to inspect weld seams
- Cleaning of electricity generators
- Restoration of historical buildings with steel exteriors
- Removal of oxides on the surface of metals such as steel and aluminium

Our experts will be delighted to customise our CRYOCLEAN snow+ technology to your specific requirements.

For optimum safety, consider monitoring your workplace with Linde G-TECTA™ gas detectors.

Other brochures on our full range of products and services are available from our sales offices and on our website.

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