



## Using liquid nitrogen to recycle used tyres

**The storage of used tyres has been prohibited in EU member states since 2003. Liquid nitrogen is an environmentally sound way of complying with this regulation by recycling scrap tyres into high-quality rubber products.**

### Wide range of applications

Tyres comprise around 65 percent rubber, 30 percent steel and 5 percent textile cord. All of these components are processed in special plants. Rubber granules and powder are particularly high-quality end products which can be used in the manufacture of new products. And there are countless areas of application for these recycled rubber materials, ranging from surfaces on playgrounds and sports grounds through sound insulation to additives for asphalt production. Rubber granules increase the elasticity of asphalt. This not only cuts noise emissions by fifty percent ("low-noise asphalt"), but also significantly reduces frost damage, thus doubling the lifespan of the asphalt surface. Other tyre parts are also well suited to recycling. Steel, for example, can be melted down again while textile components can be used as insulating material or for stabilizing textiles subject to heavy wear and tear.

### Advantages of cryogenic grinding

Cryogenic grinding of plastics and elastic or heat-sensitive materials offers a range of compelling benefits. With traditional grinding methods, the ambient temperature increases due to the enormous amounts of heat generated by engines, blades and grinders. All of which has a negative impact on the quality of the material. This is not the case with cryogenic grinding. During this process, liquid nitrogen (-196° C) is used to cool tyre granules to -100° C, making them extremely brittle and as hard as glass. The granules can then be ground to a powder, with grains measuring approximately 0.25 mm. The size of the grains in the powder can be varied by adjusting the temperature to which the granules are cooled (in other words the amount of gas applied). Magnets are used to remove even the finest steel elements whereas textile microparticles are filtered out. The resulting purity levels exceed 99.9 percent. The automobile industry is one of the main markets for this finely ground, pure rubber powder, where it is used to enhance the properties of bumpers, dashboards and panels. Depending on the type of plant used, around 1.5 tonnes of liquid nitrogen is required to produce 1 tonne of rubber powder. Linde delivers liquid nitrogen to recycling companies throughout Europe.

- HOME
- ABOUT THIS REPORT
- FUNDAMENTALS
- FIELDS OF ACTION
- DIVISIONS
  - Gases Division
    - [Recycling with liquid nitrogen](#)
    - Gases in the plastics industry
    - Using gases in the construction industry
    - Biological wastewater treatment
    - Gases for solar cells
    - Cleaning with CO<sub>2</sub> snow
    - Pain relief
    - Healing with oxygen
    - Pure oxygen for fish farming
    - Transport cooling
    - CO<sub>2</sub>-Snow for foundries
    - Oxygen increase efficiency
    - Cleaning with CO<sub>2</sub>
    - Oxygen in paper production
  - Engineering Division
- ROADMAP
- GRI INDEX
- ASSURANCE REPORT