

High-Efficiency Centrifugal Gas-Solid Separation



GDev White Paper Series
White Paper No. 3
October 2026



MICRON-SCALE SEPARATION

Cut size below 1 μm

HIGH SEPARATION PERFORMANCE

>99% efficiency

COMPACT CENTRIFUGAL DESIGN

For industrial gas streams

Centrifugal Separation of Fine Solid Particles

Fine particles entrained in process gas can lead to product loss, contamination of downstream equipment, increased filtration demand and operational challenges. GDev's compact centrifugal separator is designed to remove these particles directly from the gas stream using high centrifugal acceleration.

Particle-laden gas enters the separator and is subjected to strong centrifugal forces within the rotating separation stage.

The centrifugal field drives solid particles away from the main gas flow, allowing the separated material to be collected while cleaned gas leaves the separator. This enables continuous gas–solid separation

within a compact equipment footprint.

Short separation distances within the rotating disk stack, combined with high centrifugal acceleration, enable efficient removal of fine particles in particle-size ranges that are difficult to address by gravitational settling alone.

GDev's centrifugal separator has demonstrated micron-scale gas–solid separation with a cut size below $1\ \mu\text{m}$ and separation efficiencies above **99%** under selected operating conditions, combining high separation performance with a compact architecture suited to industrial process integration.



Performance depends on particle properties, solids loading, gas conditions and operating point. GDev therefore evaluates customer-specific applications to identify suitable separation conditions.

Centrifugal Separation: Validation and Applications

GDev has conducted experimental separation campaigns using fine powders with significantly different physical characteristics. Test materials have included mineral particles as well as very low-density silica-based powders, providing a broad technical basis for evaluating separation behaviour across different particle properties.

The test programme used powders with substantially different densities and particle sizes extending up to approximately 15–20 μm . Testing focused on evaluating separation performance for particles with sizes around and below 1 μm . An illustrative test result is shown below.

The technology has also been evaluated using customer-specific particulate material through confidential industrial testing, supporting application-driven assessment using representative materials.

Rather than relying on a single reference powder, GDev evaluates each application according to the actual particle and gas characteristics that influence separation performance. Customer-specific trials can be performed to establish suitable

operating conditions and provide a technical basis for subsequent scale-up.

The separator is intended for industrial gas streams where entrained solids need to be removed, recovered or prevented from reaching downstream process equipment.

Key uses include:

Product recovery

Recover valuable particulate material carried with process gas.

Equipment protection

Reduce exposure of downstream equipment to entrained particles.

Filter load reduction

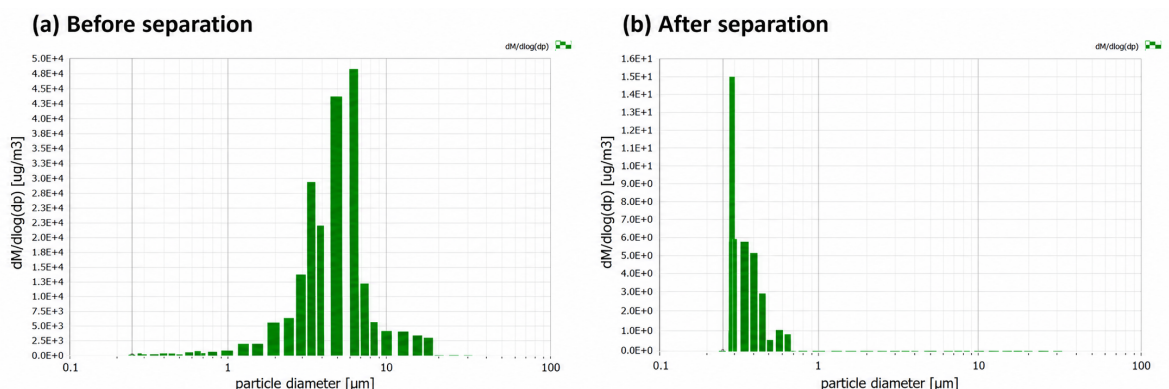
Reduce the particulate burden on downstream filtration stages.

Process gas cleaning

Remove entrained solids before subsequent process operations.

Potential applications across:

- Fine chemicals · Pharmaceuticals
- Advanced materials · Battery materials
- Minerals · Metals · Powder processing



Fine solid-particle mass size distributions before and after centrifugal separation, measured using a GRIMM aerosol spectrometer.

Have a gas stream carrying fine solid particles?

GDev can assess your particle and gas characteristics, perform targeted separation trials and support the development of an appropriate solution for industrial scale-up.

Discuss your gas–solid separation challenge with us.

Application assessment · Customer-specific testing · Scale-up support



Grimaldi Development AB

COMMITTED TO
ENGINEERING THE FUTURE
OF CLEANER INDUSTRY

Grimaldi Development AB

Cylindervägen 12
131 52 Nacka Strand
Sweden

info@g-dev.com · www.g-dev.com