



DP Pulveriser[®]
since 1962



DP PULVERISERS

AIR CLASSIFYING MILL (ACM) REDEFINED

Precision Grinding with Integrated
Particle Size Control

**DP Pulverisers - Engineering
Particle Size, Not Just Grinding**

CONTROL THE PARTICLE, CONTROL THE PROCESS

In modern powder processing, grinding alone is not enough.

What matters is control—control over particle size, distribution, and consistency.

Traditional mills grind everything and leave classification as a secondary step.

That creates inefficiencies, broad PSD, and inconsistent results.

Air Classifying Mills change the game.

At DP Pulverizers, we engineer ACM systems that combine high-efficiency grinding with dynamic air classification, delivering precise, repeatable particle size in a single, integrated system.



WHAT IS AN AIR CLASSIFYING MILL?

An Air Classifying Mill (ACM) is a high-performance size reduction system that integrates:

- Impact grinding
- Internal air classification
- Continuous particle separation

Within a single machine.

Core Function:

- Grind material
- Classify particles in real time
- Reject oversize particles
- Deliver only finished product



THE SCIENCE OF ACM TECHNOLOGY

ACM systems operate based on the interaction of mechanical impact forces and aerodynamic classification forces.

Two Forces at Work:

1. Impact Grinding

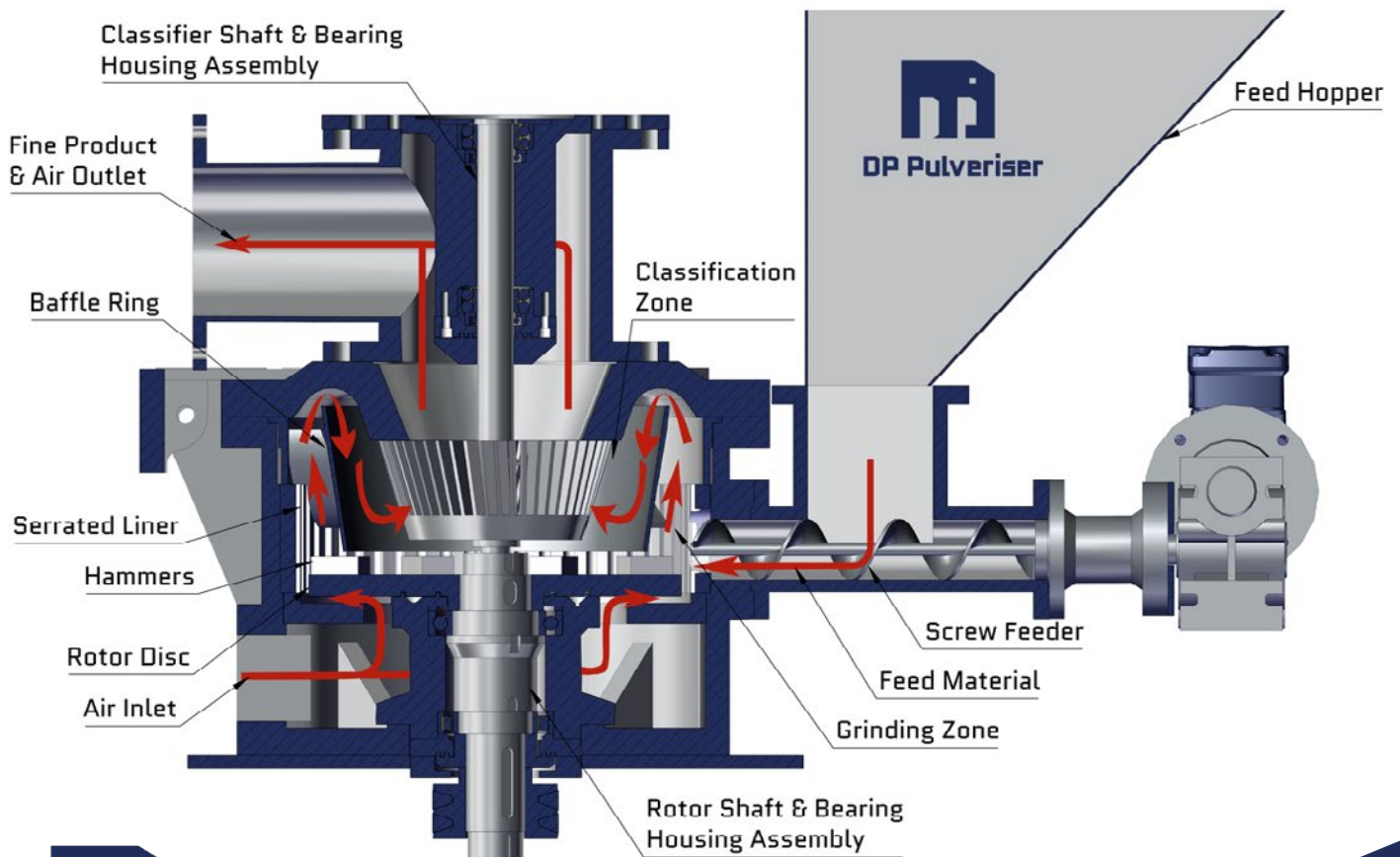
High-speed rotor generates:

- Impact
- Shear
- Particle breakage

2. Dynamic Air Classification

Airflow creates a centrifugal force field where:

- Fine particles pass through
- Coarse particles are rejected



HOW DP ACM SYSTEMS WORK

1

Controlled Feeding

Material is fed into the grinding chamber via screw or rotary valve.

2

High-Speed Impact Grinding

Rotor with hammers/pins accelerates particles for size reduction.

3

Integrated Airflow

Air stream transports particles upward into classification zone.

4

Dynamic Classification

Internal classifier wheel separates particles:

- Fine → exits system
- Coarse → returns for further grinding

5

Continuous Operation

Closed-loop system ensures:

- Uniform particle size
- High efficiency
- No over-grinding

WHY AIR CLASSIFYING MILLS ARE ESSENTIAL

ACMs are the preferred solution when:

- Tight particle size control is required
- Over-grinding must be avoided
- Heat generation needs to be minimized
- High throughput with precision is needed
- Multi-step systems must be simplified



ACM

VS.

TRADITIONAL MILLING SYSTEMS

WHY INTEGRATED CLASSIFICATION CHANGES EVERYTHING

LIMITATIONS OF TRADITIONAL MILLING

Conventional mills:

- Grind everything indiscriminately
- Require external classification
- Produce wide PSD
- Waste energy on over-grinding

Result:

- Inefficient process
- Higher operating cost
- Inconsistent product

THE ACM ADVANTAGE

ACMs eliminate these issues by controlling particle size in real time.

Benefits:

- Narrow PSD
- Reduced over-grinding
- Higher yield
- Lower energy consumption
- Simplified process

DIRECT PERFORMANCE COMPARISON

Parameter	DP ACM System	Conventional Mill
Particle Size Control	Precise, adjustable	Limited
PSD	Narrow	Broad
Over-Grinding	Minimal	High
Efficiency	High	Moderate
Process Steps	Single	Multiple
Energy Use	Optimized	Higher



THE DP ADVANTAGE – WHERE WE WIN

1. PRECISION CLASSIFICATION CONTROL

Adjustable classifier speed allows exact PSD targeting.

2. HIGH-EFFICIENCY ROTOR DESIGN

Optimized impact geometry ensures:

- Faster size reduction
- Reduced energy loss

3. ADVANCED AIRFLOW ENGINEERING

Balanced airflow ensures:

- Stable classification
- Consistent product quality

4. WEAR-RESISTANT CONSTRUCTION

Options include:

- Ceramic liners
- Hardened steel
- Specialized coatings

5. THERMAL MANAGEMENT

ACMs operate with controlled airflow to:

- Reduce heat buildup
- Protect sensitive materials

6. COMPLETE SYSTEM INTEGRATION

DP delivers full ACM systems including:

- Feeding systems
- Dust collection
- Cyclones and filters
- Air handling systems
- PLC automation



DESIGNED FOR PERFORMANCE

- Continuous operation
- Adjustable particle size control
- Minimal maintenance
- Easy cleaning access
- Consistent throughput
- Scalable from lab to production

PROCESS CONTROL VARIABLES

DP ACM systems are engineered around key parameters:

- Rotor speed
- Classifier speed
- Airflow rate
- Feed rate
- Internal geometry

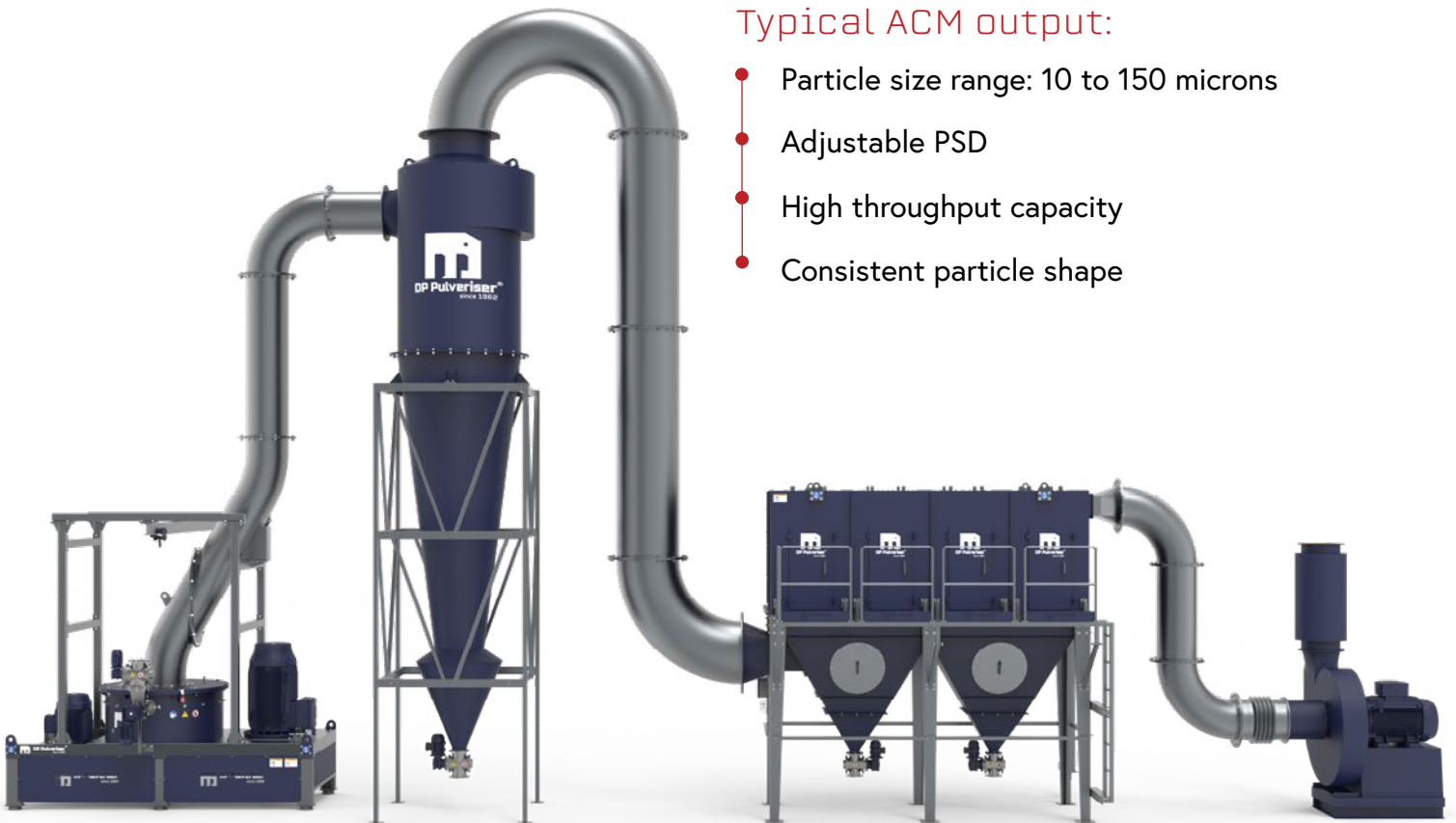
Result:

Engineered particle size, not guesswork

PERFORMANCE CAPABILITIES

Typical ACM output:

- Particle size range: 10 to 150 microns
- Adjustable PSD
- High throughput capacity
- Consistent particle shape



AIR CLASSIFYING MILL APPLICATION PLAYBOOK

CHEMICALS & PIGMENTS

Challenge:

- Uniform dispersion
- Agglomeration control

DP Solution:

- Tight PSD control
- Integrated classification

Result:

- Improved color quality
- Better dispersion



PHARMACEUTICALS

Challenge:

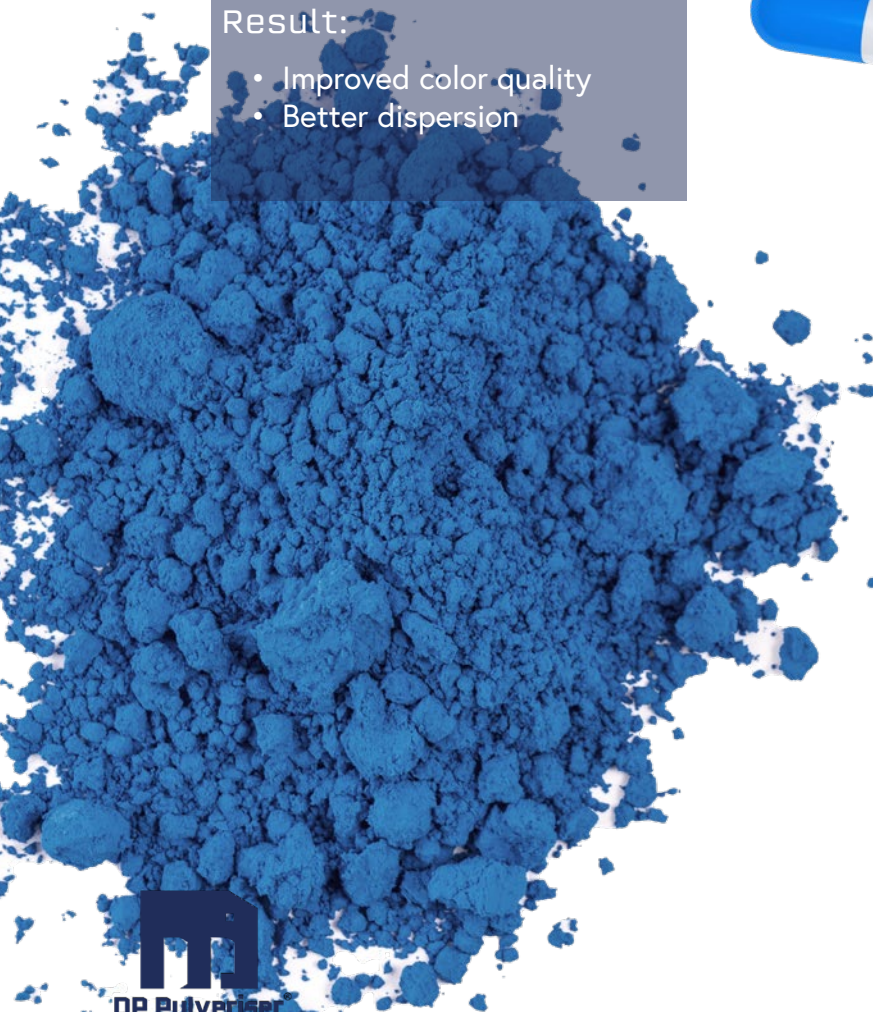
- Precise particle size for bioavailability

DP Solution:

- Controlled classification
- Consistent micronization

Result:

- Reliable drug performance
- Regulatory compliance



FOOD & NUTRACEUTICALS

Challenge:

- Heat sensitivity
- Fine particle consistency

DP Solution:

- Airflow-controlled grinding
- Minimal thermal impact

Result:

- Preserved functionality
- Consistent blends

BATTERY & ADVANCED MATERIALS

Challenge:

- Tight PSD for performance

DP Solution:

- Dynamic classification
- Fine particle control

Result:

- Improved material performance
- Consistent quality

MINERALS & INDUSTRIAL MATERIALS

Challenge:

- Abrasiveness
- High throughput requirements

DP Solution:

- Wear-resistant liners
- Efficient grinding

Result:

- Extended equipment life
- Stable operation

AGROCHEMICALS

Challenge:

- Fine particle distribution for effectiveness

DP Solution:

- Integrated grinding + classification

Result:

- Improved application performance
- Uniform dispersion

BEYOND THE MILL – COMPLETE PROCESS SYSTEMS

DP ACM systems are part of a complete solution:

- Grinding
- Classification
- Conveying
- Dust collection
- Automation

One system. One process. One result.



Grinding is easy.

Controlling particle size is the real challenge.

At DP Pulverizers, we engineer Air Classifying Mills that deliver:

- Precision
- Consistency
- Efficiency

Because in modern manufacturing, particle size is performance.



www.dppulveriser.com
www.dpmills.com

DP PULVERIZERS MILL SELECTION GUIDE

Jet Mill vs Air Classifying Mill vs Cryogenic Grinding

Choosing the Right Technology
for Precision Particle Engineering

THE WRONG MILL COSTS MORE THAN THE RIGHT ONE

In particle size reduction, selecting the wrong technology doesn't just impact performance—it impacts:

- Product quality
- Throughput
- Energy consumption
- Maintenance costs
- Process stability

Each milling technology serves a specific purpose.

Understanding when to use Jet Milling, Air Classifying Milling (ACM), or Cryogenic Grinding is critical to achieving optimal results.

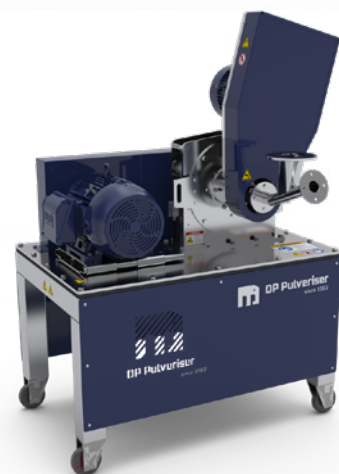
At DP Pulverizers, we guide customers to the right process—not just the nearest machine.



• DP Pulverizer Jet Mill



• DP Pulverizer Air Classifier Mill



• DP Pulverizer Cryogenic Mill



THE THREE CORE TECHNOLOGIES

JET MILLING (FLUID ENERGY GRINDING)

Best For:

- Ultra-fine particle sizes
- Heat-sensitive materials
- Contamination-sensitive applications

How It Works:

- High-velocity air or steam accelerates particles
- Particle-on-particle collision causes size reduction
- No moving parts in grinding zone

Key Advantages:

- No heat generation
- Zero contamination risk
- Extremely narrow PSD
- Capable of sub-10 micron sizes



AIR CLASSIFYING MILL (ACM)

Best For:

- Controlled particle size in mid-range micron sizes
- Continuous, high-throughput processing
- Applications requiring tight PSD without ultra-fine grinding

How It Works:

- Impact grinding + dynamic air classification
- Fine particles exit, coarse particles recirculate

Key Advantages:

- Adjustable PSD in real time
- High efficiency
- Reduced over-grinding
- Integrated system (grinding + classification)



CRYOGENIC GRINDING

Best For:

- Sticky, greasy, elastic, or heat-sensitive materials
- Polymers, rubber, spices, high-fat products

How It Works:

- Material is cooled with liquid nitrogen
- Becomes brittle
- Fractures cleanly under impact

Key Advantages:

- Prevents smearing and clogging
- Preserves volatile compounds
- Enables grinding of otherwise impossible materials
- Improves flowability



SIDE-BY-SIDE COMPARISON

Parameter	Jet Mill	ACM	Cryogenic Grinding
Particle Size Range	1–15 microns	10–150 microns	10–500 microns
Heat Generation	None	Moderate (controlled)	None
Contamination Risk	None	Low	Low
Sticky Materials	Poor	Moderate	Excellent
PSD Control	Ultra-tight	Adjustable	Moderate
Throughput	Moderate	High	Moderate
Energy Efficiency	Moderate	High	Optimized (LN ₂ dependent)
Best Use Case	Ultra-fine powders	Controlled milling	Difficult materials

WHEN TO USE EACH TECHNOLOGY

USE A JET MILL WHEN:

- You need ultrafine particles (<10 microns)
- Product purity is critical
- Heat cannot be introduced
- Contamination must be eliminated

Typical industries:

Pharma, battery materials, advanced chemicals



USE AN ACM WHEN:

- You need controlled particle size (10–150 microns)
- Throughput is critical
- You want a single-step grinding + classification system

Typical industries:

Chemicals, food, minerals, agrochemicals

USE CRYOGENIC MILLING WHEN:

- Material is sticky, greasy, elastic, or heat-sensitive
- Product smears or clogs at ambient conditions
- You need to preserve flavor, aroma, or chemical integrity

Typical industries:

Spices, polymers, rubber, nutraceuticals



REAL-WORLD SCENARIOS

API Micronization

Goal: Sub-10 micron, no contamination
Result: Jet Mill

Chemical Powder at 75 Microns

Goal: Tight PSD, high throughput
Result: ACM

Grinding Polypropylene

Goal: Fine powder without melting
ACM / Jet → Not viable
Result: Cryogenic Grinding

Spice Processing

Goal: Preserve aroma and oils
Ambient grinding → destroys product
Result: Cryogenic Grinding

Battery Material Processing

Goal: Tight PSD, ultra-fine
Result: Jet Mill (or ACM depending on target size)

COMMON MISTAKES IN MILL SELECTION

Using ACM for Ultra-Fine Applications
Results: broad PSD, inefficient grinding

Using Jet Mill for Sticky Materials
Results: poor flow, process instability

Using Ambient Grinding for Polymers
Results: melting, smearing, failure

Ignoring Temperature Effects
Results: degraded product and inconsistent output

THE DP ENGINEERING APPROACH

At DP Pulverizers, we don't start with equipment.

We start with:

- Material behavior
- Target particle size
- Process conditions
- Throughput requirements

Then we engineer:

- The right mill
- The right system
- The right process



BEYOND INDIVIDUAL MACHINES

Most processes require more than one step.

DP integrates:

Jet Milling

ACM Systems

Cryogenic Grinding

Mixing

Conveying

Classification

One partner. One system. One optimized process.

THERE IS NO “BEST MILL.”

THERE IS ONLY THE RIGHT MILL FOR THE APPLICATION.

Choosing correctly means:

- Higher product quality
- Lower operating costs
- Greater process stability

Choosing incorrectly means:

- Constant problems
- Increased cost
- Lost production



Our Global Footprint

Australia	Bahrain	Bangladesh	Bhutan	Canada	China	Estonia
Bremen	Ghana	Hongkong	Iran	Indonesia	Kenya	Mauritius
Mexico	Malaysia	Newzealand	Nepal	Nigeria	Oman	Philippines
	Saudi Arabia	South Africa	Singapore	Sri Lanka	Tanzania	
	Qatar	U.A.E	Guatemala	Zambia	Uruguay	



Contact Us



www.dppulveriser.com
www.dpmills.com