DP Pulveriser®
since 1962

Algae Processing & Micronization Systems

by DP Pulverizers

From Sustainable Biomass to Functional Powders

Algae has emerged as one of the most promising renewable raw materials of the 21st century. Its versatility stretches across industries — from food and nutraceuticals to cosmetics, pharmaceuticals, and biofuels. Yet one challenge unites them all: transforming harvested algae biomass into a fine, uniform, and functional powder that performs consistently in formulation and application.

DP Pulverizers leads this transformation. Our advanced milling systems are designed to handle the delicate balance between precision particle reduction and nutrient preservation, providing a scalable, energy-efficient, and sanitary solution for producing high-value algae powders.

Understanding the Algae Milling Process

Algae biomass is unique — high in lipids, pigments, and proteins, yet sensitive to heat and oxidation. The goal of milling is to reduce particle size, improve dispersibility, and enhance surface area for better bioavailability, all without damaging the compound structure.

1. Feed Preparation

After algae biomass has been dried—typically via spray drying, drum drying, or vacuum drying—the coarse powder or cake is loaded into a controlled feed hopper. Moisture levels are adjusted between 2–10%, depending on the species and target fineness.

2. Controlled Grinding

The biomass is fed into a DP Pulverizer (Pin, Turbo, Air Classifier, Jet, or Cryogenic Mill). Each technology serves a specific purpose depending on the target micron size, temperature sensitivity, and production volume. Controlled air flow, classifier speed, and rotor design ensure uniform particle reduction with minimal heat generation.

3. Cooling & Separation

Fine particles are separated using built-in air classifiers or cyclones. For high-fat or thermally sensitive algae (e.g., Nannochloropsis or Haematococcus), cryogenic cooling may be used to prevent clumping and preserve omega-3 oils, chlorophyll, and carotenoids.

4. Collection & Packaging

The final powder, now standardized to particle sizes between 5 μm and 200 μm, is collected into a vacuum conveyor or discharge bin. From there, it's ready for blending, encapsulation, or direct formulation.

Industries Using DP Pulverizers for Algae

1. Nutraceuticals & Dietary Supplements

Algae is a major source of natural omega-3 fatty acids, antioxidants, and proteins. Nutraceutical manufacturers rely on precisely milled powders for capsule filling, tablet compaction, and drink mixes.

- Target particle size: 20–100 µm
- DP Recommended Systems: Air Classifier Mills or Jet Mills
- Advantages: High purity, improved bioavailability, and preserved color and aroma

2. Food & Beverage

In food applications, algae acts as a natural coloring agent, thickener, or protein supplement. Uniform powders enhance dispersibility in liquids, doughs, and emulsions.

- Target particle size: 50–150 µm
- DP Recommended Systems: Turbo Mills or Pin Mills
- Advantages: Hygienic stainless construction, easy cleaning, and continuous processing

3. Animal Feed & Aquaculture

Microalgae such as Chlorella and Spirulina are used as feed additives rich in amino acids and pigments that enhance animal health and coloration.

- Target particle size: 100–300 µm
- DP Recommended Systems: Pin Mills or Turbo Mills
- Advantages: High throughput, robust design, and excellent particle uniformity

4. Cosmetics & Personal Care

Algae-derived powders are used in exfoliants, masks, and bioactive formulations. Cosmetic powders demand uniform texture and smooth mouthfeel.

- Target particle size: 10–50 µm
- DP Recommended Systems: Air Classifier or Jet Mills
- Advantages: Fine control over PSD (Particle Size Distribution) and minimal contamination

5. Pharmaceuticals

Microalgae contain high-value bioactive compounds such as β-carotene, astaxanthin, and phycocyanin. Pharmaceutical-grade processing demands extreme uniformity, sterility, and thermal control.

- Target particle size: 1–20 µm
- DP Recommended Systems: Jet Mills or Cryogenic Mills
- Advantages: Zero metal contamination, low heat, nitrogen atmosphere capability

6. Bioplastics & Green Materials

Algae-based biopolymers are ground to tight particle size distributions before blending with starches or PLA (polylactic acid).

- Target particle size: 50–150 µm
- DP Recommended Systems: Turbo or Pin Mills
- Advantages: Continuous operation, robust design, and adjustable fineness

7. Biofuel & Industrial Applications

For algae used in bio-oil extraction or catalyst feeding, particle size uniformity affects extraction yield and efficiency.

- Target particle size: 50–200 µm
- DP Recommended Systems: Turbo Mills or ACMs
- Advantages: Controlled particle surface area for optimized chemical reactivity

Technology Overview: DP Pulverizers Milling Solutions Processing

Mill Type	Particle Size Range	Key Advantages	Typical Applications
Pin Mill	50–150 µm	Compact, simple, cost-effective	Feed, food-grade algae powders
Turbo Mill	50–100 µm	High throughput, adjustable speed	Food, aquafeed, colorants
Air Classifier Mill (ACM)	10–75 µm	Integrated classification, fine control	Nutraceuticals, food, cosmetics
Jet Mill	1–10 µm	Ultra-fine, zero contamination	Pharmaceuticals, pigments

How DP Pulverizers Integrates Into the Algae Process

Vacuum Drying (PerMix Vacuum Mixer/Dryer)

Removes moisture under low temperature to protect sensitive compounds.

Coarse Grinding / Size Reduction (DP Pin or Turbo Mill)

Reduces particle size to uniform granules for controlled feeding.

Fine Milling (DP ACM, Jet, or Cryogenic Mill)

Achieves final micronization while preserving bioactivity.

Cyclone Collection / Classification

Separates fine and coarse fractions with air or mechanical classification.

Powder Conditioning & Packaging (PerMix Ribbon or Paddle Mixer)

Final blending and conditioning for flowability and stability.

Together, DP Pulverizers and PerMix provide a turnkey algae processing solution, from moisture removal to micronization and packaging.

Why DP Pulverizers Leads the Market

Thermal Integrity:

Low-heat systems protect nutrients and pigments.

Precision Control:

Adjustable classifiers, airflow, and rotor speeds deliver tight particle distribution.

Hygienic Construction:

Stainless steel contact parts for food and pharma use.

Scalable Design:

Available in lab, pilot, and full-production systems.

Automation Ready:

Optional PLC-based control for recipe management and data logging.

Explosion-Proof (ATEX) Options:

For solvent-based or dust-sensitive operations.

Sustainability Meets Engineering

DP Pulverizers aligns with the green mission of algae producers worldwide—maximizing yield, reducing waste, and cutting energy consumption. Our mills are engineered for low power draw, reduced product loss, and long service life, making them the ideal choice for sustainable ingredient manufacturing.

Industries Served

- Nutraceuticals & Functional Foods
- Aquaculture & Livestock Feed
- Cosmetics & Personal Care
- Pharmaceuticals & Biotechnology
- Plastics & Biopolymers
- Chemical Processing
- Energy & Biofuels

DP Pulverizers — Precision Milling for the Algae Economy

As the algae industry grows from niche to mainstream, the need for high-performance, scalable, and hygienic milling systems becomes essential. DP Pulverizers stands at the intersection of technology and sustainability—offering equipment that turns raw biomass into precision-engineered powders that feed, fuel, and heal the world.

DP Pulverizers: Engineering Precision. Empowering the Future.

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	Uraguay	

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