



**DP Pulveriser<sup>®</sup>**  
since 1962



**DP<sup>®</sup>**  
**PROTEINOVA**

# ADVANCED PROTEIN MILLING & MECHANICAL PROTEIN FRACTIONATION SYSTEMS



Protein has become one of the most valuable ingredients in the global food supply. From plant-based foods and nutritional supplements to sports performance products and functional ingredients, manufacturers around the world are searching for better ways to produce high-quality protein concentrates from agricultural materials.

Many crops contain significant amounts of protein, but that protein is not immediately accessible. Instead, it exists within complex plant structures surrounded by starch, fiber, oils, and other components.

Unlocking that protein requires a process capable of liberating, separating, and concentrating protein particles while preserving their functional properties.

Historically, protein extraction relied heavily on wet processing methods involving chemical extraction or enzymatic treatment. While effective, these methods can be complex, expensive, and resource intensive.

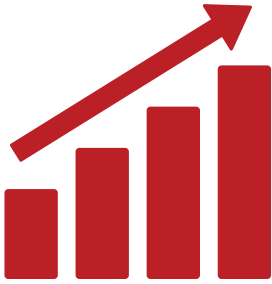
Mechanical protein fractionation offers an alternative approach.

By combining precision milling and aerodynamic particle classification, processors can separate protein-rich particles from starch-rich particles using purely physical principles.

The DP® Proteinova Protein Shifting System was developed specifically for this purpose.

Through advanced air classifier milling and high-efficiency particle separation, Proteinova transforms plant-based raw materials into valuable protein ingredients used in food manufacturing worldwide.

# THE GLOBAL PROTEIN REVOLUTION



The food industry is experiencing one of the most dramatic transformations in modern history.

**Consumer demand for protein is rising rapidly due to several major trends:**

- Growing interest in plant-based diets
- Expansion of sports nutrition and fitness markets
- Increased focus on healthy lifestyles
- Demand for sustainable food production
- Rapid growth of functional foods and supplements

Protein is no longer viewed only as a nutritional component. It has become a functional ingredient used to improve the structure, texture, and nutritional value of food products.

**Protein ingredients are now used in:**

- Plant-based meat alternatives
- Protein bars and nutritional beverages
- Dairy alternatives
- Infant nutrition
- Fortified snacks and baked goods
- Clinical nutrition products
- Pet food and animal nutrition



**To support these industries, protein ingredients must meet strict requirements for:**

- Protein concentration
- Particle size consistency
- Functional behavior in food formulations
- Flavor neutrality
- Production efficiency

Producing protein ingredients that meet these standards requires advanced processing technologies capable of transforming raw agricultural materials into refined functional ingredients.

Mechanical protein fractionation has emerged as one of the most promising solutions.

# UNDERSTANDING PROTEINS IN PLANT MATERIALS

Plant-based protein sources such as soybeans, peas, lentils, chickpeas, rice, and other legumes contain a mixture of biological components.

These materials typically consist of:

- Proteins
- Starch granules
- Cellulose and fiber
- Natural oils
- Minerals and micronutrients

Inside the plant structure, proteins are embedded within a cellular matrix made primarily of starch and fiber.

Before proteins can be separated, the cellular structure must first be broken down.

This is achieved through precision milling, which reduces the material into extremely fine particles while liberating the protein structures from the surrounding matrix.

Once the material is finely milled, the different components begin to behave differently when exposed to airflow.

Protein particles tend to have different densities and aerodynamic properties compared to starch particles.

These physical differences make it possible to separate the components using air classification technology.

This process is commonly referred to as protein shifting or dry protein fractionation.

Unlike chemical extraction methods, this approach relies entirely on mechanical and aerodynamic separation principles.



# WHAT IS PROTEIN SHIFTING?

Protein shifting is a dry fractionation process used to separate protein-rich particles from starch-rich particles through a combination of fine grinding and aerodynamic classification.

The concept relies on fundamental particle physics.

When plant materials are reduced to extremely fine particle sizes, their components begin to separate based on:

- Particle size
- Particle density
- Aerodynamic behavior

These differences allow classification systems to divide particles into separate fractions.

**The process typically follows these steps:**

**01** Raw plant material is fed into a precision milling system.

**02** The milling system reduces the material into very fine particles, breaking down plant structures and releasing protein components.

**03** The milled powder is transported through a controlled airflow into an air classifier.

**04** Inside the classifier, aerodynamic forces act on the particles.

**05** Lighter, finer particles containing higher protein concentrations move along a different trajectory than heavier starch particles.

**This results in two product streams:**

- A fine fraction with higher protein concentration
- A coarse fraction with higher starch concentration

This simple yet powerful process allows processors to increase the value of raw agricultural materials by creating multiple ingredient streams.

# THE SCIENCE OF AIR CLASSIFIER MILLING

At the heart of the Proteinova system lies one of the most powerful tools in particle engineering: the **Air Classifier Mill (ACM)**.

Air classifier mills combine two operations in a single machine:

- High-speed size reduction
- Dynamic particle classification

Inside the mill, a high-speed rotor generates intense mechanical forces that break down incoming materials through impact and shear.

At the same time, airflow carries particles into a classification zone where particle size is continuously evaluated.

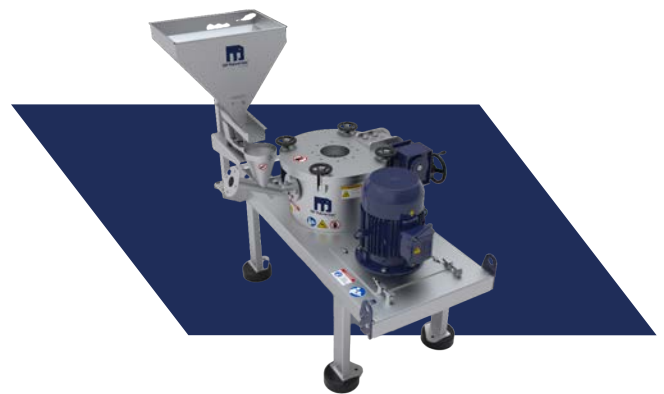
Particles that are too coarse are returned to the grinding zone for further reduction.

Particles that reach the desired size exit the mill through the air stream.

This integrated process allows extremely precise control over particle size distribution.

For protein fractionation, this is particularly important because the effectiveness of air classification depends heavily on producing a uniform fine powder.

Air classifier milling ensures that the material entering the classifier stage has the ideal particle characteristics for efficient separation.



# THE PROTEINOVA PROCESSING SYSTEM

The Proteinova system integrates precision milling with high-efficiency classification in a continuous processing line.

The system typically consists of the following equipment:

- Feed hopper with controlled screw feeder
- DP Air Classifier Mill
- Dust collection system
- Transfer screw feeder
- DP Aeroval Air Classifier
- Rotary air valves
- Pneumatic conveying blower

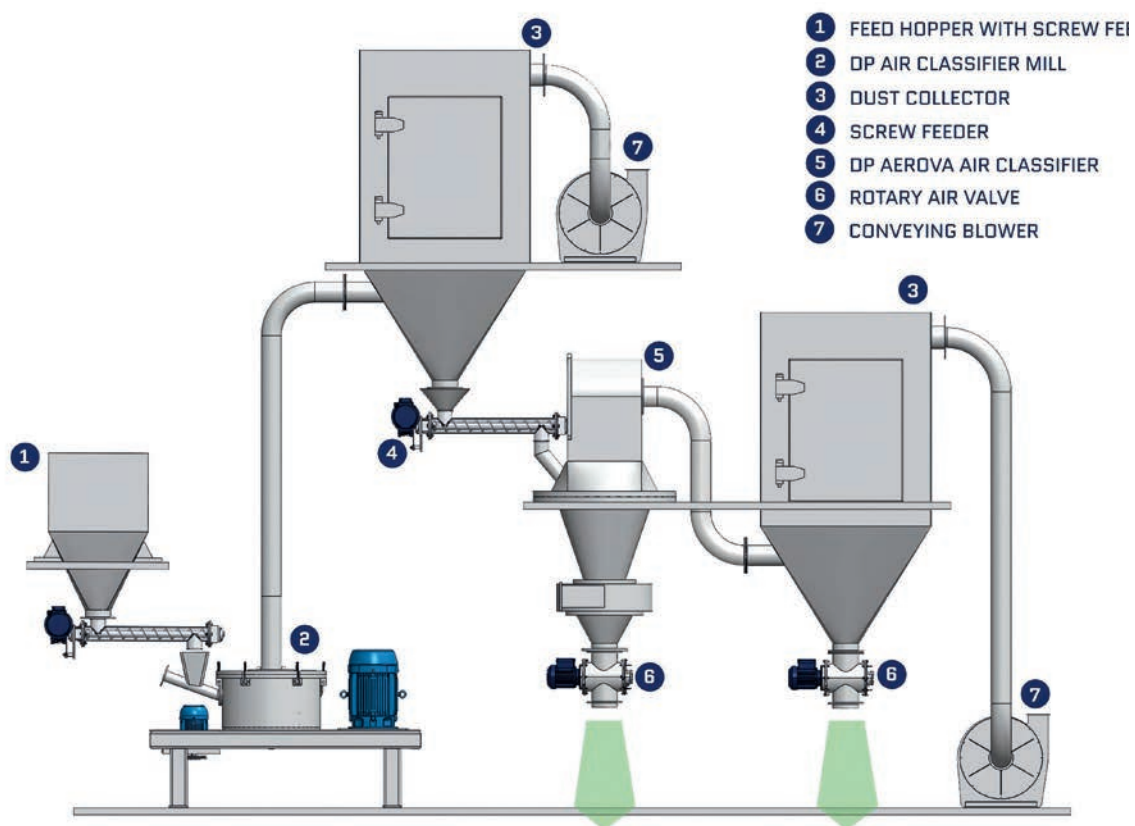
The process begins with controlled feeding of raw plant material into the milling system.

Inside the air classifier mill, the material is reduced to fine particles through high-speed impact forces.

The milled powder is transported through the system using controlled airflow.

This powder then enters the DP Aeroval Air Classifier, where aerodynamic forces separate the particles into distinct fractions.

Each product stream is collected independently, allowing manufacturers to produce valuable ingredients from a single raw material.



The diagram shown above how these components work together to produce protein-rich and starch-rich fractions.



# PROTIEN PRODUCT STREAMS

The Proteinova system generates two primary product fractions.

## High Protein Fraction

Fine particles rich in protein content.  
Protein concentrations can reach approximately 55–60% depending on the raw material.

Typical applications include:

- Plant-based protein ingredients
- Protein powders and supplements
- Functional food ingredients
- Protein enrichment in baked goods
- Sports nutrition products

Instead of creating waste streams, the process converts both fractions into valuable ingredient streams, improving overall production economics.

## High Starch Fraction

Coarser particles containing higher starch concentrations.

Typical applications include:

- Food starch ingredients
- Bakery applications
- Snack foods
- Industrial starch uses
- Animal nutrition

## APPLICATIONS IN PROTEIN PROCESSING

Protein shifting technology can be applied to many plant-based protein sources.

### Soy Protein

Soy remains one of the most widely used protein ingredients in the world.

Mechanical protein shifting enables processors to produce concentrated soy protein fractions for food manufacturing.

### Pea Protein

Pea protein is rapidly becoming a leading ingredient in plant-based foods due to its neutral taste and excellent nutritional profile.

Protein shifting allows efficient separation of protein from pea starch.

### Chickpea Protein

Chickpeas contain valuable protein structures used in plant-based foods and protein powders. Fine milling and classification allow manufacturers to produce refined chickpea protein concentrates.

### Lentil and Pulse Proteins

Many legumes contain high protein content that can be recovered using dry fractionation technologies.

### Rice Protein

Rice protein is widely used in hypoallergenic food formulations and sports nutrition products. Protein shifting provides a mechanical method for separating protein from rice starch.

# ENGINEERED FOR INDUSTRIAL PERFORMANCE

DP Pulverizer systems are engineered for reliable industrial operation.

Key design features include:

- Precision air classifier milling technology
- High efficiency air classification systems
- Energy efficient grinding mechanisms
- Compact system footprint
- Dust-free processing
- Food-grade stainless steel construction
- Easy maintenance and operational reliability

These features allow processors to achieve consistent particle size control and stable production performance.

## WHY CHOOSE DP PULVERIZERS

For more than 60 years, DP Pulverizers has specialized in size reduction and air classification technology.

With thousands of installations worldwide, DP equipment is trusted across many industries including food processing, chemicals, pharmaceuticals, and advanced materials.

Key strengths include:

- Extensive engineering experience
- Advanced powder processing expertise
- Custom system design capabilities
- Pilot testing and material trials
- Complete turnkey processing plants

DP Pulverizers works closely with customers to design optimized processing solutions tailored to each application.

## THE FUTURE OF PROTEIN PROCESSING

The global shift toward plant-based foods is driving the need for new technologies capable of producing high-quality protein ingredients efficiently and sustainably.

Mechanical protein fractionation offers a powerful pathway to achieving this goal.

By combining precision milling with aerodynamic particle separation, the DP Proteinova Protein Shifting System enables manufacturers to unlock the full value of plant-based raw materials.

The result is a scalable and efficient method for producing high-value protein ingredients for the next generation of food products.

# 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	



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