Air classification

Identification

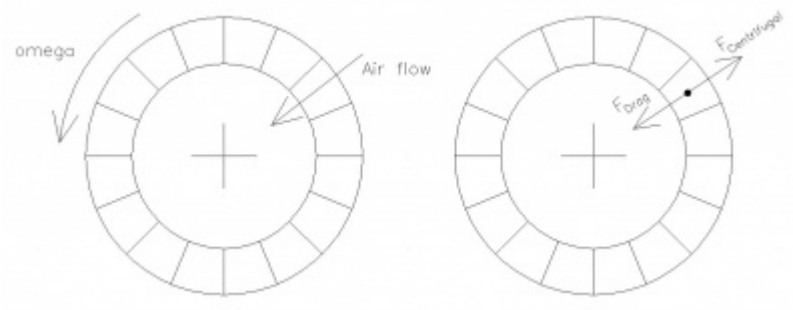
Key words	separation, dry powder, particle size, density, air
Latest version	2010/12/20
Completed by	Wageningen UR - FBR

How does it work?

Primary objective	The aim of air classification is to separate (milled) powders into fractions.

Working principle

The separation is based on the aerodynamic behaviour of small particles. On one hand the rotational speed results in a centrifugal force. on the other hand the airflow results in a drag force. Due to different particle sizes there is an imbalance between the drag force and the centrifugal force.



A dust cloud is created from the feeded powder. Due to under-pressure inside air flows through the rotating classifier. Smaller particles are removed from the cloud by the air flow. The large pasticles remain outside the classifier. Both fractions are collected in bins.

Images

Additional effects Due to the high velocities of the particles electrostatic charging can occur.

Important process parameters air flow, rotational classifier speed

Important product parameters particle size, density

What can it be used for?

Products Dry powders (<1mm), flours, dry mixtures

Operations Separation

Solutions for short comings This method saves a lot of drying energy when the process replaces a wet separation method. Moreover, reduction of functionality of protein can be avoided.

What can it NOT be used for?

Products	Liquids, gases, large solids (>1mm, incl. packed products). Sticky and wet powders.
Operations	
Other limitations	None.
Risks or hazards	If electrostatic charging occurs, there is a risk of a dust explosion. This can be avoided/minimised by using an inert gas (e.g. nitrogen or carbon dioxide).

Implementation

Maturity	Air classification is available at pilot and industrial scale.
Modularity /Implementation	Air classification can be inserted in an existing production line. Note that a lot of air is used and equipment to generate that must also be implemented.
Consumer aspects	None.
Legal aspects	None.
Environmental aspects	The dry process will consume less energy compared with wet separation including drying.

Facilities that might be interesting for you

Title	Institute/company
Air classifier FBR	Wageningen UR - FBR

Further Information

Institutes	Wageningen UR - FBR
Companies	Hosokawa Alpine, Hosokawa Micron
References	1. Ratnayake W.S., Hoover R., Warkentin T. Pea starch: Composition, structure and properties - A review (2002) Starch/Staerke, 54 (6), pp. 217-234. 2. Chavan J.K., Kadam S.S. Nutritional enrichment of bakery products by supplementation with nonwheat flours. (1993) Critical reviews in food science and nutrition, 33 (3), pp. 189-226. 3. Vose, J.R., Basterrechea, M.J., Gorin, P.A.J., Finlayson, A.J., Youngs, C.G., 1976. Air classification of field peas and horsebean flours. Chemical studies of starch and protein fractions. Cereal Chem. 53, 928–936. 4. R. D. Reichert, C. G. Youngs: Nature of the residual protein associated with starch fractions from air-classified field pea starches. Cereal Chem. 1978, 55, 469–480. 5. R. T. Tyler, C. G. Youngs, F. W. Sosulski: Air classification of legumes. I. Separation efficiency, yield and composition of the starch and protein fractions. Cereal Chem. 1981, 58, 144–148.