# Air classification

## Identification

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

## How does it work?

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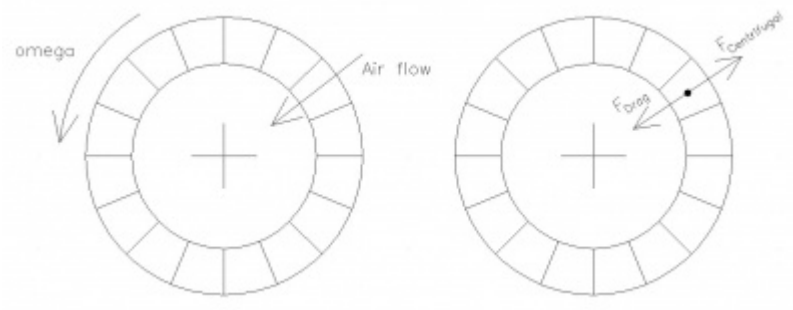
| **Primary objective** | The aim of air classification is to separate (milled) powders into fractions. |

**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?

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| **Products** | Liquids, gases, large solids (>1mm, incl. packed products).<br>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

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| **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

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|---|---|
| **Institutes** | Wageningen UR - FBR |
| **Companies** | Hosokawa Alpine, Hosokawa Micron |
| **References** | 1. Ratnayake W.S., Hoover R., Warkentin T.<br>Pea starch: Composition, structure and properties - A review (2002)<br>Starch/Staerke, 54 (6), pp. 217-234.<br>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.<br>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.<br>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.<br>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. |