Mechanized Drying of Cassava using Flash Dryers (Pneumatic Dryers)

Solution Holder is **Adebayo Abass** and can be contacted through **a.abass@cgiar.org**

Summary

The most important unit operation in the processing of cassava roots to value-added products is drying. Dryers are used to convert cassava mash to floury/powdery products. Among the different dryers, flash dryers have the shortest residence time of drying, are the most economical and widely used drying system for solids that have been dewatered or inherently have low moisture content. Thus, it's suitability for the production of starch, high-quality cassava flour (HQCF) and powdered fufu. Many flash dryer designs based on efficiency, product quality and throughput have been developed by fabricators in Nigeria. Year 2000 was the first time a flash dryer (owned by Femtex Starch factory in Lagos) was tested by IITA for drying HQCF. The result was encouraging, and it led to the subsequent technical support to equipment fabricators in Nigeria for the widespread fabrication and its use for drying of cassava to HQCF in Nigeria. Since 2004, flash dryers have been fabricated commercially and installed in Nigeria and other African countries (Ghana, Tanzania, Madagascar, Malawi, Zambia, etc.) by subsequent projects, government institutions, and the private sector.

Technical Description

The wet product enters the drying duct of a flash dryer at the feeding point and is entrained by the hot airstream. Both negative and positive pressure conveying systems are used in pneumatic dryers. In a negative-pressure system, the blower is located downstream of the material separator, while in a positive-pressure system the blower is located upstream of the material feeding point. During transport, heat is transferred from the hot air to the particles through convection, drying the material as it moves. At the end of the drying duct, a cyclone is commonly used to separate the entrained dry product from the drying air. The large surface area of the product particles results in high drying rates and short residence times and this allows heat sensitive materials to be dried at relatively high temperatures, without overheating taking place.

Uses

Flash dryers are used to dry granular materials in the chemical, pharmaceutical and food industries.

Composition

A flash dryer is composed of a feeding point, drying duct through which cassava grits are carried by hot airstream and are simultaneously dried. An air blower pulls or pushes the hot air through the drying duct. A cyclone separates the dried material from the drying hot air.

Means of application

A flash dryer (pneumatic dryer) has to be placed in a proper factory building or similar space with a complement of other cassava processing machines. Fresh roots are processed into wet but free-flowing granules to be dried in the dryer. After drying, the grits are milled into flour.

Agroecologies	All Agroecologies.
Regions	Africa South of Sahara.
Developed in Countries	Nigeria.
Available in	Cameroon, Democratic Republic of the Congo, Ghana, Liberia, Malawi, Nigeria, Sierra Leone, Tanzania, Uganda, Zambia.
Solution Forms	Equipment.
Solution Applications	Value addition.
Agricultural Commodities	Cassava.
Target Beneficiaries	Agro-manufacturers.

Commercialization

Commercialization Category

Commercially available

Startup Requirements

A flash dryer user must be able to build a processing factory where the dryer and other machines such as grater, peeler, dewatering machine, and other machines will be placed.

Production Costs

In pneumatic dryers, electricity usage is a significant component of the production costs, due to the large amount of electrical energy required to power the blowers. The cost of fuel for generating the heat could also be high. The cost of drying varies significantly depending on the efficiency of the dryer components and competence of the machine operator. The absence of a proper control system for heat generation and product feed may increase the cost of drying operation. There are approximately 180 SMEs with flash dryers in Nigeria with a capacity of 1-2 tons of HQCF per day.

Customer Segmentation

Flash dryers are used by small- and medium-sized enterprises. State-of-the-art industrial pneumatic dryers are available, and are used to process cassava in many tropical countries; however, these industrial, large-scale dryers are often too big for use with village-based agro-processing activities that are common in sub-Sahara Africa.

Potential Profitability

Profitability depends on the cost of fresh cassava, fuel and most importantly the purchase price of the HQCF, which is often dictated by the large buyers: wheat flour millers. Another cost element is the supply and price of energy required for processing. Nonetheless, the use of flash dryer is expanding across Africa and has proven to be profitable for making HQCF, starch, fufu and pounded yam flour especially when supplies of cassava roots at competitive prices is guaranteed and the set of processing equipment is efficient, making the whole processing operation efficient and profitable.

Licensing Requirements

No licensing requirements.

Innovation as Public Good

Flash dryer is a public good. It is manufactured by several engineering companies in Africa and other parts of the world.

Solution Images



Institutions

