Study and Experimentation on Advance Wheat and Rice Rotation Drying Arrangement for Industry with Special Solvent Dryer

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Abstract- *Rotaional drying is a technique which has a wide range of applications in the agriculture products. To design and fabricate desiccant wooden fins arrangement with slots sticked by silica gel so as to generate dry air.Rotary dryers are workhorses which are easy and reliable to operate, but neither energy-efficient nor environmentally friendly. In order to conform better to the requirements of modern society concerning working conditions, safety practices and environmental aspects, the development of control systems can provide opportunities for improving dryer operation and efficiency.The performance of each was examined both with simulations and in pilot plant experiments. The pilot plant dryer at the University of Oulu closely resembles a real industrial situation, so that the results are relevant. Evaluation of these results showed that the intelligent hybrid controllers are well suited for the control of a rotary dryer, giving a performance in which disturbances can be eliminated rapidly and operation of the dryer can thereby be improved, with the aim of enhancing its efficiency and environmental friendliness*

Keywords- Rotational drying, Solvent Dryer

I. INTRODUCTION

As per technical evolution and latest trends taken into consideration, here effectively created an advanced system i.e. universal grains dryer through special drying arrangement. This system can be useful any grain industry and material industry to do drying with special site. This system uses one efficient arrangement for grains and respective carriage encapsulated by duct having one inlet and outlet arrangement for dry air and inlet outlet arrangement for grains Grains which is entered from inlet stands over special arrangement of gran placement system. Initially air is entered into the system through exhaust air arrangement and heater then pass through heater and finally enter into the special encapsulation of dryer with dehumidifier. This arrangement uses some solution to generate dry air with dehumidifier arrangement which is encapsulated by material body so that system will be effective

Drying is a dehydration process used to remove the moisture present in food products by the application of air. The air may be supplied either by hot air or from the electric energy. Drying process is used to preserve the food products for future usage. Drying prevents the growth of bacteria and yeast formation. Drying can be achieved by using open sun drying and greenhouse drying. Drying is an operation of great commercial importance in all industrial applications ranging through the food, agricultural, mining and manufacturing sectors. Modern society requires better product quality, improved safety practices and more environmentally benign operations, as well as higher productivity, better energy efficiency and reduced material wastage. As drying is certainly one of the most energy-intensive operations in industry, and as most dryers operate at low thermal efficiency, the development of models and control systems offers an opportunity to improve dryer operation and efficiency.

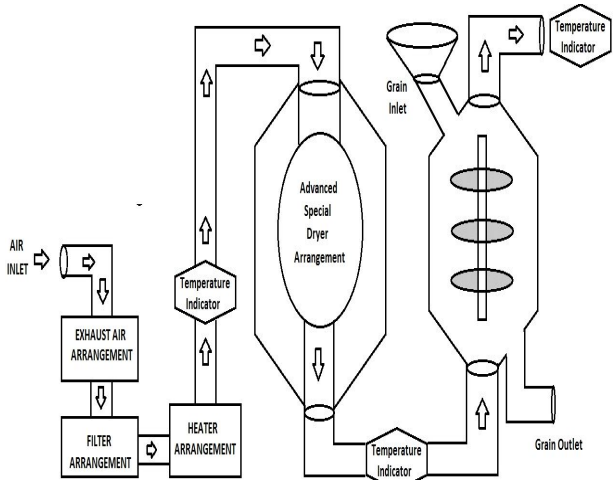

Fig. Concept of working setup

II. LITERATURE REVIEW

2.1 C.J.Aundhia1*, J A.Raval2, M.M.Patel3, N.V Shah1, S.P.Chauhan1, G.U.Sailor1, A.R.Javia1,R.A.Mahashwari1

Spray Drying in the Pharmaceutical Industry – A Review Spray drying is a technique which has a wide range of applications in the pharmaceutical industry. The unique possibilities for particle engineering, potent drug handling and continuous production makes spray drying the preferred tool in formulation departments in more and more companies. The present review highlights the instrumentation, advantages and the various applications of spray drying.

2.2 Siripan Murathathunyaluk*, Nitika Srisakwattana, Treenuch Saksawad, Eakarach Bumrungthaichaicha

Development of Rotating Tray Dryer and Study of the Hot Air Flow Pattern with Computational Fluid Dynamics Rotating tray dryer has the advantages over Cabinet dryer when we compare them, which is the end product from drying procedure has more regularity of moistness after the procedure. A new tray dryer with three rotating trays was designed, constructed and evaluated to find the optimal pattern for inputting hot air into the chamber. Three experiments to supply hot air were investigated. First, hot air flows in lower inlet tube with and without tray rotation. The comparison on hot air ratio with tray rotation was made by varying the ratio of air flow rate though three wall-side tubes at 0:0:100, 20:20:60 and 30:30:40 (upper: middle: lower). The optimal ratio was found to be 30:30:40. Next, this optimal ratio was used to compare the drying efficiency between entering hot air through one-way inlet with tray rotation (rotating tray) and entering hot air through two-way inlets without tray rotation (stationary trays). The optimal pattern for entering hot air is two-way inlets of hot air with stationary trays at the ratio of 30:30:40. This setting was used for drying of mulberry and measuring total phenolic compound (TPC) in dried mulberry. After drying process, the quantities of TPC in each tray were not significantly different. Furthermore, the optimal condition is used to study the temperature profile with simulation program (Computational Fluid Dynamics, CFD) and the results from CFD are correlated with the experiments.

2.3 K.J. Chua* and S.K. Chou

Low-cost drying methods for developing mcountries Low-cost drying technologies suitable for rural farmingareas are presented. Some of the important considerations with regard to their suitability include: 1. Low initial capital; easy-to-operate with no complicated electronic/ mechanical protocol, and 3. effective in promoting betterdrying kinetics. The drying technologies that were selected include fluidized bed, spouted bed, infrared, solar, simple convective and desiccant drying. A brief introduction on each drying technology has been presented followed bysome technical details on their working operations. Examples of farming crops suitable for the employment of individual drying technology are provided to illustrate their potential application in agricultural product drying. 2003

2.4 Otto R. Kunze* Professor Emeritus

Effect of Drying on Grain Quality -- Moisture Readsorption Causes Fissured Rice Grains Among others, drying can affect the quality of rice or other cereal grains (with a hard vitreous endosperm) in three prevalent and distinctive ways. Through Moisture Readsorption by Dry Rice Grains: Rice, as well as other cereal grains, is hygroscopic. The low-moisture (dried) grain readsorbs moisture from any source to which it is exposed. Moisture adsorbed through the grain surface causes the starch cells to expand and produce compressive stresses. Since the grain is a "free body", compressive stresses are countered by equal but opposite tensile stresses at the grain centre. When the compressive stresses at the surface exceed the tensile strength of the grain at its centre, a fissure develops. Fissured grains usually break during milling. Sources for grain moisture readsorption are discussed. Through Moisture Readsorption by Field Rice Grains: When rice grains in the field reach harvest moisture (22%), the field sample may contain grains with moisture contents (MC) between 15 and 45%. Many individual grains may dry to below 15% MC during the day. Such grains can fissure on the stalk when they readsorb moisture at night.

2.5 M. H. Lisboa, D. S. Vitorino, W. B. Delaiba, J. R. D. Finzer and M. A. S. Barrozo*

A STUDY OF PARTICLE MOTION IN ROTARY DRYER The purpose of this work was to study the performance of a rotary dryer in relation to number of flights. In this work an equationing was proposed to calculate the area used by the solids in two-segment flights of with any angle between the segments. From this area, the flight holdup and the length of fall of the particles were calculated for different angle positions and the results obtained were compared to experimental values. The results show an increase in dryer efficiency with the increase in number of flights up to a limit value, for ideal operational conditions. The experimental data on average residence time were compared to results obtained by calculations using equations proposed in the literature. The equation proposed for predicting flight holdup and length of fall of particles generated very accurate estimations.

2.6 *LEENA YLINIEMI*

ADVANCED CONTROL OF A ROTARY DRYER Drying, especially rotary drying, is without doubt one of the

oldest and most common unit operations in the process industries. Rotary dryers are workhorses which are easy
and reliable to operate, but neither energy-efficient nor environmentally friendly. In order to conform better to the requirements of modern society concerning working conditions, safety practices and environmental aspects, the development of control systems can provide opportunities for improving dryer operation and efficiency. Our in depth understanding of rotary drying is poor, because it is a very complex process that includes the movement of solids in addition to thermal drying. Thus even today rotary dryers are controlled partly manually, based on the operator's "eye" and experience, and partly relying on conventional control methods. The control of a rotary dryer is difficult due to the long time delay, which means that accidental variations in the input variables can disturb the process for long periods of time before they are reflected in the output variables. To eliminate such disturbances at an early stage, increasing interest has been shown in more sophisticated control systems such as model-based constructs, fuzzy logic and neural nets in recent years. Although it has proved difficult and time-consuming to develop model-based control systems, due to the complexity of the process, intelligent control methods based on fuzzy logic and neural nets offer attractive solutions for improving dryer control. These methods make it possible to utilise experience, knowledge and historical data, large amounts of which are readily available.

2.7 Ola Slätteke

Modeling and Control of the Paper Machine Drying Section The topic of this thesis is modeling and control of the last part of the paper machine – the drying section. Paper is dried by letting it pass through a series of steam heated cylinders and the evaporation is thus powered by the latent heat of vaporization of the steam. The moisture in the paper is controlled by adjusting the set point of the steam pressure controllers. There exist several commercial incentives to focus on the performance of the moisture control. The time to perform a grade change is often limited by the moisture and shorter grade change time is directly correlated to economic profit. Studies have shown that the drying section uses of the total energy requirement in paper making. It also creates opportunity for increased production rate. The thesis is divided in two parts. The first part deals with the controlof the steam pressure inside the cylinders. Both a black-box model and a physical model are given for the steam pressure process. A tuning rule for both PI and PID control is derived and various other controller structures are investigated. Many of the results are verified by experiments on paper machines at different paper mills.

III. CONCLUSION

Given a proper sized, low-cost dryer, food processing can proceed uninterrupted in rural areas. At the village level, localized farmers, or factories, wanting to process their surplus crops into acceptable and marketable food items need low-cost but efficient dryers for their operations.

Presented in this paper are some practical low cost, easy-to-fabricate and easy-to-operate dryers that can be suitably employed at small-scale factories or at rural farming villages. Such low-cost food drying technologies can be readily introduced in rural areas to reduce spoilage, improve product quality and overall processing hygiene. The eventual objective of employing these appropriate drying technologies is to significantly improve the agricultural returns for farmers in appreciation of thehard effort they have devoted in crop cultivation

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