

THESIS REVIEW

Bachelor thesis

Thesis title: **DESIGN OF A CHAMBER DRYER FOR SUGAR CUBES DRYING**

Student's name: **Bc. Javid AZIZOV**

Thesis supervisor: Doc. Ing. Pavel Hoffman, CSc.

Reviewer: Ing. Jaromír Štancl, Ph.D.

Reviewer affiliation : CTU in Prague, Faculty of Mechanical Engineering, Department of process engineering

The thesis was submitted to review in the range of 63 pages of text with 34 figures (including graphs) and includes 2 A3 drawings in Annex 1 and 2. References contain 17 items.

The aim of the presented thesis is to design the chamber dryer for sugar cubes (200 kg/h) drying from initial moisture 2 % to the final 0.1 %.

The work is written in English. It contains several grammatical errors but on the other hand, it is "readable written" with clear formulations, some parts of the presented thesis are not logically sorted. The work is divided into five main parts.

The first part contains a scope of the thesis. The purpose of the drying process, comments on the various stages of the drying process and discussion (perhaps too closely) of the use of an industrial heating pump in the dryer setup are presented in the introductory of the presented thesis.

The second part describes (in form of literature search) the drying methods and suitable dryers for the drying of sugar cubes purpose. The level of the literature research is weaker, there are relatively few citation in the text. Sometimes is very difficult to distinguish author's own thoughts. I am missing here some easy comparison of the described dryers and methods with selection which type of dryer will be the best for drying the sugar cubes as a conclusion of the literature research.

The third part contains a description of the laboratory device used for experiments and experimental procedure. The laboratory device and experimental procedure is described sufficiently. I have no fundamental objections to the performed experiments. Experimental part ends with the presentation of the obtained results from performed experiments in the form of dependence of the wet sugar cubes mass on drying time and cubes moisture on drying time for two selected temperatures (80 °C and 60 °C) and drying air velocities (1 and 1.5 m/s). Here I am missing some comments or comparison to the obtained experimental results. According to the work submissions, the evaluation of the energy consumption for the heating purposes and for fan is missing.

The fourth chapter deals with the basic design of the two selected types of the dryer – belt dryer and chamber dryer. According to the specified parameters for the dryer duty, the area of the belt and dimensions of the chamber are calculated. I don't understand well, why the belt dryer is designed too? (The title of the presented thesis is "Design of a chamber dryer..."). Whole basic design of the belt and finally of the chamber dryer reduces only to the design of the dimensions but basic design should already be more specific. This part ends with mass and energy balance calculations. I have no fundamental comments to the presented balances and results.

Formal remarks:

- Page 29: Too general conclusion for the selection the appropriate type of dryer for sugar cubes drying purpose.
- Page 31: the text refer to the scheme of the experimental device to Fig. 1, but the scheme is presented in the Fig. 19.
- Page 31: described heater placement does not correspond to the scheme in FIG. 19.
- Pages 35-36: Fig. 22 and 23: poor figure quality
- Pages 39 – 43: Presented graphs: the shape of points should be classic 2D form (circle) against used balls. Used ball shape of points in graph makes the graph difficult to read.
- Obtained time necessary for drying the samples is presented in graphs, but what about energy consumption for heating and for fan (according to the submissions of the work)?
- Page 39: hyperbolic diagrams???
- Page 45/ eq9 and others: writing equations, numbers and units - why the unit is in brackets after number?
- Page 56: the advantage “no manipulation with trays” is mentioned 2x.
- Page 57: it is necessary to specify the size in the basic units (no g but kg)
- Appendix A: presented drawing is almost illegible (errors in imaging, bad dimensioning etc.)

Questions for defense:

- Page 33: What was the initial moisture content of sugar cube samples before the modification of its moisture content? How that value was determined (assumption or measurements)?
- What type of data are presented in graphs Fig. 25-32 (the best obtained results from repeated experiments or the average from repeated experiments)?
- Page 53 + 54: What was the reason to select initial air temperature 25 °C? What was the relative humidity of the air on inlet used for balance calculation? Can you present how were the X_{A1} and X_{A2} values determined?

Thesis evaluation

The presented work (according my point of view) meets the requirements for the diploma thesis. The submissions of the work were respected. I agree with the presented results and procedures so I recommend to let the student defend his thesis. Regard to the quality of the presented work, its formal level and obtained results I suggest the final grade of the thesis

C (good)

In Prague, August, 17, 2015.



Ing. Jaromír Štancl, Ph.D.