THESIS REVIEWER'S REPORT

I. IDENTIFICATION DATA

Thesis title:	Energetická analýza výrobní linky sušeného mléka
Author's name:	Sumit Upadhyay
Type of thesis :	master
Faculty/Institute:	Faculty of Mechanical Engineering (FME)
Department:	Process engineering
Thesis reviewer:	Rudolf Zitny.
Reviewer's department:	Process engineering

II. EVALUATION OF INDIVIDUAL CRITERIA

Assignment	**easy**

How demanding was the assigned project?

The work is an example of a standard project. The aim was to make the mass and enthalpy balance of the milk powder production line. Several variants of the process diagrams should be assessed and the variant with the lowest fixed+operating costs selected. Steady state balances were implemented in MS Excel sheets. No comparison with different methods (process integration, exergy analysis) was required.

Fulfilment of assignment	**fulfilled with minor objections**

How well does the thesis fulfil the assigned task? Have the primary goals been achieved? Which assigned tasks have been incompletely covered, and which parts of the thesis are overextended? Justify your answer.

The basic processing line (existing scheme with the 3-effect evaporator+spray dryer) was compared with modifications according to the Scheme 1 (Thermal Vapour Compression of vapours from the second stage of evaporator), the Scheme 2 (utilisation of condensate heat for CIP preheating) and the Scheme 3 (heat recovery of drying air in the spray dryer). Comparison assumed the same „boundary conditions" (prescribed capacity of the process line and parameters of processed milk and produced milk powder). Mass and enthalpy balances of the considered processing lines were carried out in the MS Excel software. This analysis enables to calculate consumption of steam (necessary for TVR, pasteurization, CIP and calorifer), and consumption of electric power (pumps, blowers). Fixed cost of investment necessary for reconstruction of existing processing line was also very roughly estimated. Therefore it was possible to estimate annual profit of considered schemes (net and cumulative cash flow analysis). All these results hold for continuous steady state process, and start up-shot down transient regimes are not considered (the production line would probably operate continuously 20 hours per day interrupted by 4 hours CIP). The CIP cannot be probably considered as a steady process because heat is received from an accumulation tank. The Six Sigma method is mentioned in Chapter 5 but I did not understand what it was all about and how is it related to the project.

Methodology	**partially applicable**

Comment on the correctness of the approach and/or the solution methods.

See previous point. Unfortunately, I cannot say whether the results are correct (probably yes). Some equations in the text are suspicious, for example unbalanced bracketing (7), (41), and errors or inconsistency in Eqs. (7)-(11) - however in the MS Excel these equations are written correctly. There are many things I do not understand, for example, I do not understand how the thermocompressor is calculated (I do not know how the ratio of motive steam flowrate and the flowrate of sucked vapours was calculated, is it really almost one?). The parameters describing the models are classified as given (prescribed), calculated (from mass and enthalpy balances) and optimized (there are 3 optimized parameters of flowrates O_1, O_2, O_3 in the preheaters of milk, and three temperature differences in the three effects of evaporator). What criterion for optimization was selected and how was the optimization realized? Manually?

Technical level	**D - satisfactory.**

Is the thesis technically sound? How well did the student employ expertise in the field of his/her field of study? Does the student explain clearly what he/she has done?

I positively evaluate the extent of the literature used. I appreciate the routine skills necessary for process balancing using MS Excel. However, the work is poorly organized and very confusing.

Formal and language level, scope of thesis	F - failed.
Are formalisms and notations used properly? Is the thesis organized in a logical way? Is the thesis sufficiently extensive? Is the thesis well-presented? Is the language clear and understandable? Is the English satisfactory?	
There are several reasons for my negative assessment. The list of symbols is incomplete, references to figures and literature are wrong. The main problem is stylistics and language. The work is difficult to read and sometimes it is very difficult to understand the meaning of the sentences (and I think I am not the only one).	

Selection of sources, citation correctness	D - satisfactory.
Does the thesis make adequate reference to earlier work on the topic? Was the selection of sources adequate? Is the student's original work clearly distinguished from earlier work in the field? Do the bibliographic citations meet the standards?	
See previous remarks. I am convinced that the work is not a plagiate and all resources are correctly cited.	

Additional commentary and evaluation (optional)
Comment on the overall quality of the thesis, its novelty and its impact on the field, its strengths and weaknesses, the utility of the solution that is presented, the theoretical/formal level, the student's skillfulness, etc.
The diploma thesis of more or less routine character should document the understanding of the problem and some skills, such as mastering the MS Excel software (which was quite successful). And also the ability to give a clear presentation of the results (not so much anymore). The basic mistakes are carelessness, negligence, chaos. Maybe due to lack of time or lack of diligence or motivation.

III. OVERALL EVALUATION, QUESTIONS FOR THE PRESENTATION AND DEFENSE OF THE THESIS, SUGGESTED GRADE

Summarize your opinion on the thesis and explain your final grading. Pose questions that should be answered during the presentation and defense of the student's work.

The grade that I award for the thesis is **E - sufficient.**

Date: **Click here and enter the date.**   Signature: