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Field of Study: Finance and Taxes

OPTIMIZATION OF VARIABLE AND FIXED COSTS

(Bachelor Thesis)

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I confirm, that I am the sole author of this Bachelor Thesis under the supervision Ing. Petr Kobylka and that I listed all used literature and other literary and technical sources in the Bibliography.

Kunovice, August 2009

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Introduction

For business process management and decision making, the managers follow the cost-effective characteristics, which are related to the economic activity of the company. The basic indicators of the costs are the company economy, economic profitability and effectiveness.

In managerial accountancy the costs are divided dependently on the changes in production volumes. Thus we speak of variable and fixed costs. In my work I focus especially on this type of costs. Nevertheless, there is a question: How to make variable costs more optimal?

The main idea of my bachelor work is to make variable costs more optimal. There are a couple of methods, which we can use. In managerial accounting we encounter the system of calculation, budgetary system, analysis of deflection, etc. I have focused on methods of deflection management by using the consumption standards of direct costs and Standard-costs Methods. The cost-management follows the standards (both quantitative and qualitative). We evaluate deflections and establish safety precautions.

In the first part of my work I tried to explain the philosophy of the Total Productive Management (TPM). This successful method deals with variable costs management. We look for possible loss or additional costs anywhere in a company so as to make analysis of breakdowns, defects, and to create individual projects. The main idea of TPM is a more complete-use of production capacity.

The other new method is the 5 S Method. Its country of origin is Japan. This method emphasizes the value of workplace organization and process discipline leading to the most optimal use of production capacity.

1 Costs

In financial accountancy we define costs as a decrease of economic profit, which is indicated by the fall of assets or by increase of debts, and which leads to the reduction of the total capital (in a different way than withdrawal of capital by owners).¹ Financial accountancy is especially linked with account history that makes the business process accessible mainly for external users (costumers, suppliers, banks, and other institutions). Financial accountancy is completed in closing the books, which includes account documents (e.g. balance, profit and loss statement, summary of changes of own capital) and an accounting annex.² The annex provides information about the financial health of the company.

There are several principles for the business process management and decision making. The leaders of each team of the company have different information needs that should be selected exactly for them and for their purposes. This mainly refers to managerial accountancy and managerial conception of costs. In managerial accountancy we come out from cost characteristics, effective special-purpose investments of the economic sources of the company related to its own economic activity. It is mainly about economic use of resources. The cost for managerial project will prove immediately, not at the moment of product selling, but at the moment of economic investment.

Managerial accountancy:

- informs about the structure of costs (cost classification by purpose, production effectiveness and the centres, where the costs may occur)
- keeps safe the creation of calculating system, economic plans and budgets
- checks costs in relation to the standards
- provides information for decision-making

KRÁL, B. and coll. *Managerial accountancy*. Prague: Management Press, 2002.
 36 pages. ISBN 80-7261-062-7.

² LANDA, M.; POLÁK. M. *Economical management of company*. Brno: Computer Press, 2008. 5 pages ISBN 978-80-251-1996-9.

1.1 Basic terms of managerial accountancy

Economy

The basic criterion for evaluation of using of economic resources is the economy. Economy expresses such a development of costs, by which we will reach the target requirements with the smallest resources investment possible. This usually happens in the form of economic savings and economic yield. A pre-determined performance in production should be reached by the smallest amounts of economic funds. Management directs the maximizing of performance in production at constant economic funds invested, so as to use the capacity on maximum.

Economic profitability

The other criterion for evaluation of costs is economic profitability of the resources invested. Provided we measure invested resources with the reached performance in production, we speak about profitability. Profit, a difference between costs and profits, is considered to be the most synthetic criterion of the success in business. The increase of this item relates very closely to a rise in the value of the company, together with the ability to branch out business and company. We can not forget to mention the functions of profit, such as distributional and stimulative function. In this case the profit could be distributed among owners and for tax purposes and duties. The stimulative function is used as a device how to urge company workers to take part of company complete results.

Economic effectiveness

At economic effectiveness we compare costs and achieved profit. At the same time we refer profit to a total quality of assets (company properties). We can understand effectiveness as an ability of the company to evaluate all sources used in business. Managerial accountancy, except for measuring of a total economic effectiveness, deals with the particular factors which influence the increase of activity of the company. This is the area for which is the company management especially responsible.

The effectiveness of own capital can be increased by:

- the increase of profit
- quicker money return
- the increase of participation of cheaper foreign sources

1.2 Costs of managerial accountancy

The main point of study and analysis of costs lies in the following functions:

- it reveals a profitable and unprofitable operation
- it identifies ineffectiveness and unnecessary losses
- it analyzes profit and its changes
- it helps to set selling prices
- it helps in planning and supervision
- it helps to stimulate financial effects of strategic decisions

The effective cost management is subject to their isolation of costs into minor groups. It is possible to separate the costs of managerial accountancy into the different categories:³

a) according to the category of invested resources (categorical classification),

b) according to the direct purpose of their utilization (special-purpose segmentation),

c) according to their dependence on changes of range of activities (volume of effectiveness)

d) from a view of required decisions.

³ SCHROLL, R. and coll. *Managerial accountancy:* Prague: Union of accountants in publishing Balance, 1997, 61 pages.

2 Costs classification

2.1 Unit costs and overhead costs

The unit cost is specified by a relevant standard, and a basic device of their management, is calculation. Their relation to production-performance is direct. The unit cost directly increases with production volume. The examples are material cost per unit and salaries cost per unit, i.e. direct costs.

On the contrary, overhead costs are connected with a certain technological process as a whole they do not increase directly with the number of production operations. Their amount is specified on the basis of total limits and standards it usually relates to a certain period or to total production volumes. There is appointed a person who is responsible for a completion of the task, keeping an overhead budget.

	Types	of co	osts (g	roup	s)					
Items of unit and overhead cost	50 - spent purchases	51 - service	52 - personal costs	53 - taxes and charges	54 - other operating costs	55 – tax deduction , reserve, repair items of	56 – financial costs	57 - reserves and repair items of financial	58 - special costs.	59 – income taxes
Unit material	Х									
Unit earnings			х							
Other unit costs		Х								
Production outgoings	Х	Х	х			х				
Supplying outflows	Х	Х	х	x		х				
Administrative outflows	Х	Х	х	х	Х	х	х	х	х	Х
Sales outflows	Х	Х	х	х		х				

Pic. No. 1: Unit and overhead costs in financial accountancy

Source : HRADECKÝ, M; LANČA, J.; ŠIŠKA, L. Managerial accountancy. Brno:Masaryk University, 2006. 24 pages. ISBN 80-210-4212-5.

Material per unit covers all materials, especially raw material, basic material, halffinished product, fuels, auxiliary material and some other ones such as production packaging. It is also material, which can be an indirect component of a product, but without the usage of the product, it would not arise. The unit material is represented in calculating formula by the item of direct material.

Salaries per unit - i.e. salaries which are classified by the particular tariff rate according to the production operations.

The other unit costs – cover various sorts of costs which are directly connected with the unit of production operation. The costs which might be classified directly with fixed calculation unit, for example energy, tax deduction, etc.

Production outflows – comprises management costs and production service. The costs are not connected to one type of production operation but ensures the whole production process, for example material overhead and overhead salaries.

Administrative outflows – the expenses for the management of the company as a complex. The costs which cannot be directly assigned to the individual production operations are the part of fixed costs.

Sales outflows – is only related to the complete and sold products. It includes costs of store operation, expedition of marketing. etc.

Outflows costs have common character therefore we have to calculate the price with a "burden" (charge) for the product originating (by using one of the method-allocation).⁴

2.2 Segmentation of costs depending on changes of range production capacity

Depending on the change of range production capacity are costs divided into:

• *variable*, which reacts on the change in production capacity, they are changing,

• *fixed*, which do not react on the change in production capacity, they do not change.

⁴ LANDA, M.; POLÁK. M. *Economical management of company*. Brno: Computer Press, 2008. 12 pages. ISBN 978-80-251-1996-9.

2.2.1 Variable costs

Variable costs react on the volume of production and they should change according to the volume of production. There are costs which have an under proportional growth and that increase slower than total production volume, for example costs for repairs and machine maintenance. On the contrary, there are costs, the growth of which increases more quickly than production volume – over proportional variable costs.

2.2.2 Fixed costs

Fixed costs are in their absolute level invariable nevertheless they are going down with the increasing unit of volume. This fact has a deep influence on calculation of the price. We speak about the total volume of fixed costs that ensure the proper conditions for an effective progress in production process.

In practise we usually encounter fixed costs linked to investment decisions, whose total level in business process cannot be changed. We can only accept new investment decisions (e.g. non-investing).

The other group of fixed costs originates as a result of ensuring of capacity conditions. The target is to ensure the maximal usage of capacity. The bigger is the production volume, the faster is the decrease of proportion of fixed costs on production unit.

3 Systems of managerial accountancy

The above mentioned system offers the basic source of information for categorical cost classification. With assistance of devices and methods of managerial accountancy we transform a financial profit and costs on managerial conception.

Devices of managerial accountancy:

- identification of direct and indirect costs,
- methods of allocation (classification) of costs and profits,
- inter-company centres,
- calculation of own and total costs
- inter-company prices

There are three systems :

- accounting system- specialized on capacity (identification and timing of costs according to the place of origin of profits and costs),
- accounting system– directed responsibly (internal centre responsible for the origin of costs),
- accounting system- directed by process (costs of a process).

3.1 System of calculation

A basic device of accountancy which is achievement-oriented is a calculating system which ensures the analysis of costs in relation to the individual processes.

The use of calculation :

- the valuation of achievements in individual centres and volumes of stores
- the definition of selling prices of products
- the analysis of budgets in central costs and profits

a dealing with decision-making processes related to production and selling orientation of the company.⁵

Calculating formula comprises these items:

- unit material
- unit personal costs
- other unit costs
- production outflows
- sales outflows
- supplying outflows
- administrative outflows

3.2 Budgetary system

In an accountancy focussed on responsibility is essential to classify the costs according to the responsibility for their origin.

The realization of objects in responsible accountancy occurs in three mutually connected phases:⁶

a) in the preliminary phase of purpose specification is necessary to transform the top targets of company to the system of mutually intra-connected particular targets. These will be in the agreement with all the company targets and subject to be influenced. They should inspirational and motivational for the institutes and managers, who will implement them,

b) in the phase of the follow-up control of these targets, formulated by individual criterions, it is necessary that the information system is able to quantify

⁵ LANDA, M.; POLÁK. M. *Economical management of company*. Brno: Computer Press, 2008. 49 pages. ISBN 978-80-251-1996-9.

⁶ KRÁL, B. a coll. *Managerial accountancy*. Prague: Management Press, 2002. 349 pages. ISBN 80-7261-062-7.

positive and negative impacts on the total results depending on which centre (worker), is responsible for them,

c) in the phase of analysis and information evaluation it is necessary that the whole process is closed by some kind of reward or other kind of personal assessment for the achieved results (e.g. bonuses).

Planning is the setting of target and at the same time determination of activities by which the target could be achieved. In organization we set plans and edit budgets. In the budget are set the value index and direct tasks which are linked to a specific period of time and includes estimated values. The budget is applied either to the whole company, or to its particular part.

Budget can be distinguish by :⁷

• a partial budget (example: budget of overhead costs),

• a complete business budget (Master Budget), included complete economical view on business; comprises the following items: planned consequences, a planned balance, planned cash flow.

3.3 Analysis of deflection and reporting

This analysis represented by the identification of a difference between the budgetary state and the real state. The analysis of deflection concerns both profits and costs. Deflections can have either a quantitative or a qualitative character. In relation to the revenues we speak about a planned sale volumes and a real sale volumes.

The reasons for deflections are the changes of acquisitive price of variable costs or from the capacity or consumer factors. Capacity deflections represent the oscillation in the use of production capacity.

Methods of deflection management

Norm method deals with the control of economy of direct costs, it means direct material, raw material, direct personal costs, possibly other direct costs. The norms of consumption of direct costs.

⁷ LANDA, M.; POLÁK. M. *Economical management of company*. Brno: Computer Press, 2008. 62 pages. ISBN 978-80-251-1996-9.

The method of standard costs does not only deal with direct costs, but also with the management of indirect costs. They are specified by the standards of direct costs, volume and qualitative standards.

The method of standard costs:

- 1) setting of standards,
- 2) finding out about the real values, especially at direct costs,
- 3) supervision of keeping standards and discovery of deflections,

4) the analysis of deflections, revealing of their cause and identifying of the department responsible for its origin.

5) a suggestion that prevents from the origin of deflection in the future.

The use of the method of standard costs enables the deflection management, simplifies business planning, and can be used in motivational systems. This method helps a great deal in the accountancy, which is focussed on responsibility. There are also some disadvantages of this method. There can appear a problem related to the wrong evaluation of importance of deflection (in practical management an employee can "cover" some negative deflections).

The main advantage of deflection control is the fact that standards have already been set as an essential part of costs that is why the attention of a leading staff concentrates directly on the deflections against these standards.⁸

⁸ LANDA, M.; POLÁK. M. *Economical management of company*. Brno: Computer Press, 2008. 88 pages. ISBN 978-80-251-1996-9.

4 Analytical part

4.1 The Characteristics of the Company PRIBINA

Date of registration: 11th May 1993 Company name: PRIBINA, Ltd. Company location: Hesov 421, 582 22 Přibyslav Identification number: 492 42 041 Legal status: Ltd Subject of business activity:

- Purchase of goods for the purpose of its further selling and distribution
- Road transport
- Restaurant activity
- Dairy farming
- Mediation of trade activities and services
- Business activity, financial, organizational and economic consultants
- Promotional/marketing activities

Basic capital: 185.400.000 Czech crowns

Pribina Přibyslav, Ltd. is a company, which is interested in production and purchase of dairy specialities. The company was established in 1923 named "*Dairy and pasturing cooperative of Přibyslav*". In 1953 the company was nationalized. It became independent again in 1993. In the year 1995 was Pribina bought by the French Cheese Company Bongrain. Since that time Pribina has been focusing on the development of its own product range, above all, cheese specialities and there is being done a gradual modernization of the whole company.

Company Pribina is a part of the Bongrain Czech group, which is also made up by the subsidiaries in Sedlčany and Hodonín. The company employs about 405 people.

4.2 Methods of cost cutting

4.2.1 Project TPM (Total Productive Management)

In accordance with the original plan the TPM program was worked out, and its main idea was the improving of maintenance and of all processes in the company: no downtime, zero percentage of defective products, no injuries. Initially TPM was occupied with service and maintenance of mechanical devices (Total Productive Maintenance). Nowadays it is about extensive hard work of management, focused on knowledge and realization of leading and involving of employees into the process.⁹

TPM – a system of an active search for possible losses or additional costs in all activities of a company, their follow-up analysis and elimination with the support of specific projects. Into the individual projects became involved employees of various levels of organized structure according to the importance of problem. A systematic progress is ensured through appropriate training directly in production or in workshops. This way the employees not only bring an economic benefit for the company but also raise their professional qualification. Work teams are not just consisted of managers or specialists in the given profession. They also comprise efficient workers, who build up their professional knowledge through co-operation at dealing with problems. This is the principle of further independence, e.g. in production area from external service. TPM in production also concentrates on the use of time, quality, logistics, technological process, material economy, work safety and natural environment.¹⁰

The production department has to carry out a particular task for the years 2008, 2009, which is to launch the TPM methods as a cost-cutting device. As the TPM is a wide project supported by Bongrain group, there was invited EFESO Consulting Company to get involved and to help with a successful project launch. EFESO was also to introduce the project to the employees and facilitate its everyday application in production.

For each subsidiary it is compulsory to launch this project, as a main cost-cutting device. Due to a special methodology invented by TPM Method, individual teams will be set for problem solving.

⁹ EFESO Consulting: *Method of launch TPM*. Firm Prospect EFESO Consulting, Budapest 2008.

¹⁰ EFESO Consulting: *Method of launch TPM*. Firm Prospect EFESO Consulting, Budapest 2008.

The project launch was not so easy. At the beginning we ran into difficulties, especially unwillingness of employees to co-operate, as they had to carry out their ordinary tasks, and this was over the limit of their commitments. Nevertheless we had successfully overcome the difficulties and started to work on putting together the teams and on implementation. First, it was necessary to explain to our employees the benefits of these methods for the company to our employees, and point out the benefits for themselves. First teams we brought together were consisted of production staff (like operators), which was appropriately supplemented by leading staff. These teams gradually started to get familiar with the philosophy of TPM.

4.2.2 The philosophy of TPM



Pict. No. 2: Principles of launch into project TPM Source : EFESO Consulting: *Philosophy TPM*. Firm Prospect EFESO Consulting, Budapest 2008.



Pict. No. 3: Origin of faults

Source: EFESO Consulting: Philosophy TPM. Firm Prospect EFESO Consulting, Budapest 2008.



Pict No.4 : Reinstatement of basic conditions and specification of standard

Source: EFESO Consulting: Philosophy TPM. Firm Prospect EFESO Consulting, Budapest 2008.



Pict No. 5: Revealing the reasons and origin of repetitive breakdowns

Source: EFESO Consulting: Philosophy TPM. Firm Prospect EFESO Consulting, Budapest 2008.



Pict. No. 6: Introduction of activities for improvement

Source: EFESO Consulting: Philosophy TPM. Firm Prospect EFESO Consulting, Budapest 2008.



Pict. No. 7: Analysis of each defects

Source: EFESO Consulting: Philosophy TPM. Firm Prospect EFESO Consulting, Budapest 2008.



Pict. No. 8: Improvement of system on the basis of obtained advantages Source: EFESO Consulting: *Philosophy TPM*. Firm Prospect EFESO Consulting, Budapest 2008.

From the above pictures it is obvious, that philosophy TPM is a never ending process.

What does TPM need to be effective?

(10 principles to reach good results by means of TPM)

- 1) 100% devotion use of top management (in "first lines" activities)
- 2) Objective aims
- to set very ambitious goal to ourselves
- the goals must be quantified so that we are able to measure their achieving
- goals, which are not put-down, are not likely to be accomplished
- 3) A clear definition of the improvement model:
- a responsible department
- a responsible staff
- what is to be reached, by whom, till when, and how
- a distribution of improvement tasks according to the individual group belonging to define the steps and detailed time frame
- 4) Allocation of the high-qualified people on the model machines
- 5) 100% devotion of a responsible person who will lead the TPM activities

- 6) A precise precise training of the leading workers to restore and respect standards, which can improve the activities and ability to analyse problems
- 7) Allocation of sufficient sources and parts for improvement
- how much can be invested into the remedial actions and preventive measures?
- 8) Attention to details, well-considered amelioration, detailed analysis, world-class standards
- e.g: concerning a machine, detection of 1000 abnormalities and precautions making
- analysis of collapses- analysis up to the 5x WHY
- 9) Running activities of improvement
- 10) Motivation of operators... from the least favourite TPM up to the most popular one:
- more comfortable work
- less overtimes
- safer operations
- better work conditions
- a pleasure from their boss acknowledgement
- appraisal of TPM activities and its results in production
- pleasure from creative work by means of TPM
- pleasure from personal importance for company¹¹

¹¹ Source: EFESO Consulting: *Philosophy TPM*. Firm Prospect EFESO Consulting, Budapest 2008.



The main steps from the preparation to a progressive expansion

Pict. No. 9: Launch of project TPM

Source: EFESO Consulting: Philosophy TPM. Firm Prospect EFESO Consulting, Budapest 2008.

In In the following part I will try to explain problem solving in the "traditional way", and problem solving by the philosophy TPM. In the past we used to approach to the remedial actions like to a trouble situation that has occurred right now and, which is necessary to be removed so that we can go on working. We had wasted on unnecessary, not little additional costs and nobody was interested. It was really a system of "Firefighting". A case, when the maintenance employees were not ready to solve a new "burning" situation. At first they had to determine the character of the defect and whether spare parts are available the store. Nevertheless, currently, it is not possible to use this method of work. The TPM Method provides guidelines, how to solve these problems (not only defect remedies are meant) in the shortest time possible. This is a method to decrease losses, limit the consumption of energy, and to increase productivity.

In the picture below, there are graphically represented the differences in problem solving with a traditional way and with the TPM method.

System of problem solving

Traditional way

TPM



Pict. No.10: Description of the difference in functioning of TPM as compared to traditional method Source: EFESO Consulting: *Philosophy TPM*. Firm Prospect EFESO Consulting, Budapest 2008.

4.2.3 The philosophy of 5S method

What is an ideal factory?

In an ideal factory everything is adjusted perfectly, all workplaces are clean. Is this situation a result of the factory perfect organization, or is it a condition for it ?

What is the aim?

- no breakdowns, no complaints
- non-quality products must be selected so as not to get to the consumers
- searching time = 0
- minimum inventory level
- optimal consumption of energies and sources

An excellent atmosphere at workplace yields great results:

- everybody is attentive to the problems including the small ones
- everybody realizes even the smallest problems
- appreciation of costumers
- appreciation of future employees

The name of 5S comes from Japanese:

- SEIRI choose and eliminate
- SEITON determine a location
- SEISO keep your workplace clean
- SEIKETSU set up new standards
- SHITSUKE maintain and improve standards

It means in practice: to plan even the organization at the workplace, where unnecessary or odd things are left. Other things are stored in the areas destined for storage. The unnecessary things are kept in a more distant storeroom, or they are liquidated the quickest possible way. Through a thorough planning of storage of needy things we can make them available and quickly accessible to anybody in the company. Their location has to be clear to everyone.

The cleanliness of work areas is next to profitability. That is to say it is vital to keep all operation clean and dustless. Provided everything is kept clean, the abnormalities are more visible, thus we are able to precede the breakdowns and in the same time to sustain the life-cycle performance of machine.

Planning of good arrangement of things is subject to a well-functioning of the previous three demands, plus the support of accessibility information needed. There is no need to look for anything, there are no wastes of time or delays and information about it is presented clearly on visible places.

Planning a discipline certainly comprises the following of the above rule set, a daily monitoring of work discipline, the use of checklists (check-questionnaires), setting new tasks and purposes, and finally, bonuses for the best ones.

The plan of 5S method



- 1. identify losses by the primary control
- 2. fix the label of 5S method devices, materials and
- processes
- 3. remove the useless items

SEITON – make control easier

- 1. classify items according to the frequency of their use
- 2. find appropriate place for devices and equipment
- 3. identify clearly every position and their foundation in new the code

SEISO – find out problems by cleaning

- 1. initial purification and tag register
- 2. remove the tags
- 3. support running of tag register
- 4. identify sources of contamination and difficult
- cleaning areas

SEIKETSU - standardize

- 1. define the standard of cleaning and other standards
- 2. define the list according to which you can control keeping of standards
- 3. improve of visual control



- 1. plan check-ups for keeping standards
- 2. make a running analysis of problems and identification of precautions
- 3. watch results of control
- 4. determine new aims for improvement

Pict. No. 11: Explanation of term 5S Source: EFESO Consulting: *Philosophy TPM*. Firm Prospect EFESO Consulting, Budapest 2008.

4.3 Problem solving in practice

In early TPM implementation in Pribina, six teams were trained in. Our idea and aim was to decrease costs in production, a four-million Czech crown saving (cut) of annual variable costs. On the basis of these criteria we put together initial teams.

Being aware of the fact that we are introducing TPM method to the people, who are not familiar with its philosophy, we have decided to set the following teams:

Team No. 1 - Decrease of excess weight in cheeses

Team No. 2 - Introduction of 5S method in the maintenance workshops

Team No. 3- Increase of TRS (synthetic efficiency of machines) at packing department of cheeses

Team No. 4 - Decrease water consumption in production of cheeses

Team No. 5 - Introduction of tag register

Team No. 6 - Decrease electric power consumption in Frying-operation

We appointed a TPM coordinator and several leaders of individual teams. Leaders of teams could choose any members into their groups – number of team members was limited to maximum or 4 people. Each team started to work on its task. For a quicker introduction of the method, there was also available a supervisor or Efeso Consulting, who was present at regular working meetings and supervised if the teams were using a new method for successfully. In the following chapter I will deal with the work of individual teams.

4.3.1 Team No. 1 Decrease of excess weight in cheeses

This team was created with the goal to reduce big losses produced by those cheeses which had excessive weight in the moment of packing. It is desirable that the cheese has an appropriate weight in the packing day - minimum 120 g and maximum 122g.

Recently our reality has been on the level of 124,4 g. This team was expected to bring a big financial yield.

The object for this team:

real weight of cheese in packing day 124,4 g
reaching the weight decrease on 123,8 g

Team started their work by analyzing the problems and determining of place or origin of losses:

- data collection,
- adjustment of moulding machine,
- adjustment of individual pistons,
- rennet standardization

Moulding machine was unanimously determined as a critical point. Moulding is a part of production technology, when the curd grain is filled into the cheese mould. At this moment we determine the weight of the final product. That is why the attention of the team was paid to discovering the dosing system of moulding machine. Moulding machine has two mould heads, with 10 pistons. We started to monitor dosing of each mould head separately so as to be able to determine the weight and deflection at individual cheeses made by each head. For an acceptable weight of cheeses on the packaging day it is necessary to put an exact dose into the moulding machine, which is approximately 130g. In the following tables we see the results form measuring of each individual head.



Pict. No. 12: Moulding machine used for production of cheese Source: PRIBINA, Ltd, Hesov: Documentation *TPM*. 2008. 200 pages.

Measuring of cheese weight from both heads and individual filling pistons

Head										
No. 1	137,3	148,9	144,3	140	137,7	141,3	143,7	130,2	136,4	142,2
	149,4	150,2	142,5	142,9	144,8	144,5	145,3	129,6	136,4	149,5
	130,1	134,6	130,8	131,4	127,9	134,2	132,3	128,5	120,7	135,7
	142,6	142,2	142,5	136,4	132,4	137,7	140,6	137,4	133,1	146,9
	135,1	140	137,2	135,6	128,3	132,3	135,1	134,5	103,9	139,6
	141,4	144,5	138,6	141,7	134,4	139,6	139,5	141,4	143,2	146,2
	142,3	145,9	139,8	138,9	134,1	139,4	139,6	138	142,1	150
	138,2	141	142,2	135,8	126	134,6	131,7	115,7	140	144,3
	137,8	143,1	137,6	133,2	130,8	135,3	138,6	134,1	139,7	143,6
	134,2	141,9	141,5	135,9	131,3	137,9	139,5	127,8	134,1	138,5
	138,7	134,7	135,8	130,9	131,1	133,9	137,6	127,7	136,8	141
	137,3	141,5	138,7	131,2	132	131,5	134,6	122,9	134,8	142,2
	137,7	143,8	141,6	138,5	132,7	138,5	140,2	139,7	146,5	143,9
	135,1	130,8	128,7	123,7	128,4	126,7	129,8	125	128,1	132,4
	137,8	139,6	139,6	132,1	129,4	134,2	136,7	134	136,1	140,6
	133,5	135,2	133,3	129,5	127,6	131,3	133,6	128,9	134,6	136,6
	129,1	136,2	132,4	126,1	128	126,9	127,7	130,2	129,4	136,7
	137,1	139,5	136	133,4	128,1	134,2	132,4	130,9	138	143,5
	137	138,6	136,4	130,4	131,8	135,6	137,3	129,9	140,5	143,2
	123	142,1	140	135,1	129,6	133,3	136,6	132,3	137,8	143,9
average	136,7	140,7	138,0	134,1	131,3	135,1	136,6	130,9	134,6	142,0

uveruge 186,7 116,7 186

Tab. No. 1: Measuring of dosage on the head no. 1

Head

No. 2

140,7130,4131,1136,7153,7128,8136,9132,7131,8142,3142,3133,9138137140,1136,5140,1131,1137,6141,1138,3135132,5137,2137,2133,8135,3133,4135,7136,2142,5136,5136,4135,4138,8133,5132131,3137,1138,1142,8135143,2135,3140,5134,3135,9134,4137,4136139,4139,4138,7140,5140,2136,9139,5137,6140,2140134,6128,8129,7132,6135,1127,5131,1128139,8134,6135,8142,5136,8140,8139,6137,6138,7136,1135,5139,9139,3138,9140,9142,4146,1137,5138,8140,6140,6138,2137,4130,2134,8134,1135,5130,4133,7130,7134,7137,7141134,7138,4140,6140,9133,9136,9132,8137,6133,6135,8137,6133,2132,7131,1137,4130,7131,6131,2136,4130,7131,1137,3139,9134,4134,2139,8134,5136,6134,4130,3132,7131,1137,3139,9134,6133,7131,6 <td< th=""><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th></td<>										
142,3133,9138137140,1136,5140,1131,1137,6141,1138,3135132,5137,2137,2133,8135,3133,4135,7136,2142,5136,5136,4135,4138,8133,5132131,3137,7138,1142,8135143,2135,3140,5140,5134,3135,9134,4137,4136139,4139,4138,7140,5140,2136,9139,5137,6140,2140134,6128,8129,7132,6135,1127,5131,1128139,8134,6135,8142,5136,8140,8139,6137,6138,7136,1135,7139,9139,3138,9140,9142,4146,1137,5138,8140,6140,6138,2137,4130,2134,8134,7135,5130,4133,7130,7134,7137,7139,3138,9140,9142,4146,1137,5138,8140,6140,6138,2137,4130,2134,8134,2139,8136,7130,7134,7137,7137,7141134,7138,4140,6140,9133,9136,9133,2137,5137,8137,6133,2132,7135,1136,4130,3132,7131,1137,3139,9134,4130,7131,6131,2135,1136,6134,2 <td< td=""><td>140,7</td><td>130,4</td><td>131,1</td><td>136,7</td><td>153,7</td><td>128,8</td><td>136,9</td><td>132,7</td><td>131,8</td><td>142,3</td></td<>	140,7	130,4	131,1	136,7	153,7	128,8	136,9	132,7	131,8	142,3
138,3135132,5137,2137,2133,8135,3133,4135,7136,2142,5136,5136,4135,4138,8133,5132131,3137138,1142,8135143,2135,3140,5134,3135,9134,4137,4136139,4139,4138,7140,5140,2136,9139,5137,6140,2140134,6128,8129,7132,6135,1127,5131,1128139,8134,6135,8142,5136,8140,8139,6137,6138,7136,1135139,9139,3138,9140,9142,4146,1137,5138,8140,6140,6138,2137,4130,2134,8134135,5130,4133,7130,7134,7137,7141134,7138,4140,6140,9133,9136,9132,8137,5137,8133,6135,8134,4134,2139,8134,5136133,2138,5136,9137,6133,2132,7135,1136,4130,3132,7131,1137,3139,9134,6130,7131,6131,2135,1129,4130,7131,1137,3139,9137,6133,2132,7131,6131,2135,1129,4130,7131,4135,3136,9134,6130,7131,6131,2135,1129,4130,7128	142,3	133,9	138	137	140,1	136,5	140,1	131,1	137,6	141,1
142,5136,5136,4135,4138,8133,5132131,3137138,1142,8135143,2135,3140,5134,3135,9134,4137,4136139,4139,4138,7140,5140,2136,9139,5137,6140,2140134,6128,8129,7132,6135,1127,5131,1128139,8134,6135,8142,5136,8140,8139,6137,6138,7136,1135139,9139,3138,9140,9142,4146,1137,5138,8140,6140,6138,2137,4130,2134,8134135,5130,4133,7130,7134,7137,7141134,7138,4140,6140,9133,9136,9132,2135,5136,9137,6133,2132,7135,1136,4130,3132,7131,1137,3139,9134130,7131,6131,2135,1129,4130,7128,9133,6135,4136,6137,4136,9140,6141134,2138134,2138,3137,7137,2140,1133,9137,7139,1137132,5135,2136,9144136,8133,7130,3135,4136,6131,4130,9127,9135,1136,8134,7132,1130,9131,5133,8129,3130,4130,1132,6 <td>138,3</td> <td>135</td> <td>132,5</td> <td>137,2</td> <td>137,2</td> <td>133,8</td> <td>135,3</td> <td>133,4</td> <td>135,7</td> <td>136,2</td>	138,3	135	132,5	137,2	137,2	133,8	135,3	133,4	135,7	136,2
142,8135143,2135,3140,5134,3135,9134,4137,4136139,4139,4138,7140,5140,2136,9139,5137,6140,2140134,6128,8129,7132,6135,1127,5131,1128139,8134,6135,8142,5136,8140,8139,6137,6138,7136,1135139,9139,3138,9140,9142,4146,1137,5138,8140,6140,6138,2137,4130,2134,8134135,5130,4133,7130,7134,7137,7141134,7138,4140,6140,9133,9136,9132,8137,5137,8133,6135,8134,4134,2139,8134,5136133,2137,5138,8133,6135,2132,7135,1136,4130,3132,7131,1137,3139,9134,4134,2139,8134,5136133,2138,5136,9137,6133,2132,7135,1136,4130,3132,7131,1137,3139,9134,4130,7131,6131,2135,1129,4130,7128,9133,6135,4136,6137,4136,9140,6141134,2138134,2138,3137,7137,2140,1133,9137,7139,1137132,5135,2136,9144 <t< td=""><td>142,5</td><td>136,5</td><td>136,4</td><td>135,4</td><td>138,8</td><td>133,5</td><td>132</td><td>131,3</td><td>137</td><td>138,1</td></t<>	142,5	136,5	136,4	135,4	138,8	133,5	132	131,3	137	138,1
139,4139,4138,7140,5140,2136,9139,5137,6140,2140134,6128,8129,7132,6135,1127,5131,1128139,8134,6135,8142,5136,8140,8139,6137,6138,7136,1135139,9139,3138,9140,9142,4146,1137,5138,8140,6140,6138,2137,4130,2134,8134135,5130,4133,7130,7134,7137,7141134,7138,4140,6140,9133,9136,9132,8137,5137,8133,6135,8134,4134,2139,8134,5136133,2138,5136,9137,6133,2132,7135,1136,4130,3132,7131,1137,3139,9137,6133,2132,7131,6131,2135,1129,4130,7128,9133,6135,4136,6137,4136,9140,6141134,2138134,2138,3137,7137,2140,1133,9137,7139,1137132,5135,2136,9144136,8133,7130,3135,4136,6131,4130,9127,9135,1136134,7132,1130,9131,5133,8129,3130,4130,1132,6138,6134,7132,1130,9131,5133,8129,3130,4130	142,8	135	143,2	135,3	140,5	134,3	135,9	134,4	137,4	136
134,6128,8129,7132,6135,1127,5131,1128139,8134,6135,8142,5136,8140,8139,6137,6138,7136,1135139,9139,3138,9140,9142,4146,1137,5138,8140,6140,6138,2137,4130,2134,8134135,5130,4133,7130,7134,7137,7141134,7138,4140,6140,9133,9136,9132,8137,5137,8133,6135,8134,4134,2139,8134,5136133,2138,5136,9137,6133,2132,7135,1136,4130,3132,7131,1137,3139,9134130,7131,6131,2135,1129,4130,7128,9133,6135,4136,6137,4136,9140,6141134,2138134,2138,3137,7137,2140,1133,9137,7139,1137132,5135,2136,9144136,8133,7130,3135,4136,6131,4130,9127,9135,1136,8134,7132,1130,9131,5133,8129,3130,4130,1132,6138,6134,7136,9133,6134,8138,9133,4136,1134135136,8134,7136,9133,6134,8138,9133,4136,1134,1135,1	139,4	139,4	138,7	140,5	140,2	136,9	139,5	137,6	140,2	140
135,8142,5136,8140,8139,6137,6138,7136,1135139,9139,3138,9140,9142,4146,1137,5138,8140,6140,6138,2137,4130,2134,8134135,5130,4133,7130,7134,7137,7141134,7138,4140,6140,9133,9136,9132,8137,5137,8133,6135,8134,4134,2139,8134,5136133,2138,5136,9137,6133,2132,7135,1136,4130,3132,7131,1137,3139,9134130,7131,6131,2135,1129,4130,7128,9133,6135,4136,6137,4136,9140,6141134,2138134,2138,3137,7137,2140,1133,9137,7139,1137132,5135,2136,9144136,8133,7130,3135,4136,6131,4130,9127,9135,1136134,7132,1130,9131,5133,8129,3130,4130,1132,6138,6134,7136,9133,6134,8138,9133,4136,1134135136,8134,7136,9133,6134,8138,9133,4136,1134135136,8134,7136,9133,6134,8138,9133,4136,1134135 <td< td=""><td>134,6</td><td>128,8</td><td>129,7</td><td>132,6</td><td>135,1</td><td>127,5</td><td>131,1</td><td>128</td><td>139,8</td><td>134,6</td></td<>	134,6	128,8	129,7	132,6	135,1	127,5	131,1	128	139,8	134,6
139,3138,9140,9142,4146,1137,5138,8140,6140,6138,2137,4130,2134,8134135,5130,4133,7130,7134,7137,7141134,7138,4140,6140,9133,9136,9132,8137,5137,8133,6135,8134,4134,2139,8134,5136133,2138,5136,9137,6133,2132,7135,1136,4130,3132,7131,1137,3139,9134130,7131,6131,2135,1129,4130,7128,9133,6135,4136,6137,4136,9140,6141134,2138134,2138,3137,7137,2140,1133,9137,7139,1137132,5135,2136,9144136,8133,7130,3135,4136,6131,4130,9127,9135,1136134,7132,1130,9131,5133,8129,3130,4130,1132,6138,6134,7132,1130,9131,5133,8129,3130,4130,1132,6138,6134,7136,9133,6134,8138,9133,4136,1134135136,8134,7136,9133,6134,8138,9133,4136,1134135136,8134,7136,9133,6134,8138,9133,4136,1134135<	135,8	142,5	136,8	140,8	139,6	137,6	138,7	136,1	135	139,9
137,4130,2134,8134135,5130,4133,7130,7134,7137,7141134,7138,4140,6140,9133,9136,9132,8137,5137,8133,6135,8134,4134,2139,8134,5136133,2138,5136,9137,6133,2132,7135,1136,4130,3132,7131,1137,3139,9134130,7131,6131,2135,1129,4130,7128,9133,6135,4136,6137,4136,9140,6141134,2138134,2138,3137,7137,2140,1133,9137,7139,1137132,5135,2136,9144136,8133,7130,3135,4136,6131,4130,9127,9135,1136134,7132,1130,9131,5133,8129,3130,4130,1132,6138,6134,7136,9133,6134,8138,9133,4136,1134135136,8134,7136,9133,6134,8138,9133,4136,1134135136,8134,7136,9133,6134,8138,9133,4136,1134135136,8134,7136,9133,6134,8138,9133,4136,1134135136,8134,7136,9133,6134,8138,9133,4136,1134135136,8	139,3	138,9	140,9	142,4	146,1	137,5	138,8	140,6	140,6	138,2
141134,7138,4140,6140,9133,9136,9132,8137,5137,8133,6135,8134,4134,2139,8134,5136133,2138,5136,9137,6133,2132,7135,1136,4130,3132,7131,1137,3139,9134130,7131,6131,2135,1129,4130,7128,9133,6135,4136,6137,4136,9140,6141134,2138134,2138,3137,7137,2140,1133,9137,7139,1137132,5135,2136,9144136,8133,7130,3135,4136,6131,4130,9127,9135,1136134,7132,1130,9131,5133,8129,3130,4130,1132,6138,6134,7136,9133,6134,8138,9133,4136,1134135136,8134,7136,9133,6134,8138,9133,4136,1134135136,8141138,5137138,1139,3136,8136,4138,2138,6144	137,4	130,2	134,8	134	135,5	130,4	133,7	130,7	134,7	137,7
133,6135,8134,4134,2139,8134,5136133,2138,5136,9137,6133,2132,7135,1136,4130,3132,7131,1137,3139,9134130,7131,6131,2135,1129,4130,7128,9133,6135,4136,6137,4136,9140,6141134,2138134,2138,3137,7137,2140,1133,9137,7139,1137132,5135,2136,9144136,8133,7130,3135,4136,6131,4130,9127,9135,1136134,7132,1130,9131,5133,8129,3130,4130,1132,6138,6134,7136,9133,6134,8138,9133,4136,1134135136,8141138,5137138,1139,3136,8136,4138,2138,6144	141	134,7	138,4	140,6	140,9	133,9	136,9	132,8	137,5	137,8
137,6133,2132,7135,1136,4130,3132,7131,1137,3139,9134130,7131,6131,2135,1129,4130,7128,9133,6135,4136,6137,4136,9140,6141134,2138134,2138,3137,7137,2140,1133,9137,7139,1137132,5135,2136,9144136,8133,7130,3135,4136,6131,4130,9127,9135,1136134,7132,1130,9131,5133,8129,3130,4130,1132,6138,6134,7136,9133,6134,8138,9133,4136,1134135136,8141138,5137138,1139,3136,8136,4138,2138,6144	133,6	135,8	134,4	134,2	139,8	134,5	136	133,2	138,5	136,9
134130,7131,6131,2135,1129,4130,7128,9133,6135,4136,6137,4136,9140,6141134,2138134,2138,3137,7137,2140,1133,9137,7139,1137132,5135,2136,9144136,8133,7130,3135,4136,6131,4130,9127,9135,1136134,7132,1130,9131,5133,8129,3130,4130,1132,6138,6134,7136,9133,6134,8138,9133,4136,1134135136,8141138,5137138,1139,3136,8136,4138,2138,6144	137,6	133,2	132,7	135,1	136,4	130,3	132,7	131,1	137,3	139,9
136,6137,4136,9140,6141134,2138134,2138,3137,7137,2140,1133,9137,7139,1137132,5135,2136,9144136,8133,7130,3135,4136,6131,4130,9127,9135,1136134,7132,1130,9131,5133,8129,3130,4130,1132,6138,6134,7136,9133,6134,8138,9133,4136,1134135136,8141138,5137138,1139,3136,8136,4138,2138,6144	134	130,7	131,6	131,2	135,1	129,4	130,7	128,9	133,6	135,4
137,2140,1133,9137,7139,1137132,5135,2136,9144136,8133,7130,3135,4136,6131,4130,9127,9135,1136134,7132,1130,9131,5133,8129,3130,4130,1132,6138,6134,7136,9133,6134,8138,9133,4136,1134135136,8141138,5137138,1139,3136,8136,4138,2138,6144	136,6	137,4	136,9	140,6	141	134,2	138	134,2	138,3	137,7
136,8133,7130,3135,4136,6131,4130,9127,9135,1136134,7132,1130,9131,5133,8129,3130,4130,1132,6138,6134,7136,9133,6134,8138,9133,4136,1134135136,8141138,5137138,1139,3136,8136,4138,2138,6144	137,2	140,1	133,9	137,7	139,1	137	132,5	135,2	136,9	144
134,7132,1130,9131,5133,8129,3130,4130,1132,6138,6134,7136,9133,6134,8138,9133,4136,1134135136,8141138,5137138,1139,3136,8136,4138,2138,6144	136,8	133,7	130,3	135,4	136,6	131,4	130,9	127,9	135,1	136
134,7136,9133,6134,8138,9133,4136,1134135136,8141138,5137138,1139,3136,8136,4138,2138,6144	134,7	132,1	130,9	131,5	133,8	129,3	130,4	130,1	132,6	138,6
141 138,5 137 138,1 139,3 136,8 136,4 138,2 138,6 144	134,7	136,9	133,6	134,8	138,9	133,4	136,1	134	135	136,8
	141	138,5	137	138,1	139,3	136,8	136,4	138,2	138,6	144

average 138,0 135,2 135,1 136,6 139,4 133,4 135,1 133,1 136,7 138,6

Tab. No. 2: Measure of dosage on head No. 2



Graph No. 1: The analysis of results of cheese weights before adjustment Source: PRIBINA, Ltd, Hesov: Documentation *TPM*. 2008. 200 pages.

From the graph presented above we can see, that the setting and dosage of moulding machine are too high. We have also found out that we can not decrease the weight of product with the present types of pistons, because their construction will not allow us to do it. That is why it is important and necessary to make the following steps:

- adjustment of pistons on individual mould heads
- to remove huge inequality between individual pistons
- proper training of moulding machine operators
- purchase of new pistons (investment).

After making the remedial actions suggested (machine setting, proper training of operator) we tried to do the measuring again with following results.



Graph No. 2: Analysis of results of cheese weights after adjustment Source: PRIBINA, Ltd, Hesov: Documentation *TPM*. 2008. 200 pages.

From the results is obvious a decrease in weight after the moulding operation and improvement of inequality of individual pistons. Another step was to reduce the weight dose, but we were not able to solve this problem with the current pistons. Thus it was necessary to invest into the purchase of new types of pistons. (These days, they have already been installed, and are being tested).

In the above graph it is represented how the weight of cheeses was developing in the process of packing after the new measures had been made. And we can see, we have succeeded in achieving our goal.

Our average weight was between the level of 122,9 g.



Graph No. 3: Weights of cheeses on the packaging week Source: PRIBINA, Ltd, Hesov: Documentation *TPM*. 2008. 200 pages.

Consequently, we started to study another auxiliary parameter – the development of losses. We were trying to realize whether our precautions and conditions have had an influence on the increase of this indicator. Our goal was set for 1.55% versus our real state in the time after adjustment was 1.18%. Neither this remedial operation resulted in deteriorating of our state on the contrary, it proved to be helpful.



Graph No. 4: Losses of cheeses at packing Source: PRIBINA, Ltd, Hesov: Documentation *TPM*. 2008. 200 pages.

4.3.2 Team No. 2 Introduction 5S

The goal of this team was not to bring the immediate financial savings. It is common knowledge that areas which serve for maintenance are in really bad conditions. These areas have been used as a place for storage of spare parts, which are, neither utilized in the future anymore, nor liquidated. The task and a challenge for the maintenance staff was to learn how to work with philosophy 5S in their department.

Plan:

- to remove useless items,
- to make orientation in storage of spare parts and other useful tools easier
- to launch tag register of every single position
- to standardize installed system
- to implement checkups so as to maintain the set system and keep improving it.

From the first photography we can see the situation at the beginning of our team work. Storage arrangement of spare parts lacks any system. In the shelves of the storeroom we can see various, unidentified untidily kept spare parts and other devices....



Pict. No. 13: Storeroom of spare parts on maintenance before reorganization Source: PRIBINA, Ltd, Hesov: Documentation *TPM*. 2008. 200 pages.

In the second photograph we can see a visible improvement. The needless items were removed, we could orientate easier, a tag register was started and kept standard. Now there is our last goal ahead of us, which is to control this situation and conditions, and to keep suggesting new improvements.



Pict. No. 14: Storeroom of spare parts on maintenance department after reorganization Source: PRIBINA, Ltd, Hesov: Documentation *TPM*. 2008. 200 pages.

In the following picture I am introducing an example of handy storeroom of pumps and engines next to pumps before reorganization of the system.



Pict. No. 15: Storeroom of pumps before reorganization Source: PRIBINA, Ltd, Hesov: Documentation *TPM*. 2008. 200 pages.

.....and after the reorganization



Pict. No. 16: Storage of pumps after reorganizationSource: PRIBINA, Ltd, Hesov: Documentation *TPM*. 2008. 200 pages.

Even thought this team was not supposed to bring an immediate financial contribution, its result will be a big plus for our savings, which we can generate from smaller downtimes in production. Provided the maintenance staff is able to "**find"** the needed spare parts or tools **more quickly**, we can save on smaller production downtimes.

4.3.3 Team No. 3 Increase of TRS (synthetic efficiency of machines) at packing department of cheeses

The team was assigned the task of increasing the utilization of machines for packing department, where cheese is wrapped. We need to decrease downtimes. The packing department has to face a low utilization of machines due to frequent breakdowns, organizational changes and problems with wrapping materials. At the time when the project was launched, the synthetics usage of machines was at the level 72.4 %. The plan was to get in first step at least 76 % and in second 80 %. If this team accomplishes their duty, they prove that it is possible to increase the productivity in production and the capacity of packing department. The increase of synthetic utilization of machines prevents from unnecessary downtimes, and consequently the capacity of packing department will increase. It also brings the savings on salaries.

Main steps of purpose:

- data collection,
- identification of downtimes,
- standardization of times (e.g. for cleaning, change between individual products).

The team started with data collection so as to identify our most frequent causes of downtimes. Until this time we did not have any particular information about the origin and the type of our downtimes. Therefore we were not able to suggest the steps for improvement of our results. Another problem was a lack of information about the causes of downtimes, which means that people responsible were not used to writing down the causes of non productive time into the documentation. The team tried to describe the causes of our most frequent outages and standardize our technological times (e.g. setting up of machines and changes of packing material). The results are represented in following table.

LOSS	DEFINITION OF DOWNTIME	NOTE
Change	Changes between sorts of products	spicing up of cheeses,Hermadur,Character
BREAKDOWN	stopping of machines, service repair.	
Short downtimes		
of Contina	Unplanned stop of Contina – stop of	
(packing machine)	wrapping lines	Wrong parts and components
Short downtimes		squeezing, to weight again cheeses/low
of machine	Setting up of one machine.	weight/
Change of type		
of pattern and foils	Stop of machines.	Change of type of patterns and foils
	STANDARDIZED	
TIMES		MAXIMAL TIME
"Blowing" of	f	
machines betweer	1	
spices	preparing of seasoning	8minutes
Sanitation a	t	
changes of product	at Hermadur, Grandu, Velvet	24minutes
Evening sanitation	Hermelín	24 minutes
Evening sanitation	Spices	36 minutes

Tab. No. 3: Definition of downtimes and standardization of times at packing line Source: PRIBINA, Ltd, Hesov: Documentation *TPM*. 2008. 200 pages.

For better orientation in our results we have included a detailed graph for monitoring of individual causes of our downtimes. In the graph for year 2008 we can see our problems with undefined time (yellow colour), with organization of work (black colour) and change of piles and foils. Total value of synthetic usage of machines for year 2008 is 75.3%, so we did not get to our defined the target 76%, but there was a noticeable improvement comparing to the year 2007, when we reached 72.4%. Now, we have to continue in elimination of our problems and also to indicate the reasons of our technical downtimes.

	TRS & Time Losses 2008												
			TRS SHORT ST ORGANIZA	OPS of PACK	AGES !K	 BREAKDOWN TRANSITION UNKNOWN 		= <u>-</u>	SHORT STOPS CHANGE of RA	of CONTINA CKS & FOIL			
100% - 99% - 98% -	3,27%	4.03%	3,25%	1,64%	- <mark>1,83%</mark>	<mark>1,59%</mark>	<mark>1,90%</mark>	1,90%	2,10%	1,84%	2,69%	2,14%	2,40%
97% - 96% - 95% - 94% - 93% -	4,69%	5,23%		5,08%	3,89%	6,58%	4,27%	4,52%	4,73%	4,58%	3,53%	2,06%	4,91%
92% - 91% - 90% - 89% - 88% -	8,35%		9,68%	2,74%	9,01%	8,71%	9,08%	8,80%	8,99%	8,85%	8,87%	8,98%	7,80%
86% - 85% - 84% - 83% -		8,99%	2,75%	10,22%	3,19%		2,32%	1,31%	1,52%	1,95%	2,37%	2,95%	3 82%
82% - 81% - 80% - 79% -	7,92%	2,48%	5,36%			2,64%	1,25%		2.01%	0,85%	1,58%	1,90%	3,62 %
78% - 77% - 76% -		3,01%	3,30%	<mark>4,99%</mark>	2,18%	1,81%	2,38%	1,57%	1,74%	1,97%	2,53%	3,36%	1,11% 2,77%
75% - 74% - 73% - 72% - 71% - 70% - 69% - 68% -	3,98% 71,16%	76,26%	75,66%	75,32%	75,30%	73,47%	76,92%	74,73%	76,49%	77,44%	76,34%	75,39%	75,29%
66% - 65% -	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE		AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER	Σ 2008

Graph No. 5: Monitoring of synthetic use of machine in 2008 Source: PRIBINA, Ltd, Hesov: Documentation *TPM*. 2008. 200 pages.

The graph describes the period at the beginning of the year 2009. As we can see, there was a visible elimination of unspecified time intervals and improvement in downtimes due to a better work organization and a better-organized change of piles and foils. Now we will concentrate on reducing of technical issues. It is obvious, that our annual usage is getting up to 77.37%, and we can notice a very positive development especially in February, when we reached 80%, which was the target.



Graph No. 6: Analysis of synthetic use of machines in year 2009 Source: PRIBINA, Ltd, Hesov: Documentation *TPM*. 2008. 200 pages.

For a better control of package time were launched new production protocols, exactly for the checking of wrapping machine Alpma and Contina (annexe no.1 and no. 2). At the same time a standard for cleaning of wrapping machine Alpma (annexe no. 3) was specified.

4.3.4 Team No. 4 The decrease of water consumption in production of cheese

This team was in charge of reducing water consumption on 1 produced ton per product. Generally for food, and especially diary industries, it is common, that they need for their operation big amounts of water (e.g. piping treatment, washing of production machines and floors). The biggest water consumption is in the production of cheese. In 2006 our water consumption in this department was 12.81 m³ per 1 ton of product, in 2007 it was 11.72 m³ and in 2008 there was a requirement to decrease the water consumption on level 10m³.



Graph No. 7: Total water consumption per litres in individual centres Source: PRIBINA, Ltd, Hesov: Documentation *TPM*. 2008. 200 pages.

Team tasks :

- data collection
- identification of the origin of losses
- restoration of basic conditions on critical points and specification of standard
- revealing of causes of repetitive problems
- introducing of remedial activities
- each breakdown analyzing
- improving of system processing

Plan of operation:

1. to install water-meter to check the quantity of in flowing water to the machine - for the identification of the biggest water consumption at appliances in production of cheese (e.g. at **SASSARO**, which is a washing machine for cheese moulds)

2. to start data collection, water consumption in comparison with production

3. to check the machine called SASSARO finding out of water losses due to a small leakage of washer nozzle (**current control:** checking of cleanliness of jets made by the operators once a week, and checking of pressure of washing pumps made by maintenance once a month). It was not recommended to open manually the valves during the washing of forms, as there is an automatic water level control system. After finishing of the sanitation of cheese moulds it is necessary to take out jets last day of production cycle and wash them by a current of potable water after switching off the Sassara machine. We also should check the stuffing and tighten up the nut at installation

4. to check that the washer functions works well, to secure automatic switching off during the run without a space extension piece

5. to check small water leakages; there has been a leakage detected on the inlet to the second maturation – solution: to change dripping valves at pasteurization

6. to change dripping valve in cellar no. 6

7. for huge water leakages and to ensure hygiene - change old types of pissoirs in men's room at the day "production hall"

8. an improvement of efficiency at sanitation of drain cellars, adjustment of washing equipment CLAUGER, automatic top-water level control system

9. to advance function of SASSARO, after agreement with the production people to ensure switch-off function of washer on Friday after the shift

We developed detailed table for diurnal study of water consumption in the centre. The table gives us information about figure of main water-meter and about our partial ones at individual place, where is usually problem too. (cellars, Sassaro, number of blocforms), about production in tonnes and real water consumption in m³. In specified month the value of water consumption is 8,56 m³ per 1 tonne of product.

I	Main [m3]		Cellars[m	13]	Sassaro [1	n3]	Producti on [t]	m3/t	Blocforms [piece]	Blocform [litres/piec e]
1.	195 992	36	4 808	3	6 802	5	0,00		0	
2.	196 028	135	4 811	5	6 807	44	19,04	7,09	3 150	13,97
3.	196 163	116	4 816	5	6 851	33	16,80	6,90	2 800	11,79
4.	196 279	35	4 821	2	6 884	11	0,00			
5.	196 314	117	4 823	4	6 895	66	15,99	7,32	2 619	25,20
6.	196 431	134	4 827	5	6 961	17	14,71	9,11	2 350	7,23
7.	196 565	132	4 832	5	6 978	24	16,59	7,96	2 712	8,85
8.	196 697	95	4 837	5	7 002	27	14,76	6,43	2 577	10,48
9.	196 792	34	4 842	3	7 029	16	-0,38		0	
10	196 826	7	4 845	3	7 045	0	0,00		0	
11 •	196 833	21	4 848	2	7 045	0	0,00			
12	196 854	117	4 850	4	7 045	34	19,48	6,00	3 097	10,98
13	196 971	118	4 854	6	7 079	41	17,47	6,75	2 898	14,15
14	197 089	64	4 860	5	7 120	24	-0,36		0	
15	197 153	111	4 865	4	7 144	20	15,64	7,10	2 618	7,64
16	197 264	96	4 869	4	7 164	31	13,08	7,34	2 298	13,49
17 •	197 360	25	4 873	2	7 195	21	0,00		0	
18	197 385	10	4 875	2	7 216	0	0,00			
19	197 395	109	4 877	4	7 216	23	18,23	5,98	3 196	7,20

20	197 504	106	4 881	4	7 239	29	14,16	7,48	2 344	12,37
21 •	197 610	139	4 885	5	7 268	35	17,01	8,17	2 674	13,09
22	197 749	89	4 890	5	7 303	23	13,75	6,47	2 262	10,17
23	197 838	36	4 895	2	7 326	22	0,00		0	
24	197 874	23	4 897	2	7 348	0	0,00		0	
25	197 897	25	4 899	2	7 348	0	0,00			
26	197 922	130	4 901	4	7 348	27	15,45	8,41	2 542	10,62
27	198 052	134	4 905	5	7 375	39	16,60	8,07	2 637	14,79
28	198 186	142	4 910	3	7 414	31	17,33	8,19	2 934	10,57
29	198 328	115	4 913	5	7 445	34	15,07	7,63	2 670	12,73
30	198 443	31	4 918	2	7 479	15	0,00		0	
31 •	198 474	2	4 920	2	7 494	0	-0,22		0	
Σ		2 484		114		692	290,21	7,36	48 378	11,96
Ø								8,56		

Tab. No. 4: System of analysis of water in production of cheeses

Source: PRIBINA, Ltd, Hesov: Documentation TPM. 2008. 200 pages.

In the above graph we are comparing the water consumption for the past years. And as we can see, there was a considerable fall in the consumption in 2008 and another improvement in 2009, when we targeted 9m³ per 1 tonne. But it is necessary to say that in spite of the year-on-year drop in cheese production, we are successful in the decrease of water consumption.



Graph No. 8: Annual water consumption in production of cheeses in m³ per 1t of product Source : PRIBINA, Ltd, Hesov: Documentation *TPM*. 2008. 200 pages.

4.3.5 Team No. 5 Introduction of tag register

Our intent was to introduce a new report system, to remove breakdowns and eliminate defects in production. The second goal deals with the number of reported breakdowns and the process of their solution. It is necessary, to have this system active in the whole company and the people in charge of it may access into this system. Every breakdown or fault has its own number and it is recorded in **tag register**.

The way it was earlier:

- the shift guide put down the breakdowns on an official "breakdown sheet" which he passed to the head of production
- the head of a particular production division personally passed the written information to the head of maintenance
- the head of maintenance arranged the repair
- there was no written or spoken report about repairs
- the head of the production division did not have a quick feed-back
- the head of maintenance did not have fast regressive connection,
- it led to the losses of repair records

The way it is now:

- the foreman writes the repairs directly in tag register
- the head of maintenance confirms receiving of a breakdown to do and specifies the date of its repair
- a production employee confirms repair realization

Everything runs in one register and all shift guides, heads of production divisions and the heads of maintenance, have an access into electronic tag register. Work got faster and a feed-back of individual breakdowns repair is very fast and transparent. A very important step is an observation of production, keeping the terms and defect repair in a good quality.

	*** AREA TO BE PUT TAG ***									
CENTRE	TAG NUMBER	ANOMALY DESCRIPTION	DEVICE DESIGNATION	TAGGING PERFORMED	PRIORITY	WROTE BY				
						NAME	DATE, TIME			
Smajlík	18	involved textile band - machine A	MH5 - A	Tománková Anežka	middle	Tománková Anežka	3.2.2009 19:00			
Pribináček	94	air intake pump	cleaning station	Brukner Lukáš	high	Brukner Lukáš	3.2.2009 19:10			
Pribináček	97	check of pump 2P10	line Tecnal	Brukner Lukáš	high	Brukner Lukáš	10.2.2009 12:04			
			ł			-				

Tab. No. 5: Tag register - Record of breakdowns

*** AREA FOR TECHNICAL SECTION ***										
		KIND OF	REMOVING	OF ANOMALY	[WEEK					
TAG TOOK	DATE, TIME	REMOVAL	INTERNALLY	EXTERNALLY	NUMBER]	TOOK MEASURES				
Kocman Jiří	4.2.2009 11:07	internal	Krupička Milan		8					
Kocman Jiří	13.2.2009 16:26	internal	Štukhejl Pavel		8					
Kocman Jiří	20.2.2009 14:33	external		NORD	12					

Tab. No. 6: Tag register – service takeover

*** FIELD OF CONTROLS BY PRODUCTION ***										
IN TERM	CHECKED	COMMENT	DATE, TIME							
YES	Vaněček Michal		6.2.2009 13:49							
YES	Vaněček Michal	exchange of sensors	25.2.2009 20:22							
YES	Brukner Lukáš		2.3.2009 20:38							

Tab. No. 7: Tag register – Takeover by manufacture



In the graph represented below we can see a number of displayed tags (breakdowns) in the individual production sections.

Graph No. 9: Number of displayed tags in individual operation Source: PRIBINA, Ltd, Hesov: Documentation *TPM*. 2008. 200 pages.

In the graph situated below we can see a process of removing of individual breakdowns (tags) in production sectors:

- a number of breakdowns removed green
- a number of breakdowns removed after the term red
- a long-term period for breakdown removing orange
- a number of breakdowns waiting for the repair yellow



Graph No. 10: Result of elimination at individual tags Source: PRIBINA, Ltd, Hesov: Documentation *TPM*. 2008. 200 pages.

Results of tag register are evaluated fortnightly on a regular company conference.

4.3.6 Team No. 6 A decrease in consumption of electric power in a Cheese-fry hall

The team started to plan how to reduce the consumption of electric power per 1 tonne of product. As the first one we have chosen a frying-operation. In 2007 the consumption of electric power in this centre was 605.5 KWh per 1 tonne of product and in 2008 we required to decrease our consumption on 551 KWh per 1 ton of product.

The plan:

1. to install a special recording module into the frying equipment for a better identification of consumption

2. to start with the data collection

3. to define significant appliances in production for analysis of standard of consumption per 1kg

4. to discover overconsumption on key appliances and to suggest methods of using up a reduced consumption

5. to specify a maximal time of preheating in deep-fryer, to change dysfunction parts and to adjust a temperature

6. to turn on air-conditioning only during production, to install electric circuit

7. to set up a cooling mechanism in production on a required temperature

8. to install economical lights

9. to observe gain of accepted measures

10. to analyse and pass in the documents for permanent sustainable situation



Graph No. 11: Consumption of electric power in Frying operation in KWh per 1 t product Source: PRIBINA, Ltd, Hesov: Documentation *TPM*. 2008. 200 pages.

As we can see from the graph above, there was an improvement, which we reached after the individual remedial actions. We can even see some sections where a big capacity of production (it has a character of under-proportional variable costs) helps us a great deal to reduce the consumption

Recommendation for keeping the consumption of the electric power in the centre of deepfrying:

- 1. to turn on the deep fryer no more than 50 minutes before starting of frying
- 2. to keep heating bodies in a permanent cleanliness
- 3. to turn on the cooling mechanism no more than 30 minutes before starting of cooling
- 4. to set up the cooling on a desired figure, to verify output temperature of the product
- 5. to switch off the lights and the automatic shut-down of air-conditioning before leaving
- 6. to check regularly the air compressed distribution system, elimination of air-untightness

7. to minimize opening time of cooling and freezing places

8. to strictly keep the time regime for sanitation of deep-fryer

- 9. daily reading of electric-meters and filling in service duties
- 10. to make weekly analysis of consumption
- 11. to use only economical lights for lighting

Conclusion

The main subject of my Bachelor Thesis was to describe methods, which are the result of increase of expenses in the production and to prove on real examples in practise that introduction of these methods can help employees to reach given goals and bring company the required savings of their costs.

For all that exist many methods, how to reduce costs, I chose for my work method TPM (Total Productive Management) and method 5S, which is systematically similar TPM a lot.

TPM Pribina	R09											Date:	14.01.09
	TPM		Tear	m work			Year	value			Savings	n Mio CZK	
TPM topic	wave/ Team	Team focus	Start	Finished	Value	R07	R08	TPM 09	E09	R08 (vs. R07)	TPM 09 (vs. R08)	E09 (vs. R08)	E09 (vs. TPM)
											•		•
Weight reduction	1_1	PM- Overweight of Hermelin 120g	4.08	7.08	weight in g	124,4	122,6	122,0	122,0	3 402	1 088	1 088	0
TRS PM	1_2 1_3 2_1	TRS/packaging (120g, 125g) AM - packaging Contina AM - Alpmy	4.08 4.08 10.08		TRS in %	75,0%	75,2%	80,0%	80,0%	50	539	539	0
Water consumption	1_4 2_5 2_5	PM Kremarna Kremarna	4.08 10.08	7.08 1.09	m3/tonne	11.9 	10,0 4.7 15.9	9.5 4.4 14.3	9.5 4.4 14.3	290 	75 82 12	75 82 12	0 0 0
Electricity	2_2	Pane	10.08	1.09	kwh/tonne		61	55	55		95	95	0
5S	2_3	PM-production	4.08	7.08	-	-	-	-	-			0	0
Tycinka	2_4	AM Kafilerie Laboratory analysis	10.08	1.09	PCA in % Mio CZK Mio CZK		13% 379 	4.8% 0 	4.8% 0 		1019 379 	1019 379 	0
TPM total										3 742	3 289	3 289	0

Tab. No. 8: Summary of project results

Source: PRIBINA, Ltd, Hesov: Documentation TPM. 2008. 200 pages.

From the values above mentioned we can see that we have saved on costs due to method TPM amounting to 3.742.000 Czech crowns. As the whole project was started in May 2008, and our aim were annual savings which would calculated come up to 4.000.000 Czech crowns, the plan will be accomplished by the end of May 2009.

When I was working on my thesis, I faced some obstacles such as the lack of technical literature, which would describe this problem exactly. In most of cases I was only referring to the philosophy of the firm EFESO Consulting, which helped to launch this system in company Pribina. In spite of that I think it did not have influence on result, which we managed to reach. In most cases we suggested our own methods too, which we consulted with the firm EFESO Consulting. Tag register and its study is fully the result of work of our coordinator in Pribina, the system of which he improved according to the

suggestions of a consulting firm. The new modern tag register was recommended to be used also in other Bongrain subsidiaries. On the basis of this example I am confident, that method TPM is not firmly determined, but it can still develop, because only trained people can help to improve this method more.

At the beginning of the implementation of system TPM and 5S we had to fight with unconcern of people about this project, which is understandable. It was extra work for many team participants. That is why it was necessary to speak with these people instantly and point out on the positives and advantages of project. At the start only a few employees understood, that the system should be run every day. We can all see the causes of waste on daily basis, and we should all be able to help with its elimination. This system should have taught us how to advance this method and get the best out of it.

When launching of this method we have naturally made several mistakes, which we will try to avoid in the next phases of TPM in our factory. Among the most important ones belongs a non-ideal choice of employees for individual teams. We tried to choose the team members rather from blue-collar professions, from those positions, which are the closest to the problem being solved and to enrich each group by at least one leader. There is an ongoing team work due to regular meetings (workshops) with an employee of the firm EFESO Consulting, at which they present their reached results and suggest another technique. If their technique differs from TPM philosophy, an EFESO Consulting agent rectifies their opinions and suggests better technique. We have found out that there must be someone in each team, who is also able to present team results. It is not sufficient just to know the problem, but to be also able to describe it. In spite of the initial problems we have finally succeeded in starting of project.

Now we are in the expansion phase called Pillar structure. Launching of the complete TPM philosophy in Pribina is a question of minimally three years.

I must admit that launching of TPM in the factory was a very complicated issue and required an active participation of all involved people. In the beggining we chose six teams, the results of which I tried to describe in my bachelor work. There are teams (consumption of electric power, water consumption, increase of syntetic utilization on production lines and 5S), the results and experiences of which we will apply in future operations. Now, their launching will be definitely smoother, faster and with fewer problems. There are still many areas, where we can reach savings of costs.

I have found out that the TPM system helps not only to search for possible sources of savings in factories, but also to increase the skills and professionalism of people who use this philosophy. At the moment we already have employees, for example electricians, who can perform a perfect analysis of losses, to suggest data collection and system of watching it and at the end to suggest a technique for sustaining the results and to be able to present them. It means a considerable advance as compared to situation in the very beginning of the method introduction.

Finally I would like to confirm, that the TPM method helps factories to reduce losses, at the same time increasing the efficiency of their employees. The results of our actions are the proof.

The other proof of the advantages of the implemented innovations is declaration of our power engineer Mr. Krča: "Until this time we could not save a litre of water and now it is possible!"

Abstrakt

HALÁMEK, L. *Optimalizace variabilních a fixních nákladů*. Kunovice 2009. Bakalářská práce. Evropský polytechnický institut, s.r.o.

Vedoucí práce: P. Kobylka.

Klíčové pojmy: variabilní a fixní náklady, TPM - total productive management, 5S

Práce se zabývá vyhledáváním úspor ve výrobě. Hlavním cílem této práce je dokázat, že pomocí nastavených opatření a metodik se dají najít úspory, a tím samozřejmě pomoci společnosti ke zvýšení zisku.

Výrobní náklady jsou stěžejním problémem, který musí řešit každý podnik. Podle úspěšnosti řešení tohoto problému pak lze posuzovat i míru úspěšnosti celého podniku. V dnešní době je požadováno, aby výroba byla maximálně operativní, schopna vyrábět velké série, ale také série malé, a to za co možná nejmenších výrobních nákladů. Čím dál častěji se musíme přizpůsobovat rychlým změnám v požadavcích odběratelů - obchodních řetězců, spotřebitelů, atd. Vyjednávání o dodávkách zboží k odběratelům a nastavení podmínek, za kterých se budou naše výrobky prodávat, jsou rok od roku náročnější.

Tím, co je pro podnikatele směrodatné, je užitek v podobě zisku, který mu jeho činnost přináší, proto se zvětšuje tlak na vyhledávání úspor.

Tato práce je rozdělena na část teoretickou a praktickou. V teoretické části jsou uvedeny základní pojmy týkající se nákladů a jejich členění.

V praktické části jsou tyto poznatky aplikovány, použití metod k optimalizaci variabilních nákladů a vyhledávání úspor ve výrobě.

Summary

HALÁMEK, L. *Optimization of the Variable and Fixed Costs*. Kunovice 2009. Bachelor Thesis. European Polytechnic Institute, Ltd. Supervisor: ing. P. Kobylka.

Key words: variable and fixed costs, TPM - total pruductive management, 5S

The work deals with searching for savings in production. The main aim of this work is to prove that we can find savings by means of following certain steps and naturally help a company to improve their profit.

Production costs are a fundamental problem which every company has to solve. The level of success in solving this problem can also be used as a measure of overall successfulness of the company. Nowadays it is demanded, that production is operating at its most, so as to be able to produce not only the maximum production volumes. On the other hand, if a small amount of products is planned, minimizing the production costs is crucial for the production efficiency. We have to adapt to rapid changes in the customers' needs very often – commercial chains, consumers etc. Negotiations related to delivery of goods to customers and determining of conditions in which our products are sold, are getting year by year more difficult.

What is decisive for a businessman is to make sure their business activities bring benefit in form of financial gain, thus there is an increasing pressure to find all savings.

This work is divided into a theoretical and a practical part. In the theoretical part basic terms about costs and their segmentation are introduced.

In the practical part these findings are applied, and the methods of optimization of variable costs and searching for savings in production process are used.

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Annexe

Annexe No. 1 Production protocol of packing hall HERMELÍN - ALPMA

Annexe No. 2 Production protocol of packing hall HERMELÍN - CONTINA

Annexe No. 3 Standard of cleaning of wrapping machines ALPMA



Annexe No. 1



Annexe No. 2

			Cleaning standard	of wrapping machir	res "Alpma U63"					
DEPARTMENT:			NUMBER OF PEOPLE:	COMPLETED BY:	DATE:		Transition		Final sar	nitation
WRAPPING	HALL "HE	ERMELÍN"	2 (A, B)	TEAM "AM"	20.10.2008	"BLOWING"	NATURAL	SPICES	NATURAL	SPICES
WHEN	они		МОН	DETERGENTS	EGUIPMENT		OPERATI	ION TIME	ninutes]	
	-	scraps of cheese	blowing		one-shot rag, cloth		00-10	00.10	00.10	00.10
	ם + ≮	aluminium foil after wrapping o	cleaning		air-driven spray gun, brush		00:10	00:10	n: 10	
~~~~		sides sheet metal of conveyor								
	-	wrapping head	in more than the second s				00.00	00.00	00-00	00.00
	ם ⊦ ≮	tunnel, mould, skid	Alama and a second		III UI II de vey s		00.20	00.20	00.20	00.20
		gutter under the machine								
after		feed belt and wrapping head	houind	nto oir	oir driven connu aun	02:00				
finalization of wrapping			Buimoin	רופסטמופ מוו	all-uliveri spray guri					
operation	A	* 	washing	Galox Multinep	brush					
			rinse	water	one-shot rag, cloth					
			desinfection	Galox Rubis	spray		15.00	00.01	16-00	00.00
		sides sheet metal of conveyor	blowing	pressure air	air-driven spray gun		00:01	19:00	00.01	00:07
****	0	wrapping head	washing	Galox Multinep	brush					
	٥	tunnel, mould, skid	rinse	water	one-shot rag, cloth					
		gutter under the machine	desinfection	Galox Rubis	spray					
			remove of dirts	water	besom, hosepipe					
after cleaning of machine	A + B	floor + drains	foaming	Galorox JH / Pengar mousse	spatula+ hard brush				12:00	13:00
			rinse	water	spatula					
		tunnel, mould, skid								
before start of	A + B	sides sheet metal of conveyor	oomolotion of moobino		mounting keys		#D C C I	#060	#0	#0651
operation		gutter under the machine								
	service	wrapping head		8	handle					

Annexe No. 3