

## APPLICATION OF MODIFIED METHOD OF CURRENT OBSERVATIONS IN BIG INDUSTRIAL SYSTEMS

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Method of current observations is a need of modern industrial systems and rich industrial states have seen that. Its main goals are to see production cycles, to observe slowdowns and to identify the slowdowns and their frequency. If some appearances appear in extreme parameters we may ask the following questions: what is the reason, how frequent is it and does it affect the whole production? This paper has the aim to observe such problems by researching one big production system; these problems are not new, but on the other hand they are not researched enough. Actually, this method has the aim to notice certain appearances (slowdowns), monitor them and try to "measure" them and to prove it in data, charts and graphs. By observing slowdowns in these cycles, we observe reasons of their appearance if there are any. On the other hand, we observed types of the slowdowns, their frequency and possibility of prediction (where, when and why they would appear). Modified method of current observations is a new method that has the same technology and mode as classical method, but modification is that we observe only work positions where a worker and object of productions are key objects. In other words, we observe appearances of slowdowns in installment cycles where manual work is dominant and represents the object of the research. We monitored three production cycles and each cycle had several steps in installment of certain part, which was a part of production programme of the Sample. The method showed that there were slowdowns and it classified them and noticed their number, and therefore it pointed out certain activities and types of slowdowns. By defining slowdowns in certain installment steps and further analysis enabled to notice certain key topics – which factors were the reasons of slowdowns and whether they were people, production organization or technology, etc. The research itself has some graph and data index that were gathered directly from the field in the aim to find real model in order to improve production memo, reduce slowdown appearances, to shorten production cycles and to improve business success of this company.

**Keywords:** method of current observations, production systems, cycles, slowdowns

### INTRODUCTION

Today industrial production in Serbia has great problems that will be projected and prolonged in many years ahead. Transition periods, as well as, difficult years of economic crisis have led big systems in the situation to become uncompetitive on the market for they have out-of-date-technology and lack of trained stuff who know modern technologies. By using the term "lack of trained stuff" we don't say that this problem can be solved by giving jobs to the unemployed, but we want to

say that we have lack of the highly educated stuff who know modern technologies and who can easily meet the needs of the current and fast market.

Modified method of current observations gives clear insight into the production cycles and gives certain values of the average time of slowdowns, which enables us to control the length of a real cycle.

By observing certain appearances or cycles modified method of current observations we see, if there is too much vacuum in those cycles or idle

speed or if there are enough workers to do that cycle and if we can increase business efficiency by decreasing or increasing number of workers.

The sample and the topic of this paper is a company that was a giant in its field and that employed over 3000 workers and a significant company on home and foreign market by the name Industry of Precise Mechanics (IPM) located in Belgrade. Today the situation is very different: production, market and number of employees are reduced for 80% and it is a company with 500 workers of different qualifications.

The research conducted in this company consisted of monitoring certain assembling cycles in three production cycles in order to see and to identify certain appearances of slowdowns with the aim to reduce slowdown appearances, shorten production cycles and thus to increase business efficiency of this company by using modified method of current observations.

### MODIFIED METHOD OF CURRENT OBSERVATIONS

Modified method of current observations has been present in industrial production and it was started in the textile industry in 1934 by L.N.G.Tippet (Leonard Henry Caleb Tippet, 1902–1985). Its usage can be seen in any industrial production and it doesn't depend on the type of production or technologies. Modified method of current observations, which will be researched and applied in this paper, is based on several factors – serial production and production that is based on almost 100% of human resources participation in assembling cycles. In other words, traditional method of current observations was based on monitoring machines, observation of appearances and stating level of capacity usage and the main difference is that here, in this method, there is a slight modification of this method in order to monitor production cycles in serial production in assembling phase where machines make smaller participation and almost 100% of human resources participation is present.

The aim of this research is to see i.e. to identify certain slowdowns in assembling cycles and its influence on the big production systems. The research consisted of several steps followed by field researches and then analysis and computing data:

– **Defining which cycles will be monitored** - there were three cycles that had several activities, assembling steps of certain elements. These

cycles were chosen among several cycles that are all part of plan and program of this big production company;

- **Defining all the forms where field data will be written**– monitoring of the cycle demanded application of certain monitoring lists (forms) where field data were written into. The data that were important for the research consisted of two types of data – time of a certain operation (production time) and which time it was (technological or non-technological) as well as number and types of slowdowns that appeared in production as (non-production time). After receiving average times of every activity and total time we made charts (using MS Project software) for each installment;
- **Defining monitoring paths**– the person who was monitoring (observer) has certain path by which he went in order to monitor all the activities in a cycle in a certain period of time and observed appearances wrote into the Monitoring lists. The monitoring times were previously received by random number choice (using MS Excel), which were converted into times;
- **Defining the terms that will be used for data entrance** – the observer who monitored assembling cycles on the Sample had a task to write down the monitored parameters according to the certain rules i.e. he had to use certain terms or signs/marks/ that would give some results for the research by how often they appeared in numbers. The terms that appeared enabled the observer to measure and explain by using abbreviations. It is very important for observer to know every cycle, all the activities as well as certain terms that identify times in production cycles;
- **Defining data processing** – Gathered field data had computing and graphical images shown as charts, tables with data and following graphs. Graph showed numerical parameters and enabled to see clearly and actually all the appearances and to easily come to conclusions. If some slowdown appears in extreme in certain cycles, the research can be expanded on the other cycles by further analysis in order to see the reasons of its presence. In other words, by stating global problem we came to the reasons of its appearance, if that was a human factor, or organization, or technology or poor motivation, etc.

**RESEARCH RESULTS**

This research observed three characteristic assembling cycles: cycle 1- assembling of the fuel pump, cycle 2 – assembling of the hydro mechanical regulator and cycle 3 – assembling of nozzle holder with the aim to see (identify) problems and to improve and shorten production cycles.

Each assembling phase is, in fact, a position consisted of certain movements that the worker should do strictly and according to certain technological lists. From these operational lists, where work technology was precisely given for every position, we could easily determine time necessary for production. From these lists we can see times as standards for making certain parts and they are basis for further research. By monitoring directly from the field, all the positions were being monitored and times were recorded in Monitoring lists. Recorded times were measured several times in order to see the average time of the production or assembling of certain part, as well as the duration of each activity and the time of slowdowns. After gathering average times for each activity and total assembling time we made a chart (using MS Project software) for every assembling. We put a red line over the chart on the time line and it was adapted to the monitoring times received by random number choice using MS Excel. Monitoring times were the same every day and thus the monitoring took place

always at the same time. By marking monitoring times on the Chart and by observing their projection down the graph we can identify what is happening at every moment and we can see which appearances are present.

The research showed that while every data at the exactly the same time were monitored, certain slowdowns appeared in certain number and for certain reasons. These appearances were written down in new tables in Monitoring lists, with additional remarks and comments and types of slowdowns. Then they were further statistically processed in order to see if some appearances appear so frequently that we can assume that they can be considered as a rule.

Therefore, the aim of this paper is to identify certain factors:

- Identify certain characteristic slowdowns in cycles;
- If we can correct these slowdowns in order to shorten the cycle;
- How we can correct them, i.e. which numerical correction can be in time unit and similar.

By determining average number of slowdowns as well as types of slowdowns we could come to certain conclusions – if there were some slowdowns and how many of them there were.

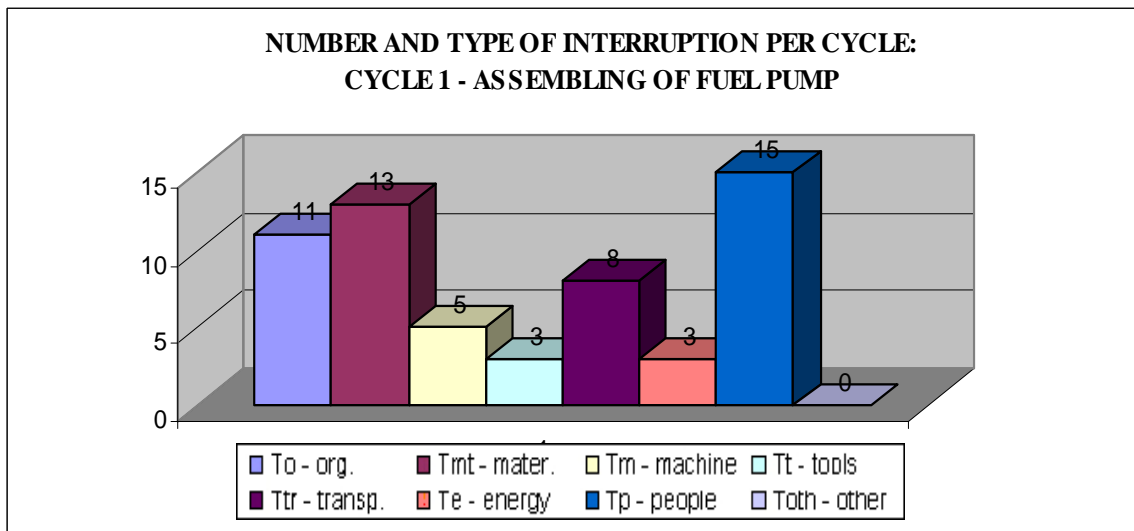


Figure 1: Number and type of slowdowns

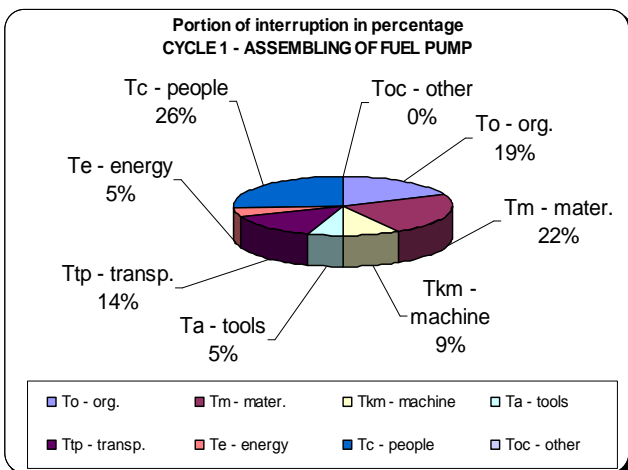


Figure 2: Portion of slowdowns in percents

For Cycle 1 the main slowdown factor is human resources. In addition to this, we can see extreme jump in the average number of slowdowns (26%), as well as mild domination of slowdowns – stoppage because of the lack of materials (around 22%), bad organization (around 19%) and transport (around 14%) in comparison to other types of slowdowns. Such a result may be expected if we have in mind that the company has recently finished its privatization and it has had a large number of problems related to how to enable good working conditions for the employees. Great technological remnant that dominated in the last years has led this organization in the condition that it is behind the latest technologies and organizations of the same production in this region.

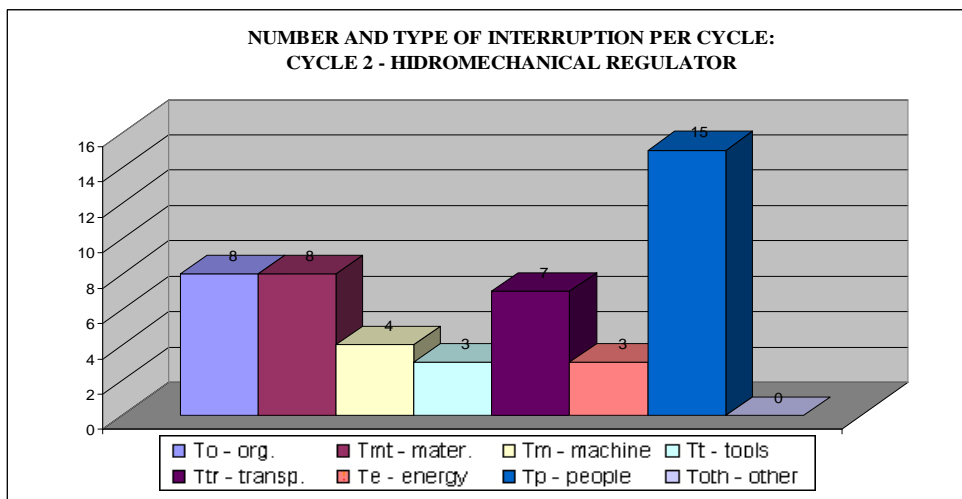


Figure 3: Number and type of slowdowns

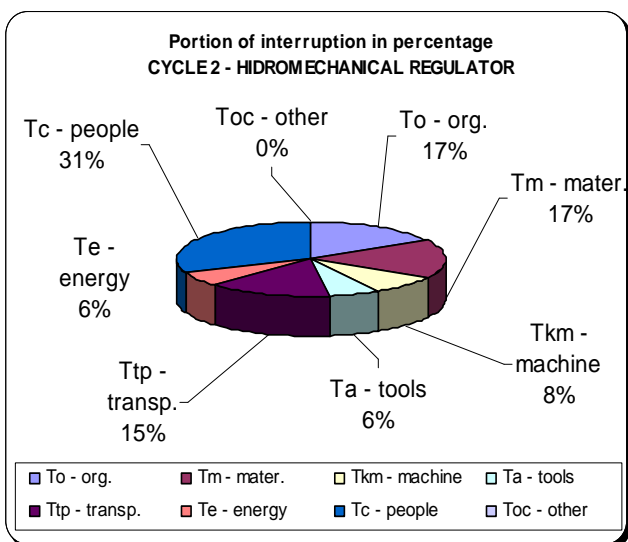


Figure 4: Portion of slowdowns in percents

Cycle2 of this Sample shows extreme jump of slowdown caused by human factors 31%, while other slowdowns are on the same level. It is not pleasant to hear such a data especially if it is the dominant one. Slowdowns with over 30% have great influence on the total business efficiency as well as on the efficiency of the organization itself. The main reason is poor motivation and lack of motivation can be easily transferred to the other negative sphere of organization psychology – and that are absence (not coming to work) or fluctuation (leaving job). Both of these terms have more or less influence on the business success, but this is the topic for some other research; we have mentioned them as a final sequence of the conclusion.

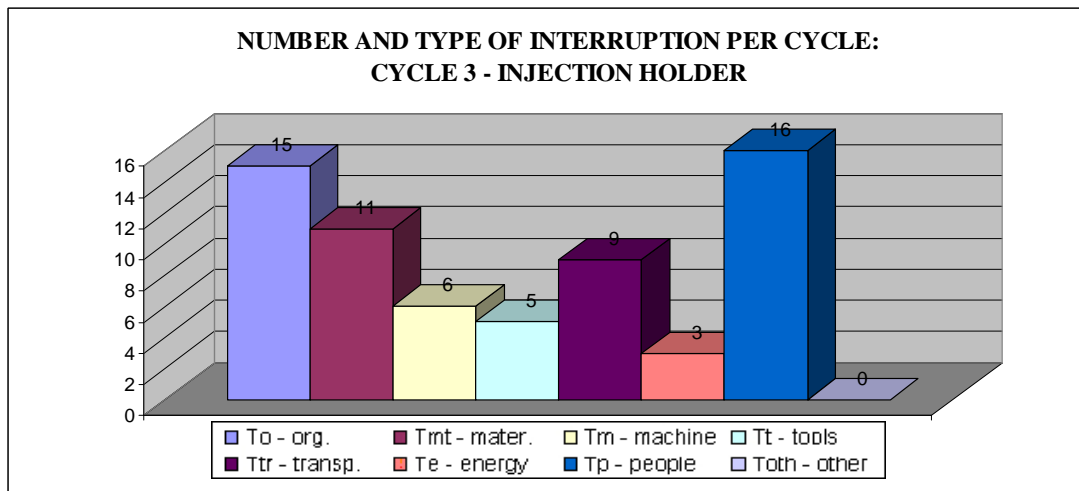


Figure 5: Number and type of slowdowns

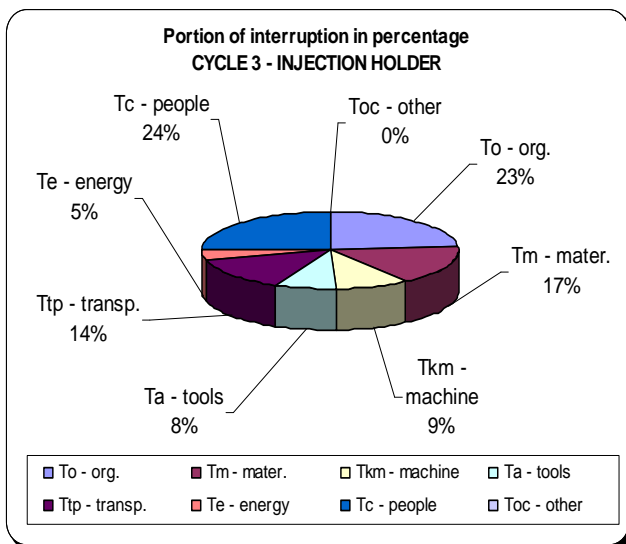


Figure 6: Portion of slowdowns in percents

In cycle 3 there is a similar situation. I.e. the numerical parameters are very similar and the main slowdown factor here is as well human resources. The other slowdowns are lack of materials, organization and transport. These results, made for all three cycles, speak that this sample has a problem concerning human resources.

We may ask the following questions:

- What kind of stuff do we have here(?);
- On which hierarchy level is the problem(?);
- Are these problems individual or the problems made by a group of people(?).

Such an acknowledgment demands another research where we would monitor just personnel regardless the cycles they participate in. On the other hand, this research has another topic, but it opens new questions for some other scientific papers.

### RECOMMENDED MODEL FOR SHORTENING PRODUCTION CYCLES

The recommended model for this Sample which was the topic of this research consists of giving some directions that will enable business efficiency. First of all, we noticed that most of the slowdowns were caused by human factor, either by human doing or human undoing. There are different factors in human resources that can influence slowdowns in production cycles.

Slowdowns caused by human resources can be defined in two categories:

- Intended slowdowns of human doing;
- Unintended slowdowns of human doing.

Intended slowdowns of human doing is perhaps the most common type of slowdowns that is present in production cycles and it is usually connected to the poor human relations, lack of motivation usually seen as small or irregular salary, lack of benefits (paid overtime, reward for commitment, reward for improving quality and similar). In other words, when a worker feels that he is not appreciated or paid, then he turns to certain methods that he uses in order to make the manager see that his work is not respected. Typical examples are: being late for work, slower work activities and deliberate slow rhythm of work.

Unintended slowdowns of human doing are rather rare, but there are some examples. Every human being is a person for himself and every man has his own style of working. Concretely speaking, in this production there are personnel who have the same qualification and the same formal knowledge, but the quality itself was different. In that purpose we

can classify slowdowns as unintended when a person does his job with less skill than somebody else. Defined standards, as well as certain stimulations enable a worker to feel the need to improve his working skills in order to have better salary, position and status in his company.

After monitoring the Sample IPM – Belgrade, processing and analysis of the results that pointed to certain problems, some recommendations as directions for future development of this company are given.

Definition of the strategy should be the key field for the people who make top management of this company and who should precisely define several directives:

- how to improve the production,
- to determine priorities of the company-aim, mission, vision,
- to define working stuff - who works, what they work, how they work,
- to define the market – whether to return to home market or to find new markets.

Definition of the strategy enables a company to give directions that will improve the quality of work and achieve success on the market. If the company doesn't know what it wants or if it doesn't have long term aims, it will constantly have problems such as bad work climate, lack of motivation, bad organization, decrease of profit and similar.

Lack of motivation is the key reason of slowdowns in this Sample. First of all, lack of motivation can be seen in bad economic situation of our state and this reflects on big business systems. When defining the strategy it is very important to plan ways and mechanisms of how to better pay the workers and how to make them feel a company as a team worth fighting for, even in a very difficult economic times. On the other hand, the company gives certain benefits according to its abilities.

Technological backwardness is a key problem not just for this Sample but for many companies in Serbia. By this we mean application of modern software tools for designing and engineering, application of CAD/CAM technologies, modernization of production capacities. The state that will have benefits from the successful company helps companies by giving certain stimulative packages and enabling them to buy modern machines, licenced softwares or modern machine production. With this we have fruitful cooperation

in which a company gets modern facilities and the state gets a corporation which pays taxes.

Reengineering – is a necessity for many companies in Serbia. Reengineering is a change of certain cycles (or processes) as a change of complete business. The essence of reengineering is a change of certain production cycles in order to improve business success and business efficiency. *We don't mean by that to change people but to change the ways of working with the same people.* At the first glance it seems impossible, but big world companies have managed to stabilize themselves and became leaders on the market by using reengineering.

## CONCLUSION

Modified method of current observations showed that there were slowdowns and it classified them and saw their number and thus we underlined certain activities and types of slowdowns. Finding a real model will improve working mode, decrease number of slowdowns, shorten production cycles and it will certainly increase business success of this company.

As a conclusion of these research results for this Sample we may conclude that by realizing personnel problems: *by defining the strategy, by solving motivation problems, by technological backwardness and reengineering* every obstacle can be overcome regardless if that is technological backwardness, loss of the market, finding new markets or clients or coming back to the old markets and etc. the important role in this have immediate supervisors, i.e. the persons who have managing influence on the company and therefore by defining the strategy we defined the most important priorities of the company.

Modified method of current observations gives clear insight of production cycles bearing in mind the following elements- duration of the operations, duration of the cycles, slowdowns appearances, definitions of the slowdowns, definition of the possible movement of usage levels in comparison to the number of observations. By using modified method of current observations every work organization can see which cycle or which department has slowdowns that can be really amortized and decreased as much as possible. Also, we can predict if some operations are necessary or not, if there are enough workers, and if business success of the company can be increased by decreasing or increasing the number of workers.

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