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Environmental management inside production systems

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Abstract: This paper deals with management of quality and environment problems of transition countries like Bosnia and Herzegovina. It's true if we say that without acceptable quality our products we can't sale it at EU markets. Many of us insisted on QMS (Quality Management System) but we must use and calculate with EMS (Environmental Management System), which means all environmental activities such as environmental audit, assessment of environmental performances, environmental labelling, life cycles of products and the other environmental aspects of products. The consumer in most developed country looks on quality of products trough the life style as they have. Sense of personal responsibility is one of most important elements of structure of mankind behaviour. From that, we can derivate characteristics of QS (Quality System) and its efficiency. It's especially applicable for complex science such as ecology. Being that management of factories in Bosnia and Herzegovina during the period of non-finishing transition (it's not separated ownership and managing of factories) has significant influence in specific and general decision processes. That gave special significance in the scope of researching of applicable eco-management. In this paper we will try to show how our factories could make technological acceptance of international standards, so that production factors are in useful function in restriction and transition period in Bosnia and Herzegovina, and implemented of reengineering management of quality and environment.

Keywords: QMS, EMS, Environmental performances, Reengineering, Synthetic oils, Production processes, Drilling processes

1. INTRODUCTION

For machining processes it is necessary to implement requirements of QMS and EMS. QMS need for continue analysed measurable parameters and its compare during production processes and to correct it if necessary with intention to satisfied consumer and standard operative procedures. EMS need necessity of reengineering of production processes corrected input data parameters on specific working places where organised machining process is. There are more requests which are in front of products with intention to satisfy next functions

as: physical quality, machining quality, assurance of its function, serviceable, price, design, etc..., to aim successful post life cycles control. Environmental friendly production as a part of completed production processes is condition No 1 to show us as a serious economic partner. Partnership is precondition for survival of factory especially when we must answer on requestions in restitution processes. For good manageering technologists must gave "new solutions"as answer for "new request". Technologists are ones who carrying production changes and there are many questions in front of them.

2. ECO-MANAGEMENT AS MODERN APROACH FOR ENVIRONMENTAL MANAGEMENT

Eco-management could be defined as part of EMS which should help industry in order to systematically organize approach to the environment and to build its concern about environment in its own production and business strategy [1]. This definition isn't mean only control pollutant emissions of waste material or waste management; it is more sophisticated concept which represented answer on crucial question: how could we find optimum between production and environment? That's mean that we must take carry on each phase of production processes on environmental characteristics products and production processes and packing of products, transportation activities and other effects of products to the environment. Developed country industry is under the permanent pressure to improve environmental efficiency of production processes, distributions and services and its ecological characteristics. There are many influences of different factors toward these requestions for industry and some of this are:

- Implementation of market directed instruments in to the environmental laws and in connection with those very strict standards. Market subjects should change its behaviour in accordance with principle "polluter pay". That's mean it'll cost for using of natural resources and pollution of it must be calculated as one of production cost;
- It is evident interest of customer which is well educated and they take tension on the ecological cleaner products. On the other side company that produce and sale "Eco friendly" products are very successful because of it.

Environmental management policy is defined at the international level through the international agreements and conventions. To accept a principles, instruments and standards are one of the key prerequisite for our approaching processes to the develop countries. Harmonizing our standards with the EU standards is crucial for Bosnia and Herzegovina. If we don't accept EMS as a part of company strategy and business opportunity it could influent significantly bad to our manage affairs.

3. PRACTICAL EXAMPLE

Bosnia and Herzegovina has a good metal industry companies. With the excellent human resources, images and tendencies in the development opportunities it has a good chances to restructuration and continue cooperation with the European and world companies. Tools industry Trebinje, from SE part of Bosnia and Herzegovina is one of it, with the 50 year tradition in tools production. That part of B&H is rich with the clean water resources and it is suitable for agriculture and eco tourism. Tools industry use about 60 tons per year of heavy biodegradable cooling and lubrication oil for machining processes, and 1/3 of it is

uncontrolled dispersed out of system on the different ways: burning and evaporating; with the chip; with the products; technical incorrectness of equipment.

Finding better solution for this problem is necessity [2]. This practical example is talking about one solution for this problem by using synthetic easy biodegradable oils, which are friendly for environment. Old oil are unacceptable for environment management system and it couldn't satisfy requirements of ISO 14041 standard. Research is conducted on the two series of experiments: with the conventional lubricant oil (heavy biodegradable oil) and with the new synthetic lubricant oil (easy biodegradable oil) in conditions of drilling two different materials (aluminium alloy and steel with characteristics showed in the table 1 and table 2) [3-5]. Mathematic modelling of drilling processes is calculated by Bocks – Wilsons multifactorial analyses of first row. Numerical dependencies between quality parameters and drilling processes for Al-alloy and steel is calculated by equation (1):

$$R_a = C \cdot v^x \cdot s^y \quad (\mu\text{m}) \quad (1)$$

R_a – average deviation of roughness

C – constant depends of material

v – drilling speed (m/min)

s – feed (mm/revolution)

x, y – exponents dependant of condition of machining process.

Area of drilling speed variation (Al alloy) [$v_{\min}=60$ (m/min); $v_{\max}=90$ (m/min)]

Area of feed variation (Al alloy) [$s_{\min}=0,09$; $s_{\max}=0,20$ (mm/o)]

Area of drilling speed variation (steel) [$v_{\min}=20$ (m/min); $v_{\max}=30$ (m/min)]

Area of feed variation (steel) [$s_{\min}=0,04$ (mm/o), $s_{\max}=0,12$ (mm/o)]

Table 1.

Chemical composition of Al alloy (AlMgSi) (%)

| Mg | Fe | Si | Ti | Cu | Zn | V | Cr | Mn | Pb |
|------|------|------|-------|-----|------|-------|-------|------|------|
| 2,10 | 0,27 | 0,30 | 0,045 | 3,5 | 0,04 | 0,005 | 0,001 | 0,83 | 0,15 |

Table 2.

Chemical composition of steel (Ck45) (%)

| C | Si | Mn | P | S | Cu | Cr | Ni | Mo | Pb |
|------|------|------|------|------|------|------|------|------|------|
| 0,46 | 0,18 | 0,52 | 0,03 | 0,04 | 0,29 | 0,32 | 0,12 | 0,02 | 0,15 |

Experiment is conducted at the drilling machine type ASIERA PA22 and quality parameters of processes metal is measured at PERTHOMETER S6P by using one-axis indicator. Results of research and calculations are showed at diagrams (Figure 1.and Figure 2.) Analysis of results and diagrams are given partially in next part [6].

Table 3.

Legend for Fig. 1, 2

| | | | |
|---|---------------------------------------|---|---|
| ◆ | Synthetic biodegradable oil ISO VG 15 | ▲ | Semi synthetic oil ISO 3170 (5% emulsion) |
| ■ | Mineral oil ISO VG-22 | × | Synthetic oil ISO 3170 (7% emulsion) |

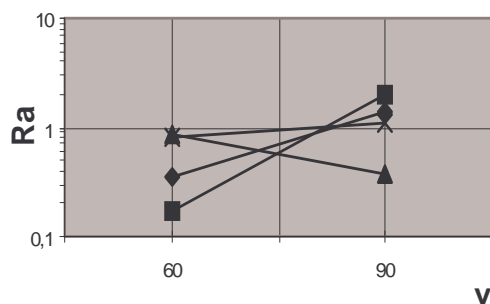


Figure 1. Diagram Ra/v; Al Alloy/ HSS

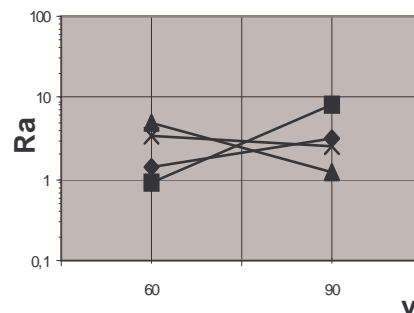


Figure 2. Diagram Ra/v; SteelCk45/HSS

4. CONCLUSIONS

In this paper we have tried to give contribution to the methodological approach for searching systematic answer from company concerning to the QMS and EMS. After conducting experiment we can conclude that using synthetic oil for drilling processes is satisfied for quality of metal surface, and avoiding the sediments. Utilization of synthetic biodegradable substances in processing steel Č.1530 and AlMg alloy resulted in the increase in the treat ability parameter by 5, up to 15%, from the aspect of the treated area quality as compared to the utilization of classic mineral substances. The use of titanium nitride coating on tool blade resulted in a 50% lower amount of refrigerant and lubricant used while cutting, under the same conditions of treatment and approximately same treat ability parameters. Synthetic oils are in some results same as mineral oils, and that results push us toward future research especially in the field of better machining condition and synthetic oils which should satisfied more demand technological systems which must suitable to the principle of excellencies. It is important to have a good cooperation between oil producers and company especially in the testing phase of lubricants which can provide good oil layer in condition of higher pressure and temperature. Taking a care about QMS and EMS producers of synthetic oil and consumer become strategic partners in the machining processes.

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