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XII Халықаралық ғылыми конференциясының
БАЯНДАМАЛАР ЖИНАҒЫ

СБОРНИК МАТЕРИАЛОВ
XII Международной научной конференции
студентов и молодых ученых
«НАУКА И ОБРАЗОВАНИЕ – 2017»

PROCEEDINGS
of the XII International Scientific Conference
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«SCIENCE AND EDUCATION - 2017»

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Жинаққа студенттердің, магистранттардың, докоранттардың және жас ғалымдардың жаратылыстану-техникалық және гуманитарлық ғылымдардың өзекті мәселелері бойынша баяндамалары енгізілген.

The proceedings are the papers of students, undergraduates, doctoral students and young researchers on topical issues of natural and technical sciences and humanities.

В сборник вошли доклады студентов, магистрантов, докторантов и молодых ученых по актуальным вопросам естественно-технических и гуманитарных наук.

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Education And Research (2013) Industrie 4.0 gives an opportunity to include customer-specific criteria in different stages, such as design, ordering, development, production and it also allows to accept last-minute changes. Therefore, it can be said that Industrie 4.0 is able to cope with all issues that took place in Heimlich Industries.

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POTENTIAL BENEFITS AND PROBLEMS OF INDUSTRY 4.0 IN MANUFACTURING COMPANIES

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With the rapid globalization of market, more and more companies attempt to benefit from updated possible technologies. In turn, technology is being improved very fast, thereby encouraging industries to change quickly as well. For example, only while ago people encountered 3rd industrial revolution which was about using computers and PLCs in order to make production automatically[1]. However, manufacturing world is growing fast and becoming smarter. Therefore, the new term "industry 4.0" was already launched in 2011 Hanover Trade Fair[2]. There are many high-tech industries which are attempting to experience the new method. The concept of the new industrial revolution is that machines interact with each other through Internet of Things (IoT). Although the idea of smart companies seems unbelievable, there are companies which already make use of that. Consequently, the essay aims to identify the opportunities of Industry 4.0 for manufacturing companies, and then explain preparation issues and problems.

One of the main aims of Industry 4.0 is to establish smart product and manufacturing processes through integrating data and process[3]. Cyber-Physical Systems helps to transfer the data gained from monitoring physical processes through computer and network systems. Simultaneously, decentralized decisions are carried out. German industry, where Industry 4.0 started, concentrates on customized market and on market which needs to respond quickly. Moreover, integrated networks give an opportunity to combine core competencies[4]. Subsequently, if process and supply chains are virtualized, then it will turn to better communication between operations, thereby accessing to right product. Furthermore, the communication will be carried out with people equally as well[5]. Next, it is a great chance in terms of business as well, as keeping track of inventory and raw materials will be relatively easier. Moreover, because, systems like RFID (Radio frequency Identification Devices) are used, products can be controlled easily at any stage.

Opportunities

Having identified what is Industry 4.0 in general, now essay seeks to find out what kind of opportunities could be drawn from implementing Industry 4.0.

One of the main problems is expensive labour cost. Therefore, it is said that it is a great

opportunity to reduce labour cost through implementing Industry 4.0. For example, if company is currently employing 700 people excluding 50 professional part time engineers, which shows that it is a relatively large company. Subsequently, one of the first reasons why Industry 4.0 was launched in Germany was that they have high rate of labout cost[6]. Banda (2015) also states that Industry 4.0 will improve machine uptime, thereby decreasing labour cost. If company's bills are reduced through cutting labour cost, it is possible that capital will be used for improving other aspects of the company.

It is known that in companies only few robots are used for loading and unloading, and material handling is mostly carried out by hand. Moreover, they are carried out by subcontractors. Using CAD systems will allow using more machines instead of manual labour. For example, it is said that steel components are up to 50 kg, which is very heavy. Obviously, human are paid more for this kind of job. Whereas, if right types of machines are set up, then cost will be reduced. Furthermore, machines in smart factories will not probably require excessive wiring and it is believed that consumption of energy and resources would be reduced by 50%[6].

Secondly, equally important issue within companies is lead times for ETO (electron tube operations) takes long time, despite the fact that ETO is expanding. This is because companies do not acquire enough capacity. In order to eliminate these problems, Industry 4.0 should be applied to the company as much as earlier. Because, according to Brettel et al (2014) in machine and plant industries it is crucial to present high quality customized products for reasonable payment. Smart automation of these industries will help to improve their quality. According to Koch et al (2014)[7] increasing number of companies is choosing digitized factories. In other words almost 80% of companies will probably be digitized in 5 years (Koch, 2014). Thus, it can be concluded that, customers will probably prefer products from digitized factories. Therefore, it is preferable to outstrip other companies. Although the company has invested money in using CAD system, it is also said that not everyone in the company is capable of using them.

Turning to competition between manufacturing companies, it seems that using computer controlled technology will perhaps have privileges. This is because, mainly in Germany and other European Companies, companies are starting to implement Industry 4.0

Preparation

Because the idea of Industry 4.0 is relatively unfamiliar to many of companies, it is said that preparation process will be the main part of moving into it. It is believed that application of Industry 4.0 into companies will take over 10 years (Mittermair, 2015). Thus, companies will probably be fully using the new system in about 2025.

According to Mittermair (2015) while moving to Industry 4.0, it is very likely to meet terms CAM, CAD and CNC, as the processes controlled or modeled by computers. Furthermore, during the modeling processes into virtual world, CAD is absolutely crucial to convert from 2D into 3D model all the management processes, such as procurement, planning, supply chain processes and even sales. Nevertheless, integrating all the processes into one database system is new. This is because, nowadays in the companies which use Industry 4.0 system, software systems integrate and evaluate all the data from different parts of companies unlike the past.

There are many companies which benefit from Industry 4.0, as they integrate whole production system into virtual factory. As a result, especially product development department is enhanced (Brettel et al, 2014). In the case work, design and development in companies will be improved and carried out in shorter time.

According to manufacturing specialists only several years ago, managing some processes was almost impossible. However, collaborated community of machines is making everyday production easy. Thus, it can be said that software creates significant changes in manufacturing world[8]. Taking into account this fact, it can be said that all the works in companies by hand in the previous should be prepared to be carried out through the aid of machines. For example, material handling was relatively high as it was done manually.

According to Banda (2015) who is head of Hans Beckhoff, manufacturers acquire huge responsibility to satisfy the customer needs. As a consequence, the fact how efficient companies are

working in terms of manufacturing is major reason of whole companies' efficiency. Furthermore, managing machines in a smart way is a key while implementing the system (Banda, 2015). Therefore, machines of companies should be fully prepared to the new step. From the background of the company it is seen that most of the machines are computer controlled. For instance, 15% of machines of component manufacture is electrical and with electronic components. Thus it might also consider as a small preparation. However, many more machines are likely to be bought in order to compete in the market in the future.

Perhaps the most logical starting point in looking at the implementing issues is interaction between human and machine. At present, mainly logistic schedules are accomplished by managers; machines are driven by operators, whereas technologies carry out only specific tasks. In general, operations are advanced by operators and managers. However, it is worth mentioning that conditions of machine parts are not well maintained. In order to be prepared to smart industry all the computer controlled machines of companies should be well maintained or more automated machines ought to be purchased in the future.

It is usually said that different kind of machines are used for totally various purposes. On the contrary, many of predictive measures are created for only one type of machine or specific machines. Now, in many cases, measures which take care of machine conditions are not giving benefits for the machines. Hence, the more attention needs to be paid for "health management methods". It is advisable for companies to maintain the machines, which are held now and will be bought in the future. This is because, within Industry 4.0 all the products and processes conducted in machines are integrated. Thus, error of one machine might lead to high economic decrease in companies.

Data management is one of the essential aspects of machines which serve by themselves. Moreover, it is impossible to refuse cloud computing, which gives an opportunity of being flexible and extra capability. Nevertheless, in order to reach the efficiency in data management, technologies should be studied and developed deeper.

As can be expected the new system industry 4.0 will be based on central database system. Hence, more research should be accomplished in order to tackle the issues of integrated data.

Problems

A further issue remains with regard to problems which might occur during the implementation of Industry 4.0. First of all it is worth mentioning that fourth industrial revolution is a new concept. Therefore, probably not many challenges have been discovered yet. However, this section of essay will attempt to identify the potential problems of companies based on both literature and background information.

A further problem might be related to human factor. Namely, it might be due to the absence of willingness to change in factory. This reluctance is mainly considered as a biggest challenge during implementing process. Naturally, people simply hesitate to change their surroundings. For example, there are about 700 workers in the factory which is large number for the first moment. Therefore, it might be difficult to employees to accept the change.

Next, if the company's products and processes communicate through Cyber-Physical Systems, then it means that the amount of information collected is huge and it is more challenging to manage and control them. Therefore, here security issues might occur. This is because, HI is relatively stable company with marginal turnover. Therefore, it is likely that the company's competitor might access to the information, which is confidential.

Subsequently, within Industry 4.0 system, it is said that there is a direct relationship with suppliers. Moreover, for example, when companies need a particular product, then signal will reach the supplier automatically. However, in practice it is not likely to involve vendors to the system as they might not be ready to the change.

Experts from small manufacturing companies say that producing customized products are expensive in terms of warranty. Also, it is said that mass production will dominate compared to customized products. Furthermore, standardized products are demanded as they fit to huge percentage of customers. This also might be applied to many companies, as it is stated that demand

for individual is static or even decreasing.

Last but not least major problem is probably that the implementing Industry 4.0 requires a large amount of investment. In addition, the expenses might be spent on the reasons shown in preparation. Notably from previous sections, it is known that one of the advantages of Industry 4.0 is it decreases labour cost through changing manual work to machine work.

Conclusion

According to Koch (2015), only 37% of German companies preferred combined system, whereas all the others were in favour of moving to Industry 4.0. Therefore it means that earlier or later many companies are likely to work with the aid of Cyber-Physical Systems. Thus, HI should implement Industry 4.0 as soon as possible in order to be one of the first in German market and to succeed in long term plan. In addition, while considering the challenges and advantages of Industry 4.0, it can be concluded that benefits outweigh the problems in terms of long term plan. However, also it is worth remembering that, the company would need capital.

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АКТУАЛЬНЫЕ ВОПРОСЫ ОБЕСПЕЧЕНИЯ КАЧЕСТВА И КОНКУРЕНТОСПОСОБНОСТИ ТУРИСТИЧЕСКИХ УСЛУГ

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Туризм является одной из динамичных отраслей экономики, интенсивно развивается, приносит доход в бюджет страны. Эта отрасль является одним из мощных факторов усиления престижа страны. Туризм занимает важное место мировой экономике: на его долю приходится 20-25 % мировой торговли услугами. Экономика многих стран зависит от туристических услуг. Для многих стран они являются основным источником валютных поступлений.