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Engineering logistics in machine structure and exploitation Just-in-Time implementation process inside the enterprise

*Inżynieria logistyczna w budowie i eksploatacji maszyn
Proces wdrażania metody Just-in-Time w przedsiębiorstwie*

This research paper contains the plan necessary to implement the Just-in-Time method. The target of research, analysis and implementation of JiT is an enterprise producing agricultural machines, cars, etc. The concept serves as an enhancement of the information and material process. This article demonstrates the process of introducing the selected tool inside a factory. It also highlights the benefits of JiT idea.

Key words:

Just-in-Time, JiT, engineering logistics, enterprise, production process optimization, machine structure and exploitation.

Opracowanie zawiera plan niezbędny do wdrażania metody Just-in-Time. Obiektem badań, analizy i wprowadzania JiT jest przedsiębiorstwo produkujące maszyny rolnicze, samochody itp. Omawiana koncepcja służy usprawnieniu procesów przepływu informacji i materiałów. W artykule przedstawiono proces wprowadzania wybranego narzędzia wewnątrz fabryki. Wyekspozowano też korzyści wynikające z idei JiT.

Słowa kluczowe:

Just-in-Time, JiT, inżynieria logistyczna, przedsiębiorstwo, optymalizacja procesów produkcyjnych, budowa i eksploatacja maszyn.

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Introduction

In the area of useful knowledge in structure problematics and exploitation of technical systems the engineering logistics tool Just-in-Time marks its position even further.

Engineering logistics as knowledge discipline handling the research of occurrences and processes related to:

- transportation,
- storage,
- administration and stock management,
- other actions related to production engineering.

While the nature and rules of logistics are, it seems, adequately universal, applying certain methods and logistics tools is still an open matter. When it comes to usefulness of logistics, the

deciding factors are the gains from the reduction in cost of the flow of material assets, increase in workplace safety in work area and rational administration of stock. One of the main administration concept is lean management, depending, among others, on improving chosen fragments of logistics infrastructure.

Problem

The subject of this presentation is the discussion on rules of implementation of the Just-in-Time method in a business. The main goal of changes while using JiT is the increased effectiveness in material flow and the elimination of storing detail on assembly line.

Lack of unequivocal approach while implementing the JiT method gave the idea to schematize the introduction of said method in factories with high production serialization, assembly line moving in strict time windows and inner facility storage.

Case state analysis

It is known that Just-in-Time is a method of managing reserves relying on delivering elements precisely on time. Created by Taiichii Ohno, chief of Toyota, who in 1970 r. pioneered the system into his own factory. The goal is to minimize stock size. In many companies the storage of detail means additional costs [3].

JiT concept includes:

- supplying on time via outside delivery provider,
- manufacturing product on time or service,
- supplying parts on time from inner company storage to a workstation of choice.

Detail distribution happens in precisely specified hours.

According to the idea of Just-in-Time is the result of improper management of the company. Companies often secure the flow of production processes with excess of elements necessary to manufacture the product. This is not the best solution to the problem, e.g. with unreliable suppliers. The solution will be building long-term relationships with contractors and familiarizing suppliers with all operations performed in the facility. In addition, trust and stability is an important aspect on both sides. The recipient must be convinced that he will receive the ordered goods on time. The appearance of even one delayed delivery will force the company to store parts. In JiT, the reduction of inventory is associated with

the reorganization of the volume and frequency of supply. The entire delivery process should be carefully analyzed and optimized because it will be unreasonable to deliver one element every day.

The flow of material within the company according to the discussed system will also bring many benefits, including.:

- eliminating buffer zones at work stations,
- improving the product quality,
- improving the flow of production processes [2].

One of the basic foundations of Just-in-Time is also the change in employees' way of thinking and total elimination of waste of time and material. Since the implementation of the concept, everyone is responsible for the final product. Key decisions are made together. All employees should report problems immediately and suggest new technical solutions. Additionally, in inventory management, frequent employee training and improving employee qualification is mandatory.

A comparison of the traditional system with the Just-in-Time system — Table 1.

Before the implementation of the system, the company and all links of the logistics infrastructure must be prepared. It is necessary to perform many changes and procedures, including:

- development of the easiest technological process of the product,
- preparation of instructions of conduct in the event of untimely deliveries,
- the use of machines with short changeover time,
- determination of the fabrication size,
- introduction of serial production.

When selecting contractors in addition to deliveries on time, an important factor is the ability to buy ready-made components from companies specializing in a given product (e.g. engines). According to the idea of JiT, such an action increases the quality of the final product [1].

The rules of implementing Just-in-Time may look as follows:

Table 1

A comparison of the traditional system with the Just-in-Time system [2]

Traditional system	Just-in-Time system
Production pushing through stocks	Pulling production by demand
Organization according to technological phases	Organization by product line
Classic faculty structure	Cellular structure of monoproduktive centers ("factory inside factory")
Significant inventory	Limited inventory
Deeply specialized operating staff	Operating staff prepared to work in many positions
Centralized production service	Decentralized production service
Acceptable level of quality (some defects are tolerated)	Global quality control

Source: Own elaborations.

- create a plan with the current state of affairs,
- analysis and observation of results,
- project preparation using JiT,
- introduction and system monitoring.

It is difficult to determine a detailed scheme of operation, due to different variants of transport of elements and various forms of cooperation between the supplier and the recipient. In addition, the discussed concept of inventory management to achieve the goals set often uses the Kanban system.

The implementation of JiT is very difficult, labor-intensive and requires a lot of knowledge about the whole system. Comprehensive modernization of the factory using the discussed method is highly expensive (training, purchase of new machines, etc.). The effect will be visible only after a few years, but in the current economical situation, each company must develop and introduce new management modules to increase its competitiveness on the market. Just-in-Time is not a good solution to the inventory problem in small facilities with variable production. Incorrect implementation of the concept may bring a result that is opposite to the intended one, for example, deepening the company's instability [2].

JiT Implementation Plan

Introduction

The research, analysis and implementation of solutions streamlining the flow of material in the enterprise are carried out by specialists in the field of logistics engineering. Diagnosis of the problem is carried out on the selected work area, including important aspects affecting the functioning of the entire enterprise. The logistic survey should also take into account the transport of parts inside the plant and the flow of material between external entities.

The whole action is aimed at correct implementation of the Just-in-Time method, which will bring many benefits through:

- increasing the product quality,
- reducing the level of stocks,
- increasing the stabilization of production processes,
- reducing time losses associated with the flow of material inside the enterprise,
- increasing productivity.

All these benefits have a positive impact on the company's financial situation.

In addition, at the beginning of the observation it is worth conducting an interview with employees to get information on what needs to be improved. Most

often, people employed in the analyzed work area clearly indicate specific irregularities that can be overcome by implementing a well-chosen method.

Characteristics of the workspace for implementing JiT

Logistics engineering in the construction and operation of machines is aimed at optimizing the processes of material flow and information in enterprises, in particular those involved in the production of: working machines and transportation means.

To implement the Just-in-Time method, it is necessary to correctly characterize the selected work zone. The description should include:

- number of stations on the assembly line,
- number of people employed at each position and throughout the selected work area,
- specific work system containing a break,
- precisely described and analyzed assembly line movement,
- description of the activities of each employee in the selected work area, taking into account the time needed for transporting and preparing elements, e.g. for assembly.

The next step is to analyze other departments that have a direct impact on the proper functioning of the selected workspace, e.g. a warehouse. In the warehouse's characteristics, it is also necessary to carefully consider the number of people employed, the work system, the duties that should be performed and the area on the assembly line for which they are responsible.

Logistic diagnosis using JiT

On the basis of a correct logistic diagnosis, the direction of action can be determined. Most often these structural changes of applied solutions or implementation of new ways of transporting detail. The whole of the research concerns the improvement of material flow in a selected company.

Diagnosis of the problem should be based on:

- interviewing the assembly line employees, warehouse and management staff of the logistics department,
- measuring the delivery time of individual elements and/or cart to selected positions,
- measuring the time of assembly of elements from a given cart,
- defining the minute of a tact for the demand of details from the right cart,
- measuring the loading time of each trolley,
- preparing the instructions for proper loading of the cart,
- analyzing and consulting results.

Implementation JiT in practice

Analysis of JiT

At the beginning, a logistic analysis should be made which involves observing the selected workspace. The entire study is a necessary element for the correct implementation of the new logistic method. The time of operations mentioned above is measured using the stopwatch.

Each measurement should be saved specifically for this prepared table (figure 1). The analysis should focus on a previously selected work area and cells directly affecting the proper functioning.

The research of the designated production sector should last a minimum of one working month. A full analysis should be repeated three times to obtain reliable data. Basing on the obtained result, you can create a list of all the carriages traveling between the assembly line and the warehouse together with the necessary times.

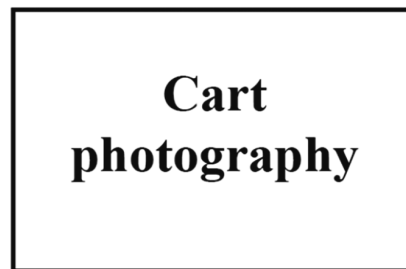
Updating the instructions for correct loading of trucks

To properly use the Just-in-Time method, the instructions for proper loading of carts should be updated (figure 2).

Information includes:

Figure 1
XYZ Cart

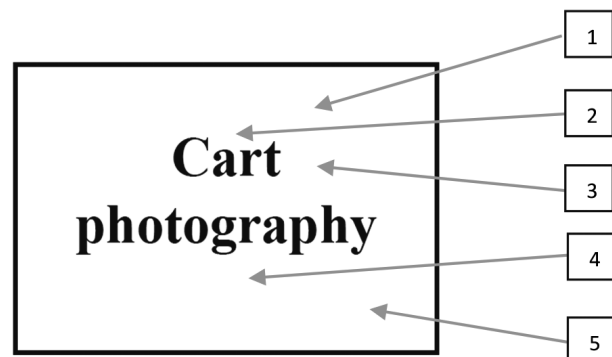
<u>XYZ Cart</u>	
Position	9
Delivery method	On foot
Delivery time	6 min
Loading time	8 min
Item collection time	44 min
Cart usage – minute in tact	14



Source: Own elaborations.

Figure 2
Instructions for proper loading of the XYZ cart

<u>XYZ CART</u>			
	Name	PN	Quantity
1	Bracket	1234	1
2	L Cover	4567	1
3	P Cover	7890	1
4	L Bracket hinges	1235	1
5	P Bracket hinges	1236	1



Source: Own elaborations.

- type of cart,
- amount of item,
- name and number of part,
- photograph of the loaded cart.

The instructions should be developed for all carts leaving the analyzed warehouse.

Final conclusion

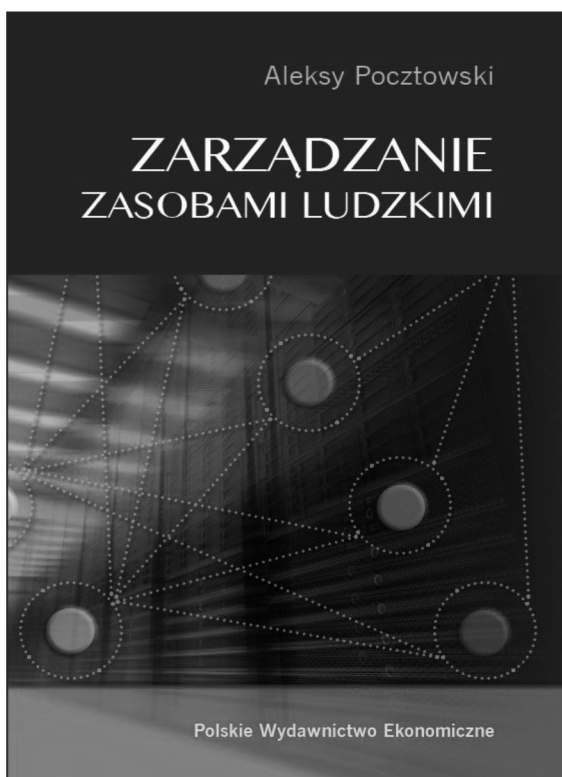
In the market economy, business managers strive to reduce production costs. A good solution is to reduce expenses by reducing storage costs. To achieve this goal, you can use the Just-in-Time method, which allows you to not only gain the benefits discussed earlier, but also, for example, minimize the chaos of providing detail.

Bibliografy

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Due to the lack of space, only the outline of the problem of implementing JiT in the enterprise was signaled. It is necessary to remember about the training of people working in the area of Just-in-Time activities and monitoring the processes of material flow. In the future, it would be worth focusing on developing a concept that would facilitate the introduction of new employees in the JiT area. One of the ideas is displaying messages on a monitor places, e.g. in a warehouse. The information would include the minute of the measure, the number of the cart with the instructions for loading and the position on which the detail should be provided. The next solution is to develop a plan and project of material flow.

PWE poleca



Wiedza, umiejętności, zdolności, zdrowie, motywacja i wyznawane wartości przez osoby świadczące pracę decydują o ich zatrudnialności, stanowią źródło konkurencyjności organizacji oraz pomyślności regionów i krajów. Upowszechnianie się tego faktu w świadomości społecznej prowadzi do wzrostu profesjonalizmu w zakresie zarządzania zasobami ludzkimi, które ewoluuje od rutynowego administrowania w kierunku zrównoważonego zarządzania, integrującego – w strategiach i metodach rozwiązywania kwestii HR – aspekty ekonomiczne, społeczne i ekologiczne.

Zarządzanie zasobami ludzkimi, jako dziedzina badań oraz wdrożeń praktycznych rozwiązań dotyczących funkcjonowania ludzi w organizacji i na rynku pracy, jest związane z wieloma wyzwaniami, które determinują jego obecny i przyszły rozwój. Zaliczyć do nich należy zmiany technologiczne, które zmieniają charakter pracy oraz polityki i praktyki HR, czyniąc je coraz bardziej sieciowymi, zdalnymi i wirtualnymi. Zmiany demograficzne, generacyjne, w połączeniu z rosnącą mobilnością na rynkach pracy, to kolejne wyzwania w obszarze zarządzania zasobami ludzkimi, które wiąże się z rosnącą różnorodnością. Należy też pamiętać o presji płynącej z rynków pracy na wzrost efektywności pracy, optymalizację kosztów i innowacyjność usług HR.

Zasygnalizowane powyżej kwestie stanowią przedmiot rozważań w książce, w której autor przedstawia problematykę zarządzania zasobami ludzkimi całościowo, łącząc jego teoretyczne i praktyczne aspekty oraz podkreślając znaczenie kontekstu w rozwijaniu teorii i doskonaleniu praktyki w tej dziedzinie zarządzania.

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