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PRACTICAL ASPECTS OF JIT

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1. Introduction

JIT is the core method of the lean production concept. Before putting JIT in place, many activities have to be performed and once JIT is implemented, many activities and rules have to be maintained. JIT itself is not a goal; it is only one of necessary steps to achieve best performance of the company.

2. Target And Facilities

The company performance can by measured simply based on the Q.C.D.[1] level. High Q.C.D level assures both costumer satisfaction and supplier efficiency. It is necessary to organize the activities on company with emphasis on the core activity. All activities necessary activities which are essential for final product making shall be represented by corresponding cells (departments) in the company with clear understanding of the role of each one of them, which finally brings customer satisfaction and company profit. See Figure 1. The company shall base its own philosophy from both bottom up and top down way, assuring both each final one operator and manager that they not only can, but shall contribute using their own ideas and experiences to continual improvement of company allover activities.

[1] Q.C.D. = high **Q**uality, low **C**ost, flawless **D**elivery

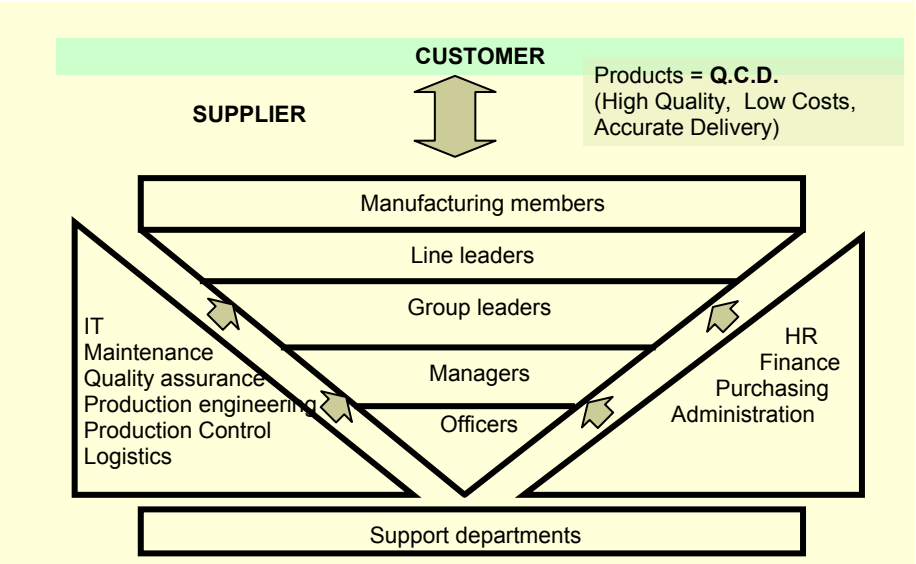

Fig. 1 *Target and Facilities*

3. Quality And Productivity

The simpler a company sets up all activities and arrange facilities the higher the probability of success is. There are two main pillars of success for every production company. First one is quality, the second one is productivity. The company must take only steps which will increase productivity, but never decrease the quality. Only a perfect organization of "5M+1E" (see) will make these two apparently opposed goals possible. If one part of 5M + 1E is poor or missing, the system and also output will collapse, guarantee.

4. System Conception

In order to achieve JIT, a company must always thing in context with allover system. To reach best Q.C.D., it is recommended to go one by one with following conceptual activities:

- Cellular Manufacturing,
- Balanced production lots (Heijunka),
- Rapid Setup (SMED) ,
- Six Sigma/Total Quality Management
- Team Development ,
- TPM – Total Productive Maintenance,
- Visualization of workplace,
- VSM – Value Stream Map,

- OEE – Overall Equipment Effectiveness,
- Jidoka – problem visualization and prevention (Poka Yoke, SOP, Andon, S-C-W),
- 5S activities,
- 3M – Wasting elimination (MUDA), overexertion (MURA), inconsistencies (MURI) Kayzen – continuous improvement

- JIT/Kanban

It is obvious these activities are related to many areas of the company ground and requires specialized attention of all company departments (see **Chyba! Nenalezen zdroj odkazů.**). This also means that only process oriented management can assure their successful fulfillment.

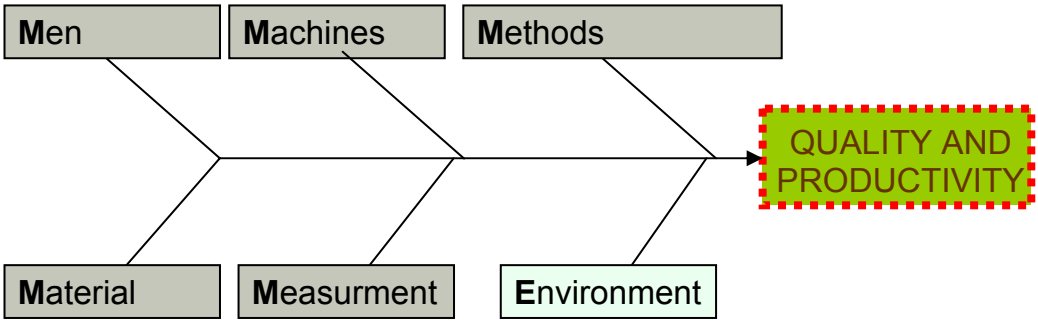

***Fig. 2** Quality and Productivity*

5. Methods And Instruments

Lean production requires strict rules and regular follow up activities for keeping rules and standards It is very useful to conduct all activities in a company in compliance with the simple P-D-C-A method which is an effective tool for both small and local activities and big and global steps. Most important is the understanding, that each process is producing parts (semifinished products) for next process, which shall be treated same way like a customer, that means every process must guarantee 100 % quality to the next process which is still internal, this makes the company stronger and cost oriented and decreases the risk of final rejection of parts by the real external customer. Any problem which occurs shall be investigated for a real route cause (5 why method) and perfectly countermeasure. See Fig. 1 **Methods and Instruments**.

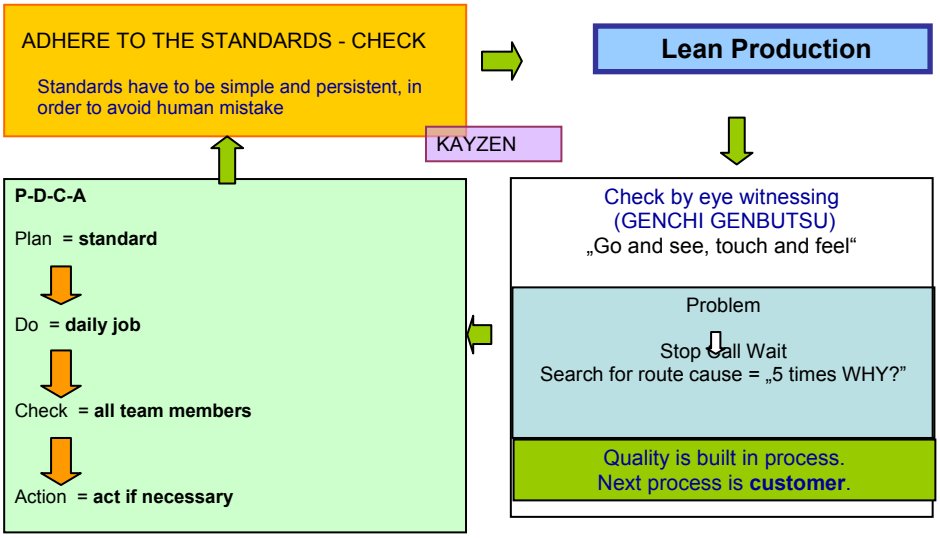

Fig. 1 *Methods and Instruments*

6. JIT

Parts (components, semifinished products and finished products) are produced and moved to the designated location right on time, when the customer needs them. The main concept of JIT in a production company is based on:

- Kanban – (special system for production (stock) control)
- One part flow
- Pull production

The basic area of usage:

- JIT in production
- JIT by material

There are several presumptions of a successful JIT implementation in connection with the lean production philosophy, see **Chyba! Nenalezen zdroj odkazů.**.

The presumptions are generalized lean production factors, when a company goes to JIT, it means that the stock level is going to be minimal or zero through allover process. Zero stock will uncover every potential weakness of a company step by step. See Fig. 2 The Inventory Hides Probleme.

Supplier performance

One of the most sensitive factors of JIT is supplier performance. It is strictly not recommended to run JIT by material before assuring each supplier performance. Supplier performance shall be measured in connection with two most critical aspects – Quality

performance (measured by PPM – rejected parts per million) and Delivery performance (DPM – delivery rejections per million). This two factors are quantified which means that they can be objectively evaluated. Company must realize simply, that you can hardly improve what you can not measure. See Fig. 3 **Supplier Performance**. The goal is to push suppliers to perform within the left down quadrant, which assures both high level quality and delivery. Company can decide to run JIT by material not by all suppliers at once, but can start with a reference one with best performance. This supplier can be a good example for other ones.

Presumption	Description
Production plan	Continuous demand
Layout	Corresponding the demand
Process	Short setup (change over) time, high OEE
Capacity	Flexible capacity reserves
Qualification	Assure quality corresponding the difficulty of process
Supplier	Strict requirements to suppliers

***Tab. 1** Presumptions for Implementation*

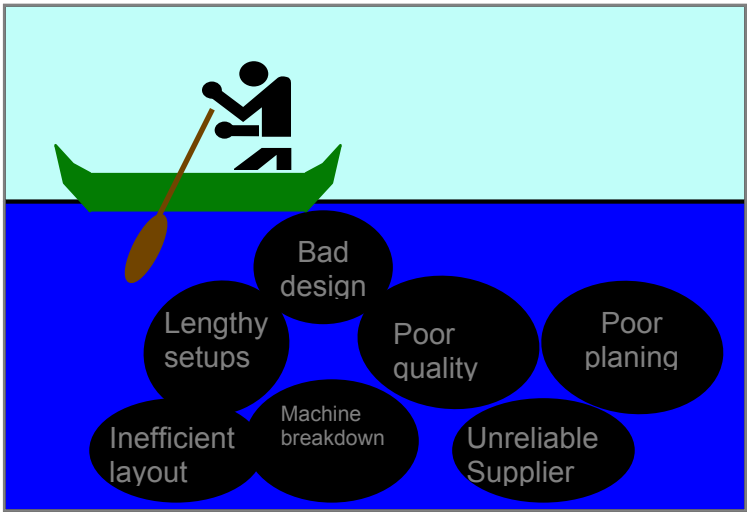

***Fig. 2** The Inventory Hides Probleme*

The goal of supplier requirements policy is to minimize stock level by the company and to minimize the lead time of supplies. Generally following policy for supplier requirements shall be applied by a company:

- High frequency deliveries,
- Lead time within hours, not days,
- Quick response capability(not from stock),

- On production line deliveries in requested quantity, time and sequences,
- Reliability,
- High level duality (0 PPM),
- Competitive price.

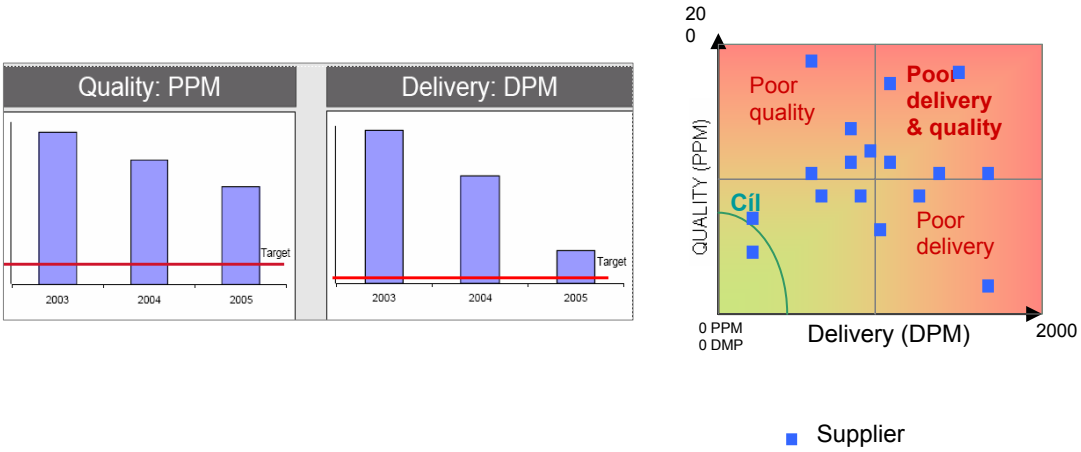

Fig. 3 *Supplier Performance*

Kanban

Kanban is a useful but kind of complicated tool for JIT production control. Implementation of kanban requires going through following preconditions:

- Overall process analysis
- Synchronization of processes
- Standardization of processes
- Error prevention
- Facilities improvement
- Gather and implement improvements
- Process management

Once JIT is successfully implemented, it becomes a strong tool leading to many company benefits:

- Reduced inventory
- Improved quality
- Lower costs
- Reduced space requirements

- Shorter lead time
- Increased productivity
- Greater flexibility
- Better relations with suppliers
- Simplified scheduling and control activities
- Increased capacity
- Better use of human resources
- More product variety

Kanban implementation and utilization requires hard discipline of every each one member of a company to be in touch with production flow. Generally following ones are the most obvious disadvantages of JIT/Kanban:

- Long implementation time,
- High dependence on Supplier
- Continuous assurance of a strict discipline

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Resumé

PRAKTICKÉ ASPEKTY JIT

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Produkční koncept JIT je v současné praxi spojen s mnoha faktory, které se významně zasloužily o úspěch či selhání. Tyto faktory mohou být chápány jako předpoklady a důsledky. K nalezení a popsání zmíněných faktorů je třeba hlubší analýza a dlouhých praktických průzkumů. Zpravidla jádro může být nalezeno v konceptu štíhlé produkce. Před implementací JIT do praxe, by měli být zváženy převážně následující faktory (metody): tahové plánovaní v Hijunka konceptu, rychlé nastavení, TQM, OEE, Jidoka a program 5 S a 3 M. Každá společnost užívající JIT by se měla rozhodnout pro preventivní politiku a nezbytné kroky a to z důvodu vyvarovnání se problémů, které by se mohli objevit krátce po implementační fázi JIT. Pokud tyto faktory nejsou brány v úvahu, JIT koncept bude dobrým ukazatelem slabých stránek společnosti (tj. špatná kvalita, dlouhodobé nastavení (seřízení) strojů, nespolehlivý

dodavatelé), které budou garantovat pouze jeden případ selhání skladovací úrovně, a společnost bude toto trpět dlouhou dobu a nakonec může přestat používat JIT uplně. V dnešní době „kanban“ je navržen jako užitečný prvek pro JIT v mnoha společnostech, ale koncept této metody potřebuje přesná pravidla a striktně sledované aktivity v praxi.

Summary

PRACTICAL ASPETCTS OF JIT

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In today's production practice the concept of JIT is connected to many factors which significantly decide its success or failure. These factors can be understood both like premises and like consequences. To find and describe these factors needs deep analysis and long practical surveys. Generally the core of these factors can be found in the concept of lean production. Before implementing JIT in live, mainly following factors (methods) shall be considered: Pull scheduling in Heijunka concept, Rapid setup, TQM, OEE, Jidoka and program of 5S and 3M. Each company to run JIT shall decide the prevention policy and necessary steps in order to avoid problems which may occur shortly after the implementation phase of JIT. If these factors are not well taken into account, the JIT concept itself will be a good indicator of company weaknesses (e.g. bad quality, long setup of machines, unreliable supplier) which will guarantee occur once the stock level goes down, but company will suffer from these quite a long time and finally may give up JIT at all. Nowadays kanban can be proposed as a useful driver of JIT in most companies, but the concept of this method needs precise rules and strict follow-up activities in practice.

Zusammenfassung

PRAKTISCH ASPEKT JIT

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In der heutigen Produktions Praxis wird das Konzept von JIT bei viele Faktoren angeschlossen, die erheblich zum Erfolg oder Misserfolg beitragen. Diese Faktoren können sein Vorraussetzungen zu schaffen und Konsequenzen zu bewirken.

Diese Faktoren benötigen eine tiefe Analyse und eine lange praktische Erfahrungen in der Beschreibung. Im Allgemeinen kann der Kern dieser Faktoren im Konzept der niedrigeren Produktion gefunden werden.

Bevor man JIT in den Phasen-, hauptsächlich folgenden Faktoren (Methoden) werden bei der Betrachtung eingeführt: Die Terminplanung im Heijunka Konzept, in der schnellen Einstellung, in TQM, in OEE, in Jidoka und im Programm von 5S und von 3M ziehen. Jede Firma, die entscheidet JIT laufen zu lassen entscheidet die Verhinderung der notwendigen Schritte, um Probleme zu vermeiden, die kurz nach der Implementierung Phase von JIT auftreten können.

Wenn diese Faktoren nicht in Betracht gezogen worden sind, ist das JIT Konzept jedoch selbst eine gutes Anzeigeinstrument für Unternehmensschwächen z.B. schlechte Qualität, lange Einstellung der Maschinen, unzuverlässiger Lieferant oder das auftreten plötzlich absinkenden Lagerniveaus. Für Firmen die an diesen Problemem leiden, kann durch den Einsatz die Leistung wieder nach oben gehen.

Heutzutage kann der Einsatz von JIT in den meisten Firmen vorgeschlagen werden, aber das Konzept diese Methode benötigt eine hohe Notwendigkeit von präzisieren Richtlinien und strenge Anschlußtätigkeiten in der Praxis.