

PRODUCTION FACILITY IMPROVEMENT

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Abstract

The purpose of this article is to describe cell production system from a general perspective and to introduce this system as a option towards to conveyor production system. Nowadays is hard to say, whether all production companies will start to think to change conveyor production system, but it is clear that for many companies where the flexibility is a critical manufacturing capacity, cell production will be (or already is) an option.

Key words

conveyor line, cell line, production system, productivity, facility, improvement

Introduction

With the recent globalization, there are many corporate environments to consider in order to achieve the corporate objectives including the severe competition, price decline, diversification of customer demands, information, globalization, and requirement of high quality requirement. Another change of corporate environment is the difficulty of human resource securing and strengthening of legal regulation on environment.

Such a change in the corporate environment requires the change of manufacturing environment. The are securing of flexible production system, design capability for new product development nad high initial compensation by the installation of high priced facility. Not only that, it requires the optimization of manufacturing productivity of harmful and hazardouts substance management of less than legally permitted level and the development of alternative on human resource difficulty.

Change of manufacturing site rapidly changing the condition of facility, one of the most important element of manufacturing process. The facility not repair well, the facility not having the facility defect responding rapidly to the job change, the facility that has the condition for easy informatization, and the facility that anyone may easily approach and operate.

Why to improve production facility

In current market environment, there is several reasons why companies are thinking about organization (reorganization) of production. Most important „engine“ to start up changes in production systems are cost reduction and productivity improvement. From the year 1990, there are visible first trials to move from conveyor production to cell production. Generally we can say, that cell production method has been adopted by Japanese manufacturers (mainly in consumer electronic industry), see Figure 1.

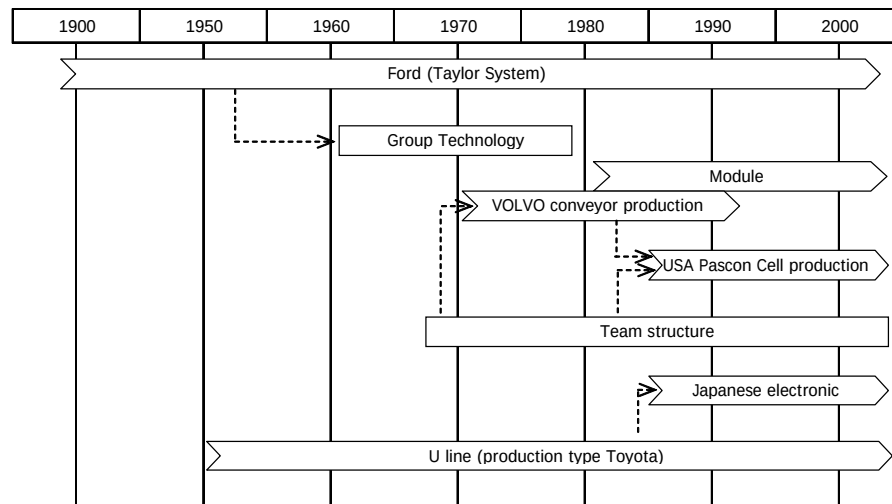


Fig. 1. Cell production history

Even if conveyor production is currently still dominant there are already companies, where cell production is slowly replacing the conventional production system.

Cell production was started from „Group Technology“ company in the early 1960s. Later on Volvo automobile company withdraw conveyor, introducing Cell in the 70s. It was formally reconstructed in Fascon MECHA industry in the 80s. It was on the base of „U shape line“ in Toyota automobile in the 50s, and developed to new manufacturing method in Japanese electronics manufacturers in the 90s. Very rapid implementation of cell production started, after it was introduced in Korea.

Cell production system has been implemented by many companies for different reasons:

- Cost reduction
- Increasing productivity
- Development of abilities
- Launching new projects/products
- Reducing of work in process inventory
- Establishment of stimulating working environment

To understand advantages of cell production, we should first understand problems of Conventional production system (conveyor):

1. process unbalance (production line consist from too much operators)
2. work unbalance (difference between speed of conveyor and speed of work)

3. buffer of not finished products (line unbalance, problem with synchronization)
4. low quality (too big work separation)
5. work/model change (too big change of work, models)
6. working dissharmony (too big work separation, stereotip)
7. portion of manual work (too small research for process improvements)

Cell production means the system that a person or a team consisted from a few persons are in charge of quality, time limit and costs by a product or small LOT and do processing, assembly, inspection, completion and outgoing inspection while using small sized facility. It is parallel production concept of batch production and production making method of self-completion. Advantages of cell production we can summarize in to these points:

1. flexible changing in any product kind and quantity
2. stock of semifinished product is small
3. productivity is improving together with LOB
4. manufacturing lead times are shorten
5. quality awareness is high and defect is decreased
6. facility investment is low
7. morale of operators is stirred up

To be honest, we should also mention disadvantages of cell production:

1. individual ability differs
2. no teamwork and slow function transfer
3. equipment and tools are needed as much as the number of working tables
4. high requirements for training system

Basically, cell production is following and using Maslow's hierarchy of needs, where on top of the hierarchy is desire to show his/her own ability. Simple comparison of conveyor and cell production system you can find in Table 1.

COMPARISM BETWEEN CONVEYOR AND CELL PRODUCTION Table 1

Item	Conveyor production	Cell production
Work	Simple work	Complicated work
Technology	Low	High
Function	Single skilled operator	Multi skilled
Work type	Belt conveyor	Block
Facilities	Expensive – big scale	Cheap – small scale
Production	Mass production	Small quantity an many kinds
Work in process	Many	Little
Production efficiency	Low	High
Humanity	Concept	Respect

There is several possibilities how to organize cell production. Starting from one man cell – operated by one operator. In this case, there is no division of labor, layout has no limitation and the worker manufacture basically 1 unit. Next type is division method – several persons working on one cell. There is clear division of labor, workplace layout is usually U word type and basically manufacture 1 unit. Last one is rotation method, where several persons is working. There is no division of labor.

Since I would like to introduce cell production system, I will not explain deeply advantages of different organizations of cell production systems. Generaly we can say, that on

the assembly station (within the cell) worker performs much more tasks (or sequences of tasks) than in conveyor production. Than is clear that number of parts that have to be assembled within the cycle time is significantly larger. Due to this fact, there must be a storage area close to the cell line and components must be taken from specific „lot containers“.

Conclusion

Cell production system enables to shorten the time-to-market when introducing new models or product changes. Allowing manufacturers to increase productivity with minimum costs. Real fact is, that while the design, development, building up and installation of fully equipped conveyor line may require several months. Instead of this, prepare cell production workplace can be done within few weeks. The same story it is with layout adjustments. Therefore cell production sustain flexible towards market changes.

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