

„EFFICIENCY OF ASSEMBLY POSITIONS” PRELIMINARY REMARKS

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Abstract

The problem of costs which exists in companies during production of goods is still actual. Growing requirements and frequent changes of clients' likes resulted in necessity of profile changes from stock production to production for individual order /flexibility/. Such changes created a new strategy of production called "Just in time" (JIT). The JIT system enables elastic production what is more production of goods which are demanded by the market.

But on the other hand it automatically causes growth of production costs although companies seek optimal usage of production tools. Such situation causes that a special attention should be given to production process and especially these work stations which have potential reserve of efficiency growth.

Key words: assembly, JIT, production

INTRODUCTION

The problem of costs which exists in companies during production of goods is still actual. Growing requirements and frequent changes of clients' likes resulted in necessity of profile changes from stock production to production for individual order /flexibility/. Such changes created a new strategy of production called "Just in time" (JIT). The JIT system enables elastic production what is more production of goods which are demanded by the market.

But on the other hand it automatically causes growth of production costs although companies seek optimal usage of production tools. Such situation causes that a special attention should be given to production process and especially these work stations which have potential reserve of efficiency growth [Białoń 1996].

EFFICIENCY OF ASSEMBLY WORK STATIONS

Production of new products requires constant revision of production process and assistant processes which influences output indexes and productivity indexes of a given company. Productivity of companies (P) is not only the function of productivity connected with management (p_z),, but also with productivity of basic production units (p_T) [Suska 2004].

$$P = f(p_z, p_T) \quad \text{where} \quad p_T = \frac{\text{result}}{\text{costs}}$$

Properly undertaken actions can in consequence lead to a better utilisation of stock which a company has at its disposal and to realisation of its production process. Work stations of production (their quality estimated in the aspect of their output or rather potential output) are potential reserve of production efficiency growth.

In furniture industry this problem is strictly connected with assembly work stations which in comparison with mechanical working stations show less automatization. This is a result of lack profitability of its introduction especially in small and medium companies producing individual orders (short batches). The example of this can be research data shown in Fig.1.

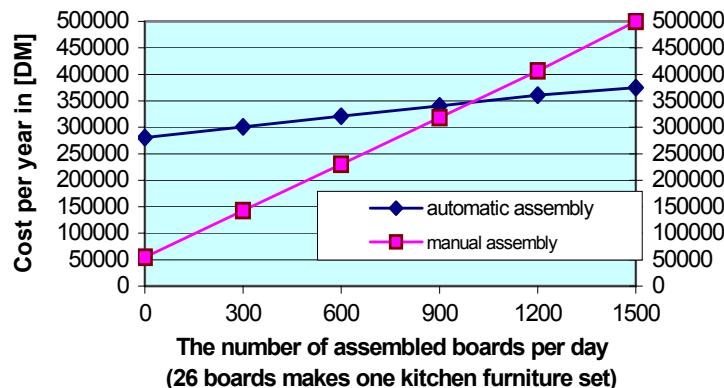


Figure 1 Comparison of costs of two assembly techniques of the same product depending on production size according to KERN and others (1996)

Appropriate actions can in consequence lead to better usage of factors of production, which are at the disposal of a company. Lack of information concerning relationship between particular elements of **production techniques T**, constituting assembly stands, causes considerable difficulties in decision making rationalizing the assembly. There is necessity for a assembly model, which would inform about its output during flows of materials – Fig. 2.

$$T = m + t + r + s$$

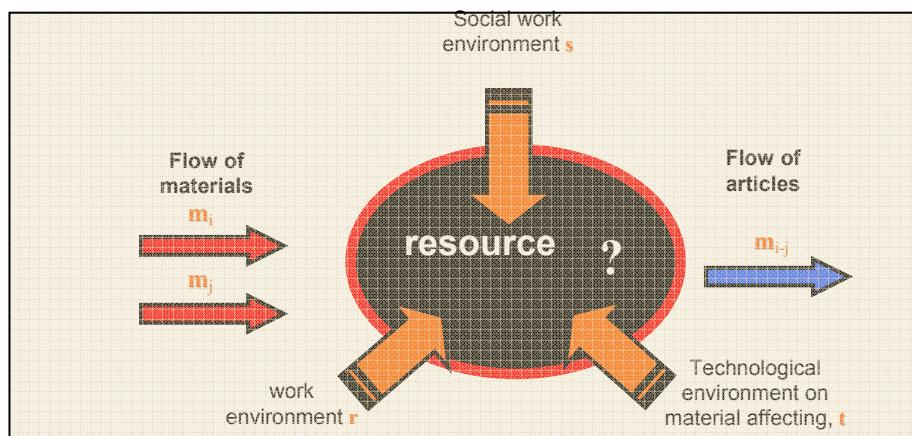


Figure 2 Production stand according to RYBARCZYK (2004) modified by OSAJDA (2006)

METHODS

In research conducted in industrial companies the structure of real time of production processes was identified. The following commonly known research techniques of these processes were used:

- instantaneous observation of work processes,
- observation of a working day,
- timekeeping
- interviews with employees (mainly to verify the research data).

Because of large number of complex operations, while viewing assembly stands a Panasonic digital camera type NV-GS 17 was used.

RESULTS

The analysis of succeeding assembly steps in furniture industry shows that more and more often elementary assembly factors, which condition high output of assembly stands are omitted.

The observation of an exemplary assembly operations (Fig.3) allowed measurement of duration of assembly steps on the work stand is shown on Fig.4 and Fig. 5. Tests conducted in furniture industry show high level of hand-held assembly operations which in connection with inappropriate instrumentation lengthen substantially assembly time of final product. High proportion of real assembly time of table board assembly shown in Fig.4 only confirms the existence of the problem.

The growing output of machining stands (usage of CNC machine tools) – results in constant staff increase instead of better technical arrangement of assembly stands. Inappropriate assembly technical equipment is not the only problem which occurs in furniture industry. Another one is the problem of organization of assembly stands which can be seen in Fig.5. The consequence of such approach is more and more often switch over the assembly process for consumer. Lack of appropriate materials for assembly within reach forces an employee to constant movements which substantially influences output of assembly stands.



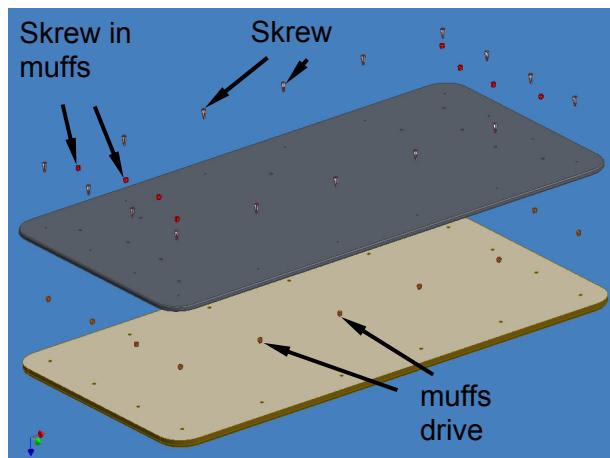


Figure 3 Example - assembly - task

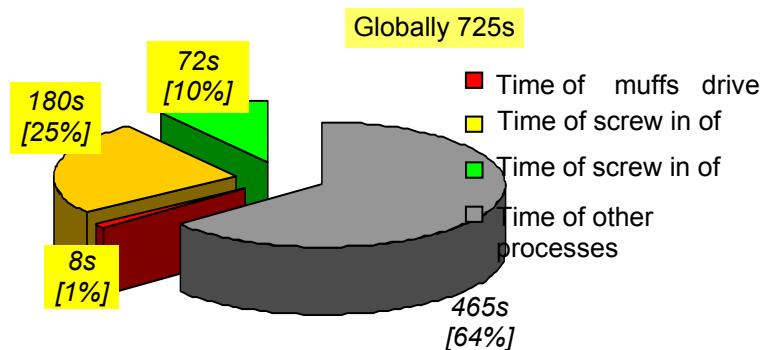


Figure 4 Real time contribution of assembly processes

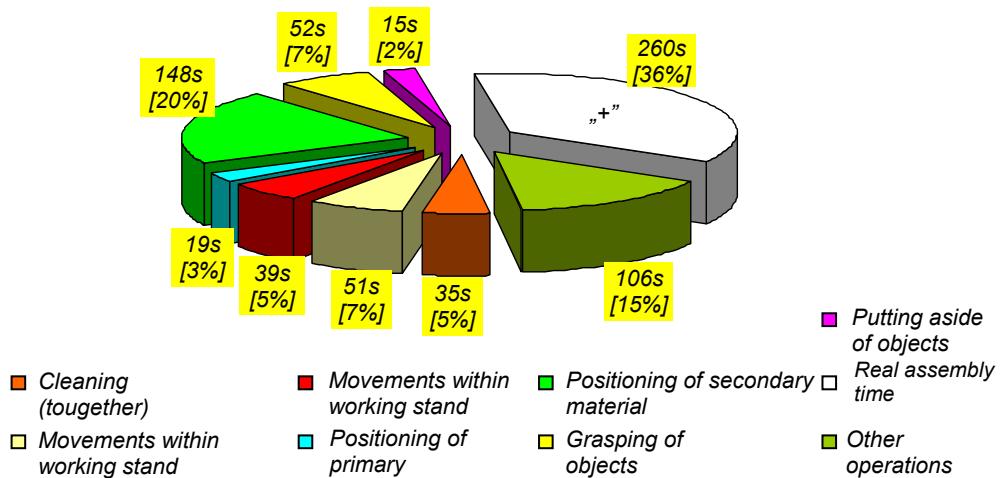


Figure 5 Time contribution of other actions during assembly process on working stand.

RECAPITULATION

On the basis of the research it seems essential to create models of assembly processes. They would serve to analyse real processes (processes on assembly work stations) and to prognoses their future performance or would be useful for their optimal designing.

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