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SZCZEGÓŁOWE PLANOWANIE PRODUKCJI W ASPEKCIE WYKORZYSTANIA OPTYMALIZACJI W TRYBIE RZECZYWISTYM NA BAZIE ROZWIĄZANIA proALPHA®APS

Konwencjonalne systemy klasy ERP tylko w ograniczonym zakresie spełniają swoje podstawowe zadanie – efektywnego planowania i sterowania zasobami w przedsiębiorstwie – w szczególności w obszarze produkcji i logistyki. APS (Advanced Planning et Scheduling) stanowi nową generację systemów o znacznie udoskonalonej funkcji planowania i sterowania. Rozwiązana klasy APS oferowane są na rynku oprogramowania jako systemy specjalistyczne lub w postaci rozwiązań zintegrowanych w ramach systemu ERP. W artykule przedstawiono szanse i ryzyka zastosowań rozwiązań zintegrowanych na przykładzie systemu proALPHA®, który jest zorientowany na potrzeby średniej wielkości przedsiębiorstw, a przy tym dostępny w wielu językowych oraz zlokalizowanych wersjach – również w Polsce.

MULTI-RESOURCE-PLANNING AND REALTIME-OPTIMIZATION BASED ON proALPHA®APS SOLUTION

Conventional PPS/ERP systems still come up to the expectations of planning and management of the resources of manufacturing company in the limited manner, as regards production and logistics areas especially. APS (Advanced Planning et Scheduling) is also meant as the forthcoming generation o the systems characterized by planning and management functions basically improved. APS Solutions are being offered on the market both as unique APS and with ERP Systems combined applications. The chances and risks of implementation of combined solutions are on the example of proALPHA® system discussed. proALPHA as the multi-language and -country (among other things localized for Poland) ERP standard solution is designed for small and medium-sized enterprises.

1. THE CONCEPT

The main difference between classic MRP planning, which makes up the core of the very most ERP systems, and APS concept, which was implemented in proALPHA is on the figure 1 presented. The crucial point is a change of a complex, multidimensional, successive planning of the materials and capacities into one integrated multi-resource-planning with optimization of using of resources according to the goals of manufacturing company [5].

The reason for unsatisfactory planning results delivered by the most present-day systems is a deficient illustration of planning systems' reality across the manufacturing companies. Production flow modeled by these systems is derived directly from the bills of materials. Production part, which belongs (from constructive point of view) to a sub-assembly is in the first place assembled on the constructive site and when it's done completed respectively.

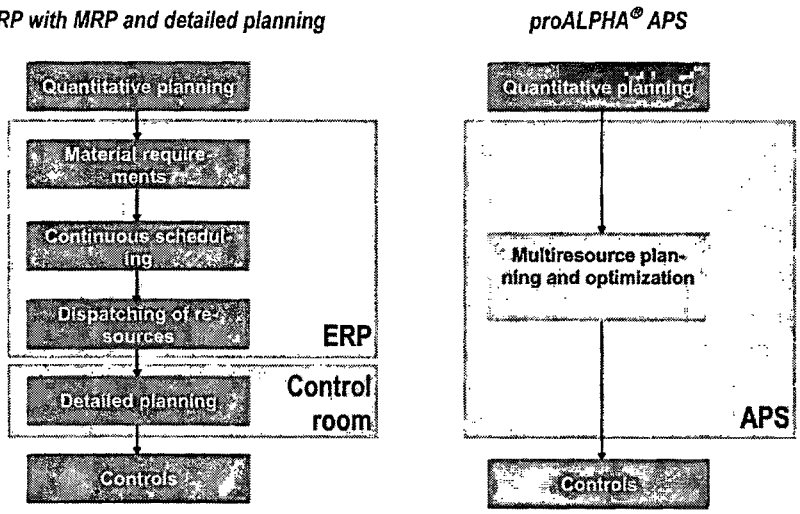

Fig.1 Comparison of MRP and proALPHA® APS
Source: self work based on [2]

Classical routines are based on sequential execution of individual operations only. The fact contradicts the real manufacturing process essentially. In the reality these operations are conducted simultaneously. Modeling of parallel appliances of various orders by one resource is not possible in that kind of systems, what is in fact an ordinary situation for resources like transport or courses of methods.

The new basis structures offer the flexibility that is required. Flexible structures of the processes designed in the form of the operations network take place of the sequential execution of unique operations that used to be building as the hierarchy of production level. Various resources are able to be used by activities of many work orders together and simultaneously [5].

2. IMPLEMENTATION

Simultaneously consideration of all the crucial resources is for achieving of the accurately planning outcomes a necessary condition. A work could be start only if the acces-

sibility of all resources is good synchronized. As a result a material is being purchased on that time only.

Beside the material, workers and machinery there is in addition equipments for production purposes and surfaces as regards assembly, which have to be taken into consideration as well. Theoretically it makes no difference to APS system on how many various resources might be engaged. Optimization of using of resources is carried out according to diverge goals.

Evaluation a specific delivery date for standard products is carried out on the basis of inward and outward stock movement supported by the Available-to-promise (ATP) method. Up to the date of delivery there are no planning orders on the client oriented environment. In that case, the scheduled delivery date must be set on quasi real-time, having regard to actual availability of resources and complex structures. This kind of examination of capability is known as capable-to-promise (CTP) method. Classic PPS/ERP systems cannot provide with a satisfactory solution for this problem.

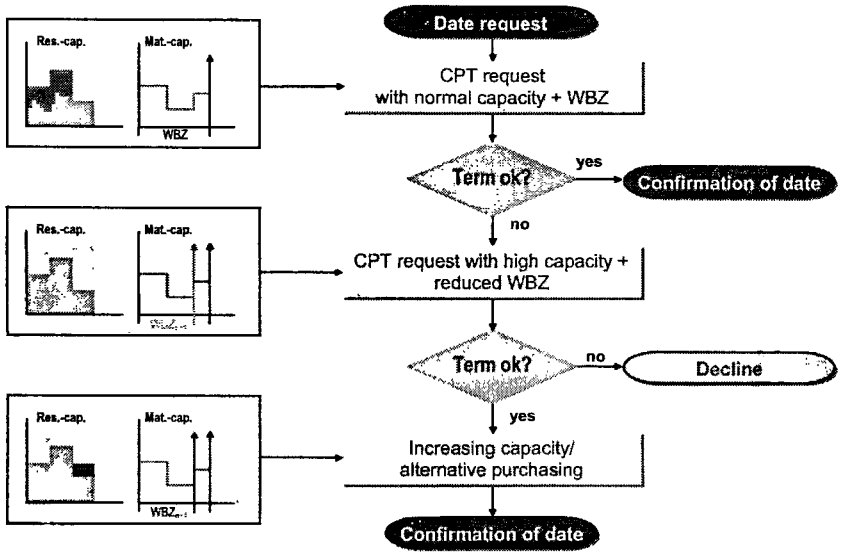

Fig.2 CTP request
Source: self work based on [2]

The routine of CTP diagram is presented on the figure 2. If the requested delivery date cannot be met, it is possible to schedule under condition of capacity overload and/or shortened .replacement time for material. Capacity adjustment is the way to eliminate overload and the shortened replacement time is understood as the utilization of alternative suppliers [5].

Computing optimization is a basis of detailed planning and scheduling with multidimensional goals. This is a user, who decides about selection and parameterization of the objective function. Productive algorithms make the calculating time is very fast. The results can be viewed or edited with the graphic elements in the Gantt chart (Fig. 3).

Total value-added process can be managed directly in a work order specification. There is no constraint on viewing a real network structure, what used to be a serious problem for classic PPS systems. The unique operations of one sub-process, which are maintained simultaneously, could be trouble-free presented on the Gantt chart. Though, there is still a possibility to use the classical bill of materials and routines.

A new work order specification shows all sub-processes and unique operations. There are various arts of operations and basic resources viewed in details in the chart. It is possible to take a closer look, when analyzing unique operations. Using "zoom in" will display and edit only selected data on the screen. For example, when using Gantt's chart tools it is possible to derive from an activity of unique resource the orders, which are competing against the engaged resource [1].

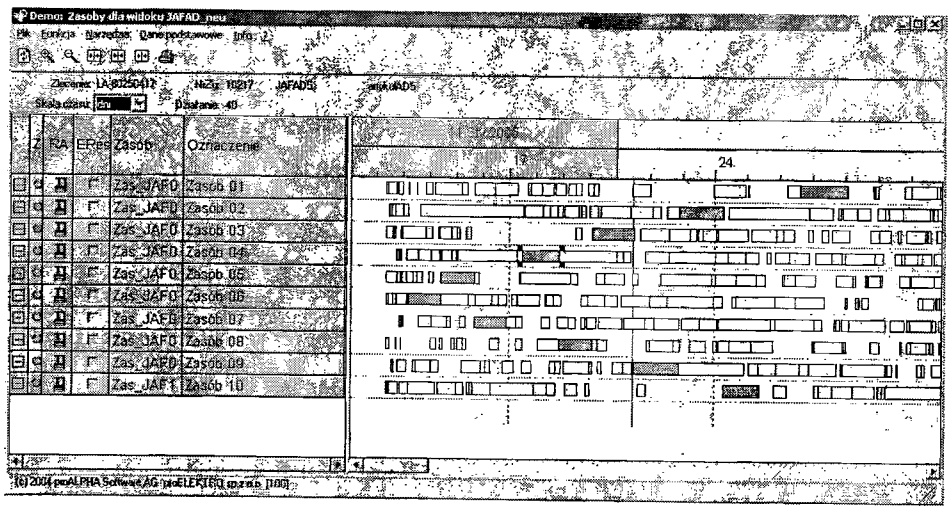

Fig.3 Gantt chart of processes

Two groups of risk seem to be referred to this kind of usage potential. A first one is associated with **the acceptance problem**, is of the objective and subjective kind.

Objective the results of detailed planning live always up to next breakdown or other planning deviation. From the organisational point of view it is not possible to respond to every deviation with a new session of optimization. This is why, proALPHA offers a functionality of "Frozen-Zone", whereas a production plan could be frozen and managed by standard control tools only. Subjective the outcomes of optimization could be seen as irreproducible.

"Believing" these results might be strongly supported by comparison between the optimized target values on the one site, and on the other performance indices build on the basis of the planning results, which had been generated with the aid of traditional control tools. proALPHA makes the comparison possible, which makes sense provided that the conditions of processes remain not changed. This is a reason why additional performance indices are needed. Performance indices, which describe the conditions of processes, are for example: profile of the overload of the capacities, structures of the processing of order [5].

A second group of problems applies directly to the **quality of data**. Poor quality of data is for many small and medium-sized companies a common reason for which, they cannot profit from the MRP II based solutions (even though, they already need APS). Minimal expenditures on the supervision of data and consulting explain partly the situation [3]. That is why it is so important to consider these aspects already before a purchase of ERP/APS solution. A careful evaluation of vendor has to be done as well.

3. SUMMARY

Advanced Planning and Scheduling makes possible [5]:

- flexibility of structures,
- integration and simplifying of the unique levels of planning,
- synchronization of all essential demands for resources and
- real optimization of usage of resources according to the operational goals of the company.

In addition there are some necessary assumptions, which have to be fulfilled by system and its applications so as to meet the requirements of APS . They cannot be replaced with the additional components and attach a huge importance to understanding of Know-how and protection of quality of data.

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