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COMPUTER AIDED COOPERATION

Abstract:

The problem of system aiding of inter-enterprise cooperation process designing is presented in the article. Development of enterprises' productivity requires making the start, creation, and extending of cooperative links among enterprises easier. Development of methods and ways of data exchange in cooperation enables creation of aiding computer systems of production cooperation.

1. PRODUCTION DESIGNING RUN IN COOPERATION

Production designing run in cooperation with the presentation of some main cooperative points are given in Fig.1.

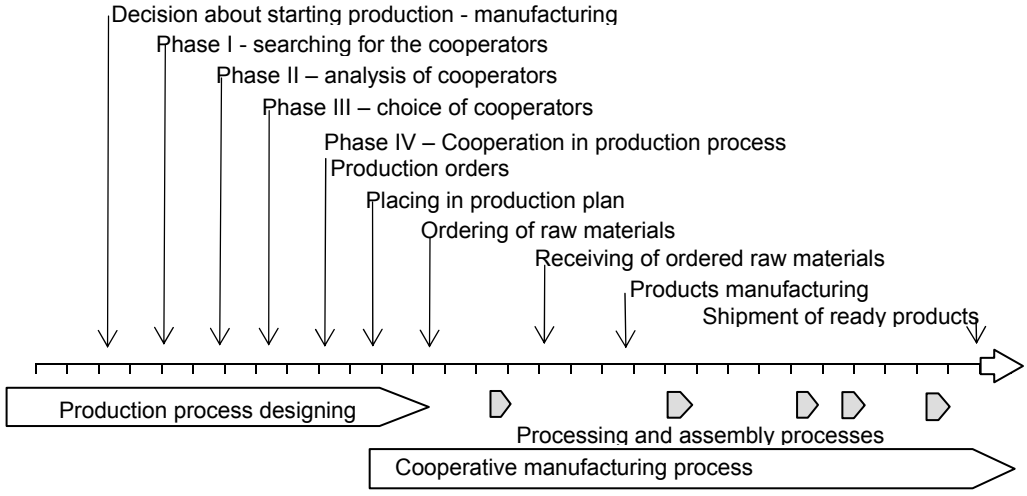

Fig.1. Cooperative production realization in time (self elaboration**)**

Production designing process in conditions of cooperation consists of several stages:
- market analysis,

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- structure designing of product's form,
- manufacturing processes designing,
- organizational manufacturing designing.

The analysis of run and reasons of delays- waste of time- leads to the conclusion that they are mainly the result of lack of information in production organization system, information which allows to make production decisions earlier. Lack of information, which is the result of paralysis of production system in cooperation, creates delays in information flow in the whole production chain. The conclusion is that the delays exist as a result of the accepted production organization since the very beginning - process designing phase.

2. GENERAL MODEL OF PRODUCTION COOPERATION DESIGNING PROCESS

Having assumed that the most future promising form of enterprises cooperation is virtual enterprise, the main problem becomes defining of composition and number of cooperating units which are geographically spread. The process of selection of cooperation partners is strictly connected with an order which determines the criteria of selection and analysis process. Well carried process of selection is the key to match co-operators with such resources, material possibilities, appropriate technologies and well trained staff in the comparison with order-design that can guarantee gaining synergic effect and product's position on the market.

Cooperation designing process in the presented aspect can be viewed in four phases as it is presented in Fig.2.

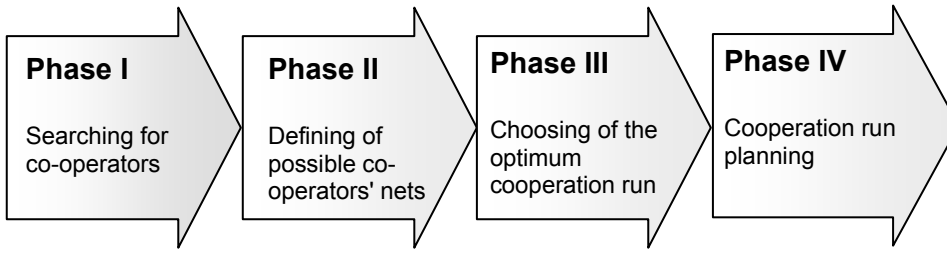

Fig.2. Phases of designing stage of production process cooperation (self elaboration)

The discussed problem of cooperation designing requires production designing and its flow to be broaden through the issue of marking and optimization of organizational structures of labour run for enterprises set. Determining of the optimum production process in cooperation requires multi-criterion marking for the variant of cooperation process- production process route in the subset of enterprises. The result of the issue is regarded as NP problem- difficult, requiring inclining expenditures of calculations in problem size function.

To make the problem more general, it is reduced to certain answers to the given questions:

- do the enterprises which can compete in realization of a certain project exist?,
- which of these enterprises are able to create the nets which would have free resources for order's realization?,
- which of these nets of co-operators are able to create optimum production process?,
- how to organize and control the cooperative run of production in the net?

The solution of the problem will specify which subset of enterprises- corresponding with its PW which abilities guarantee keeping term-price-quality appointments with the client.

3. TENDENCIES IN PRODUCTION COOPERATION PROCESS DESIGNING

Shortening of production process designing thanks to cooperation aiding system together with cooperation process formulating (Simultaneous Engineering – SE) is presented in Fig.3.

As given in pictures 1 and 3 lack of earlier information, reaction to coming information, its receiving, elaboration of the correct answer takes time and as a result the total sum of these delays gives information delays in cooperative production process.

The proposed solutions of this problem allow to put forward the thesis that the implementation of such changes in organization which can change system's paralysis is necessary. To make the information circulation in cooperative system – customer- producer-supplier faster, usage of database computer system to aid the searching and choosing of co-operator phases is needed.

The proposal of the system which makes information circulation faster is the implementation to the system of additional information which is realized in real time. It makes estimation of system answers and choosing of the co-operator possible.

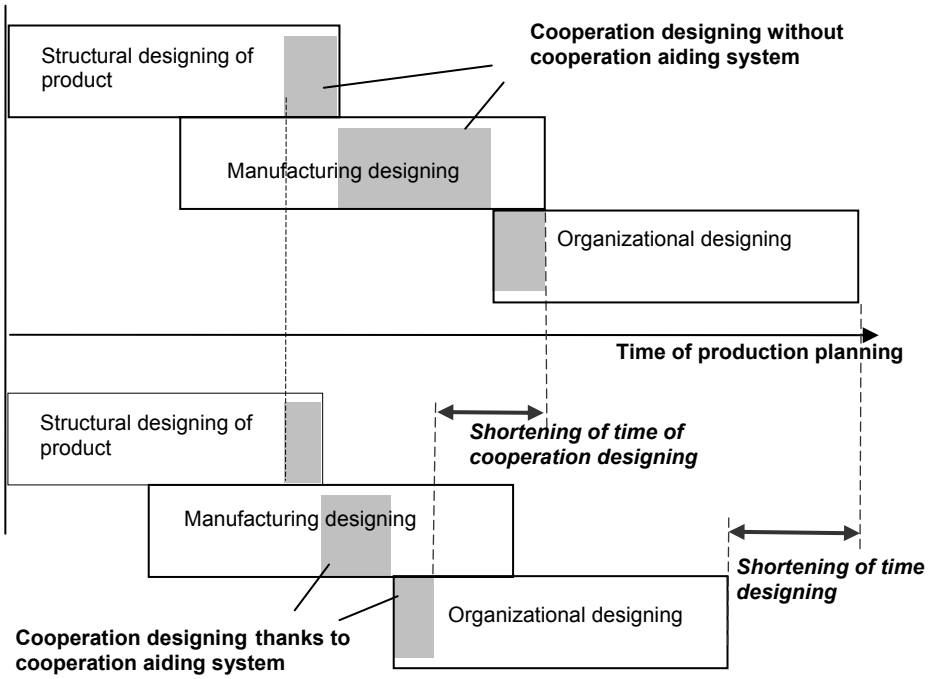

Fig. 3. Application of cooperation aiding system to shorten the time of production designing

4. COOPERATION AIDING SYSTEM

4.1. Assumptions of cooperation aiding system

The answer to the question: *Who can cooperate in production order realization?*- requires knowledge about enterprises which exist on the market. Defining of possible co-operators set leads to the conclusion that there is a need to create a database about these enterprises where potential co-operators will be selected – Fig. 4.

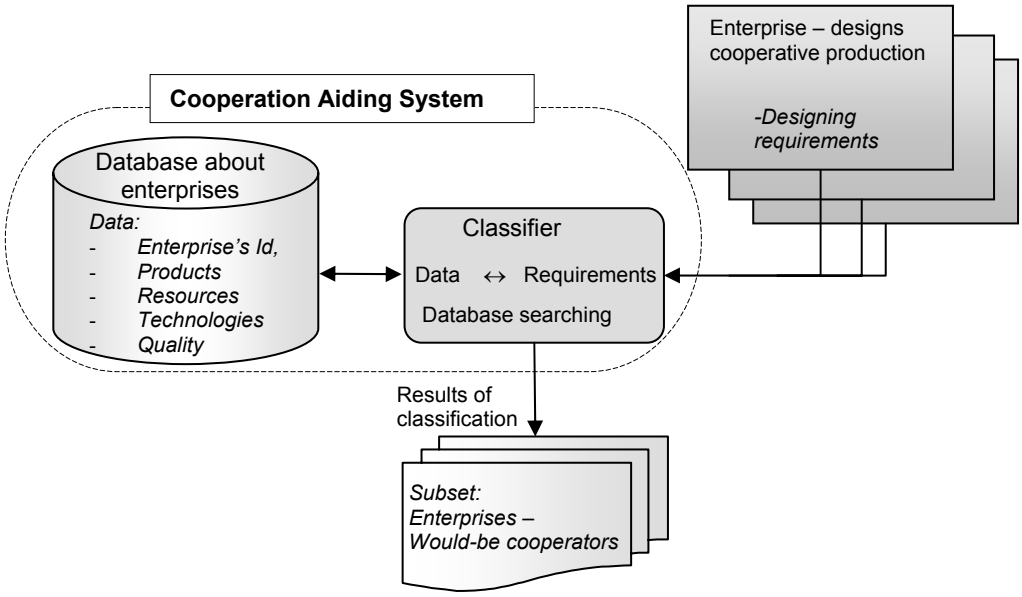

Fig.4. Searching of would-be cooperators in production (self elaboration)

The problem requires supplier- producer model creation which would describe the standard of requirements for the virtual enterprise. The proposed solution is based on creation of a base for enterprises defined with fundamental information needed in this phase designing, in combining with the system of base searching by the use of classifier, basing on the criterions which are specified for the designed production.

4.2. Data form for cooperation aiding system

Development of cooperation requires data flow according to the elaborated standard of data exchange model of the product for cooperation at the exact time of its coming into being. Standardization should also take the need of information form determination into account, especially in the initial phases of cooperation, which is safe for know-how of the enterprise – phase's I-II-III - fig.5.

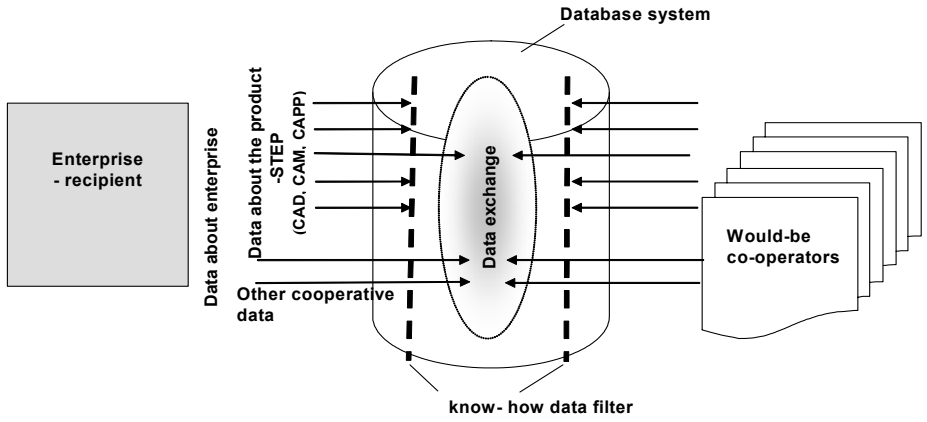

Fig. 5. Cooperation aiding system – cooperation start initiation phase – data standard and flow (self elaboration)

The characteristic which describes the potential co-operator is information about the enterprise which is limited by the security of know-how of the enterprise. The fundamental features are needed in this phase are pieces of easy available information about the enterprise:

- information which identifies the enterprise,
- enterprise's products,
- used technologies,
- technological and innovative level,
- broadly described quality - quality certificates,
- production ability- size of resources.

The accepted assumptions concerning the requirements of the designed production specify customer's requirements and define minimal abilities of potential cooperative manufacturing system. Having implemented all the requirements, set by the designed production, the proposed system enables to find enterprises which can take part in production process.

4.3.Computer environment of cooperation process

Organization of cooperation run is strictly connected with computer technology which is used in the enterprise. The complex computer systems in enterprises, which are being developed currently, are systems of ERP class (Enterprise Resource Planning) defined as sets of strongly integrated software packages which can offer coherent information flow in the enterprise. In the area of production there work CAD, PDM, CAM, DNC systems which are integrated with them. Other systems are the ones which work in the Internet environment and other tele-computer nets like WAN. Easy access to the Net resulted in B2C trade with mass customer systems development (Business to Customer) and systems which aiding processes B2B inter - enterprises (Business to Business).

The next systems, which are being developed nowadays, are the systems of Supply Chain Management (SCM) and of Customer Relationship Management (CRM). These systems integrate the activities among business partners on the strategic, tactic and operational levels and function in integrated chains within the frames of one enterprise on the account of lack of adaptation to changes in chains consisting of independent partners.

4.4. Integration with aiding system of manufacturing planning

Elaboration of classifiers which divide into groups according to similarity from the point of view of different criterions creates the basis for database structures creation – fig. 6 and 7.

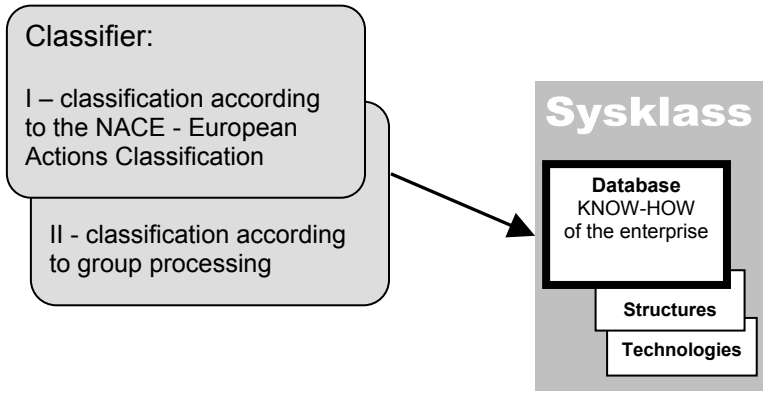

Fig.6. Integration with Aiding System of manufacturing Designing

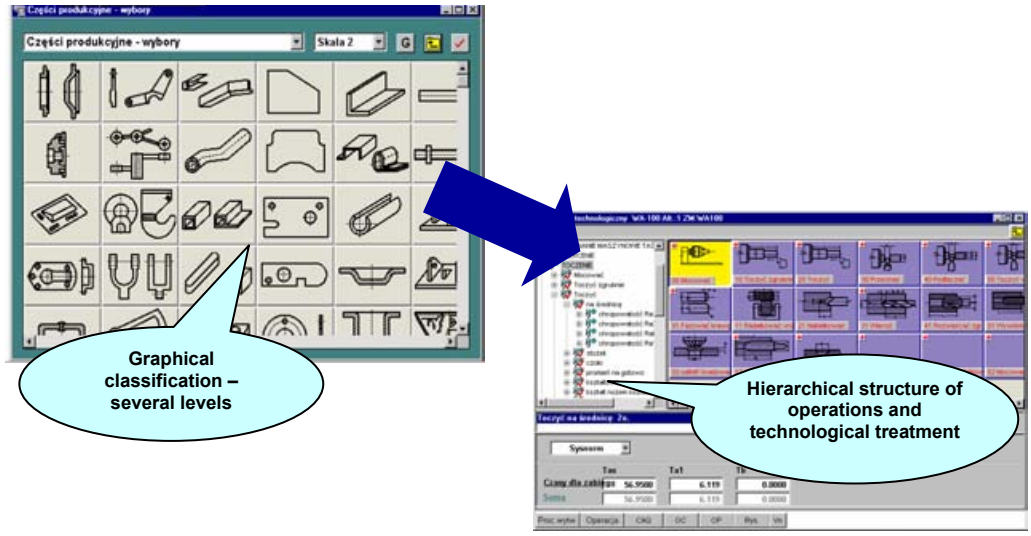

Fig.7. Classifier – part II: classification according to group processing

4.5. Example Computer Aided Cooperation

The prepared system aided of cooperation is example Computer Aided Cooperation on the website: ***www.intercooperate.com***

Structure the first site of cooperation aiding system is presented in Fig.8. Systems aiding cooperation give possibilities:

- find the product,
- find the company,
- advanced search – find the product or company according to NACE,
- check the technologies,
- design manufacturing process on cooperators system and his resources (if you have passwords).

Fig.8. Example Computer Aided Cooperation - the first site of cooperation aiding system ***www.intercooperate.com***

Systems of computer aiding cooperation create new possibilities from the enterprise's perspective which uses this kind of system and for its business partners and customers as well. These are:

- low costs – costs and subscribers' fees account for only 10% of costs which the enterprise would pay for realization of similar tasks by its workers,
- possibility of order creation at any time,

- cooperation with ERP systems- on –line orders registration in ERP systems,
- possibility of material management- order's registration on the basis of current stock on hand is possible,
- permanent control – monitoring of run and state of the ordered range of products among the business trade partners is possible,
- current archiving of all the operations- all data about the realized and current orders are registered and made available to all the engaged enterprises.

5. CONCLUSION

Development of productivity of the enterprises requires initiating, creating and deepening of cooperative connections among different enterprises, participants of the production process, through development of methods and forms of data exchange in cooperation. The implementation of mutual data exchange concerning current possibilities of cooperative production in cooperative system customer – supplier will decrease as soon as possible, in real time, the system paralysis by accelerating the information circulation in production process in conditions of cooperation.

Active net cooperation will be modern and very effective form of complex aiding of production cooperation among system users in the future. Using the offered tools which the system provides requires to set a standard way of registration of data about the product, its production process and categorization of products and services.

All the entities-enterprises introduced to the system- can be subjected to classification. It will enable to search for potential customers willing to buy certain products or services of the user and automatic matching of both entities. The presented technology can be an offer for the already existing producers, virtual enterprises and many new enterprises which will exist in the future and which will offer their products for e-business and make them available as outsourcing.

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