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Informatics on Industrial Platforms

The study presents the conditions to be fulfilled for the organization of centres, respectively big computation offices at an industrial platform level.

THE INDUSTRIAL PLATFORM AND INFORMATICS

Generally, the big industrial platforms can be organized according to the following criteria of technological structures:

a) with interdependent technological flows in which all the technological stages of the platform units contribute to the achievement of products of the same series. As a rule, this fact corresponds to an organizational structure according ts whom all the units making up these industrial platforms are subordinated to a single central body (that is the case of the big industrial platforms in the fields of chemistry, iron and steel, etc.).

b) with independent technological flows in which the units making them up belong, as a rule, to different branches (central bodies).

Generally, on any type of platform, there are service and utility units common to all industrial units existing there (electro-thermal power plants, water supply units, filtering stations, etc.).

Starting from these different situations, we shall analyse whether it is possible or not, in a case or another, to organize unitary informatics units (centres or big computer offices) to serve the entire platform.

Informatics in industry is developed along three main directions:

1) the management of economic processes;

2) the control of technological processes;

3) industrial engineering.

In a big industrial platform, informatics for economic management and that for the control of technological processes will be developed in particular.

Naturally, when we have to do with the case a) in which all the component units belong to the same branch and the technological processes are interdependent, the organization of the activity of informatics raises no special problems in relation to the organizational structure of the platform. This activity is organized in an electronic computer centre subordinated to the managerial body of the respective platform, serving with informatic production all the units existent there. This is the case of the big Romanian industrial platforms: in chemical industry there are such centres on the petrochemical platforms of Brazi, Pitești and Borzești, on the platform of inorganic chemistry of Rîmnicu Vîlcea-Govora, on the platform of the fertilizers industry of Craiova, on the Dudești industrial platform of Bucharest and, in the iron and steel industry, on the Galați and Hunedoara platforms a.s.o. As a rule, in these cases, the informatics centres are units without any juridical personality, with or without their own administration.

THE PROBLEMS OF ORGANIZING INFORMATICS IN INDUSTRIAL PLATFORMS WITH INDEPENDENT TECHNOLOGICAL FLOWS

If on such platforms the organizational structure will be materialized in several independent units, each of them with its own juridical personality and administration, then the computer centres to be set up on the platform will have their own juridical personality and administration. The relationships between these centres and the units for which they will provide informatics services will be identical with those between the territorial electronic computer centres and the units of the field served by them.

In the case when some platforms although made up of units belonging to different branches as regards character, will have a single management system, the activity of informatics on these platforms can be organized within a centre without any juridical personality, directly subordinate to the managerial body of the platform to serve the component units of the platform, its expenditure being distributed on these units proportional to the services each of them is benefitting by.

A VARIANT OF ORGANIZATIONAL STRUCTURE OF INFORMATICS ON AN INDUSTRIAL PLATFORM

A very general, hierarchically functional diagram of the organization of informatics on an industrial platform is presented in figure 1.

The idea deriving as an important observation from the diagram is that it is fully valid for the industrial platforms of type a). In case of the platforms of type b), the organizational image provided by figure 1 is equally valid with the remark that the activity of the computer dispatcher regards non-dependent technologies and therefore this activity must be modulated and similarly, the general activity of informatics should be modulated, in keeping with the number and the specific needs of information for the managerial bodies of the units which are independent from the technological point of view and of those of subordination to the existent branch, on the respective platform.

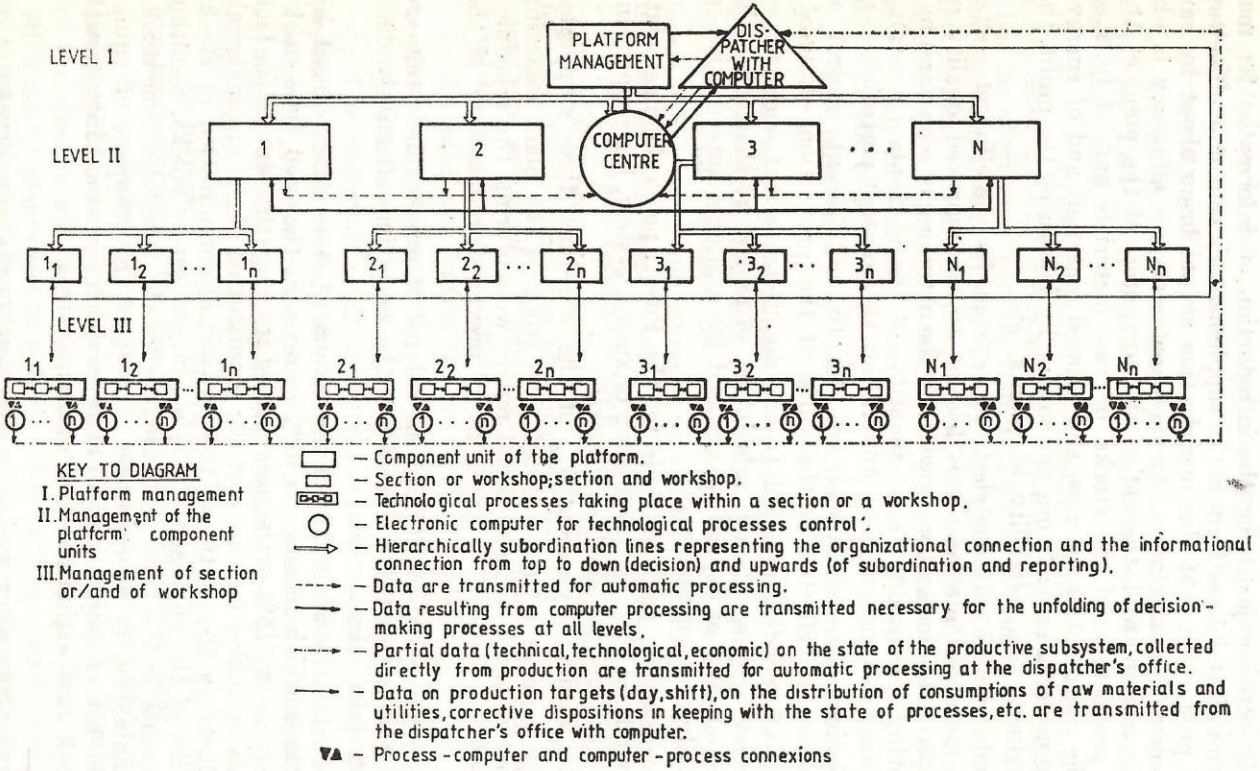

FIG. 1: Hierarchically functional diagram of informatics organization on an industrial platform

The basic criterion justifying the introduction of informatics for management on an industrial platform is the supplementary economic efficiency in the field of production that this introduction should bring about by raising the efficiency of management. An increased economic efficiency is obtained by optimization, with the aid of the computer, of the plan, of the scheduling of production, of the stocks of raw materials and of finished products, of the consumption of raw and related materials and of energy; by diminishing material expenditure and costs; by increasing the profit, the quality of products, the reliability of plants, etc.

The introduction of only one electronic system for the efficient management of an industrial platform [1]) is leading to an improved quality of decision in all activities, indirectly allowing for the obtaining of economies by:

— improving the quality and quantity of the elements converging on the achievement of production, by diminishing the existent perturbations;

— diminishing material expenditure due to an efficient control of consumption which is reflected in the value of the production obtained;

— cutting of spendings related to the maintenance and operation of equipments achieved by a judicious scheduling of repair, by shortening the length of overhauls and of capital repairs and by a prompt intervention in the event of failure of equipments.

From the economic analysis made for the Pitești petro-chemical platform, it was found out that by introducing of such a system, big supplementary annual profits are obtained as follows:

— the diminishing by about 5% of the scheduled time stoppages, namely a 0.47% increase in the scheduled time stock of the plant following the carrying out of the maintenance and repair work during the scheduled stoppages based on network charts, by a previous organization of the work front;

— the decrease by about 10% of the volume of unscheduled stoppage hours which is leading to a 0.73% increase in the work time effectively done within the scheduled time stock;

— the reduction by about 5% of the volume of stagnations caused by operating mistakes which means a 0.10% increase in the used time stock;

— the decrease by 15% of the unscheduled stoppage time due to the lack of raw materials by taking into account the coordination of the raw materials and semi products on the platform, the previsional computation of stocks and the signaling of the approach of the alarm and safety stocks, resulting in a 0.45% increase in the time stock used within the scheduled time stock;

— the elimination in a proportion of 15% of the stoppage of equipment due to the lack of coordination of utilities which means a 0.15% growth of the time stock used within the scheduled time stock;

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[1]) A complex hardware system is taken into account, composed of computers for on-line data collecting from platforms, equipped with modules permitting the input of analogical or numerical signals received directy from the sensors in plants and from the control computer (for the processing of these data).

— the application of network charts in the restarting of plants and in organizing the entire activity from a central control point which allows for shortening time in putting into operation again the plants on the platform.

As it can be seen, the useful time stock increases by 1.78% in the balancesheet of the calendar time stock, which means a proportional growth of the commodity production.

— Similarly, due to the qualitative and quantitative check up it is estimated that 0.5% increase in the value of the commodity production will take place;

— the introduction of a centralized control system through a computer aided dispatcher following the spacing out of the monthly production plan for short time periods, namely by establishing the production targets for each shift, with the pay being established according to the fulfilment of the targets, will allow the raising of the degree of utilization of the plants capacity. It is estimated that a 10% diminishing in the effective capacity reserve will be obtained, which means a 0.61% increase in the intensive indices of the plants.

The introduction of the centralized control system will also change the cost price.

The proper coordination of the production sections results in the decreased number of the products evacuated at torch light, in an adequate control of the internal transport and storage network which leads to a reduction of losses in transport and storage, to a cut in the number of scheduled and unscheduled stoppages, leading to the diminishing of the number of evacuations, purgings and restarts of the plants which is leading each to the obtaining of low quality products and to losses of raw materials. It is estimated that following the introduction of a central dispatcher a cut by about 0.3% of spendings on semifabs, raw and related materials will be obtained per 1,000 lei of commodity production.

An adequate control of production, of consumption of utilities as well as over the appearance of perturbations is estimated to lead to a 0.5% cut in spendings on utilities per 1,000 lei of commodity production.

The control of each operator's activity is estimated to lead to an increase of labour productivity by about 0.5% for directly productive workers and by 5% for the indirectly productive ones. The results obtained from the experience of similar applications abroad have led to a growth of labour productivity by 15 to 45%.

An increase by 61.70 lei of the profit per 1,000 lei of production stock has been estimated for the Pitești petro-chemical plant.

It results from those shown above that the introduction of only a single electronic dispatcher system on an industrial platform is leading to the raising of the quality and quantity of the commodity production, to an increased efficiency of plants and to a diminishing of the production expenditure not to speak of the remaining elements of efficiency to be engendered by the other activities of informatics on an industrial platform.

L'INFORMATIQUE SUR LES PLATFORMES INDUSTRIELLES

On présente les conditions nécessaires à l'organisation des centres soit des grands offices de calcul au niveau d'une platforme industrielle.

ИНФОРМАТИКА В ПРОМЫШЛЕННЫХ КОМПЛЕКСАХ

В работе указывается на условия, которые должны быть удовлетворены для создания вычислительных центров на уровне промышленных комплексов.

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