

THE IMPACT OF IPOSYSTEM - AUTONOMOUS DECISION-MAKING SYSTEM INDEPENDENTLY MANAGING PRODUCTION ON THE PRODUCTIVITY AND ANTI-FRAGILITY OF MANUFACTURING ENTERPRISES

Your planning and direct production management costs are high?
The market expects flexibility, customers force ever shorter series
and deadlines, and this will disrupt your planning and production
management? Do you feel that the working time of your resources
is not used effectively?

Experience shows that in most cases management based on the planning of production orders and resources is not the correct method of production management.

How can it be? After all, such a method is taught in college, a lot of books and articles have been written on this subject, and IT providers have implemented APS systems in many companies. After all, effective production management is only possible with planning and scheduling!

APS! Are you sure?

The idea of creating production plans that closely reflect the production environment, i.e. APS class systems, was created in the early 90's. At that time, mass production was the standard – long production series, limited variants, low variability, time-consuming changeovers. In such conditions, detailed production plans were justified.

The purpose of the APS system is to prepare a production plan. This common name hides the fact that each plan is in fact a SIMULATION. This means that before starting scheduling, we have to introduce a number of ASSUMPTIONS (planning parameters) to the system – precisely define the availability of each resource (detailed calendar of availability of each employee, machine service and repair dates, tool availability), enter production orders with detailed



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technology of their implementation (BOM, queue of operations, precisely defined times of execution of each operation, preparation times, completion times, changeover time, batch time, etc.) and the required deadlines, introduce precise delivery times for materials, etc.

Based on these assumptions, APS will calculate the simulation, i.e. as a result of scheduling, it will prepare a detailed production plan. The implementation of each such plan is possible only in one case – when in real business and production conditions it is possible to meet all its assumptions. If this is not possible, i.e. one of the plan assumptions has not been met, you should quickly introduce a correction and simulate a new plan. In practice, in the case of high variability of planning parameters, the development of new plans by planners is delayed. Therefore, to speed up scheduling, the creators of APS systems have developed a number of simplifications – the definitions of technological operation times do not take into account the differences in the actual skills of employees, production-related operations such as preparation of documentation, preparation and release of materials from the warehouse, inter-operational transport, quality control activities, etc.,

are omitted, the scheduling process omits the availability of employees and creates a plan for production cells, which causes downtime and micro downtime of resources as a result of the need to "manually" manage these areas by managers. In addition, as part of "good practices" in the implementation of planning systems, the aim is to standardize the execution time of a given technological operation by all resources, which leads to the situation that for planning reasons this time is set at the average time or below this time. As a result, the most productive workers run at reduced productivity, but on schedule. Moreover, the aim is to "freeze the plan" for a specified period of time in order to avoid variability related to the status of orders (new orders, changes of dates, changes in quantities), which causes companies to lose flexibility, which is so important in the current economic conditions.

System that manages the work

All of the above problems are solved by the new generation MOM (Manufacturing Operations Management) systems, the operation of which is based not on the APS system, but on the ADS class system (Autonomous Decision System). One of the first such systems in the world is IPOsystem.

IPOsystem automates the processes of planning, direct resource management and automatic collection of precise data on the actual course of production processes. IPOsystem makes real-time decisions regarding the sequence of implementation and selection of resources for individual technological activities. Each employee / team of employees, after reporting readiness to work in the system, immediately receives an instruction to perform the optimal technological operation for

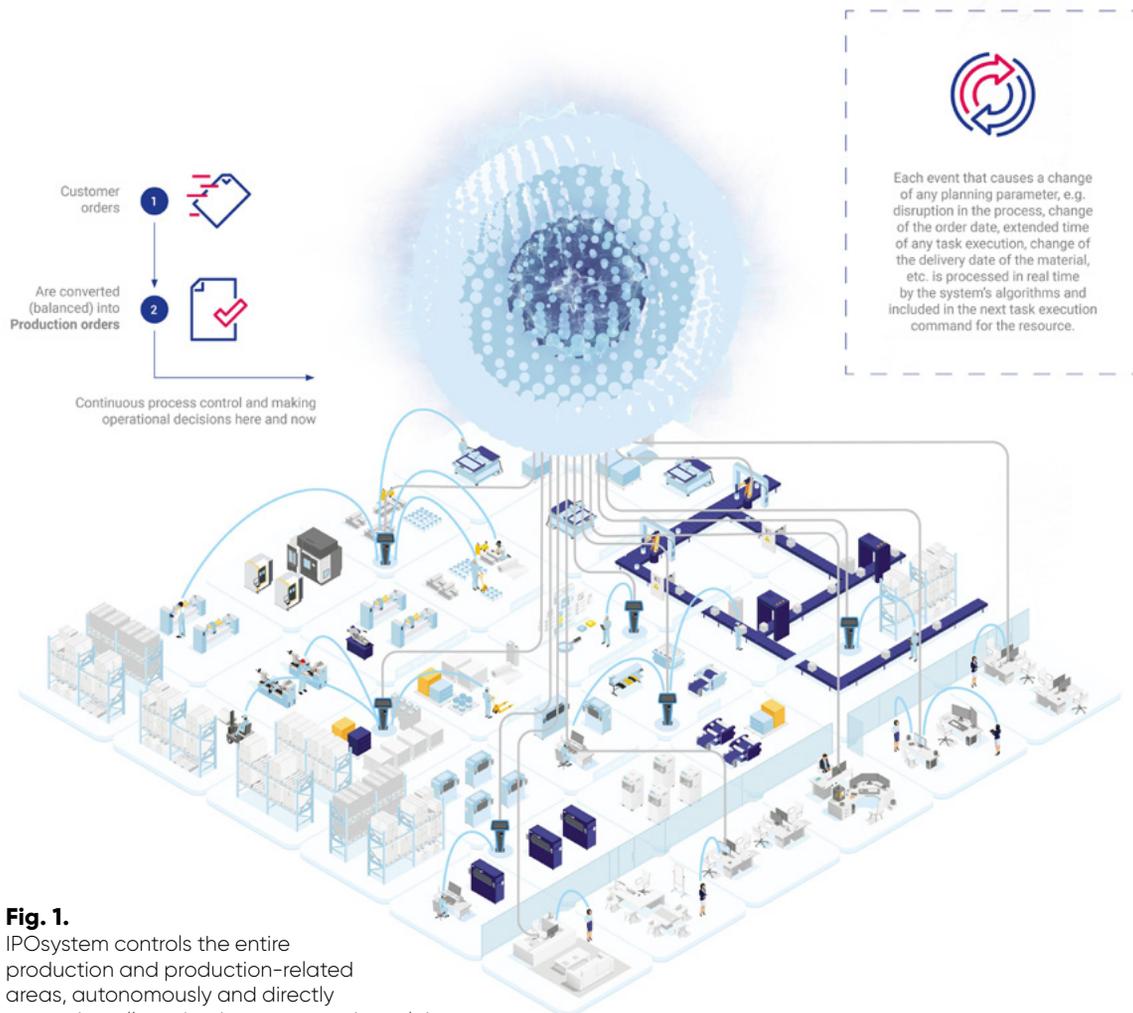


Fig. 1. IPOsystem controls the entire production and production-related areas, autonomously and directly managing all production resources in real time

a given moment. The system issues only works that are possible to be carried out at a given moment, indicating precisely the number of the production order, the workplace where the work should be performed, technological details of the operation and the place where the necessary materials, semi-finished products and tools are located. The preparation of these materials, semi-finished products and tools is also controlled by the system. Each termination of work by an employee in IPOsystem generates the calculation of the next decision of the system and issuing the command optimized at that moment. Thanks to decision algorithms, the entire process of calculating and issuing each work takes no more than 5 seconds. In this way, each employee in a factory controlled by IPOsystem works in the procedure "Work – report – work – report – – work – report"

The main goal of the system's decision-making algorithms is the timely execution of production orders with the maximum use of the available time of all resources.

The system calculates the production completion date for each order on an ongoing basis, informs the managers about works that are carried out longer (slower) than the applicable standard, and indicates "bottlenecks" in the process.

The employee interacts with the system using terminals, tablets, smartphones, machine controller displays, personal computers, and in the near future, augmented reality and voice commands. Through them, IPOsystem transmits decisions made autonomously and enables the introduction of additional reports and information. The system also enables the

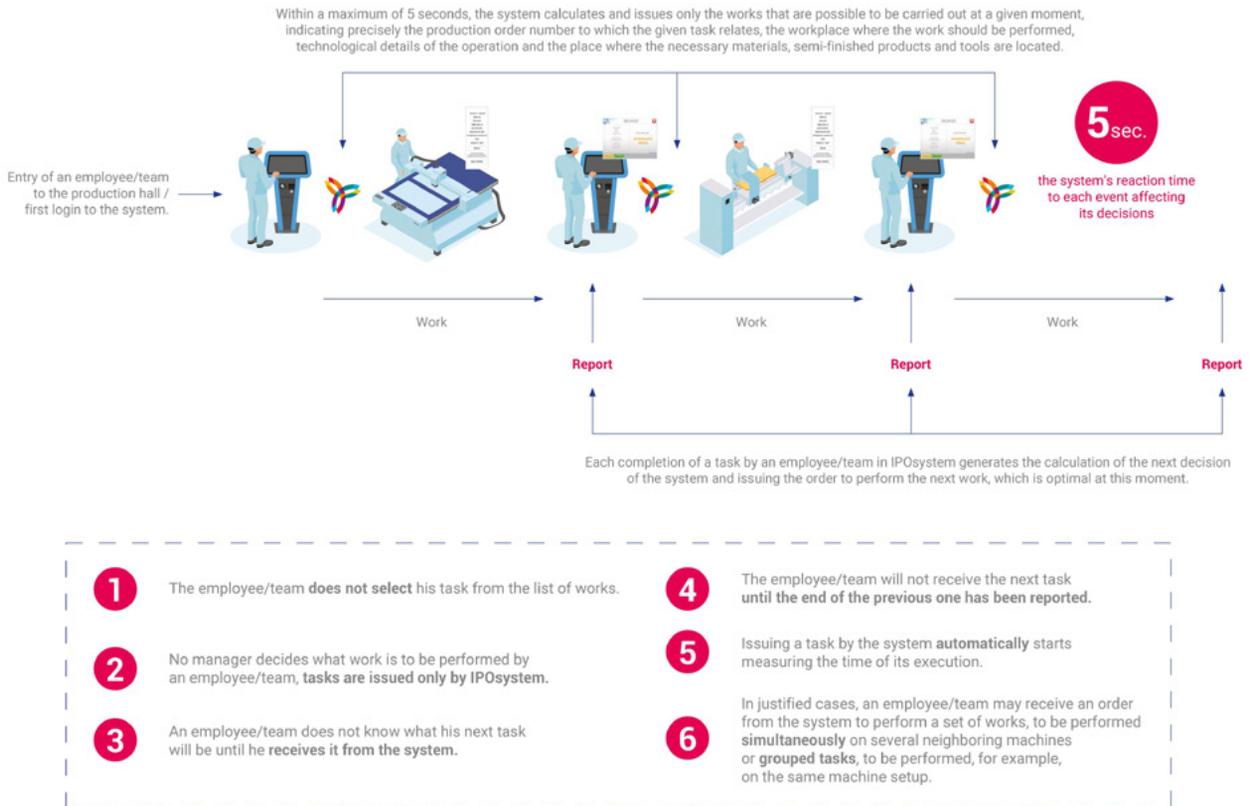


Fig. 2. Diagram showing operation of IPOsystem in production halls. In this way, the system controls the work of all employees/teams.

collection and use of data directly from machines (IoT) and independent control of machines and robots in processes carried out without human intervention. In the ADS system, in contrary to the APS systems, the assumed times of execution of individual technological operations may be approximate.

The goal of managers at IPOsystem is not to plan and then implement the production plan, but to solve technological and performance problems.

An important effect of the system's operation is a change in the behavior of employees in the production hall. They try, while maintaining the quality requirements, to complete the works issued by the system as quickly as possible. Everyone works at their optimal pace, and the system automatically optimizes the course of production processes in subsequent decisions. Thanks to this, we obtain very precise and real data on the skills and performance of each employee / resource, which allows us to take appropriate improvement actions in places where such actions will bring the greatest benefit.

IPOsystem integrates with any ERP system with which it exchanges data. So far, comprehensive integrations with the systems of SAP, Microsoft, Oracle and many others have been completed. Integration takes place via API and allows, among others, to fully automate the creation of warehouse documents in the ERP system, creating production orders in IPOsystem, transferring technology and BOMs, transfer and current updating of material stocks and orders for materials. IPOsystem is a unique addition to ERP systems, which provides these systems with reliable data regarding the actual course and use of resources during the execution of production orders (working time of each workstation / machine, working time of each employee, actual consumption of materials and tools).

Benefits

IPOsystem is an effective answer to the challenges of modern production and the specific needs of factories. The key benefits achieved thanks to the implementation of IPOsystem include:

- low-cost management - reducing the costs of planning and direct management of employees by up to 80% compared to APS systems

- increasing the company's productivity by up to 20-30% one year after the completion of the implementation
- increasing the personal performance of each employee,
- elimination of downtime and micro-downtime related to re-planning, errors in the logistics of materials and tools,
- simplification and facilitation of the principles of production management - no need for continuous planning and evaluation of the plan and direct management of employees' work.
- autonomous coordination between individual departments eliminating problems with planning and timely implementation of tasks
- reduction of work in progress
- significant improvement of the company's flexibility in response to market demands
- access (also remotely, from anywhere in the world) to accurate, reliable and up-to-date data on orders, processes and resources.

A system for a variety of applications

IPOsystem is already operating in almost 60 factories, autonomously controlling the work of over 12,000 employees and issuing almost 50,000 operational decisions every day.

The factories where the IPOsystem has been implemented are production plants of various sizes and employment, representing various industries and various types of production, from individual, short-series production to mass production. The expectations and requirements of these companies regarding the production management system were also different. In each of them, after the implementation of IPOsystem, there was a thorough qualitative change.

Customer: The company that supplies traction network equipment for railway industry.

Challenge: Tens of thousands of production orders carried out annually.

Solution: IPOsystem has extensive "self-production" functionality. The system independently, by balancing the needs resulting from orders and analyzing the available resources and the calculated optimal production batch, launches subsequent orders with appropriate delivery date, priority and quantity.



Another system user, who supplies machines and production lines for industrial ice cream production, achieved a productivity increase of more than 25%. The company emphasizes the reliability of data from IPOsystem, which it uses for incentive and bonus purposes. This is due to the ability to identify and analyze the performance of each employee depending on external conditions, which the company uses in training less efficient employees.

Customer: Producer of circulation and collector coins

Challenge: High variability in production combined with a huge number of operations to be performed.

Solution: IPOsystem has enabled the company to control thousands of changes, and its autonomous mechanism ensures optimal allocation of work and continuity of production. Managers freed from routine operational decisions solve technological problems of employees on an ongoing basis.

IPOsystem, a large Polish manufacturer of industrial power tools and tools, allowed to increase the level of multitasking of employees and significantly increase their efficiency.

IPOsystem, thanks to its unique decision-making algorithms, not only automates the processes of planning and direct resource management, freeing managers from these tasks,

changing their roles in the plant, but also proves to be an effective tool supporting continuous improvement.

IPOsystem is an effective Industry 4.0 tool that works well even in the most demanding production environments.

Check what benefits would be the implementation of this innovative solution in your company. ●

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