Chapter 13
Considerations on Multi-Service on Workstations

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ABSTRACT

Polyservicing the workplaces takes into account the cycle of processing the benchmarks by machine tools and their features and implies a thorough analysis of the technical, organisational, and economic aspects. It is thus intended to efficiently use the machines and machine tools including the worker’s working time. Grouping the processing operations by machine tools will be done depending on the technological structure of each operation, given the use index of the machines, the effective use index of labour, the structure and duration of the operations necessary to make the product, the type of the machine tools used. Polyservicing the machine-tools is featured by a series of parameters: the duration of the working cycle of a machine, the duration of the polyservicing cycle, optimal number of machines that can be services, the coefficient to use the performer’s working time, etc. Combining the operations to be done on various machine tools is based on the types of technological processes and is done separately for manufacturing unique products, serial production, and mass production. Establishing the optimal production conditions for polyservicing can be done by using the theory of “waiting queues” and “Markov chain,” which is based on three elements, namely: input into the process, the servicing mechanism, and the type and way of servicing. Optimising the polyservice of machines can be done using the “Takacs and Runnenburg model,” which basically solves the issue of the general distribution of servicing times and the “method of the mechanisation coefficient,” which takes into account the influence of cost on the number of polyserviced machines.

FEATURES OF THE PROCESSING CYCLE ON TOOLS

The application of multi-service implies the performance of thorough analyses on technical, organisational and economic aspects. First, an optimal use of machine processing capacities and an efficient use of the worker’s work time must be ensured. To this purpose, the ratio between the time of operation of machines, without supervision, and the manual time required for the preparation and supervision of the processing operation must be determined. Depending on this ratio, a decision on the implementation of the multi-service system shall be taken.
After the determination of this ratio, which shows the worker’s availability to serve several machines, the main aspects of the processing process shall be analysed: analysis of the features of the operations to be performed, on whose basis work machines shall be established; taking measures for providing machines with technological equipment, tools, devices and checkers, so as to ensure a substantial reduction of auxiliary time; because the worker is compelled to go to each machine in the group, the possibilities of minimisation of the cycle to be undergone from one machine to another must be studied; tools must be placed so that the itinerary travelled by the worker should be shorter, but allowing for the possibility to supervise the processing process, i.e. in flexible cells.

The number of machines which may be grouped for applying multi-service is determined according to the ratio between the basic time of the machine and the service time of the machine concerned, considering the technological complexity of processing.

The succession of technological operations shall also be considered in the spatial arrangement of machines in manufacture sections. Based on the spatial arrangement of machines and tools, the most adequate transport system shall be chosen, aiming at reducing or, at least, facilitating hard handling. An utmost important issue that must be solved consists in providing optimal work conditions, through a proper environment, for creating positive motivation.

Generally, the concept of multi-service in workstations may be defined as a work system where the workstation of a worker or several workers consists of various stations where he or they operate(s) simultaneously or successively.

A definition including all the sides of the issue is hard to provide; however, the idea of multi-service of workstations may be suggested by mentioning the following issues, especially referring to technical and organisational issues, such as:

- **Considering the Manufacture Object:** Cases may appear when homogeneous or non-homogeneous operations must be performed;
- **Considering the Requirement and Regularity in the Participation to the Multi-Service of Multiple Workstations:** This may be done in a well determined order or in an undetermined, fortuitous order, meeting the requirements of stochastic events;
- **Depending on the Number of Participants in Multi-Service:** Situations may arise when it is done by a single worker or a group of workers. The group may consist of workers with the same profession and qualification or different professions and qualifications;
- **According to the Type of Operated Machines and Workstations:** Machines of the same type and dimensions or different machines may be used, the work in machines in an area may be cumulated with various manual works in other area, only manual works in different areas may be cumulated in different time intervals during the work day, etc.

The concept of multiple qualifications, lying at the basis of multi-service, may, hence, imply, that a person acquires professional knowledge in a field which is different or close to his/her basic training. This implies the extension of theoretical and practical knowledge, both in terms of the training level and the diversification of specialised training.

Within the processing process, by using the multi-service system, situations may arise when the group of machines is not made up of machines of the same type, but also different types (e.g.: lathes, cutters, drills, etc.) In order to operate such a group, a worker must acquire proper knowledge, in order to be able to apply the adequate processing technology.