

DIVISION OF LABOUR AND MANAGING THE DIVISION OF LABOUR IN SOCIALIZED PRODUCTION

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Introduction

Concise history

History of production in general is described by economic science, development tended from production of simple articles to production of more complex articles. Each work, necessary for production of a complex article can be backwards divided into operations, sub-operations, ... , till most simple elementary operations. Partial works can be performed by different, independent workmans, this is natural ground for formation of division of labour, wholly individual personal labour tends to socialized one. Handicraftsman needed only few helpmates for performing of simple labour. Quite natural the production of each article need also mental work, done before manual work, creation of product conception, product image. The labour on the whole was gradually divided itself into great number of partial labour, starting with e.g. mental and bodily labour. Unnormalized pictures were used for ages, first for handicraftsman himself, for the support of his imagination and memory, afterwards also for the other people as an order. Real technical drawings for machinery industry arrived in 19th century, when there existed basic knowledge of descriptive geometry. The order for helpmates became more exact, more definite. Division of labour was justified by documents. At the end of 19th century and at the beginning of 20th century mental labour, in form of technological activities, divided itself to development of product and development of production processes. It was settled, that development of product involved design, projection and construction. Production processes involved process planning, job evaluation, production planning and technological projection. Obviously, these main activities had many fractional activities in them. Primarily it seemed natural, that development of processes has to follow development of product. In the middle of 20th century, by development of complicated machinery products during the war, if there were thousands of drawings, by requirements of short development cycle time, system of working „first product design, then process planning“ proved itself as disadvantageous and mainly slow. During that time were formed first workgroups, wherein the drawings and process planning documents were elaborated simultaneously. Afterwards the experience was collected and the theory was built, how to design the product for suitable, fast and cheap production, inclusive of assembly [1]. Literary knowledge was transformed to software, for automation of designer's work [2]. Some researchers, mainly in Japan after the world war II., quest for enterprise success in increasing

quality of product, [3], [4]. Those were resources for development of concurrent engineering (CE), for working in more complex development teams. Organized CE teams in the automotive industry started at beginning of eighties, they were successful and this method of work is very popular at the present time [5], [6].

Division of Labour. Mental Part and following Part of Labour

Mental part of labour needed for production of an article can be divided into gradually performed steps, functions or executions, in short we follow up the results, because activities in brain are not so visible as motions of mechanisms, or human limbs. Some of these steps can be:

- feeling of some need,
- feeling of some disadvantage,
- problem definition,
- finding of basic idea, basic possibilities how to solve the problem,
- conceptual framework of problem solution,
- decision, justified by not binding, or by legally binding documents.

Mental labour can be again fully natural divided between many people. Some of them can fetch feelings of needs or disadvantages, it is insignificant if after meaningful work or accidentally, and other people define and solve the problem. Partial mental labour have usually its own specialized methods of problems solving. In area of problem definition and finding of basic idea perhaps could be most elaborated method „method TRIZ“ [7], [8]. For some methods, belonging to brainstorming group, associated work is essential. There is extraordinary dividing of work, mental capacity of working group is centred on one target, but each member of group is looking for its individual creative solution, at the same time he can see others proposed solutions. Conceptual framework of problem solution and detailed elaborating of documents for production must solve number of detailed problems, which needs also specific approaches and methods. As mentioned above, very important is cooperation between development of products and development of production processes. There can rise diverse requirements on function of machine part and on production possibilities. Practice of several recent decades proved that better and faster is parallel development than sequential. Both specialized working groups were at first grouped together by working in one room, today they can communicate electronically and meet together only in case of need. Managing of differentiated work is unavoidable. New methods of design, based on interactivity between developer, designer and those proposals given him by computer [2], collected plenty of experiences how to effectively produce the articles, but they can not eliminate existence of specialized technological processes developers. Possibilities of DFMA software ought to be permanently updated.

According to documents the real articles are produced, e.g. as prototypes, for verification of construction correctness, as test series, for verification of production process correctness, or articles for sale and immediate utilization. If there were managing of described primary mental works, logically consequent development works, production of prototypes and test series, ought to be performed at once. All activities mentioned above fall into development activities, they are all technical activities. Term „mental labour“ is not very precise, because each human activity must have mental part. Moreover, operating of modern machine-tools needs much more mental than bodily effort.

In analysis of whole labour needed for production of an article we can find various methods, how to produce the chosen article. Technical activities were already outlined above.

But there are further enterprise activities, having elements close adherent to technical view of product and production processes. For success on market is enabled whole enterprise.

Total Quality Management

There were developed many organizational systems supported enterprise activities and methods how to increase products quality. Was found, that business success of enterprise depends on quality in all its activities, on quality of all employees work, on quality of work organization. Quality in this general sense must be managed. Enterprise activities are constantly divided to specialized partial activities and works. Total Quality Management (TQM) count on concerted corporate effort by provision of product quality, including qualitative planning, design, production, testing, installing and collecting of requirements on quality parameters during all product lifetime. Definition of TQM is today already stabilized. For fast and reliable implementation of TQM in the enterprise there are elaborated software means [9]. Chosen organizational systems for guarantee of general quality in the enterprise, were standardised (in ISO 9000 series, EN 14000 series) and introduced to all advanced enterprises. Specialised individuals and individual groups are managed by standardised system of enterprise working rules. Co-operation is provided by enterprise information system and necessarily also by personal contact. There were built independent institutes for certification of enterprise quality systems. TQM is a framework for utilization of quality standards like ISO 9000.

Concurrent Engineering

Concurrent engineering (CE) is most frequently defined as:
„A systematic approach to the integrated, simultaneous design of both product and their related processes, including manufacturing, test and support... Concurrent engineering is a concerted corporate effort to achieve maximum efficiency, economy, and quality throughout the total business cycle-from product concept through design, verification, manufacture, test and service“.

International Society for Productivity Enhancement (ISPE) began with exchange of CE experiences on conferences in year 1994, and conferences were held yearly.

Object of CE study is nowadays very wide. The programme [3], during CO-MAT-TECH 2003 conference already as 10th ISPE conference proceedings, is divided into 21 chapters in two volumes.

Volume 1 is under the title: Enhanced Interoperable Systems, Volume 2 under: Advanced Design, Management and Production Systems.

Under Enhanced Interoperable Systems are Engineering in general, Enterprise (its architecture, integration in it, technologies in it, computing in it, modelling in it, ...).

Advanced Design, Management and Production Systems contents:

- in Advanced Design Systems: Complex product developments, Collaborative product developments, Collaborative networks, Cost engineering, Design technologies and standards, Optimalization,
- in Advanced Management Systems: product Lifecycle Management,
- in Advanced Production Systems: tool path optimization, ...
- CE use in all its parts specific databases, data warehousing, ..., also specific tools for data mining and evaluating.

Conclusion

In development of technology are in progress differentiation and integration processes over sets of elementary operations, over more general operations and over other activities. Both types of processes have their own advantages and disadvantages and both needed to be managed. Differentiated processes brought division of labour, people perform precise specialized work. Modern (machinery, electronic and many other) products and processes are complicated, warranty of success is management of division of labour. Newest technological trends integrate several progressive methods: marketing, design for manufacture, design for assembly, computer aided technologies, total quality management and eventually another methods into concurrent engineering. Full enterprise managing systems : TQM and CE have different roots, but their final enterprise objectives are similar, but even some of their working methods are similar, if not the same.

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