

SCHEDULING OF THE PRODUCTION PROCESS IN DENTAL TECHNOLOGY BASED ON THE GANTT CHART

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Abstract

The paper presents the graphically production planning in dental offices and technical laboratories. In the paper, the two typical scheduling tools, flow char and Gantt chart have been used. Charts allows to schedule tasks at the prosthetic restoration manufacturing process, thereby coordinating the work of the two cooperating departments: a dentist and technical laboratory. The importance of prosthetic restoration execution scheduling has been pointed and the stages which may arise delay of execution have been determined.

Keywords: Process scheduling, Gantt chart, prosthetic restoration, dental office

1. INTRODUCTION

The efficiency and effectiveness of each organization determines the ability to manage a number of processes and tasks, this refers to the various types of production and applies to all industry production [1-8]. That is why a group of new or modified projects require, above all, the use of methods that facilitate the management and enabling the completion of their implementation within the prescribed period. In management of not very large and not very time-consuming projects, especially in the stages of planning structure, often classic Gantt charts are used. The Gantt chart allows to proper plan and monitor of the project implementation. [9]. Production planning, supervision of order tasks, and minimize the time the operation is particularly difficult in the case of orders in the dental laboratory. Each prosthetic detail (dentures, bridge, veneer) or dental braces are treated as individual product (one-off project), the implementation of which is dependent on a number of special processes. The standard defines the so-called. special processes, as that of which the progress results can not be verified by subsequent non-destructive inspections and tests, or these which mistakes may be proven only during the use of the product by the customer. Due to the limited possibilities for their verification, supervision of such processes is subjected to specific requirements. According to data from the literature [10-13] in the process of individual production (dental restoration production) is required to have specialist knowledge, which guarantees precise requirements determination, and more ensure an appropriate level of quality. Production unitary is marked by a specific set of requirements for implementation. It should also Reed the processes, operations and equipment qualifications. During the producing process of prosthetic restoration or braces all parameters are negotiated individually with the client (patient), and dimensional parameters depend on the individual anatomy of the patient's mouth. This is connected with an individual approach to individual order. An additional factor is the fact that the individual production is controlled through direct dialogue between the contractor and the client [14-16].

This work is devoted to propose the use of planning tools in manufacturing orders in prosthetic laboratories. The paper presents Gantt chart and the the planning sta ges in dental laboratory. Analysis of timely execution of orders related to the exemplary set of activities is presented in case of the partial prosthetic restoration manufacturing technique. The aim is to identify the critical points in the implementation of the order and milestones in the project plan.

2. PROJECT SCHEDULING

The need for collaborative action planning is considered theoretically by most of the people, however, in practice, is also often overlooked (which is wrong). Planning is usually based on the coordination of more participants work, taking into account a large number of unknown, unpredictable factors, which are impossible to determine in the beginning. Project according to definition is an unique, innovative and creative activity, as opposed to routine activities. However, absolutely it not due to the fact that the action plan is unnecessary. In other words, the importance of the project plan can be presented on the basis of stages ie.: rational description of the task and methods, presentation of the tools for achieving the goal (measurement, correction), the review of project expectations. In technical terms, in the dental laboratory the elements of planning (according to contracts) are: method of team and subcontractors coordination, basis for measuring of project progress, controlling tools. As a basic triangle of the project are: (1) project executive time, reflected in the schedule of the project, (2) project budget based on the cost of resources: people, equipment and materials required to perform the tasks, (3) the tasks of the project and work required to implementation.

Project management is the process of planning, organizing and managing tasks and resources in order to achieve the objective within the constraints of time, resources or cost. After defining the objectives of the project and its main phases, should be ready to create a plan:

- introduce and organize a list of tasks to be performed with the duration of each task and the dependencies between tasks,
- plan to add resources: people, equipment and supplies, as well as the relevant costs,
- allocate these resources to the tasks,
- using this information, creating a project schedule.

2.1. Scheme of the partial dental prosthesis execution

In this work the plan of the partial dental prosthesis implementation has been described. Flow chart of a process is described in **Figure 1**. Dental prosthesis being artificial, and also an integral part of the stomatognathic system can not to interfere with the activities of its individual components. The process begins with a patient visit in the dentist's office. There takes place the examination of the patient, followed by an analysis of the prosthetic base, when the plan of the treatment course is stated, the diagnostic impressions of the patient's mouth is taken. The patient's mouth impression should include the exact site of the future prosthesis to ensure its maximum maintenance, support and stabilization during speech and chewing. The impression downloaded properly is the first milestone in the process. Performed impressions are transferred to the dental laboratory and their are the role models for gypsum casting. For gypsum models obtained from the diagnostic impressions, the wax shaft is applied and again the detail are transferred to the dentist to take the impression of the patient' occlusion. On the wax model of teeth short-circuit, dentist in addition to establishes a central short-circuit of teeth and also selects the shape, size and color of artificial teeth, on the model applied guide lines that help during the artificial teeth setting (detail returns to the technician). The wax model with inserted artificial teeth shaped by a dental technician as the future prosthesis are transferred back to the dentist.

During the patient' visit the control of the test prostheses is taken. After application of the necessary adjustment, the model again returns to the technique where is canned (wax model of the prosthesis placed in the lower part of the can), and the wax is replaced by the acrylic material. This stage of implementation consists the several steps: gypsum hardening, cans opening and plastic wax removing, gypsum molds cleaning with a water vapor stream, drying of gypsum mold, gypsum mold coating with several layers of the insulator, drilling of the holes in the surface of the tooth plate. Prepared in this manner molds are filled with acrylic material. The can is placed in the prosthetic press and is left for over 20 min. For complete polymerization can with acrylic

material is placed in a water bath (water temperature is gradually raised to 70 °C, and left for 7 to 16 hours, finally the temperature is raised to 100 °C for next 2 to 3 h). After heat treatment the prosthesis is removed carefully from the can and mechanically machining (to remove any excess of acrylic material), eventually prosthesis is polished to a high gloss. The prepared restoration is passed to the dentist, and if it is well suited process is considered to be terminated, in case of improper fitting, the restoration returns to the technician to correction.

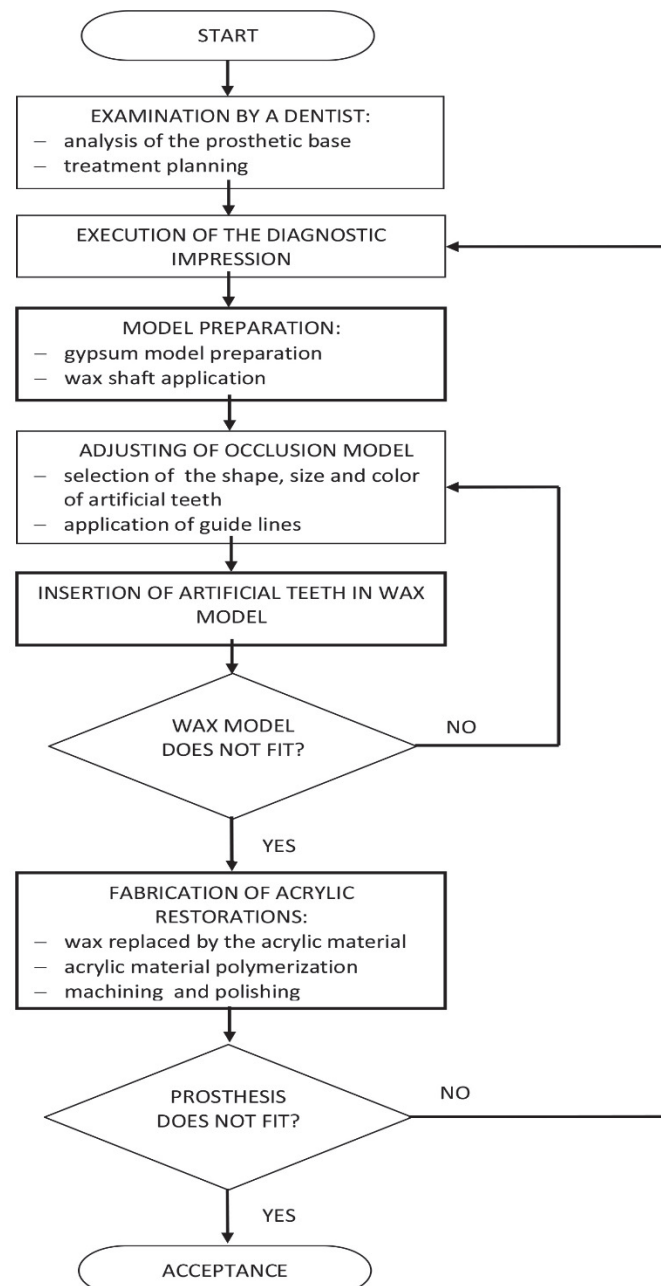


Figure 1 Flow chart for production process of a dental prosthesis

2.2. Gantt chart for the process for partial denture

In **Figure 2** the Gantt chart is presented as schedule of the production process of partial prosthetic restoration, according to the course in **Figure 1**. In **Figure 2** it can be seen that all the operations follow one after the other and it is not possible to carry out concurrent processes. Among the most critical points, should be indicate the

transport stage of the diagnostic impression from the dentist's office to the dental laboratory. Life times of such impression is about 12 hours. Proper impression representation of the patient' mouth is closely related to the type of material used to this purpose. In the process, four milestones have been determined. The appearance of each of them is associated with the necessity of proper adjustment of the prosthesis elements during a meeting with the patient. The greatest dangerous is that if milestones are not exceeded the process operations have to return to operation from the initial stage.

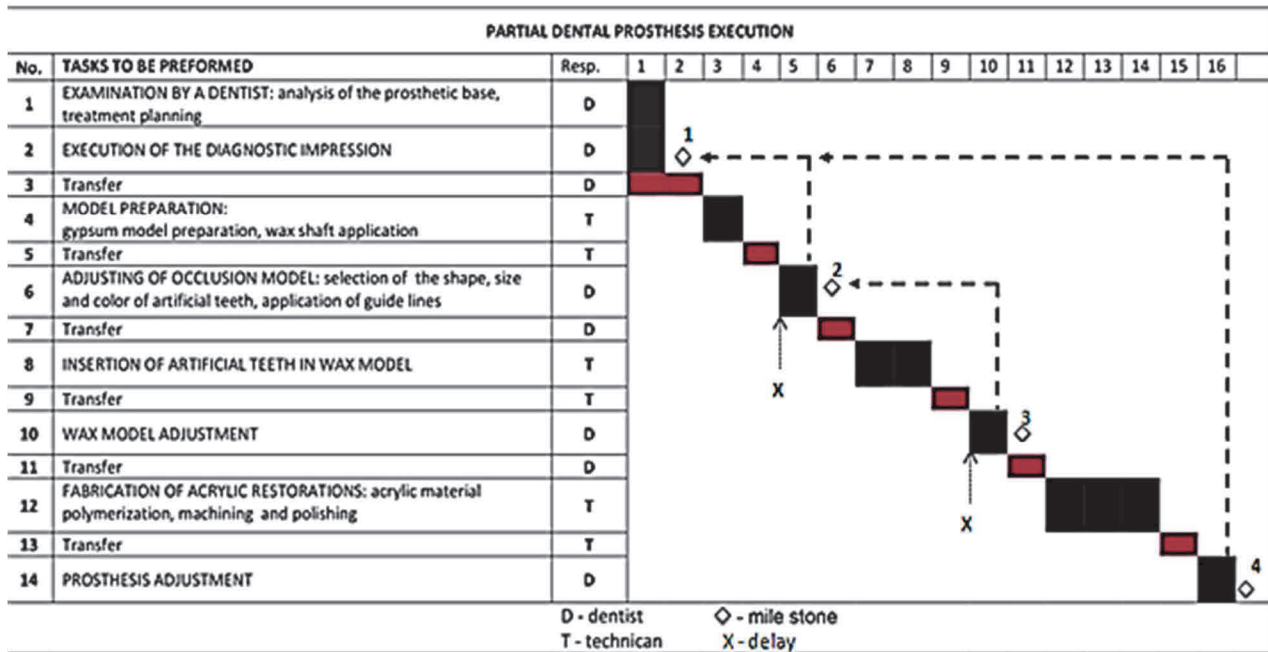


Figure 2 Gantt chart for production process of a dental prosthesis

Another information resulting from the Gantt chart are the places marked with "X" - sources of delays. This delay is closely connected with the deadlines of meeting - dentist with the patient. It should be noted that in the illustrated diagram were determined only the planned project implementation times. Chart does not include days off work.

3. CONCLUSION

On the basis of the analysis, it has been found that it is possible to create the graphic plan of prosthetic restorations production process using a Gantt chart. Chart allows to schedule tasks at the time which is especially important because in most cases during the manufacturing process, there are involved two entities: a dentist and technical laboratory - the work of these two units is not concurrent, and their action is consecutive. Another advantage is the possibility of avoiding a delay in the execution of the order by timely patient schedule meetings with the dentist. Due to the graphic presentation it is possible to present the milestones that have a significant impact on product quality and timeliness of its implementation.

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