| BULETINUL Universităţii Petrol – Gaze din Ploieşti | Vol. LXIV No. 3/2012 | 23 - 28 | Seria Tehnică |
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# Aspects of Shaft Assembly from Composition of the Rotary Table Shaft Prisnel

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## Abstract

*Rotary table is a geared single stage consists of a bevel gear with teeth in the arch and constant height of the tooth. In these conditions, the paper presents a method of analysis of the technological process of assembling all of structure prisnel shaft rotary table product information using Microsoft Project.*

**Key words**: *mass rotating assembly, shaft, conical pinion*

## General Aspects

The machinery and equipment making a product involves establishing correlations between execution cost of the product, production time and product quality.

Quality workmanship finished product depends on quality parts and components assembly.

The technological process of mounting assembly has the final goal (group) finished pieces in a logical, in parts, assemblies and units that meet the quality requirements prescribed by regulations. The technological process of assembly is done in a scientific manner by assembling sub-assemblies and assemblies independent components of [1].

Under these conditions, the similarity with the definition of a project, the technology of assembly (fig. 1) is carried out through planning and coordination of work on a plan determined (fig. 2).

Thus, given the similarity of the two models presented (fig. 1 and fig. 2), this paper analyzes the technological process of the whole assembly of the component tree prisnel rotary table product information using Microsoft Project [3].

## The Development of the Working Model

For assembly work that applies to all shaft decomposition was used prisnel increasing component activities. This method allows hierarchical addressing temporal ordering of activities and structures necessary planning and management of installation works.

Whole shaft prisnel represents element through which movement is transmitted to the crown gear which is mounted on the rotor pressed. It is a flange on the rotary table unit (fig. 3), composed of a housing - bearing (8) which is mounted in the shaft (1) resting on two bearings, one swing (6) and one radial cylindrical roller (26). At one end shaft bevel gear is mounted by

pressure (2), and the other end a flange through which the propeller shaft connects the drive group table.

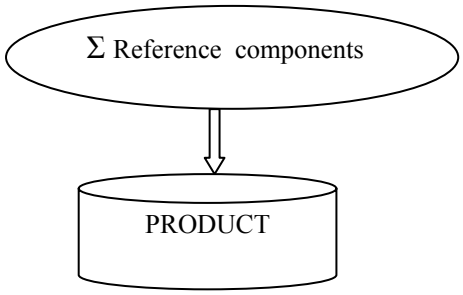



**Fig. 1**. Technological process structure

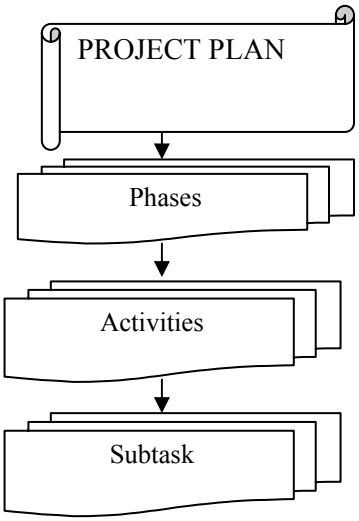



**Fig. 2**. Structure project plan mounting

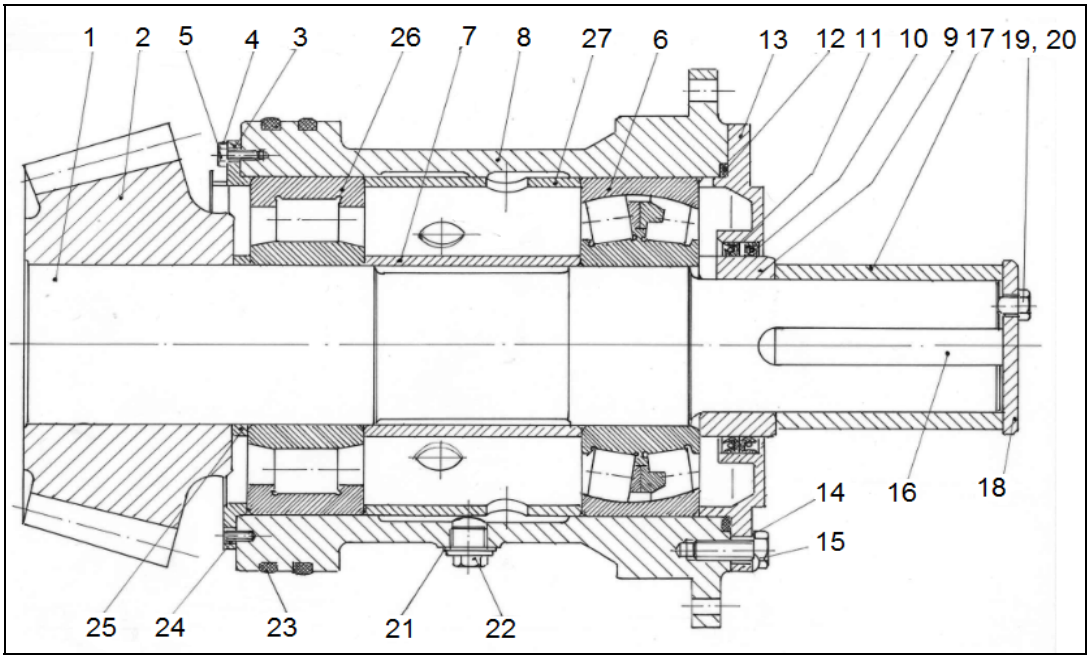



**Fig. 3**. Prisnel shaft assembly [2]:
1 – shaft; 2 – bevel pinion; 3, 13 – cup; 4 – screw; 5, 20 – wire lock; 6 – swing bearing; 7 – spacer, 8 – flange; 9, 17 – bush; 10 – cuff; 11 – ring; 12, 23 – gasket "O"; 14 – safety; 15 – screw M 20x55; 16 – wedge; 18 – cover; 19 – screw M 16x35S; 21 – gasket; 22 – cap; 24 – stifle; 25 – bush; 26 – cylindrical roller bearing; 27 – lantern.

In order to determine how Microsoft Project can be used in the management, monitoring and optimization of a process and assembly the steps is presented below.

1. Establishing nomenclature assembly work. Assembly of the whole technological process of the prisnel shaft includes activities shown in Figure 4.

2. Introduction of time needed to perform assembly work (fig. 5). To measure time work were used timing method and the direct supervision of installation works.
3. Establishing correlations between the activity (activities) that take place in the technological process of assembly. For a complex technological process, the complete set of activities necessary to carry out its activities will include a combination of serial and parallel, forming a network that can be represented graphically – Figure 5.
4. Determination of total duration of the project (fig. 6). All work (activities) assembly linked by logical and chronological relationships form a network (a chart / graph or a graph network). Determine the total length of the technological process is shown in Figure 6.
5. Establishing the critical path and reserves for activities that are not on the critical path – Figure 7.
6. Establishing the necessary resources. In Microsoft Project, enter information about resources (fig. 8) requires the establishment of time spent on execution and cost of operation.

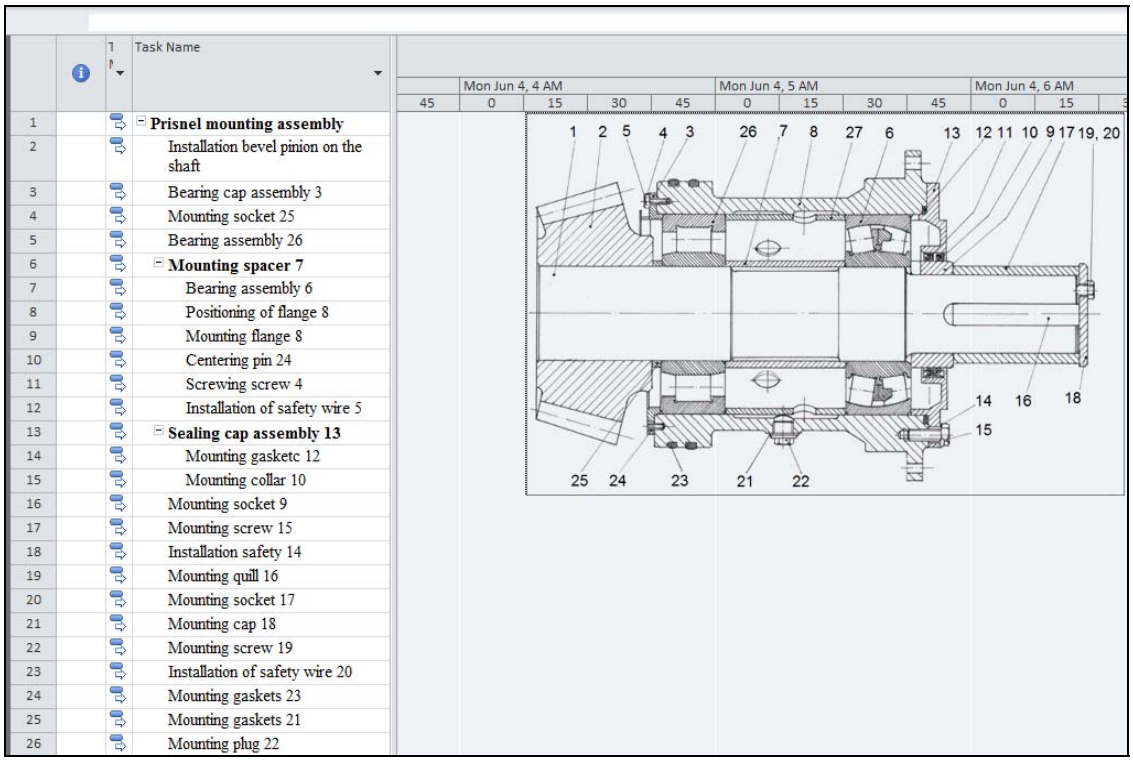



**Fig. 4**. Mounting structure of the technological process stages and phases of work.

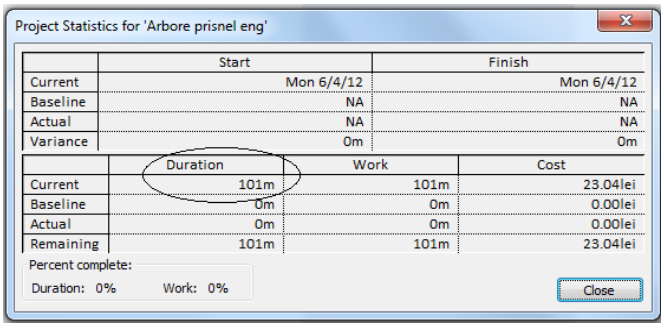
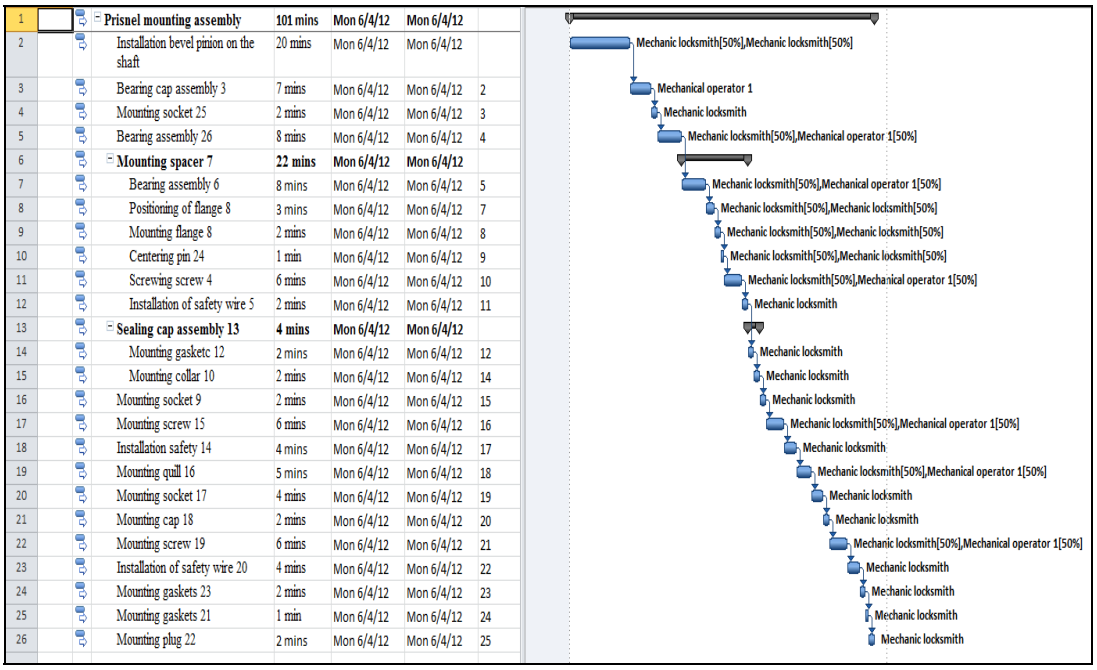


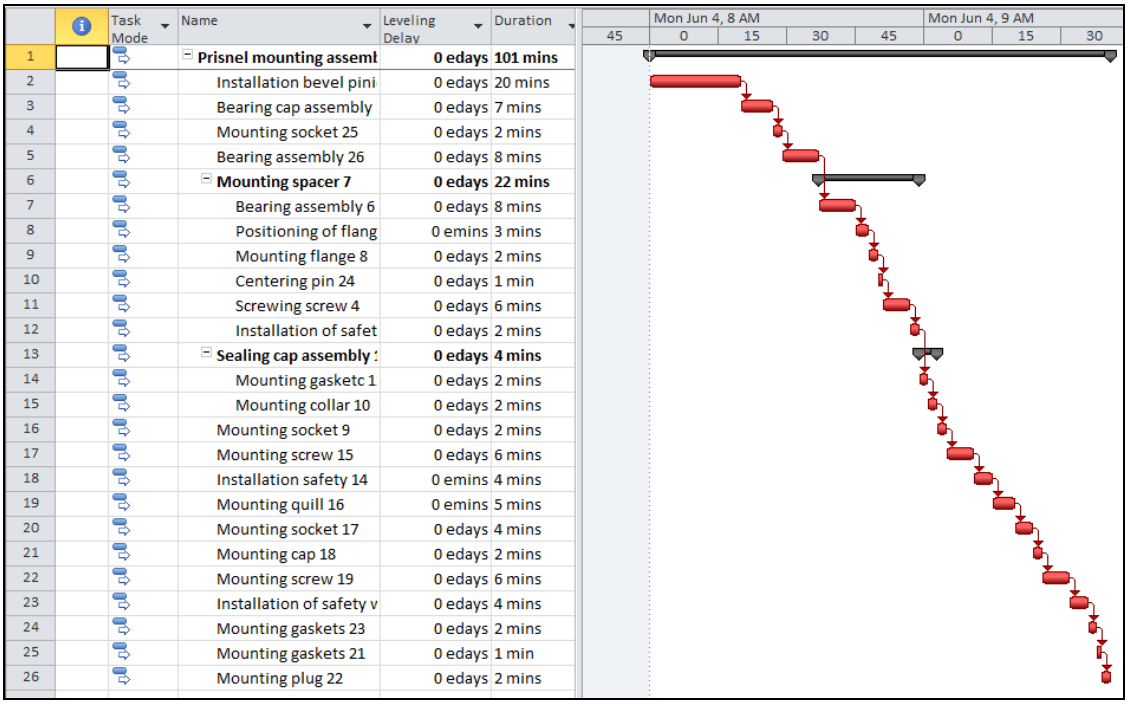

**Fig. 6**. Determine total duration of the technological process of mounting.



| | | | | | | |
|---|---|---|---|---|---|---|
| 1 | **Prisnel mounting assembly** | **101 mins** | **Mon 6/4/12** | **Mon 6/4/12** | | |
| 2 | Installation bevel pinion on the shaft | 20 mins | Mon 6/4/12 | Mon 6/4/12 | | |
| 3 | Bearing cap assembly 3 | 7 mins | Mon 6/4/12 | Mon 6/4/12 | 2 | |
| 4 | Mounting socket 25 | 2 mins | Mon 6/4/12 | Mon 6/4/12 | 3 | |
| 5 | Bearing assembly 26 | 8 mins | Mon 6/4/12 | Mon 6/4/12 | 4 | |
| 6 | **Mounting spacer 7** | **22 mins** | **Mon 6/4/12** | **Mon 6/4/12** | | |
| 7 | Bearing assembly 6 | 8 mins | Mon 6/4/12 | Mon 6/4/12 | 5 | |
| 8 | Positioning of flange 8 | 3 mins | Mon 6/4/12 | Mon 6/4/12 | 7 | |
| 9 | Mounting flange 8 | 2 mins | Mon 6/4/12 | Mon 6/4/12 | 8 | |
| 10 | Centering pin 24 | 1 min | Mon 6/4/12 | Mon 6/4/12 | 9 | |
| 11 | Screwing screw 4 | 6 mins | Mon 6/4/12 | Mon 6/4/12 | 10 | |
| 12 | Installation of safety wire 5 | 2 mins | Mon 6/4/12 | Mon 6/4/12 | 11 | |
| 13 | **Sealing cap assembly 13** | **4 mins** | **Mon 6/4/12** | **Mon 6/4/12** | | |
| 14 | Mounting gasketc 12 | 2 mins | Mon 6/4/12 | Mon 6/4/12 | 12 | |
| 15 | Mounting collar 10 | 2 mins | Mon 6/4/12 | Mon 6/4/12 | 14 | |
| 16 | Mounting socket 9 | 2 mins | Mon 6/4/12 | Mon 6/4/12 | 15 | |
| 17 | Mounting screw 15 | 6 mins | Mon 6/4/12 | Mon 6/4/12 | 16 | |
| 18 | Installation safety 14 | 4 mins | Mon 6/4/12 | Mon 6/4/12 | 17 | |
| 19 | Mounting quill 16 | 5 mins | Mon 6/4/12 | Mon 6/4/12 | 18 | |
| 20 | Mounting socket 17 | 4 mins | Mon 6/4/12 | Mon 6/4/12 | 19 | |
| 21 | Mounting cap 18 | 2 mins | Mon 6/4/12 | Mon 6/4/12 | 20 | |
| 22 | Mounting screw 19 | 6 mins | Mon 6/4/12 | Mon 6/4/12 | 21 | |
| 23 | Installation of safety wire 20 | 4 mins | Mon 6/4/12 | Mon 6/4/12 | 22 | |
| 24 | Mounting gaskets 23 | 2 mins | Mon 6/4/12 | Mon 6/4/12 | 23 | |
| 25 | Mounting gaskets 21 | 1 min | Mon 6/4/12 | Mon 6/4/12 | 24 | |
| 26 | Mounting plug 22 | 2 mins | Mon 6/4/12 | Mon 6/4/12 | 25 | |



**Fig. 5**. Gantt chart view.



| | Task Mode | Name | Leveling Delay | Duration |
|---|---|---|---|---|
| 1 | | **Prisnel mounting assemb** | **0 edays** | **101 mins** |
| 2 | | Installation bevel pini | 0 edays | 20 mins |
| 3 | | Bearing cap assembly | 0 edays | 7 mins |
| 4 | | Mounting socket 25 | 0 edays | 2 mins |
| 5 | | Bearing assembly 26 | 0 edays | 8 mins |
| 6 | | **Mounting spacer 7** | **0 edays** | **22 mins** |
| 7 | | Bearing assembly 6 | 0 edays | 8 mins |
| 8 | | Positioning of flang | 0 emins | 3 mins |
| 9 | | Mounting flange 8 | 0 edays | 2 mins |
| 10 | | Centering pin 24 | 0 edays | 1 min |
| 11 | | Screwing screw 4 | 0 edays | 6 mins |
| 12 | | Installation of safet | 0 edays | 2 mins |
| 13 | | **Sealing cap assembly 1** | **0 edays** | **4 mins** |
| 14 | | Mounting gasketc 1 | 0 edays | 2 mins |
| 15 | | Mounting collar 10 | 0 edays | 2 mins |
| 16 | | Mounting socket 9 | 0 edays | 2 mins |
| 17 | | Mounting screw 15 | 0 edays | 6 mins |
| 18 | | Installation safety 14 | 0 emins | 4 mins |
| 19 | | Mounting quill 16 | 0 emins | 5 mins |
| 20 | | Mounting socket 17 | 0 edays | 4 mins |
| 21 | | Mounting cap 18 | 0 edays | 2 mins |
| 22 | | Mounting screw 19 | 0 edays | 6 mins |
| 23 | | Installation of safety v | 0 edays | 4 mins |
| 24 | | Mounting gaskets 23 | 0 edays | 2 mins |
| 25 | | Mounting gaskets 21 | 0 edays | 1 min |
| 26 | | Mounting plug 22 | 0 edays | 2 mins |



**Fig. 7**. Identifying the critical path.

| | Resource Name | Type | Material | Initials | Group | Max. | Std. Rate | Ovt. Rate | Cost/Use | Accrue At | Base Calendar |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Team leader | Work | | T | | 100% | 15.00lei/hr | 0.00lei/hr | 0.00lei | Prorated | Standard |
| 2 | Mechanic locksmith | Work | | M | | 100% | 15.00lei/hr | 0.00lei/hr | 0.00lei | Prorated | Standard |
| 3 | Mechanic locksmith | Work | | M | | 100% | 15.00lei/hr | 0.00lei/hr | 0.00lei | Prorated | Standard |
| 4 | Mechanical operator | Work | | M | | 100% | 10.00lei/hr | 0.00lei/hr | 0.00lei | Prorated | Standard |
| 5 | Mechanical operator | Work | | M | | 100% | 8.00lei/hr | 0.00lei/hr | 0.00lei | Prorated | Standard |
| 6 | Mechanical operator | Work | | M | | 100% | 5.00lei/hr | 0.00lei/hr | 0.00lei | Prorated | Standard |

**Fig. 8**. Establishing the necessary resources.

7. Allocating resources to activities (fig. 9). How time is managed is called a resource allocation and overtime may be:
   - sub-assignment: maximum capacity of the resource is not occupied by resource allocations;
   - full allocation: maximum capacity of the resource is occupied by the division;
   - over-allocation: the maximum capacity is exceeded resource distributions.
8. Determination of total time and cost calculation process of mounting technology - Figure 6.

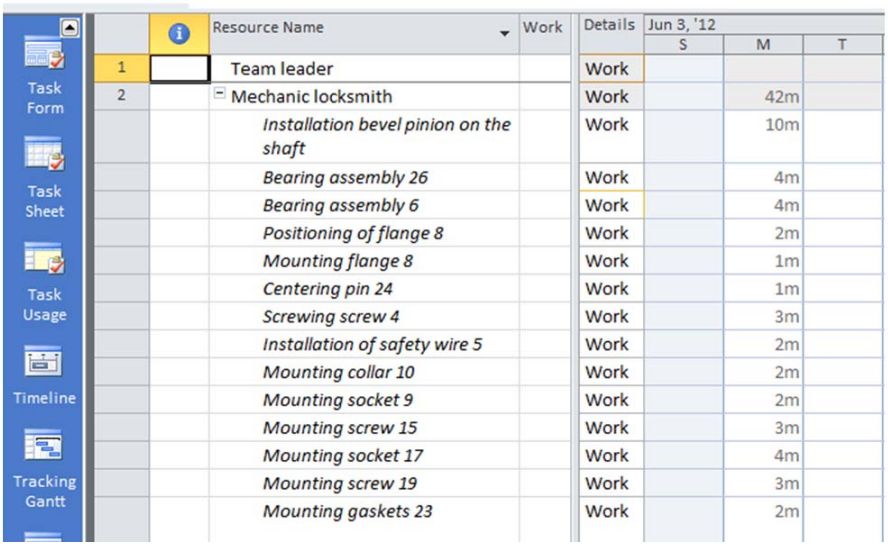



**Fig. 9**. View the resource allocation activities.

## Conclusions

The ultimate goal of any installation process is getting a quality product that is characterized by dimensional accuracy, geometric shape precision and mutual position of surfaces.
In this respect, the rapid pace of technical progress and industrial development engineering conditions require increasingly demanding.
Now, for the correct operation of machine, not only the concept design, dimensional accuracy, and surface quality are crucial but also the assembly of such machine parts.

The usefulness of the proposed method is justified by:

- systemic approach works mounting which eliminates time not worked;
- composition of models which can be changed quickly by using the computer system;
- rapid adaptation to changes that occur in the cycle of editing (changing working times, replacing resources, specifying interruptions of work etc.);
- establishment of working templates work stages;
- effective monitoring, permanent record of the work performed;
- rapid control of the working stages, highlighting the activities that fall outside the parameters specified;
- rapid analysis of resource use and costs.

## References

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3. Nae, I. – *Project Management - planning and control techniques*, Petroleum-Gas University of Ploiesti Publishing House, Ploieşti, 2009.

# Aspecte privind montajul ansamblului prisnel din componența mesei rotative

## Rezumat

*Masa rotativă reprezintă un reductor de turație cu o singură treaptă formată dintr-un angrenaj conic cu dantură în arc de cerc şi cu înălțimea constantă a dintelui. În aceste condiții, lucrarea prezintă o modalitate de analiză a procesului tehnologic de montaj a ansamblului arborelui prisnel din componența mesei rotative utilizând produsul informatic Microsoft Project.*