Journal of Trends in the Development of Machinery and Associated Technology
Vol. 16, No. 1, 2012, ISSN 2303-4009 (online), p.p. 75-78

SOFTWARE SUPPORT FOR MONITORING AND CONTROL SYSTEM THE NON-RAFINED GOLD TREATMENT BY ELECTRO-CHEMICAL MEHTOD

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ABSTRACT
Gold is a precious and strategic important metal. Therefore, and due to the high price of this metal in the market, it is very important to organize the production for rapid recovery the commercial product and reduction of losses to minimum.
The aim of this work and also the main user-demand is development of information system (IS), which would represent a software support for monitoring and control the process of gold recovery from the anode slime. The idea is to keep all relevant business information in one place. This would facilitate the data handling, monitoring of parameters and making out the balance sheet and enabled more complete insight into all phases of processing the non-refined gold.
In designing the system, special attention is dedicated to the structure and presentation data in database because they are the bases for building the new functions of system.
Information system of monitoring and control the treatment of non-refined gold of electrochemical method was implemented using the ORACLE ORDBMS. The system was selected because it allows the implementation of multi-user IS in a network environment and supports the certain level of control data access by multiple users.
Keywords*:* gold, monitoring and control, software support, DB, RDBMS, data handling, design, development, user-demand, multi-user IS, network environment

1. INTRODUCTION
In Bor, gold [1.,2.,3.] is obtained as a by - product from the treatment of sulphide ores of copper and substantially affect the economics of production of copper. In the process of treatment ores, core mass of gold is concentrated in the anode slime, which is obtained during electrolytic refining of copper. The content of gold in anode slime is variable, ranging from 0.6 - 2.0%. Besides gold, anode slime contains a considerable amount of copper, silver, selenium, lead, tellurium and other undesirable ingredients that have to be eliminated in order to obtain gold of commercial quality (> 99.99 % Au).
After removal of copper, selenium and other non-precious metals, in the melting phase of anode slime, it is obtained the silver alloy with gold and platinum metals so-called Dorè - metal. Gold content in the alloy is 10 - 15%. Except the precious metals, it contains a certain amount of copper and other undesirable ingredients. This alloy is subjected to electrolytic refining - in order to obtain the silver, while gold with the platinum metals is concentrated in the anode slime, the result of that, which is named non - refined gold.
In order to obtain a commercial gold, further refining process comprises the following phases: leaching of silver or afinage, drying of refined gold, melting and casting of refined gold in the anode, electrolytic refining of gold, melting and casting ingots of gold and processing waste solution.

Due to the complexity of obtaining gold and because of its high value, information system is designed to support a process of monitoring and control of gold recovery from the anode slime.

2. METODOLOGY OF WORK

In CHAPTER 1, System Analyze has been done. System is analyzed using Structural System Analyze Method.
In CHAPTER 2, System Specification has been done. Database is defined using Extended Entity - Relationship Model.
In CHAPTER 3, System Implementation has been performed. The system is implemented using ORACLE ORDBMS.

2.1. Analyze of the system

Decomposition of the System Hierarchy is performed using the Method of Structural System Analyses [4.]. Data flowing and handling of data inside of the system are presented using Dataflow Diagrams with reference to: processes (functions), data stores, external objects and data flows.
The diagrams begin at a Context Diagram and progress down through levels of diagram to show a complete decomposition of all the functions. The Context Diagram (Fogure1.), the diagram lowest, zero level of the system i.e., the highest level of abstraction of the system as a "black box", is presented a single process and one that reflects the essence of the functioning of the system. Here, it is a system monitoring and control to obtain gold from the anode slime. It communicates with the outside environment, sharing with it the relevant information from the standpoint of achieving the fundamental objective of its existence - obtaining commercial quality gold.

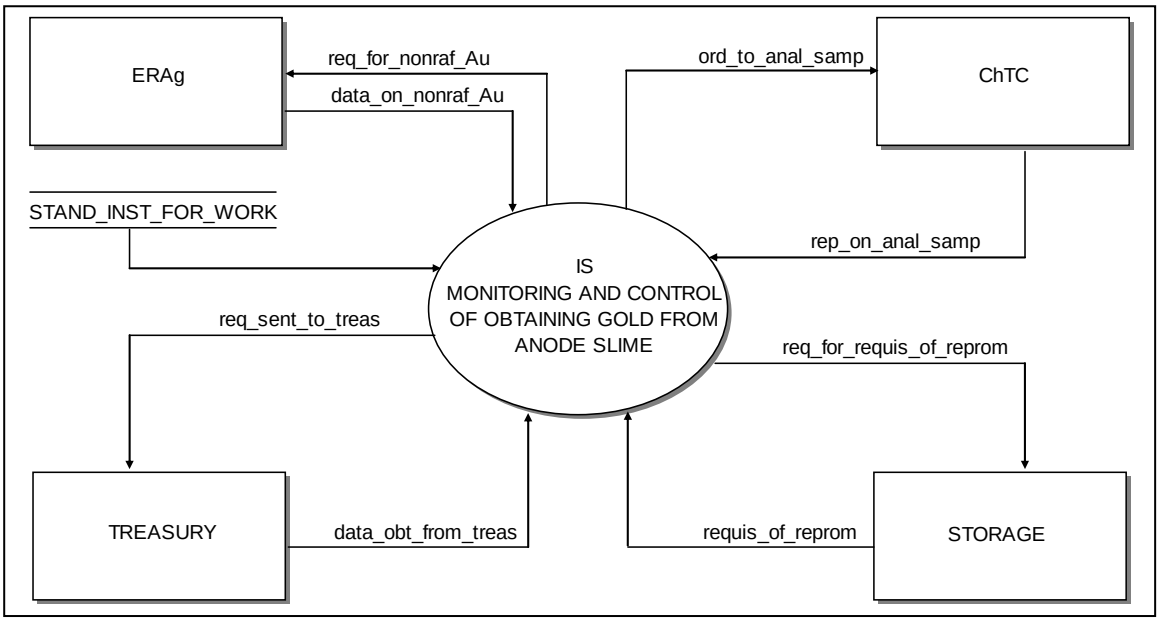

Figure 1. Context Diagram IS monitoring and control of obtaining gold from anode slime.

The diagram of the first level of decomposition (Figure 2.), the initial process (the process at the highest level of abstraction) is decomposed into sub-processes, i.e. the less complex processes (processes in the lower level of abstraction), which are further decomposed too.
Data Dictionary with data structure and content of all data flows and stores for the system could not be displayed from technical reasons.

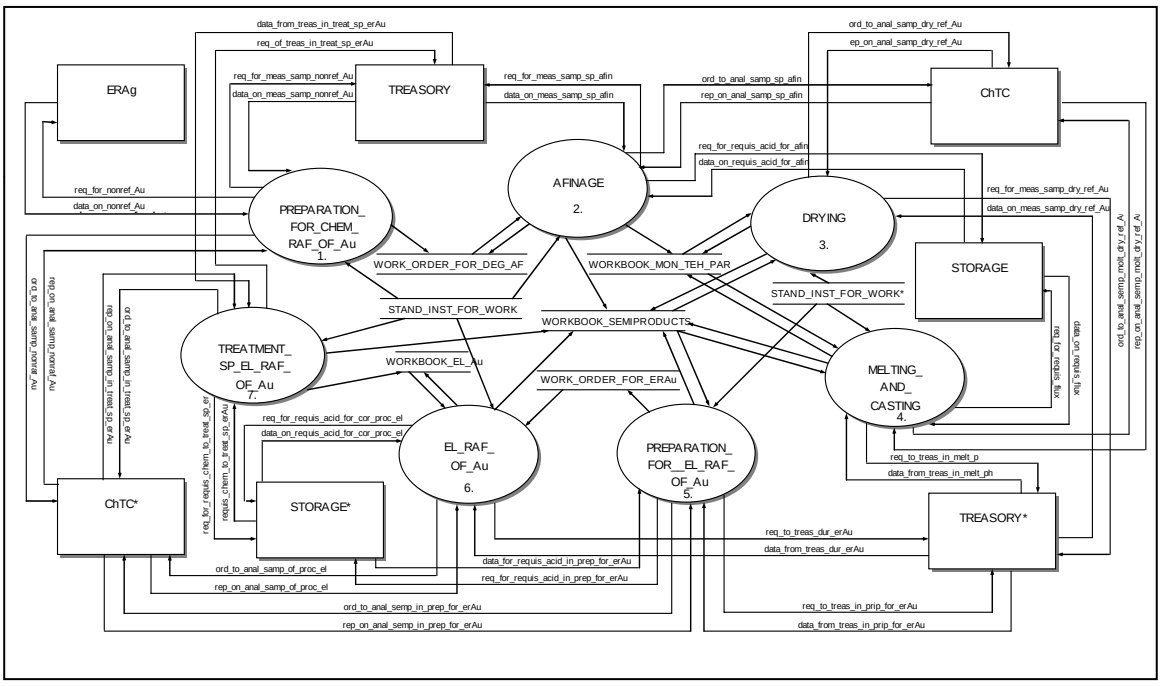

Figure2. Dataflow diagram IS monitoring and control of obtaining gold from anode slime.

2.2. Specification of the system

Database of the system considered is specified using Extended Entity - Relationship Model and using its basic and specific concepts: entity, relationship, attribute and value [5.,6.]. The method of working is a top-down approach in which you start by looking for the things about which you need to hold information - the entities. You then find the association between them - relationship, and finally fill out the detail of the information to be held - the attributes. The basic principle of entity relationship models is that data is described in one place and one place only.

Extended Entity - Relationship Model and table description of the attributes and domains with all attributes could not be displayed from technical reasons. Therefore, one of E-R Models (Figure 3.) is given only partially.

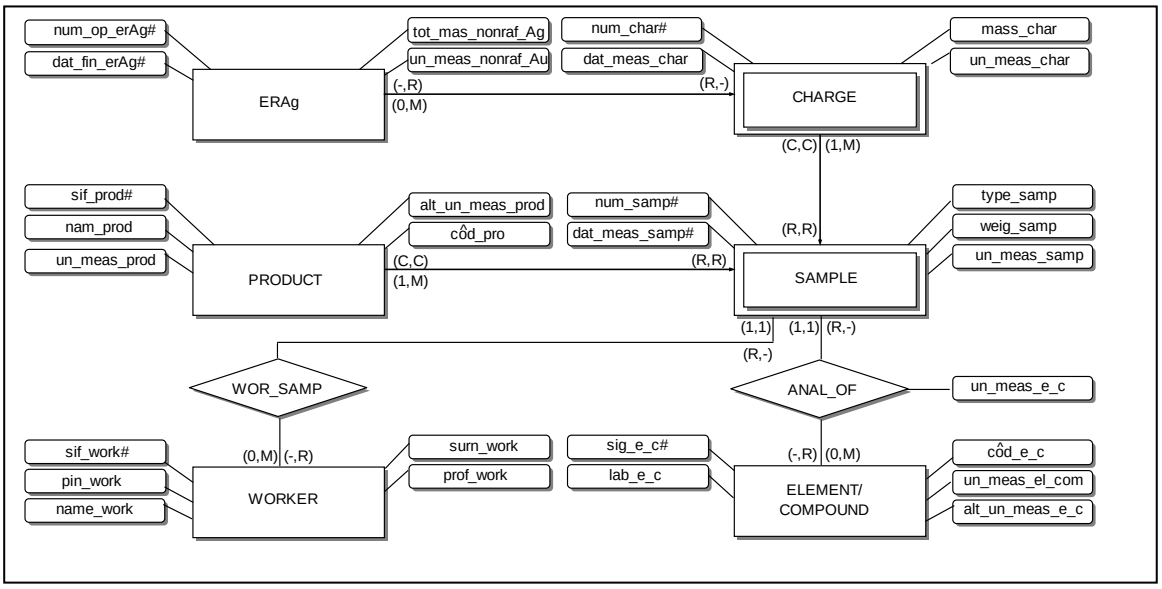

Figure 3. Entity-Relationship diagram NONRAF_GOLD_CHARGE_AND_SAMPLE

2.3. Implementation of the system

Entity - Relationship Model is translated using translation rules in the Relational DB Model, which guarantees getting relations in third or B/C normal form [7.,8.].

Database tables are created using Relational Model. The tables are base for applying ORACLE Developer/2000 tools (ORACLE Forms, ORACLE Reports, ORACLE Graphics and ORACLE Procedure Builder); ORACLE Forms [9.] or ORACLE Reports [10.] help us in creating forms for entering data in DB or output reports and views, respectively. Forms and reports are related in a single application (using the menu) which is started by COMMAND:

IFRUN60 path\aplication_name.FMX[user_name/password@database];.

3. CONCLUSION

In order to merge all the documents, simplifying and accelerating the arrival of the necessary data in order to respond quickly at any given moment, whether it is a process of transformation or the metals calculation, it is done analysis and specification of user requirements and information system is designed to monitor and control treatment of unrefined gold electro - chemical method, which was implemented using the ORACLE database management system. The data are organized into a single DB, with minimum redundancy, thus simplifying data access and enabled a quick and easy way to monitor system parameters in order to control the process and preparation of balance sheets and other parameters in the system. All authorized users can access data. Since the data is remembered only once and more programs simultaneously (competitive) require access to the same data, the DBMS must ensure that the conflicting requirements and undesired interference of the program, that this situation may occur, successfully resolve.

Moreover, the DBMS must protect data, that is ensures the preservation of the integrity of DB or accuracy and correctness of data errors in a program or system failure, and to provide security of data and protect DB against unauthorized use and update data.

Since the data in DB are kept at one place only and if the entire business system based on such a BP, then a system failure can have catastrophic consequences. It is therefore necessary that DBMS, through periodic copying BP to archival memory and memory transactions that have taken place between the two copying, enabling efficient recovery of BP after a failure.

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