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OBJECT ORIENTED ARCHITECTURE FOR PRODUCT INFORMATION SYSTEM ENGINEERING

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ABSTRACT

The product information system is an organizational device for regulating the creation, circulation, use and evolution of the information assets of the product definitions. It refers to all the information that defines how the product is designed, manufactured and used.

Product information systems have become a critical element for the enterprises to support their process of product offer definition.

The company SOTACIB itself assembles these production elements (from the basic composition phase to the final phase). Our application provides a computerized management system for the technical data of the product manufacturing. Its objective is to support the development activities of the cement product by preparing atomized powders such as grinding, controlling the parameters of the slip, by sieving and final atomization. An UML modeling of the system is developed in the context of a driven approach centered on a proposed architecture.

KEYWORDS: UML, Product Information System, TDMS

1. Introduction

The information system of a company is a communication link both inside the company and outside. The systematic vision of the company sets up the information system at the interface between, on the one hand, the operating system responsible for production and responding to the purpose of the company and, on the other hand, maintains the chosen objectives [1].

The operating system of the company contains two key processes that are decisive for the achievement of the company's objective:

1 - a first process of "definition of the product offer", whose function is to define and maintain the products that the company releases on the market. Enterprise Resource Planning (ERP) information systems play an important role in supporting this process.

2 - a second process of "production of supply" This process begins when a customer expresses his need and therefore places an order. In this case, the company must provide a quality product as soon as possible. This process requires the installation of a PDM (product data management) information system. We refer to this second enterprise information system in this article. Thus, the objective of this work is the setting up of UML for the modeling of an information system for the preparation of cement. Indeed, with the complexity of the product offer and in a concurrent engineering context, the mastery of technical information has become a crucial and difficult subject: crucial because any failure in the management of information is translated immediately by non-qualities but also difficult due to the dynamics of the system [2, 3].

2. Development of the approach

The manufacturing process goes through several stages: after studying the needs of the customer, the product is defined and the preparation is made. The production takes place according to precise conditions, which are controlled at all the stages. The preparation of cement passes through several stages: choice of raw materials, grinding, control of color, control of the parameters of the slip, sieving and atomizing the slip. In the control room, engineers

drive the factory from their screens where all the information is displayed. At each stage of the transformation of the material, samples are automatically taken and analyzed very rigorously.

To construct a computer system that manages the manufacturing process, the SIP context is used, which implies different needs than those present in traditional management applications. The data managed are more complex (graphic, text, etc.), the data models are richer (with strong semantics and involve a rich dynamic with several levels of abstraction: instance, class, model).

This information system is developed by the object - oriented approach which has shown its results in research work on engineering application development [4].

3. System Modeling

The development of the product information system is based on an object - oriented architecture as part of an approach driven by the use cases centered on an architecture and iterated in an iterative and incremental way.

This tool is based on a PIS package that brings together all the business objects: manufacturing, product definition and user's need as it can be seen in Fig. 1 [5]. Our modeling is centered on the "manufacturing" business object that describes the technical data of the manufacturing process.

3.1. Description of Collaboration Diagrams

In analysis, UML creates the use cases by means of collaborations between the objects coming from the domain of the application [6, 7]. Collaboration diagrams show interactions between objects (class instances and actors, which allow us to represent the context of an interaction, because we can specify the states of the objects that interact with each other). Collaboration diagrams that present the functions "Define Product", "Grind" and the "Sift" function are shown in Fig. 2, Fig. 3 and Fig. 4.

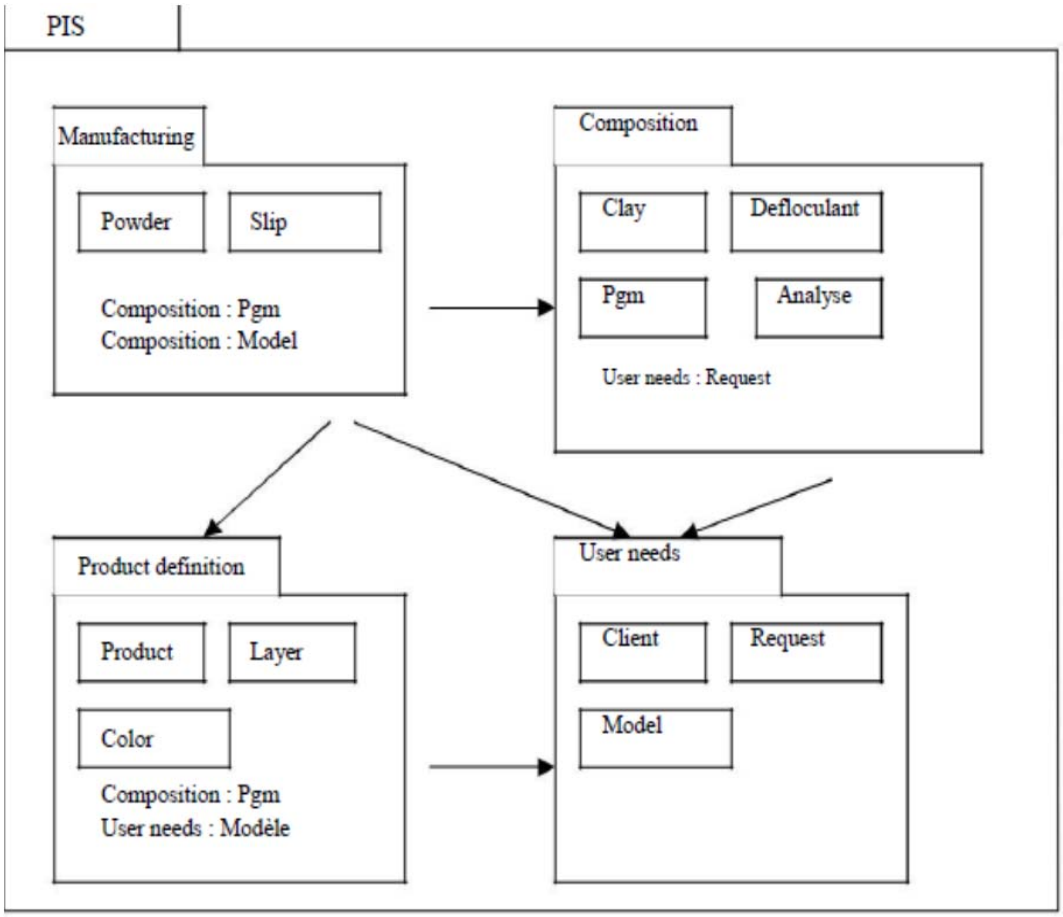

Fig. 1. *Representation of the PIS package for the cement*

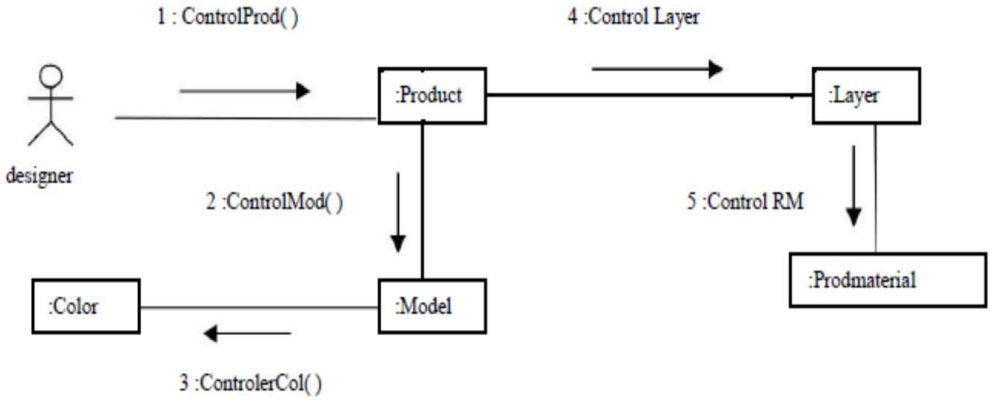

Fig. 2. *Collaboration diagram «Product definition»*

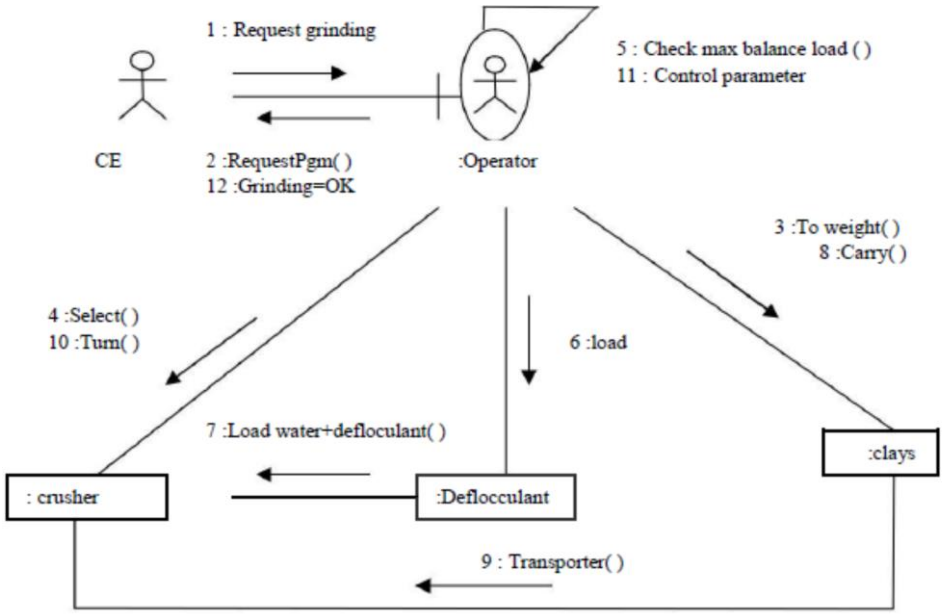

Fig. 3. *Collaboration diagram «Grind»*

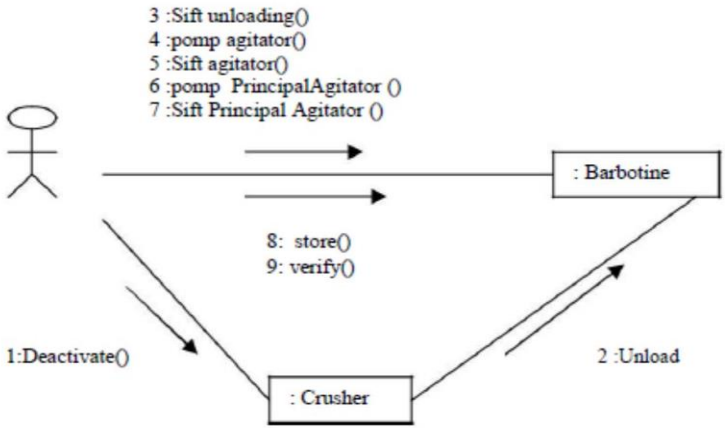

Fig. 4. *Collaboration diagram «Sift»*

3.2. Class Diagram

The class diagram is a schema used to present the classes and interfaces of the systems as well as the different relationships between them. This diagram is a part of the static part of UML because it disregards the temporal aspects. The class diagram of our application is shown in Fig. 5 [8, 9].

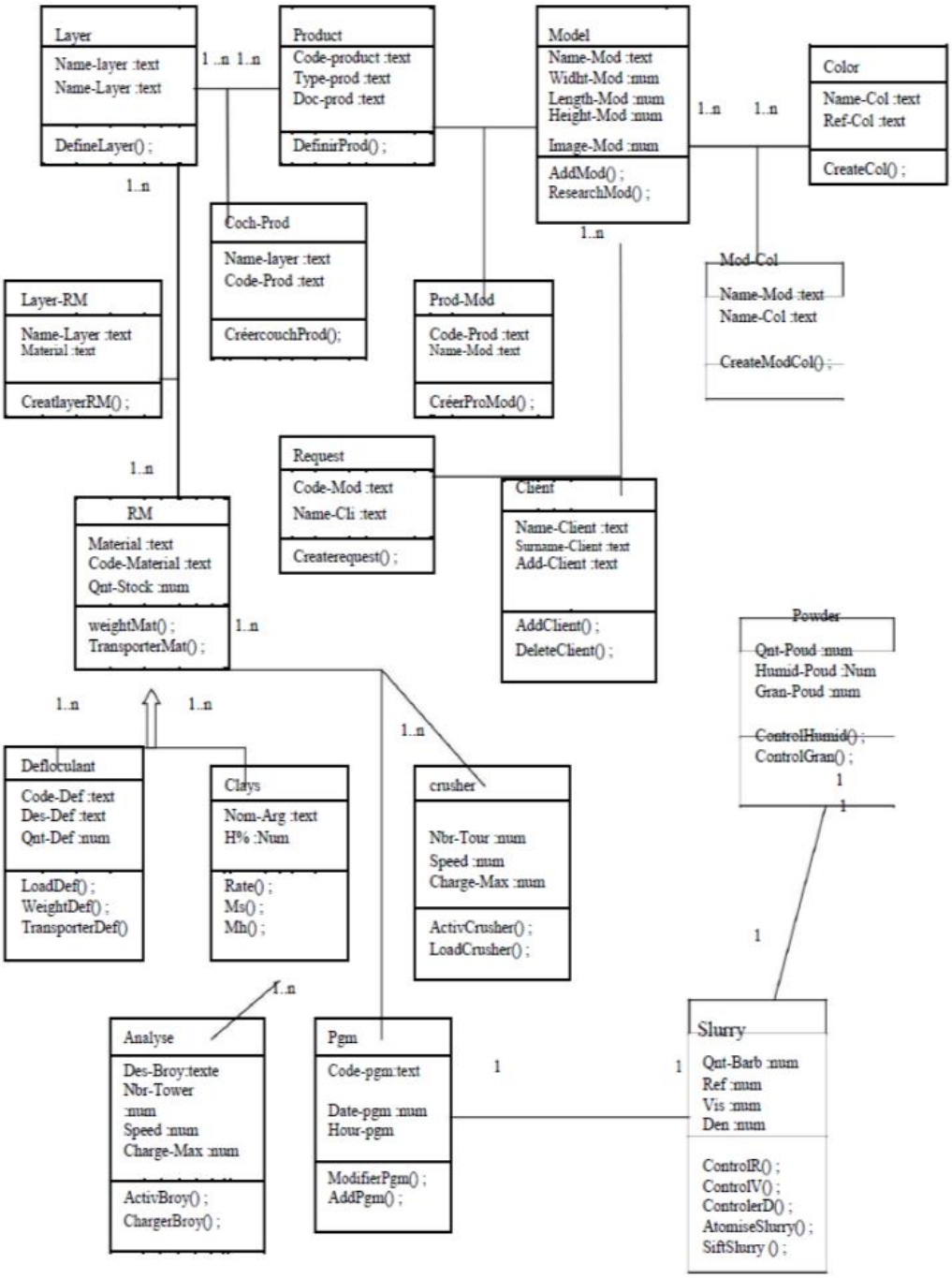

Fig. 5. *Class Diagram for Business Object "Manufacturing"*

4. Conclusion

This work is part of a research study on product information systems that use the UML modeling language. In this paper we have succeeded in developing an object- oriented architecture for the engineering of product information systems and more

specifically of the technical data management system (TDMS) for the manufacture of cement product.

The developed TDMS allows us to structure, secure and share access to information for the cement product and on the other hand to ensure both the accuracy of the production records and the visibility of the process Technical change management.

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