Chapter 14
Introduction to Augmented Reality Training in the Industrial Environment

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ABSTRACT

Faced with technological development and that of new information and communication technologies (NICTs), organizations' service structures and their processes have become increasingly flexible, interactive, and virtual. Industrial maintenance is one of the features that can take advantage of this change based on NICTs. The objective is to improve the reliability and availability of industrial equipment and installations, as well as to maintain a knowledge base allowing the capitalization of human skills. This makes it possible to keep production equipment at a distance and quickly by relying on remote maintenance and e-maintenance platforms. This allows real-time management between operators around industrial problems related to maintenance. In this chapter, the authors describe the change in the maintenance function between the classic strategy and the modern strategy, explaining the contribution of augmented reality to help solve problems in a remote maintenance or industrial e-maintenance task.

INTRODUCTION

Industrial maintenance is confronted with multiple constraints of cost optimization, improvement of the quality of interventions, availability and maintainability, accessibility to industrial sites. Added to this is the complexity and diversity of industrial equipment and installations, without forgetting the various maintenance problems often thrown into the background in the face of the imperatives involved in production concerns. During this decade, with technological development and that of NTIC (New Information and Communication Technologies), and faced with new socio-economic challenges, profound international changes resulting from globalization and globalization as well as the new competitive environment, industrial companies wish to take advantage of this to speed up the interventions of maintenance agents on the sites.

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This situation makes it possible to reduce the idle time of their machines and installations on the one hand, and to build a knowledge base to keep track of their work on the other hand. This allows industrial equipment to be kept at a remote production site. Such maintenance must be supported on e-service platforms (electronic service via the Internet). In this article, we will present the mutation of the maintenance function between the classic strategy and the modern strategy, while giving the contribution of augmented reality in terms of exchange and transfer of videos and view them on 3D smart glasses for remote control in an industrial remote maintenance training tasks.

BACKGROUND

Industrial maintenance has long played the curative role, the sole objective of which was to reduce the downtime of industrial machines and installations. According to the AFNOR standard, maintenance is defined as being: all of the technical, administrative and management actions carried out during the life cycle of an asset and intended to maintain or restore it in a state in which it can perform the required function (AFNOR, 2001). Once curative, maintenance becomes preventive, contributes to improving the reliability of equipment and the quality of products. This maintenance results in the definition of action plans and interventions on the equipment, by the replacement of certain parts in the process of deterioration. Indeed, this is done by greasing or cleaning certain installations. In fact, these actions were initially carried out systematically according to predefined timetables.

Thanks to the evolution of diagnostic and control methods, new maintenance has been created. Such maintenance aims to use fault forecasting techniques such as vibration analysis. This maintenance is said to be conditional preventive allowing the parts to be replaced just before they break. Maintenance has thus evolved towards the proactive concept (Cocheteux, 2010) which results in the application of means of monitoring and continuous controls on the primary problems which cause the failure of the system, while being based on methods of optimization such as Total Productive Maintenance TPM (Bufferne, 2008), Maintenance Based on Reliability (MBF) (Cotaina et al., 1997), Expert Systems (SE) (Blanc et al., 1989). The following figure shows the evolution of the maintenance function within the framework of a classic production:

The unrestrained competition and the race for competitiveness encourage companies to seek the total quality of the product, and especially the reduction of costs, the maintenance function has thus become one of the important functions in companies. In the next section we present the evolution of maintenance in a modern production context. With the development of competition and the race for competitiveness and with the increasing complexity and automation of processes, industrial maintenance has become one of the strategic functions of the company. Far from being stabilized today, it is evolving according to New Information and Communication Technologies (NTIC), the introduction of new management methods, as well as the technological development of production tools. (Rachidi et al., 2014)

These factors have changed the communication strategy and the information between maintenance operators. Indeed, in the past information was entered manually on paper, and also was exchanged verbally between operators. On the other hand, the information is quite different, it has become structured and formalized in order to be manipulated by computer systems (Computer-Aided Maintenance Management). (Rachidi et al., 2013a). Industrial companies are looking to improve the current maintenance system through two strategic levels: outsourcing and outsourcing. (Alali, 2010).