New perspectives in intervention for health at work: analyzing design work to transform design practices

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1. Introduction

Many ergonomic studies highlight the need to consider the activity of operators in design processes, in order to improve their future working conditions (Garrigou & al., 1995; Daniellou, 2007). Nevertheless, we point out both the importance and also the difficulties of intervening directly during design work and define the status and stakes of workers’ activity in the design process (Beguin, 2007). In this presentation we specifically focus on analyzing the work of designers to better understand their activity and to find ways of transforming their design practices, in order to improve the health of operators at work.

2. Intervention-Research at an automotive supplier

We are conducting an emerging research project that associates an engineer and an occupational psychologist. We focus on the trades involved in the design of work situations. Our principal aim is to help designers to better take into account the health and safety of operators who are the future users of the production systems designed. In this multidisciplinary framework, we are developing a new intervention method with designers, aimed at transforming their practices.

In particular, we present our intervention in the framework of a production line re-design project at an automotive supplier. This project consists in starting the serial production of a new automotive part intended for an automobile constructor. The industrialization of this new product requires the modification of a production line already in place in the workshop and which supplies products of the same type to other car-makers.

The company has a manufacturing workshop and a research and development center on the same site. This specific characteristic allowed us, firstly, to observe the production activity in the current configuration of the line and, secondly, to participate in the meetings of the project team in charge of its modification and in the installation of the new product. It also allowed observing the interactions between the production personnel and those of the design department. Here, we speak more specifically of the part of the intervention dedicated to the engineers in charge of the re-design project.

3. Intervention methodology

We first conducted operator work analyses, by using the activity clinic method of occupational psychology (Kloetzer, Quillerou-Grivet & Simonet, 2015), initially by helping the operators to perform a detailed analysis of their daily activity, their skills, ingenuity, and their difficulties and constraints. The methodology is based on observations and simple self-confrontation interviews followed by cross self-confrontation interviews (Clot & al., 2000). The aim of this initial work analysis with operators was to arouse the interest of the designers, to draw their attention to the wealth of the operators’ resources and to help them to improve the operators’ working conditions (Lux & Quillerou-Grivet, 2014).

In parallel, the objective was also to encourage designers to explore a new approach to design and perform their own work analysis using our methodology.

In this presentation, we present only the work analysis of the design team derived from:

- observations of the design team during project meetings in order to better know the design actors, their interactions, their trades and practices (in total 30 meetings, i.e. FMEA\textsuperscript{1}, technical follow-up, project review, “scrum” meeting, etc.);
- observations during the daily follow-up of one specific process designer. This was done to learn the process of the designer’s trade and its characteristics, dilemmas and resources.

\textsuperscript{1} FMEA : Failure Modes and Effects Analysis

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involved in re-designing the production line with other project members and production personnel (in total 6 complete days of observation).

Observations and analyses were conducted in pairs: initially, the engineer and occupational psychologist observed the same work situation but each took own notes in separate notebooks. Secondly, these data were pooled and discussed to confront the different approaches. Finally, a simple self-confrontation was organized with the process designer: we prepared a document showing the monitoring of his activities over a full day’s work. This document alternated the notes taken by the engineer with those of the occupational psychologist, thus presenting both our visions and interpretations of the same situations observed.

4. Results of the work analysis

4.1. The Design Task and the Designer’s Activity

The main task of the process designer is to manage the industrialization of one or several design projects. The process designer provides the link between the design office - which defines the product - and the production department. His scope of action ranges from creating the product to implementing mass production on the shop floor. The key role of the process designer is to ensure the link between the design world and the production world, and he is then constantly negotiating with other design project members (quality designer, product designer, etc.) and production personnel (operational managers, operators, maintenance, etc.).

We propose a categorization of our observations on the different aspects of the designer’s activity and his interactions with the company’s internal and external stakeholders. These aspects of the designer’s activity are:

- Some difficulties in the organization of many daily tasks in different domains, always with several levels of urgency;
- A high concentration level required by certain tasks (i.e. CAD\(^2\)) and the considerable creativity needed to find technical solutions;
- A core work which appears to be constantly interrupted by many interactions with designer colleagues, production operators and managers, multiple phone calls from customers or suppliers, and numerous different types of meetings too, leading him to declare: "It's OK, meetings have been cancelled, I'll be able to work!"
- The necessity to find individual and collective resources to cope and find better ways to implement the design projects and to organize them together with different trades.

4.2. Changes in the project

Through our observations and discussions with designers, managers and operators, we noted several effects on the designers’ activity in this project. In the first step, the project leader observed that without our intervention, his team would not have developed issues relating to occupational health and the actual work done by operators in this project. In line with this trend, the occupational health manager was also allowed to participate in meetings, whereas this was not possible before. Therefore she was able to contribute her ergonomics knowledge and argue in favor of improving the operators’ working conditions.

In the second step, the designers changed their way of solving design problems: they no longer systematically sought "THE" technical solution but spent time on seeking other possible solutions: crossover trials with operators centered on their knowhow, benchmarking with other similar products, different ways of testing prototypes with operators, etc. Finally, we observed that the most important effect was the designer’s critical reasoning employed to find more effective ways of collaborating with operators. We explain these results through the double work analysis, initially conducted with operators and then with designers.

5. Perspectives

These first results allow us to construct an intervention framework and methodology centered on designers’ activities. This approach helps them to transform their tools and design practices to better understand the work done by the operators and to look for ways to involve the latter, in order to enhance the performance of their projects and view them from the perspective of occupational health. On the basis of this initial intervention in an automotive equipment supplier in the context of production

\(^2\) CAD : Computer-Aided Design
line re-design, the outlook for further research is to find other paths for transforming design practices through a new analysis framework, which directly associates designers.

The originality of this intervention-research is its cross-disciplinary approach that relies on bringing together engineering sciences and human and social sciences. The engineer brings his analytical skills and knowledge of the design environment and the occupational psychologist provides a specific framework of intervention in order to observe and analyze the work really done, and encourage changes in work organization. This dialogue between an engineer and an occupational psychologist during the intervention is considered to enhance both research and action. We performed this experiment to remove barriers which may be difficult to overcome between these disciplines (Vinck, 2002; Hubert, 2005), in order to integrate health and prevention in work. In the future, we aim to continue developing Research-Intervention in this way and build together other methods and a new framework using a hybrid methodology that combines engineering and human sciences.

References