The Analysis of the Painting Work Clothes Clothing Comfort and Wearer Mobility Considering the Work Environment in the Machine and Shipbuilding Industries*

Park Ginah* · Park Hyewon · Bae Hyunsook
Assistant Professor, Dept. of Clothing and Textiles, Changwon National University*  
Professor, Dept. of Clothing and Textiles, Changwon National University  
Professor, Dept. of Clothing and Textiles, Changwon National University

Abstract

The purpose of the study was to analyze the work clothes’ clothing comfort and wearer mobility of painting workers with the consideration of the work environment features in the machine and shipbuilding industries in South Korea. A questionnaire survey was conducted for the study, which consisted of questions on the clothing comfort and wearer mobility aspects of painting work clothes by clothes types and body parts. The work clothes’ clothing comfort and wearer mobility levels were scaled in 5 points i.e. 1(: very tight/very uncomfortable) to 5(: very slack/very comfortable). The painting work environmental hazardous features were considered as high impact levels of workplace temperature, oxygen deficiency, organic solvent, toxic gas factors while metal fragment factor only impacts ‘low’ in the painting processes with the findings throughout this study. Since the painting work consisted of surface washing and the spray and touch-up painting processes, which was carried out in an outdoor work place, the painting work clothes should meet high performance of waterproofing from the painting material and air permeability specially in summer as well as thermal performance in winter. The subjects painting workers’ assessment of the existing work clothes’ clothing oppression was in the levels between 3 (i.e. moderate) and 4 (i.e. comfortable) in a range of 1 to 5 points. The existing painting work clothes’ wearer mobility was evaluated ‘very uncomfortable’ in all work clothes parts, especially, armhole length, biaromial breadth, sleeve length of the jumper; and body rise, waist, hip, thigh and knee circumferences of the pants.

Key Words : painting work clothes clothing comfort, work clothes wearer mobility, painting work environments, work postures, painting work processes in the machine and shipbuilding industries

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Corresponding author : Park Ginah, Tel. +82--55--213--3496, Fax. +82--55--213--3490  
E-mail : gpark@changwon.ac.kr
I. Introduction

While some industries such as financial insurance, education, tourism, cultural contents and etc. have been creating high values without a smokestack, there have been others in relatively poor conditions in terms of work environment and tasks such as mining, construction and manufacturing in the heavy industries. In spite of the difficulties in work condition, such industries are playing an important role in the real economy, which is the foundation of the national competitiveness. Thus, all seem to be in agreement that it is one of the primary national issues to enhance the quality of work condition in such areas and to continue to make developments. Among heavy industries taking the lead of the national export, machine and shipbuilding industries are contributing a lot to the trade surplus in manufacturing businesses of Korea as of October, 2009. The export indexes of machine equipment and shipping except automobiles were 749.0 and 311.5 respectively with the standard index of 100 in 2005, which were the fifth and eleventh among 33 industries\(^1\). The manufacturing process in machine and shipbuilding industries, which utilize steel as the primary material, includes such operations as cutting, molding, assembly, welding, mounting, transferring, and inspection of the steel processed goods\(^2\). In particular, painting is one of the most important that prevents the external parts from being corroded or polluted during or after the processing and that maintains the outer appearance refined. Such painting work is essential in machine and shipbuilding industries in reflection of the demands in the business circles. However, most of the pigments used consist of a large amount of additives including organic compounds, and organic solvents contained in thinners for antifouling paints such as benzene, toluene, and xylene stimulate the worker's olfactory sense during the inhalation of the vapor, which may result in fatigue and dermatitis and dry skin upon pigmentation\(^3\). In addition, long-term or short-term exposure to such organic compounds may cause dyspnea, headache, suffocation, coma, anxiety, insomnia, prostration, chronic skin disease, and so forth. Thus, it is vital to prevent workers from being directly exposed to such organic solvents effectively. Painting work in machine and shipbuilding industries includes the combination of colors and thinner, pre-treatment to cleanse the steel plate before painting with the cleansing agent, whose major element is organic compounds, spray of high-concentrated paints over the large surface by means of a spray gun, and touch-up for partial coloring by means of a brush or roller on corners and inner parts of piping where spray cannot reach. Organic solvents may result in serious diseases once they are absorbed in a body in proportion to the area and time of skin contact\(^4\). Thus, it is necessary for the worker to wear protective suits that cover the entire body and masks for safe respiration. In addition, workers of high-concentrated spray need a more strengthened protective method which prevents the air from coming inside and contains an air supplier.

In the preliminary study\(^5\), the three major domestic industries - automobile, machine, and shipbuilding - were investigated, and the main processes were divided into 12 sections, each of which was classified again based on the impact indexes of environmental factors and motion factors on the involved workers. Based on the results, it turned out that painting work in