INFLUENCE OF COMBINED OPERATION OF RADIATION AND CONVECTION HEAT ON RELIABILITY OF PROFESSIONAL PERFORMANCE

Malý S[1], Hladký A[1], Jokl M[2], Jirák Z[3], Bernatíková Š[4], Pražáková M[1], Maclová I[1], Malčíková K[1]

[1]*Occupational Safety Research Institute, Prague, Czech Republic*

[2]*Czech Technical University, Faculty of Civil Engineering, Prague, Czech Republic*

[3]*The University of Ostrava, Medico-Social Faculty, Ostrava, Czech Republic*

[4]*The Technical University of Ostrava, Faculty of Safety Engineering, Czech Republic*

Key words: radiation and convection heat, human factor reliability, moderate thermal stress

Objective: The results of both field research and experiments prove that under unfavourable microclimatic conditions physical and psychological efficiency drops, whereas error rate increases and overall performance reliability falls. Nevertheless, practice shows that error rate also increases under relatively favourable microclimatic conditions, to be admissible under pertinent binding legal regulations and standards. Yet, it has been consented that owing to existence of a great number of variable physical settings (or conditions) the issue has not been devoted much attention to and has not been elucidated. Therefore, it stands to reason that opportunities of any research thereupon are highly envisaged. This mainly attributes to influence of various combinations of physical components pertaining to thermal-humidity microclimate, especially radiation and convection heat. In experiments dealing with non-uniform thermal stress, the tests held in the microclimate chambers were supposed to ascertain an influence of actual range of radiation and convection heat on human factor reliability in moderate thermal settings. The study focusses mainly on the parameters depicting working settings, which relate to non-uniform thermal stress derived from one-sided radiation and air circulation. The other domain is an error rate and human factor reliability subjected to influence.

Material and methods: The research methods of experimental persons in relation to independently variable phenomena required given and stringently requested experimental conditions. The dependent variables involved reactions of model persons who have been experimented upon by use of the following methods: 1. Psychological tasks (computer games of attention tests), 2. Questionnaires dedicated to subjective feelings, 3. Methods to ascertain the physiological parameters.

Results: Within results of examining of the variable factors of thermal conditions, provided their distribution is unevenly limited to so-called acceptable microclimatic conditions of the working environment, there was only one and only condition to be influencing

the three stages of the experiment systematically. This referred to a warm partition wall wherein the difference between air and radiation temperatures was +10 °C.

Conclusions: With regard to this very condition as well to other ones to have evidenced partially at one or two stages of the experiment and thus to have influenced to a certain extent reliability of performance in the psychological tests, as well as aimed at perception, attention and operational memory, it may be concluded that under the existing microclimatic conditions regardless potential radiation and convection components regarded as appropriate and irrelevant to mistake-making process and operator's reliability in complex working systems in a regular working environment, it proves necessary to contain, while assessing operator's errors assessment or investigating the reason of an undesirable event, as a influencing factor which could or potentially may contribute to operator's errors, especially by means of influencing operator's concentration and attentiveness.

The experiments resulted in a conclusion that the question of microclimatic relations in physical settings is one of the most significant ones and assessment and optimising of microclimate of working environment, although falling into the requested brackets, is necessary in case of operational posts requesting high concentration, attentiveness, exactness and high rate of motion.