Simulating the effects of efficiency improvement efforts on mechanical exposure

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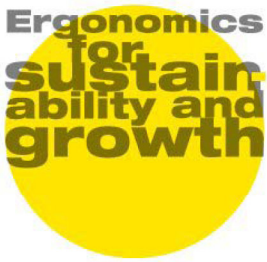

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Introduction

Rationalizations toward more effective systems generally focus on reduction of waste ('losses'). Our previous research has shown that waste generally offers less risky biomechanical exposures. Some of these data are used in the present simulation study to predict potential biomechanical exposures implications at job level.

Methods

Data were obtained from nine male workers in a serial-flow car-disassembly system. Direct measurement of mechanical exposure and video-recordings were performed simultaneously. The present analyses focus on the wrist and arm kinematics including time in low and high angular velocities, the median (50%ile) wrist flexion and arm inclination levels, and % time at rest for the wrist. In the simulation the duration of waste activities was gradually reduced from the average 18.5% occurring in the present factory down to zero. The changes in job exposure for the above mentioned parameters were calculated as new time-weighted mean values based on the remaining relative work task exposures.

Results and Discussion

The simulations showed that the job exposures will increase risk levels as the duration of waste is reduced (see Figure 1). This is due to the fact that waste, in general, offers lower risk levels compared to the remaining tasks.

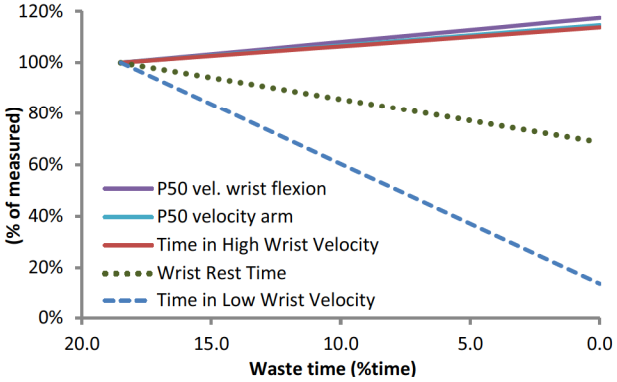

Figure 1: Results of simulated rationalization

This kind of simulation performed ahead of a rationalization may offer information of particular significance in high-risk jobs. For instance, wrist velocity has been revealed as a risk factor for disorders in many jobs demanding light manual handling, e.g. light and repetitive work. Caution should then be taken not to substitute waste reduction by other tasks without considering their exposure profile. In the present case, the tasks should not represent high wrist velocities.