APPLICATION OF THE POSTURE, ACTIVITY, TOOLS AND HANDLING (PATH) ANALYSIS FOR UNION LABORERS AT A HEAVY HIGHWAY CONSTRUCTION SITE

Victor Paquet, Bryan Buchholz, Laura Punnett, Susan Moir, Diane Lee, and David Wegman

Department of Work Environment
University Massachusetts Lowell
Lowell, MA 01854, USA

ABSTRACT

The ergonomic hazards of specific road construction operations and job tasks have not been fully characterized. Important risk factors for musculoskeletal injuries include awkward body postures and muscular loading. This poster summarizes a preliminary ergonomic assessment of union laborer jobs during several road construction operations.

METHOD

As a prelude to the job analysis, the hierarchical taxonomy used by the Massachusetts Highway Department was used to describe the construction process. The process is first broken down into stages. Each stage is further divided into operations and then divided into tasks and elements, which are performed by individual workers.

PATH, a modified work sampling-based method of ergonomic job analysis, was employed to characterize postures, estimate loads handled and tasks of laborers while working. The coded postures were modified from the Ovako Working Posture Analysing System (OWAS). Data were coded on a checklist designed for the specific trade and operation observed.

PATH data was collected by two trained researchers on five occasions at a union highway construction site in Plymouth, MA. The data were used to obtain mean estimates and 90% confidence intervals for the proportion of time laborers spend in awkward postures, handling loads and performing manual material handling tasks.

RESULTS AND CONCLUSION

A total of 1002 observations were collected for 6 laborers during 6 operations and 3 stages of highway construction. Some results are summarized in Table 1. From these preliminary findings it appears that laborers spend large proportions of time in awkward postures, handling loads, and performing manual material handling tasks. It also appears that these exposures vary greatly between operations, days and workers. These results can be used to identify specific operations and job tasks posing large ergonomic hazards, and provide insight for methods of intervention for control of these hazards.

Table 1. Proportion of time laborers were observed in various trunk postures and handling loads during 6 heavy highway construction operations.

Stage		Drainage				Structure	Sub-base Pavement
Operation		Rip Rap Construction Est.(90% CI)	Clean Up Est.(90% CI)	Laying Pipe Est.(90% CI)	Catch Basins Est.(90% CI)	Demolition Est.(90% CI)	Road Widening Est.(90% CI)
Est. Load Handled (lbs)	0	.51 (.46-.56)	.25 (.17-.33)	.65 (.62-.70)	.50 (.41-.60)	.15 (.06-.24)	.25 (.17-.33)
	1-10	.33 (.28-.38)	.51 (.42-.60)	.20 (.17-.23)	.34 (.25-.43)	.85 (.78-.94)	.74 (.66-.82)
	11-30	.09 (.06-.12)	.18 (.11-.25)	.13 (.10-.16)	.12 (.06-.18)	0	.01 (0-.03)
	31-50	.02 (.01-.03)	.06 (.02-.11)	0	.05 (.01-.09)	0	0
	>50	.04 (.02-.06)	0	.01 (0-.02)	0	0	0
Trunk Posture	neutral	.40 (.35-.45)	.39 (.30-.48)	.66 (.62-.70)	.55 (.46-.64)	.15 (.06-.24)	.39 (.30-.48)
	slight flex	.05 (.03-.07)	.04 (0-.08)	.08 (.06-.10)	.03 (0-.06)	.20 (.10-.30)	0
	severe flex	.09 (.06-.12)	0	.02 (.01-.03)	.08 (.03-.13)	.18 (.08-.28)	.01 (0-.03)
	twist	.02 (.01-.03)	.04 (0-.07)	.07 (.05-.09)	.10 (.04-.16)	.08 (.01-.15)	0
	flex and twist	.45 (.40-.50)	.53 (.44-.62)	.16 (.13-.19)	.25 (.17-.33)	.40 (.27-.53)	.60 (.51-.69)
Total Observations		258	77	470	77	40	80