Job safety analysis program refined human factors design in a large pharmaceutical manufacturing facility

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Abstract.
This case study describes how a large pharmaceutical company used an ongoing Job Safety Analysis program to guide and feed a "What If/Checklist" type hazard analysis.

A large pharmaceutical company used a series of safety analyses to guide the reconstruction and design of a cell culture suite. The changes incorporated on the manufacturing floor were part of the technology transfer from a previous biotechnology process project that involved the implementation of new equipment, materials, and tools. Over a period of ten months, personnel were assigned to complete the Job Safety Analysis (JSA) for all 27 tasks in the cell culture suite. The JSAs were collected to show the observed hazards associated with the steps of a process, environment, equipment, materials, or tools. Then these hazard steps were organized by location in the suite. The production supervisor for each area was involved in the project.

A "What if/Checklist" process hazard analysis (PHA) is a set of organized and systematic assessments of the potential hazards associated with an industrial process and the corresponding engineering and administrative controls, safeguards, recommendation/actions and a quantitative description of consequence, likelihood and the risk priority for mitigating the identified hazard. The PHA was facilitated by a safety professional for each process step in the written operating procedure with the help of the production supervisor.

Hazards from the JSAs were then transcribed to the PHA. During the PHA meetings, the hazards listed were edited, revised, and supplemented by a panel of subject matter experts in ergonomics/human factors, engineering, production, quality, and safety. This group determined the severity and whether action was necessary and proposed controls based on their knowledge of the process. Typically an expert panel could have difficulty understanding the manufacturing process. This particular method incorporated the concept of participatory ergonomics to understand the issues from the users’ points of view. This process resulted in excellent workplace engineering designs with user-centered engineering that positively impacted worker safety, productivity, and morale. The various engineering controls described in this article include:

• A machined part that articulates to a hoist designed to securely elevate cart to appropriate working levels using existing lift stations
• Cell culture system components including antifoam pumps, electric outlets, analytic equipment, distributed control connections, and heat exchangers embedded into a single workstation. Equipment locations are optimized based on usability, troubleshooting, and safety.
• Optimized control displays and alarm systems for components.

The step-by-step process implementation is detailed with productivity improvements, design diagrams, investment in hours and cost, lessons learnt, and cost/benefit analysis. This process can be applied outside of the biotechnology industry as it pertains to other manufacturing facilities.

Keywords: Job safety analysis, hazard analysis, applied ergonomics, case study, participatory ergonomics, manufacturing

References: