

## The Impact of Manufacturing Work Experience on Shoulder Muscle Activation Utilizing Shoulder Passive Exoskeletons

Andrea Martinez

*College of Engineering  
Natural Sciences and Engineering Oral Presentation*

**Abstract:** Work-related musculoskeletal disorders (WMSD's) of the upper limbs remain a challenge in the workplace where workers perform repetitive and forceful motions. A relatively new device that manufacturing industries are drifting attention towards are wearable passive exoskeletons in hopes of reducing shoulder injuries. Although some studies have investigated the effects of passive exoskeletons on experienced workers, the majority of the research exoskeletons impact on muscle activation has been performed on participants who are inexperienced in industrial work activities. Thus, it is not generally known if passive shoulder exoskeletons would impact the shoulder muscle activation of experienced workers differently compared to inexperienced participants. In this study, a passive shoulder exoskeleton was investigated for five different overhead postures on twelve inexperienced participants and thirteen experienced participants. Electromyography (EMG) was utilized to collect and analyze the muscle activity on four different muscles. There were significant differences in muscle activity of the anterior and medial deltoid for certain postures when comparing experienced workers to inexperienced participants. The findings suggest there are significant differences in muscle activity, and how experienced workers utilize the passive exoskeleton compared to inexperienced participants. These differences may arise from the skillset experienced workers already have and how they know how to execute overhead tasks to minimize effort.

Faculty Mentor: *Michael Jorgensen, Nils Hakansson*