

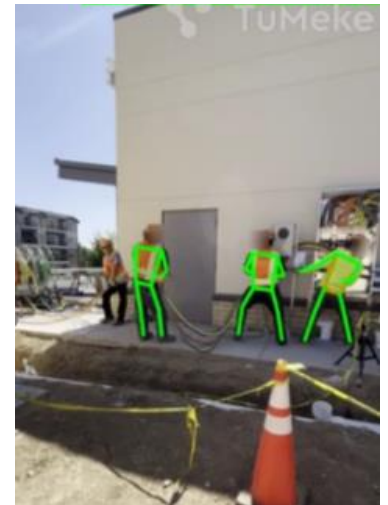
Impacts of Computer Vision Technology in a Utilities Operation

What's the Risk?

Field employees at Guarantee Electrical engage in manual material handling daily in their jobs. Field employees handle power tools, conduit, cable trays, and other equipment that can leave them feeling fatigued and overexerted. Moreover, these electricians commonly find themselves in awkward positions doing repetitive movements for the entirety of their workday.

Workers at Guarantee Electrical are also often required to lift heavy objects and pull heavy wire. To circumvent issues related to heavy lifting, Guarantee Electrical has lifting policies based on the weight of an object, but adherence to such policies and best practices can be difficult on construction projects. Technology to better understand risky job tasks in general could provide a deeper insight when completing ergonomic assessments.

Figure 1. Example Wire Pulling Task



Project Aims

Through their participation in the [MSD Solutions Lab Pilot Grant Program](#), Guarantee Electrical aimed to alleviate the burden of doing traditional ergonomic assessments with pen and paper by shifting to using computer vision software, which could automate assessments. Using the computer vision software from TuMeke allowed Guarantee Electrical to video job tasks, identify risks, and determine solutions to prevent musculoskeletal disorders (MSDs) within the TuMeke platform. More specifically, Guarantee Electrical Company aimed to:

- Utilize TuMeke to assess and verify various tasks in electrical construction and other sectors of work.
- Evaluate TuMeke software for cost benefits and efficiency.
- Use objective data and videos for employee training, and to determine the applicability of exosuits to reduce risk in specific applications.

Implementation of Computer Vision Technology

Guarantee Electrical utilized the computer vision software for tasks in electrical construction to help establish objective data in the form of Rapid Entire Body Assessment (REBA), Rapid Upper Limb Assessment (RULA), and National Institute of Occupational Safety and Health (NIOSH) lifting equation criteria. During the pilot period, Guarantee Electrical tracked data collection by industry sector and these risk exposure groupings:

Conduit bending	Wire pulling
Cable tray installation	Device wiring/trimming out
Ladder/above ceiling work	Miscellaneous power tools use

Impacts and Lessons Learned

Due to the extreme variability of construction work and body positions, Guarantee Electrical did not have enough time with the software to gather data on their entire operation or collect enough data to determine statistical validity. However, the videos with overlaid risk level warnings proved to be valuable for on-the-spot and task-specific ergonomic risk reduction training.

Guarantee Electrical also has several key lessons and takeaways from the pilot process:

- The TuMeke technology was great for fast evaluations of manual material handling tasks, while also providing follow-up analyses.
 - As a result of the pilot, Guarantee Electrical incorporated the TuMeke videos into their orientation and manual material handling programs to provide further information about risks and the importance of safe handling.
- The software served as a training mechanism for the safety and industrial hygiene teams, as they were able to learn more about RULA, REBA, and the NIOSH lifting equation.
- The interaction with employees before, during, and after the video assessments were rewarding and highly informative for the employees as they were able to quickly see risk levels and discuss alternatives for task completion.
- Application of the TuMeke technology within the construction industry could be vast, as workers perform many variable tasks.
- An opportunity to incorporate the use of exosuits for overhead work was identified for Guarantee Electrical through data provided by the technology.
- The amount of involvement needed from the solutions provider should be determined up front. More support or involvement during the implementation and pilot process from TuMeke would likely have made the pilot smoother.

Overall, Guarantee Electrical found benefits in the TuMeke Ergonomics software. Due to the value seen, Guarantee Electrical plans to continue use of the TuMeke software to further their MSD risk reduction efforts and MSD prevention program improvements.



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