Several studies have assessed and validated the impact of back and shoulder support exoskeletons on users’ exertion and endurance; however, limited research has assessed the impact and benefit of hand-based exoskeletons. This study assessed the impact of Ironhand, an active hand exoskeleton (H-EXO) designed to reduce grip force exerted, on worker exertion level using a two-phase experimental design. Ten male participants performed a controlled simulated drilling activity, and three male participants completed an uncontrolled concrete crushing activity. Exoskeleton impact was assessed in terms of muscle activity across four muscles using electromyography (EMG), perceived exertion, and perceived effectiveness. Results indicate that the H-EXO significantly impacted the Extensor Carpi Radialis muscle and reduced peak muscle activation in the three target muscles by < 1% to 27%. Using the exoskeleton in controlled conditions did not significantly influence the perceived exertion levels. Users indicated that H-EXO was a valuable technology, and they would use it to complete tasks in the future. This study showcased how glove-based exoskeletons can potentially reduce wrist-related disorders, thereby improving safety and productivity among workers. Future work should assess the impact of H-EXO in other tasks, in different work environments and configurations, and using diverse users.