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AN EFFECTIVE WAY TO REDUCE UPPER LIMB MSIs

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AN EFFECTIVE WAY TO REDUCE UPPER LIMB MSIS

Machines require less force and repetition

At the request of the Rodworkers' Trade Labour-Management Health and Safety Committee, CSAO conducted a study of rebar-tying tasks during concrete reinforcement.

Because of the repetitive, often heavy manual material handling required to lift, carry, lower, and install reinforcing steel, rodworkers suffer a high number of musculoskeletal injuries (MSIs).

MSIs are injuries of the muscles, nerves, tendons, ligaments, joints, cartilage, and spinal discs. Typically they are non-traumatic, that is, caused not by sudden accidents such as trips or slips but by overexertion and repetition over time.

Purpose

The main purpose of CSAO's study was to evaluate the risks of upper limb injury (such as elbow, arm and hand) and the benefits of using rebar-tying machines. The photo shows the use of a rebar gun.

Rebar-tying tasks were evaluated using an electro-goniometer (to measure wrist angles) and force sensor tape (to measure hand and grip forces). Seven rodworker apprentices and one instructor took part in the research.

Results

The study revealed that working with rebar-tying guns required significantly less handgrip force than manual tying. Moreover, the number of hand repetitions was significantly lower when participants used the guns.

Results indicate that rebar-tying machines can have a positive benefit in preventing MSIs to the upper limbs.

The machines also allow workers to work upright and thus avoid the bending, twisting, and awkward static trunk posture of manual tying at ground level.

In addition, working with rebar-tying guns requires only one hand. Workers can lean on their knee with the other hand and thereby support their trunk. This in turn decreases some of the muscle activity and muscle fatigue that occur with manual tying.

Summary

Rodworkers have a high rate of lost-time MSIs caused in part by static awkward posture during manual tying and by repeated and often heavy material handling.

One way to decrease these risks is to use automatic rebar-tying machines. CSAO research indicates that these machines can help to decrease hand-grip force and repetitive wrist motions such as bending, twisting, flexion, and extension.

Future Research

In a future issue, CSAO will report the results of a study that evaluates the potential benefits of reducing low-back injury by using rebar-tying machines.

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