

Engineer studies how to reduce impact of power tools vibrations

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Anyone who's ever used an electric or gas lawnmower knows how pushing the device can cause tingling hands. This side-effect is caused by motor vibrations and comes with the turf for people who cut grass for a living.

Workers who employ handheld power tools in the mining, forestry, manufacturing and services sectors can also be exposed to large levels of vibrations in their hands and upper arms. Such vibrations are not without consequence.

"Prolonged exposure to intensive tool vibration can cause hand-arm vibration syndrome," says Subhash Rakheja, a professor in Concordia's Department of Mechanical and Industrial Engineering.

"Over time, some workers can lose sensation in their hands or loss of dexterity, they can no longer distinguish between hot or cold surfaces or they can experience discoloration in the extremities of their fingers, which is known as Raynaud's Phenomenon," he continues.

The study of work-vibrations exposure is a relatively new in North America, although it has been a subject of extreme significance in Europe. As a member of the Concordia Centre for Advanced Vehicle Engineering, Rakheja has published widely on the ills of vibration overexposure and prevention.

His most recent study on soil compactors, staples of construction sites,

found that exposure to vibrations could be reduced by a whopping 60 percent through a simple seat upgrade.

Rakheja routinely collaborates with an interdisciplinary research network on workplace health. His expertise led the U.S. [Centers for Disease Control and Prevention](#) to employ him as an advisor for its West Virginia research site. In Quebec, he works with the Institut de recherche Robert-Sauvé en santé et en sécurité du travail (IRSST).

He's worked extensively with the IRSST's Paul-Émile Bouleau and Pierre Marcotte to develop best workplace practices, which have led to International Organization for Standardization (ISO) for whole body vibration (ISO 5982) and for hand-arm vibration (ISO 10068). They are now investigating a world standard for anti-vibration gloves.

Rakheja is also examining how to reduce the impact of industrial power tools, such as jackhammers used in the mining industry, which can lead to vascular and skeletal disorders. "The most risky tool to use for workers is the jackhammer," he says. "It's like a loaded gun."

Solutions do exist, he says, and can be as simple as equipping workers with the appropriate anti-vibration gloves. "The goal is to cushion the hand from repeated exposure, but how do you measure if that glove is good?" he asks. "We can simulate any tool [vibration](#) in our lab, but how tools are actually used in the field can differ considerably. Everyone pushes at different strengths and speed."

While prevention remains the best medicine, Rakheja says workers are often asked to go beyond their capacity in the name of productivity. "We live in a society where everything must go faster," he says. "But when we make things go too fast, we forget about the slow poison. The biggest challenge is to convince industry to invest in worker safety beyond what's legislated."

Provided by Concordia University

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