



*Title: Effectiveness of a generic risk assessment to quantify Hand-Arm Vibration exposure risks*

## Summary

Many companies use a generic task based assessment for Hand-Arm Vibration (HAV) exposure risk, based on observation and/or advice for estimating vibration emission from tools. A leading utilities company requested a case study on a live project to gain an insight into the effectiveness of a generic risk assessment used to quantify HAV exposure risks.

The results concluded an unexpected high level of variability between tool users and tool measurements even whilst performing repetitive activities. Without accurate knowledge of operator daily exposure, the likelihood of effectively applying controls to keep HAVs exposure below required levels is extremely low. This can influence controls to reduce risk, your ability to assess their effectiveness at a later date and most importantly your understanding of the actual risk faced by your employees.

## Case study format

The study included 14 tool operators, each excavating the same size hole within the same grade of road surface. Each operator used the same tool type for which the duty holder had determined a vibration magnitude of  $12 \text{ m/s}^2$ . A mix of site teams were used per excavation which consisted of two and three man operator teams.

Chart number 1 displays the calculated total exposure in HSE HAV exposure points for each excavation. Each team accomplished the same task within different time durations. The colours within each excavation shows the relative contribution from each team member of each excavation. Clearly a wide range whereby even if the most extreme results are disregarded the exposure per excavation ranged +/- 40% on the mean value.

A task based assesment of these excavations would potentially determine the average exposure per excavation to be 278 points and therefore a two man team would be exposed to 139 points and a three man team exposed to 93 points. A task based assessment will typically only account for an average exposure risk per task, not the actual exposure of individual operators.

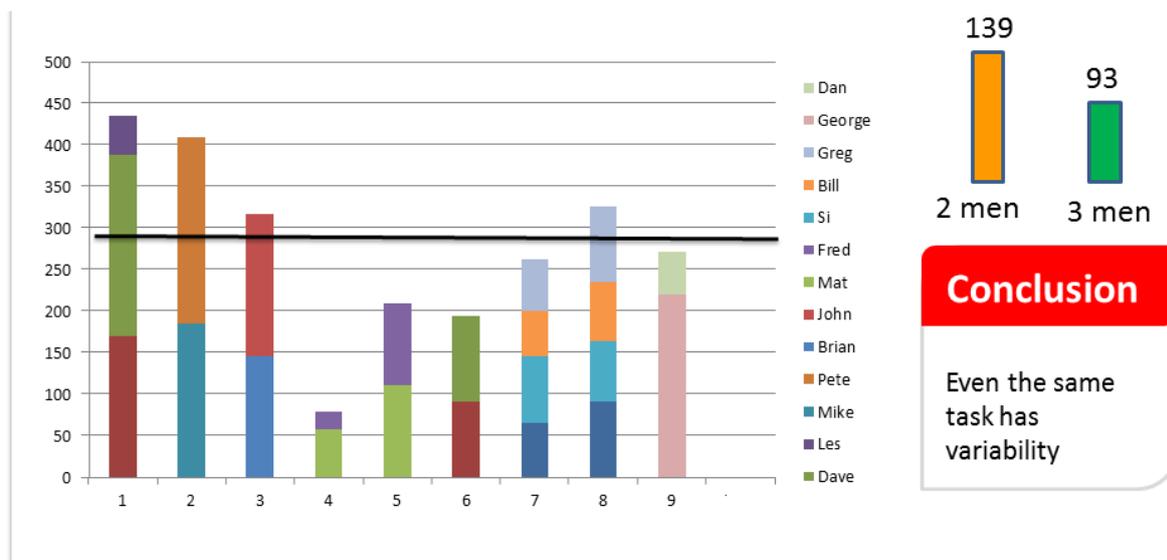


Chart No. 1

The assessment also included live tool vibration testing which took place during these excavations. Two methods were used to determine the vibration level.

1. An ISO5349 measurement using a reference instrument involving a skilled technician
2. Data collected on a HAVwear worn by the tool operator during tool use.

The data from both is depicted below in chart number 2. Strong correlation can be seen between the HAVwear (HW) and reference instrument (LD) with an overall average for the reference instrument of 10.5m/s<sup>2</sup> and the HAVwear 11.8m/s<sup>2</sup>.

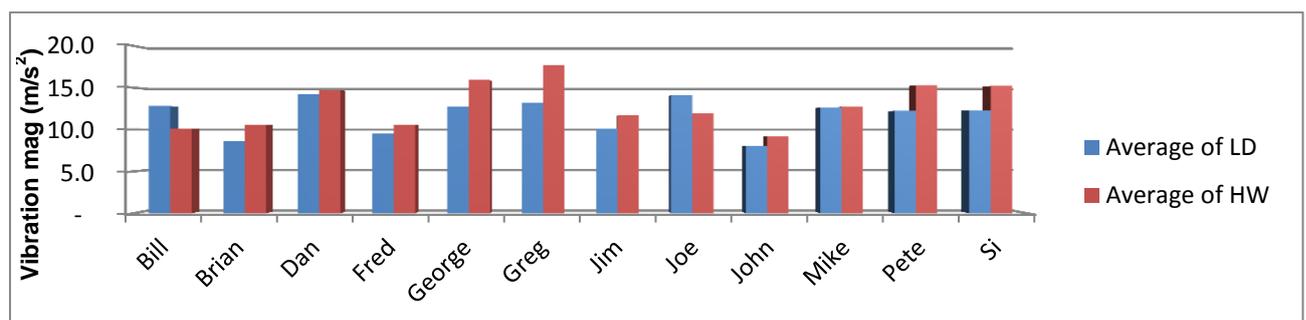


Chart No. 2

Chart number 3 below depicts the calculated maximum HAV risk exposure for each individual when excavating one hole from the actual trigger time and real-time vibration measurement. Based on a task based assessment with a minimum two operator team the expected max risk would be 139 points. Reality 5 out of 14 men exceeded this level. The conclusion is that job rotation is unlikely to be as expected without monitoring and each operator is unique in technique and physicality which can lend itself to a high level of variability in exposure risk. Pete's exposure was close to the HSE Exposure Limit Value and 6 times some of colleagues tasked with the same duties.

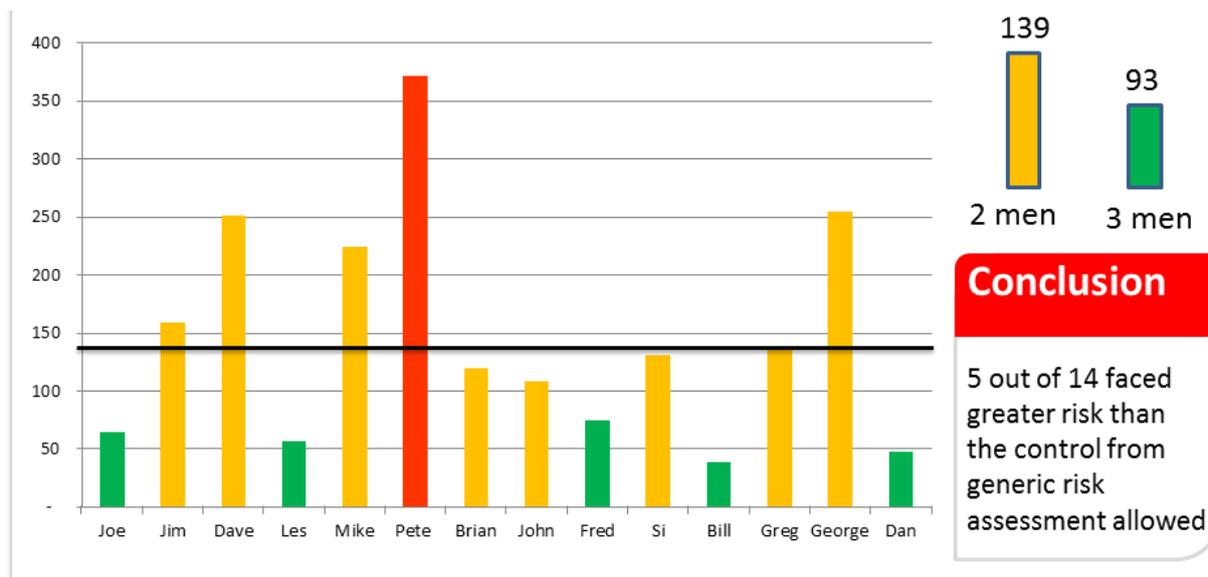


Chart No. 3

### Reducing the high level of variability in the field?

Without more accurate knowledge of operator daily exposure, the likelihood of safely applying controls to keep HAVs exposure below required levels is extremely low. This is due to the unpredictability of most work processes across sectors from landscaping to engineering.

It is also widely accepted that manual assessments of exposure in the workplace, following regulations, will have a high level of uncertainty. This can influence actions to reduce risk as well as assessing their effectiveness at a later date.

Due to the constant variability in the field only continuous digital monitoring such as the Reactec Analytics Platform can practically help identify operator's individual exposure. It not only informs the wearer of their personal real-time exposure risk team leaders and employees responsible for worker welfare can identify and address exposure risks on the ground, and not later. These interventions are an essential part of a company's continual risk reduction plan. These incremental changes support behavioural change, awareness, education and actions can include switching tasks amongst operators, ensuring tools are fit for use and used correctly. The HAVwear also has a unique ability to further improve protection against exposure risk by determining the real-time vibration exposure experienced by the wearer. Due to the high level of variability of exposure from tool application and operator technique in the field this unique information helps employers further reduce risk with evidence-based controls. See chart 4 below illustrating the range of vibration experienced by differing operators

using the same tool relative to the assumed static level for the tool for two typical tools used in the utilities sector.

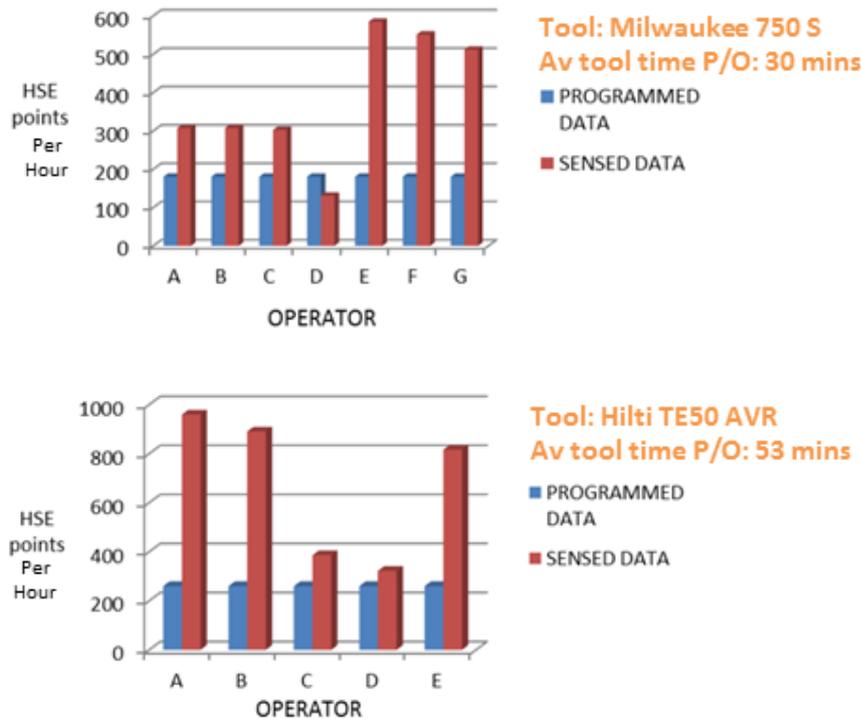


Chart No. 4

### Reduce risk ALARP - With evidence based solutions

The Reactec Analytics online reports collates and make sense of the exposure data companywide to help develop more proactive and effective controls to reduce HAVS exposure risk.

This added insight helps develop more effective controls to reduce HAVS exposure risk, by highlighting issues previously undetected by static and generic risk assessments. These can include improving project design and planning to work schedules and tool usage, maintenance and selection.

### Additional benefits - Tool Assessment

Measuring a tools vibration level can be an expensive process which is seldom practical to determine during live tool use. Risk assessments therefore generally rely on a static, dated and typical value for tool vibration. As stated above uniquely HAVwear has the ability to determine a vibration level during tool use which can be compared with the static value to prioritise and ensure only when necessary tool vibration testing is carried out. As shown in chart No. 5 below, the HAVwear when used alongside reference instruments correlates well while static information such as manufacturers' data may vary significantly.

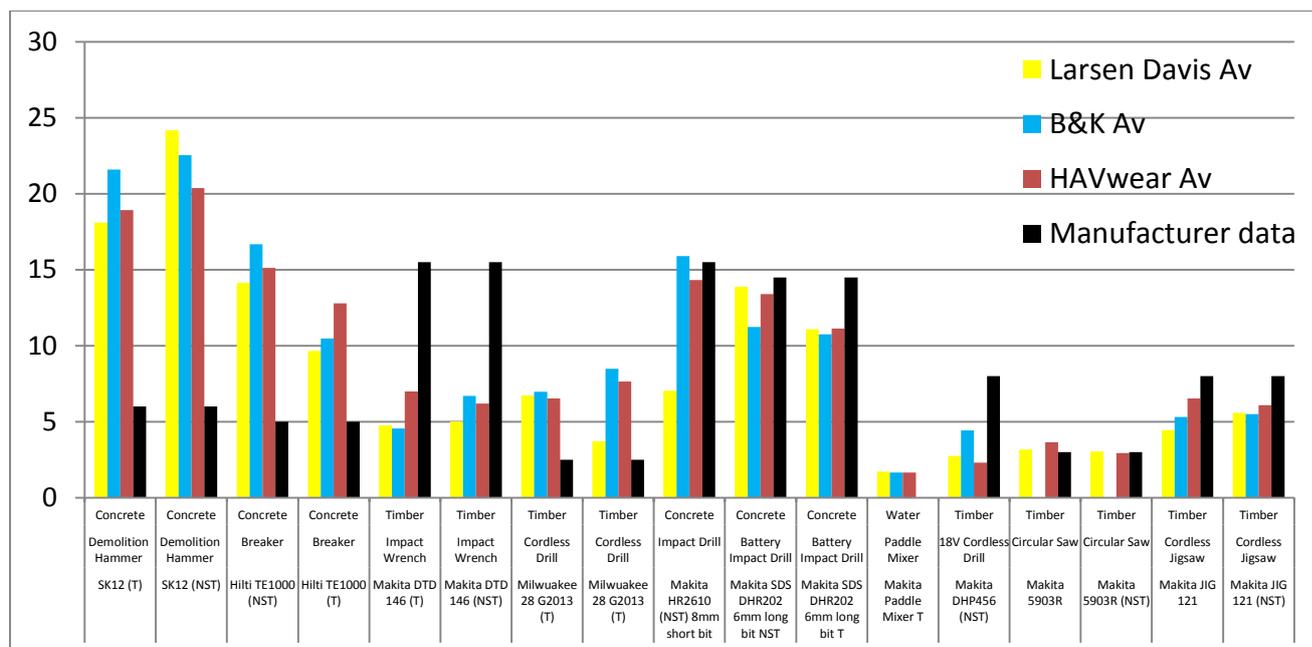


Chart No. 5

### Additional benefits - Civil Case protection

Typical no win, no fee lawyers are the first port of call for an employee to make a HAV related claim. Using task based assessments may satisfy the HSE and avoid criminal charges but provides limited company protection for a civil case. Auditable, accurate & tamper proof data on an individual's exposure are a more robust defence to assist in limiting costs

## Summary

An employer is duty bound to assess the risk of vibration exposure taking into account, tool age, tool condition, usage and substrate and of course operator skillsets. These factors are extremely difficult to establish leading to organisations applying safety factors onto manufacturers declared tool vibrations or applying generic vibration levels at the upper range of estimated vibration levels of a particular tool.

Based on fact-based data instead of estimations our system makes assessing exposure and developing effective risk reduction activities more simple and efficient. It provides every director, manager and worker a far greater ability to recognise the risks in their operational activities and apply more effective and efficient measures of controls. Also for the first time, manage risks previously undetected by static and generic risk assessments. With sensed vibration and continuous monitoring the guess work is dramatically reduced. Sensed vibration can provide a dynamic risk assessment and a greater understanding of exposure in work delivery.

## Contact Reactec

For any company wishing to better protect their business and employees from HAV risk, retain skilled workers and reduce wasted resources - by making fact based decisions instead of estimations then contact Reactec.

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