

> Objective and proactive fatigue risk management



The implementation of a more holistic HSI approach – in relation to the physiological indicators of worker fatigue and heat stress – also allows organisations to gather valuable quantitative biometric data insights and not just rely on limited one-sided qualitative data that's grounded in subjective intuition and self-assessment. This can enable a healthy break and substitution culture, while validating shift pattern and working hours planning. The quantitative and objective

biometric data collected by BaselineNC works in parallel with the qualitative and subjective data collected from workers. The verification and validation assessment process for BaselineNC used a cross-reference combination of psychomotor vigilance testing, the Karolinska Sleepiness Scale (KSS), behavioural-based observations and situational awareness as a human performance attribute indicator. As a result, workers are regularly asked to provide KSS scores as part of the system.

After years of development that also led to the CIEHF's 2024 Innovation Award, the BaselineNC workplace fatigue monitoring wearable is being trialled in the European public transport industry but is also gaining cross-industry and global interest because workplace fatigue is a general human factors issue. The ergonomic design of the wearable device allows for real-time data collection from energy-efficient, lightweight, mobile and unobtrusive wrist-worn industrial internet of things devices. Future enhancements include a connected mobile application, further development of a heat stress model and another evolved and more rugged version of the wrist-worn wearable device.

Ultimately, using a predictive data-driven approach can help elevate the dangers of worker fatigue and heat stress into an enterprise-wide organisational priority, from front-line workers to the boardroom. This objective rather than subjective, and proactive rather than reactive, philosophy aims to prevent accidents and incidents and most importantly protect humans from harm. ■

With these issues in mind, the BaselineNC™ workplace fatigue monitoring wearable was developed in alignment and partnership with public transport safety initiatives such as the Driver Innovation Safety Challenge, EIT Urban Mobility and Vision Zero. It's designed to mitigate fatigue-related incidents and increase productivity, using predictive analytics through real-time monitoring of biometric data.

In safety-critical industrial operations, this further enables the 'human sensor' and allows for a 'predictive maintenance' approach in relation to the pre-emptive detection of the onset of fatigue and heat stress. This supports proactive human performance management and the optimisation of worker safety and wellbeing, especially in relation to healthy shift patterns and working hours.

This is achieved with real-time monitoring of individuals' baselined biometric data, such as blood oxygen saturation, galvanic skin response and heart rate, with 98% accuracy. A traffic light alert system – red for 'fatigued', amber for 'approaching fatigue' and green for 'not fatigued' – enables fatigue and heat stress status updates to be sent wirelessly to control room supervisors. This leads to timely safety-critical interventions, with the aim of reducing human error. By reducing the likelihood of fatigue-related incidents while increasing productivity, organisations can effectively manage workplace fatigue leading to better job performance, reduced worker stress and less downtime.

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About the author

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