3 Science. Applied to Life.™

Personal Protective Equipment influencing productivity

Costs of workplace injuries and illness

Recent statistics from the European Agency for Safety and Health at Work have revealed that work-related ill health and injury costs the European Union €476 billion a year^[1]. Alarmingly, this figure represents 3.3% of the European Union's GDP^[1]. Worldwide, work-related injury and illness results in the loss of 3.9% of GDP, at an estimated annual cost of €2,680 billion.^[2]

On a regional level, British workplace statistics from the Health and Safety Executive (HSE) based on 2014/15 – 2016/17 annual averages indicate there were 614,000 workplace injuries.^[3] This goes alongside the 521,000 new cases of work-related ill health annually in workers over the same period.^[3] In both cases over 35% of these injuries or illnesses resulted in 7 or more days off work.^[3]

As a result of these figures, the HSE estimate that workplace injuries and ill health in Great Britain cost around £14.9bn^[3]. The HSE estimate of this total £4.9bn can be attributed directly to the financial costs associated with productivity^[3].

A link between health and safety and productivity

Peter McGettrick, director of Safety, Health, Environment and Quality (SHEQ) at Turner and Townsend, in a recent interview with Irwin & Colton, outlined there was a "huge link between good workplace safety and good levels of productivity."^[4]

"Benefits of good workplace health and safety includes low levels of accidents, incidents, absenteeism and improved staff morale. So the benefits of better workplace health and safety can really have a big impact on improving productivity, reducing product delays and improving profits for the company", he added.^[4]

Peter also remarked that businesses often assume that a by-product of improving productivity is the sacrifice of other elements, such as safety. However, the opposite is true as "evidence suggests that good businesses that have a good health and safety culture and are well run are also very well performing economically as well".^[4]

"For every pound you spend [on health and safety], you get £10 back, whether that's through reduced costs or getting more out of people. It's a no brainer. Businesses should be investing in health and safety, because it has a huge business benefit and should not be seen as a cost that can be cut when the bottom line needs to be improved."^[4]

Can PPE aid with workplace productivity?

Of course, the aforementioned figures will be as a result of a number of different circumstances, but personal protective equipment (PPE) transgressions and non-compliance will have played a factor in workplace injuries and ill health. In 2006 the HSE estimated that there were around 9,000 PPE related accidents reported each year.^[5]

The protection of workers is of paramount importance for employers. When faced with an industrial hazard, employers should look to reduce risks to the lowest practicable levels. Typically, they will consider and employ the hierarchy of controls: elimination, substitution, engineering, administration and finally PPE.

PPE should always be seen as the last line of defence and that's why it's imperative to make sure that the protection provided is appropriate and adequate.

While the primary purpose of PPE is to protect workers, the extra functionality integrated into PPE can help to improve workplace productivity while maintaining fundamental protection for wearers. Throughout the rest of this paper we'll illustrate how working environments can benefit from productivity gains afforded to them from PPE. Work-related ill health costs the EU €476 billion a year – that's 3.3% of the EU's GDP.^[1]

For every pound you spend [on health and safety], you get £10 back, whether that's through reduced costs or getting more out of people. It's a no brainer.^[4]

PPE improving workplace productivity case studies

1.1) Communication devices

Communicating in high noise

As well as being a potential hazard to health, high levels of noise can also threaten productivity in the workplace. As site supervisors will know only too well, the ability to communicate regularly on site is essential within many industries.

Take for instance workers in construction and rail industries. Communication is essential in these environments which are often dominated by high noise. All too often non-compliance can be seen with workers removing their ear protection to talk to colleagues. Alternatively, workers may withdraw themselves from noisy areas every time they want to have a conversation. Over the course of a big project, you can imagine how much time can be lost.

Equally, if speech can't be heard over the high noise levels of an automated production line and a halt to manufacturing is required, operators may not be able to stop the line before it's too late. In certain industries such as food and pharmaceutical manufacturing this can potentially lead to loss of products, along with production downtime while machinery is fixed. The use of two-way radios is common across a range of industries. While these devices offer remote communication in noisy environments, they don't offer any hearing protection to the user – meaning that workers are often exposed to damaging noise levels. One solution which overcomes this problem is a two-way radio communication headset which also provides hearing protection.

This functionality is provided in a range of 3M[™] PELTOR[™] Communication Headsets for use in hazardous and high noise environments. The devices have radio communication as standard and can offer further features such as Bluetooth[®] connectivity, depending on customer needs.







Improving productivity and reducing downtime

In a 2015 study, researchers at Lund University, Sweden, found that the use of two-way radio communication headsets improved the productivity of a construction work unit by 380 minutes per week, increasing productivity from 71% to over 86%.^[6]

The university chose to test the effects of the headsets on construction workers as their repetitive and homogenous activities made it possible to compare results over time. The study included two observations on two separate teams, one equipped with 3M[™] PELTOR[™] WS[™] LiteCom Headsets and one without.

Each team performed tasks such as earth excavation, pipe laying and tube welding. The study recorded the time individuals spent on direct work and downtime. Any activity that added value to the project was defined as direct work, whereas downtime was categorised as that during which no direct work was performed, for instance time spent walking across site or conversing with co-workers.^[6]

The results of the study showed that downtime during observation one (without headsets) came to a total of 590 minutes for the team.^[6] During observation two, the study with headsets, just 320 minutes of downtime were recorded across the team.^[6] Detailed follow-up interviews revealed the main advantage for workers was being able to quickly relay and receive messages on the job.^[6]

The study concluded that 3M[™] PELTOR[™] WS[™] LiteCom Headsets improved the productivity of a work unit by 380 minutes per week – an increase in productive time from 71% to over 86%.^[6] The headsets solve the two critical problems of noisy environments; providing hearing protection and enabling effective communication.

Speaking to Arbetarskydd, a Swedish occupational safety news website, Fredrik Greén, production manager at Skanska, said of the devices: "Everyone can hear what's going on, which also makes logistics easier. The increase in efficiency is so great that we recover the higher costs fairly fast."^[7]

As the communications headsets are worn helmet-mounted via a neck band or over the head, it removes the need to be operated by hand, unlike a traditional hand radio. This means that those wearing the equipment can work 'hands free', beneficial for completing workplace activities but also allowing for hand signals to be made.

Also available within the 3M communication headset range are the level-dependent 3M[™] PELTOR[™] ProTac[™] III products. The level dependency allows wearers to maintain hearing protection but also hear ambient sound: conversation, machine sounds and warning signals to improve communication and safety. 3M[™] PELTOR[™] ProTac[™] III have been introduced as an entry level communications headset for environments where two-way radios would be excessive. The study concluded that 3M[™] PELTOR[™] headsets improved productivity by **380 minutes per week**

- an **increase in** productivity from 71% to over 86%.^[6]

The headsets solve two critical problems of noisy environments; providing hearing protection and enabling effective communication.

Everyone can hear what's going on, which also makes logistics easier. The increase in efficiency is so great that we recover the higher costs fairly fast.^[7]

Integrating communication headsets into respiratory headtops

Across many different industries the use of powered air respiratory systems and loose fitting headtops is common. These devices are often utilised as they can provide higher levels of respiratory protection in comparison to some classes or types of tight fitting reusable and disposable respirators. Additionally, tight fitting respiratory protection can't be worn by wearers with facial hair which can compromise the fit of the respirator. As powered air systems with loose fitting headtops don't rely on a tight seal to the wearers' face they're often the only viable form of respiratory protective equipment for those with facial hair.

While powered air respiratory systems and loose fitting headtops can provide increased functionality, they traditionally have compromised communication between workers. Especially in noisy environments, speech from workers wearing headtops can be negligible. Workers often have to remove their respiratory protective equipment and hearing protection to talk to each other – not only reducing productivity but also reducing the protection provided.

However, there has been a recent integration of 3M[™] PELTOR[™] LiteCom headsets with 3M[™] Powered Air M-300 helmet headtops, which enable effective communications while protecting workers' hearing in noisy environments. The headsets can be retrofitted to the headtops allowing workers to communicate seamlessly while maintaining their face, head, respiratory and hearing protection.



1.2) Auto-darkening welding equipment

In their book 'Increasing Productivity and Profit through Health and Safety',^[7] Maurice Oxenburgh, Pepe Marlow and Andrew Oxenburgh discuss the merits of auto-darkening liquid crystal displays (LCD) which can improve the productivity of welders.^[8]

The authors discuss that a common issue with traditional, passive welding helmets is that the eye protection filter is "very dark and is opaque in normal lighting"^[8]. As a result, when welders are completing tasks they will "frequently have to raise their helmets to see around them and to identify the actual parts to be welded"^[8]. This can be an inefficient use of time but unfortunately it's an inherent burden when using passive welding helmets.

This issue is exacerbated by the fact that welders will often be using two hands to hold their welding gun, meaning that flicking their welding helmet back into position with a "rapid nod of the head"^[8] is common. This action, according to the authors "has been said to lead to neck injuries in workers"^[8].

Fortunately for welders, these issues have since been overcome with the use of liquid crystal displays (LCD), which have been integrated into welding helmets for the past 30 years. When a welder strikes an arc the intensity of the light activates a photoelectric cell in the LCD in around one millisecond. This activation then darkens the LCD to protect the wearer's eyes. This auto-darkening filter (ADF) technology eliminates the need to repeatedly raise a helmet to inspect welds and ready a welding stick in between arcs. 3M were first on the market with ADF technology and it is available throughout their 3M[™] Speedglas[™] range of welding headtops.



Oxenburgh, Marlow and Oxenburgh go on to detail three case studies where the use of 3M[™] Speedglas[™] welding visors, equipped with ADF technologies, have aided with productivity gains:

i) Metal bed manufacture

In this case study three welders wore 3M[™] Speedglas[™] helmets and had to make around 240 spot welds per hour. Using passive welding helmets, the welder "would have to raise his conventional helmet for each weld, but the use of the automatic darkening welding helmet has enabled the welder to weld a whole side of the bed head (ten welds) without having to raise his helmet".^[8]

At the time the case study was conducted, the company had been using the 3M[™] Speedglas[™] helmets for ten years. The authors suggested that their use has made productivity gains significant enough to remove the need for one additional welder. The authors' calculations concluded that "a pay back period of less than one month can leave one in no doubt as to the advantages of this particular piece of safety equipment, and show the advantages of exploring the cost effectiveness of PPE rather than looking only at the purchase price".^[6]

ii) Crane jib manufacture

In this case study welders were manufacturing crane jibs and girders of around 10 metres in length. The process involves multiple spot welds as well as long sections of weld. Prior to the introduction of the 3M[™] Speedglas[™] Headtops, welders wearing conventional welding helmets took 90 minutes to complete the task. Using the 3M[™] Speedglas[™] ADF the process now takes just 60 minutes. According to the company, this productivity increase is due "solely to the automatic darkening welding helmet",^[8]

The authors detail that, based on the number of girders the company fabricates, the Speedglas headtops have saved two weeks' work in a year for this individual welder. Another positive noted by the authors is the fact that welders wearing the 3M[™] Speedglas[™] equipment are less exposed to neck injury as they no longer have to repeatedly "nod or flick their heads to put the helmets down".^[8]

iii) Harbour equipment manufacture

The organisation in this case study manufacture spreaders which are used to hoist shipping containers. Given the size of the equipment manufactured (weighing 12 tonnes upwards) the fabrication typically takes 110 man-hours with 70 hours spent welding and 40 hours spent in preparation. At the time of writing, the company had been using ADF technologies in their welding helmets for ten years. Anecdotally, the production manager estimated that there has been an 8-10% saving in welders' time with the ADF technologies, compared to conventional helmets.^[8] Given the savings, the authors suggest that in this case study the purchase payback period of the equipment is between two and three months.^[8]

Additionally, the reports of neck injuries of workers have been "substantially reduced".^[8]

1.3) Recent welding equipment advancements

In contemporary times, the use of ADF welding visors has become somewhat ubiquitous as the cost of the technology has reduced and productivity benefits have become widely recognised. However, there have been a number of recent product introductions aimed at enhancing productivity even further.

i) 3M[™] Speedglas[™] Auto-Darkening Filter 9100XXi

A recent addition to 3M[™] Speedglas[™] range are the XXi filters which have improved optics to provide more contrast and natural looking colour before, during and after welding. As a result, welders may harness productivity gains through better control of the weld puddle (via a view that appears lighter, brighter and more realistic – see right) and greater precision when performing setting up and finishing operations.

ii) 3M[™] Speedglas[™] 9100 FX Welding Helmet

Another addition to the 3M[™] Speedglas[™] Welding Portfolio is the 9100 FX, which features an auto-darkening LCD which can be flipped up to reveal a 'B' impact rated polycarbonate visor underneath. Often welders will alternate between creating a weld and then grinding/fettling the weld. The 9100 FX solution eliminates the need to have two powered air headtops for both applications – reducing the downtime involved in changing the headtop for different activities.



2) Reducing the PPE burden

2.1) Comfort of PPE

When procuring PPE which will be well-received by wearers, increased consideration should be made with regards to comfort. There are a number of factors which can influence the comfort of PPE, including:

- fit
- fabric
- material weight and softness
- wearer temperature
- allowable movement when worn

According to the HSE, "when employees find PPE comfortable they are far more likely to wear it".^[9] Like with any item of clothing, or indeed PPE, if a wearer is uncomfortable they will look to make adjustments, or even remove the offending item(s) completely. This is a common issue across workforces and in the worst instance may result in wearers not being sufficiently protected. Additionally, continually having to adjust uncomfortable PPE can take workers away from their task in hand, increasing downtime and associated productivity. Ultimately you want workers focussing on their work as opposed to their PPE.

Giving workers choice over product selection and the use of trials of prospective PPE can aid with procuring comfortable protection for workers. Choice and the perception of control are interesting factors when considering the psychology surrounding human behaviour. If people are given a choice, even if it's between two options, there can be a feeling of empowerment and ownership of their decision, which could lead to greater engagement and ultimately improved PPE compliance.

While certain items of PPE may offer the same levels of protection there may be differences in comfort features, styling and fit that will appeal to different users in different ways, depending on a whole plethora of reasons. This is why trials are vitally important in ensuring workers find a suitable product for their needs. If people are given a choice, there's a feeling of empowerment and ownership – which could lead to greater engagement and improved PPE compliance.



2.2) A focus on respiratory protective equipment

Respiratory protective equipment (RPE) can come in a variety of forms to suit a multitude of customer requirements. Like with other items of PPE, selection considerations are made with consideration of the RPE being both adequate and suitable. In this context, adequate equipment is that which is right for the hazard and reduces exposure to the level required to protect the wearer's health. 3M manufacture many products with the same level of protection, however they will differ in supplementary features – this is where suitability comes into consideration. To be suitable, PPE including RPE must be right for the wearer, task and environment, such that the wearer can work freely and without additional risks caused by the equipment.

2.2.1) Comfort of RPE

When it comes to RPE being comfortable, the key considerations include:

- fit
- weight
- softness against the skin
- breathing resistance
- exhalation resistance

The breathing resistance of RPE is a major contributor to wearer comfort. If wearers find that their RPE is difficult to breathe through they may be more inclined to remove their protection. Respiratory filter materials are constantly evolving and improving, and 3M have invested heavily in their advanced electret filter media. The electrostatically charged filter media is able to capture particles from a greater distance which means the filters need less fibres, giving a more open structure, reducing the breathing resistance for the wearer.

Exhalation of warm and moist air is often an issue for RPE wearers. If RPE has not been adequately designed, this warm, moist air can lead to protective eyewear steaming up and be a frustration to wearer's comfort as it can increase heat and moisture build up within the RPE. Across a number of 3M's RPE range, 3M[™] Cool Flow[™] Exhalation Valves have been integrated to not only help make breathing easier but also reduce heat and moisture build up, providing cool, dry comfort for the wearer. This improved comfort can aid with reducing the need to adjust RPE while in use and may also reduce the need to remove eyewear to alleviate fogging.

Given comfort is a subjective matter, finding RPE which will be comfortable for all wearers can be difficult. However, if the above factors are considered in product selection this can potentially help with comfort perceptions. As previously mentioned, wearers of uncomfortable PPE are likely to make adjustments and take their attention away from the workplace task in hand. Wearers of uncomfortable PPE are more likely to make adjustments and take their attention away from the workplace task in hand.





2.2.2) Maintenance of RPE

Regional requirements will dictate how frequently reusable RPE has to be maintained. However, as well as there being legal requirements for the care and maintenance of reusable RPE, it can also be beneficial from a life cycle cost perspective. Regular checks and maintenance can not only help to ensure optimum performance and protection for the wearer, but can also increase the effective lifetime of equipment – reducing the need for additional cost of replacement.

However, with care and maintenance comes the time required to facilitate it. Powered air systems and their applicable headtops, as well as reusable masks, can be labour intensive to maintain, especially across a large workforce. There are multiple examples where disposable RPE can offer equivalent protection to reusable and powered air RPE options. Disposable RPE is simply thrown away at the end of a shift, eliminating the need to complete regular care and maintenance checks. This also eliminates the need to store RPE after use, another benefit over reusable alternatives. Additionally, disposable RPE is issued to the user 'factory fresh' and hygienic which may not be the case with reusable products.

There will of course be times where reusable RPE and powered air systems are the only consideration due to their protection adequacy or other benefits they may bring.

However, the advantages of disposable RPE should not be diminished and should form part of the decision making process when establishing an RPE programme.

2.3) Temperature effects on productivity

In a research study by Olli A. Seppänen and William Fisk^[10], the authors analysed 26 studies which focussed on the effects of temperature and performance, calculating the percentage performance changes as a result of increases in temperatures. Ultimately the authors were able to derive a percentage change in performance figure per degree increase in temperature.

The results indicated that performance increases with a temperature up to 20-23°C, however performance decreases with a temperature above 23-24°C.^[10] Further extrapolation of the data revealed that workers' productivity drops between 1% and 2% for every degree above 23°C.^[10]

Notoriously hot working environments like foundries, castings and smelting plants can conceivably have working temperature environments above 30°C. Based on the research conducted by Seppänen and Fisk, this could lead to significant performance (and therefore productivity) losses.^[10] In many working environments the use of protective coveralls may be required to protect worker's skin. While required protection is given to the wearer, the coveralls may add to the wearer's working temperature further.

Often with protective coveralls a balance is needed between protection and comfort. 3M manufacture chemical protective coveralls constructed of highly protective laminate materials at the front of the coverall with breathable panels at the back. This breathability allows for improved air circulation to increase wearer comfort and can help to reduce the effects of temperature.



Extrapolation of the data revealed that workers' productivity drops between 1% and 2% for every degree above 23°C.¹⁰

2.4) Protective eyewear

Protective eyewear can come in a variety of forms, including safety spectacles, safety goggles and face shields. All options provide varying levels of protection depending on the workplace activity. However, depending on workplace conditions they all have the capacity to possess the same end user pain point – fogging.

Eyewear fogging can be frustrating and dangerous. Removing eyewear to wipe away fog can expose eyes to potentially dangerous workplace impact hazards and debris. While wiping away fog may be a short process, ongoing rectification of eyewear over the course of a working day can make a significant dent in worker's downtime and therefore productivity. This issue can be exacerbated in workplace conditions conducive to fogging, namely workers who move from hot to cold environments and those involved in particularly heavy manual work.

Similar to the effects of eyewear fogging, protective eyewear which has become scratched is another end user pain point. Once again, if vision and clarity of view through safety eyewear has been compromised, wearers are likely to continually remove their spectacles to inspect and rectify the damage, which is often permanent.

Innovative anti-fog and anti-scratch coatings can be applied to safety eyewear to help reduce these issues. There are optional tests within the eyewear standard EN 166 which assess eyewear for fog resistance and scratch resistance. If protective eyewear meets the requirements of these tests it will be given the N marking for anti-fog and K marking for anti-scratch.

However, the in-use performance and longevity of these coatings also needs to be considered. While their performance in a laboratory may meet the test standards, this does not always correlate to the real life requirements of end users.

3M[™] Scotchgard[™] Anti-Fog Coating resists fogging for longer than traditional coatings, outperforming the N marking requirements of EN166 by 5x, even after up to 25 washes. 3M uses a special process to provide a thicker coating layer than is actually needed to meet the K and N requirements of EN166. This means that both the resistance to fogging and the resistance to scratching lasts longer so wearers can benefit longer without replacing their safety eyewear. The 3M[™] Scotchgard[™] Anti-Fog Coating is available across a variety of 3M[™] protective eyewear.



2.5) Legal implications

PPE should be the last line of protective defence for workers to prevent them from becoming harmed or suffering ill health. From a moral and ethical perspective, employers have a duty of care and don't want to harm their workers. But this also extends to financial and productivity reasoning as well: workers who require time off will impact workplace output.

III health of workers can also lead to litigation. An alarming statistic from the Association of British Insurers revealed that noise induced hearing loss (NIHL) claims have increased 189% between 2011-2014.^[11] Of course, non provision and/or misuse of PPE may not be the primary factor during litigation but improving PPE compliance can help to protect against these types of claims. NIHL claims, along with other workplace injury and illness claims can pose significant financial damages for organisations.

Alongside the financial burden is the strain on time and resources, when organisations have to prepare for a legal challenge. As an example, Spencers Solicitors estimate the case settlement timeframe for a workplace accident and slip, trip or fall claim can be between 6-9 months, and an industrial disease claim 12-18 months.^[12]

An alarming statistic from the Association of British Insurers revealed that

mmm

noise induced hearing loss

(NIHL) claims have

increased 189% between 2011-2014.^{III}

8 Personal Protective Equipment influencing productivity

3) Lean principles for PPE

3.1) Site layouts and Lean thinking

Having access to adequate and suitable PPE when required is vitally important to keep workers safe in all industries. Therefore, where workers get their PPE from is crucial. This is where the location of PPE stores can be an influencing factor for both safety and productivity.

When it comes to ensuring workers are protected, there may be pockets of non-compliance with workers deterred from getting their PPE if it's kept too far away from the workplace activity. A worker having to make a long journey to PPE stores can also be an inefficient use of time.

Companies have attempted to alleviate these issues in a number of ways, such as locating stores close to workplace activities, creating satellite stores to reduce the distance to collect PPE and the increasing use of vending machines to dispense PPE when required. While these steps may seem minor, the collective efficiency gains across a whole workforce can be significant.

3.2) Safe and efficient putting on and removal

In a range of workplace environments, the safe putting on and removal of PPE is really important. It increases further still in pharmaceutical, healthcare, asbestos abatement and life science industries. PPE is often the last line of defence against harmful hazards in these industries and the last thing a wearer wants is to contaminate themselves while removing their PPE.

Within the healthcare sector there are lots of protocols when it comes to the safe removal of PPE to prevent the inadvertent exposure to pathogens. Similar procedures are common across other hazardous industries.

The correct putting on and removal of PPE is clearly imperative, but from an efficiency perspective the time spent doing so must not be overlooked. Ultimately, PPE for these environments should provide adequate protection, but also be simple to use, dispose of, or decontaminate.

Source

- 1 Dr Christa Sedlatschek quoted in European Agency for S Health at Work. 2018. Work-related accidents and injurie €476 billion a year according to new global estimates. [C Available at: https://osha.europa.eu/en/about-eu-osha/ room/eu-osha-presents-new-figures-costs-poor-workpl safety-and-health-world. [Accessed 19 June 2018].
- 2 European Agency for Safety and Health at Work. 2018. Workrelated accidents and injuries cost EU €476 billion a year according to new global estimates. [ONLINE] Available at: https://osha.europa.eu/en/about-eu-osha/press-room/eu-osh presents-new-figures-costs-poor-workplace-safety-and-healt world, iAccessed 19 June 2018].
- 3 Costs to Britain of workplace fatalities and self-reported injuries and ill health, 2015/16. [ONLINE] Available at: http://www.hse. gov.uk/statistics/pdf/cost-to-britain.pdf. [Accessed 19 June 2018].
- Irwin and Colton. (2018). Safety Byte: Peter McGettrick. [Online Video]. 13 March 2018. Available from: https://www. irwinandcolton.com/safetybytes. [Accessed: 19 June 2018].
- 5 Health and Safety Executive. 2006. Evidence base for identifying potential failures in the specification, use and maintenance of PPE at work. [ONLINE] Available at: http://www.hse.gov.uk/research/ rrpdf/rrd19.pdf. [Accessed 19 June 2018].
- 6 Victoria Joäng, Albin Sadiković, 2014, Radiokommunikationens inverkan på produktiviteten inom anläggningsprojekt, Tryck av Media-Tryck, Lund [ONLINE] Available at: http://www.bekon.th.se/ fileadmin/byggnadsekonomi/ASadikovic_VJoaeng_Examensarbete_ Radiokommunikationens_inverkan_paa_produktiviteten_inom_ anlaeggningsprojekt.pdf. [Accessed 19 June 2018].

- Fredrik Greén quoted in Ben Lobel. 2016. Protection, product and passion: How headsets help on hazardous industrial sites [ONLINE] Available at: http://smallbusiness.co.uk/protection productivity-and-passion-how-headsets-help-on-hazardous industrial=sites-2507881/. Accessed 20 June 2018].
- Oxenburgh, M., Marlow, P., Oxenburgh, A., 2004. Increa Productivity and Profit through Health and Safety. 1st ed Raton: CRC Press.
- Health and Safety Executive. n.d. Coshh Basics- Personal protective equipment (PPE). [ONLINE] Available at: http://www hse.gov.uk/coshh/basics/ppe.htm. [Accessed 19 June 2018].
- 10 Seppänen, Olli A. & Fisk, William (2006) Some Quantitative Relations between Indoor Environmental Quality and Work Performance or Health, HVAC&R Research, 12:4, 957-973
- 11 Association of British Insurers. 2015. Tackling the compensation culture: Noise Induced Hearing Loss Claims: Improving the claim system for everyone. [ONLINE] Available at: https://www.abi.org uk/globalassets/sitecorf/lies/documents/consumers_uides/ tackling-the-compensation-culture.pdf. [Accessed 20 June 2018]
- Spencers Solicitors. 2018. How long does a personal injury claim take to settle?. (DNLINE] Available at: http://www. spencerssolicitors.com/accident-guides/how-long-will-apersonal-injury-claim-take-to-settle.html. [Accessed 20 June 2018]

Conclusion

Keeping workers safe in their working environment is of paramount importance and is pivotal to reducing the amount of workplace injuries and work-related ill health. This in itself can help to improve workplace efficiencies and productivity but as we have learnt, productivity gains can also be harnessed through improvements in the PPE provided to workers.

As mentioned, PPE is first and foremost for the protection of workers. However, as outlined in the prior case studies, if workers can also benefit from innovation and enhanced design this can help to overcome objections, improve buy-in, comfort levels and productivity.

Whether it be in enhancing communication capabilities between workers, increasing efficiencies while welding or reducing issues of eyewear fogging, appropriate added value features of PPE should be considered during the selection process with a view to productivity enhancements.



3M Personal Safety Division

3M United Kingdom PLC 3M Centre, Cain Road Bracknell, Berkshire RG12 8HT Tel: 0870 60 800 60 www.3M.co.uk

3M Ireland Limited The Iveagh Building The Park, Carrickmines Dublin 18 Tel: 1 800 320 500

Please recycle. Printed in the UK. © 3M 2018. 3M, Aura, Cool Flow, PELTOR, ProTac, Scotchgard, Speedglas and WS are trademarks of the 3M company. Bluetooth is a registered trademark of Bluetooth SIG, inc. All rights reserved. J426793

