



OUTER HOUSE, COURT OF SESSION

[2020] CSOH 77

A140/18

OPINION OF LORD DOHERTY

in the cause

REACTEC LIMITED

Pursuer

against

CUROTEC TEAM LIMITED

Defender

**Pursuer: Lake QC, Tariq; Harper Macleod LLP
Defender: Higgins QC, O'Brien; Shoosmiths LLP**

31 July 2020

Introduction

[1] The pursuer is the registered proprietor of European Patent (UK) No 1971262 (“the Patent”) entitled “Monitoring Apparatus for Monitoring Hand Held Tool”. The Patent was granted on 27 February 2013. The priority date is 23 December 2005.

[2] In this intellectual property cause the pursuer maintains that the defender has produced products (the “Curo Plus” and the “Q2”) which infringe the Patent. The pursuer seeks interdict against infringement; an order for delivery up or destruction of infringing products; count, reckoning and payment of the profits arising from the infringement; and further orders in terms of regulations 4 and 5 of the Intellectual Property (Enforcement etc)

Regulations 2006. The defender denies infringement. In a counterclaim it seeks revocation of the Patent. It avers that claim 1 of the Patent lacked an inventive step because it was obvious from prior art and the common general knowledge of the skilled person. It further avers that claims 2-14 are dependent upon claim 1 and therefore also fall to be revoked. It maintains that there are no additional features in any of the dependent claims which involved an inventive step.

[3] The matter came before me for a proof before answer. The proof dealt with the issues of construction of the Patent, validity, and infringement. The parties prepared a Joint Statement of Legal Principles. I heard evidence from three ordinary witnesses to fact and from five skilled witnesses. Affidavits or signed witness statements from the ordinary witnesses were lodged and those documents were treated as being the substance of their evidence-in-chief. Reports prepared by each of the skilled witnesses were lodged and these formed the substance of those witnesses' evidence-in-chief.

Background

[4] Hand-arm vibration (HAV) is vibration transmitted to the hands and arms, such as that experienced by operators of hand held power tools. Whole-body vibration (WBV) is vibration transmitted to the body as a whole via the supporting surface, such as through the feet when standing, or through the buttocks when seated. Vibration magnitude (level) is expressed in acceleration units of m/s^2 . A person's daily vibration exposure is also expressed in acceleration units of m/s^2 . Daily exposure is the average vibration spread over a standard working day of 8 hours, adjusted to take account of the actual total exposure time (ie contact time or "trigger time"). To avoid confusion with vibration magnitude, it is

conventional to add 'A(8)' after the units when quoting a daily vibration exposure, eg: 5m/s² A(8).

[5] In 1986 the International Organisation for Standardization (ISO) published ISO 5439, "Mechanical Vibration - Guidelines for the measurement and assessment of human exposure to hand-transmitted vibration". ISO 5439 1986 provided recommended standards for measurement of HAV. It did not deal with assessment of HAV (ie assessing exposure using a known vibration magnitude and trigger time), and it did not deal with either assessment or measurement of WBV. ISO 5349 was revised in 2001. The revised standard was entitled "Mechanical Vibration - Measurement and evaluation of human exposure to hand-transmitted vibration". Where measurement of HAV was to be carried out the revised standard recommended measurement in three orthogonal axes. It acknowledged that while triaxial measurement was preferred, in some cases it may not be possible or necessary and that in such cases the axis or axes of measurement should if possible include the axis of greatest vibration (Part I, paragraph 4.5; Part 2, paragraph 6.1.6).

[6] So far as WBV is concerned, early guidance was provided by "Guide to evaluation of human exposure to whole-body vibration and shock. General requirements" ISO 2631-1:1985; by BS 6841:1987 "Guide to the measurement and evaluation of human exposure to whole-body mechanical vibration and shock"; and by EEC Council Directive 89/391/EEC. In 1997 a revised ISO 2631-1:1997 was published.

[7] Directive 2002/44/EC of 25 June 2002 on the minimum health and safety requirements regarding the exposure of workers to the risks arising from physical agents (vibration) dealt with both HAV and WBV. Article 3 set out daily exposure limit values and daily exposure action values for HAV and WBV. In each case it provided that workers' exposure could be assessed or measured. Article 4.1 provided that in carrying out the

obligations laid down in Article 6(3) and Article 9(1) of Directive 89/391/EEC an employer “shall assess and, if necessary, measure the levels of mechanical vibration to which workers are exposed”. Article 4.2 provided that vibration exposure could be assessed by observation of specific working practices and reference to relevant information on the probable vibration magnitude of equipment. Part A point 1 of the Annex to the directive provided in relation to assessment of exposure to HAV that assessment of the level of exposure may be carried out on the basis of an estimate based on information provided by the manufacturers concerning the level of emission from the work equipment used, and based on the observation of specific work practices or on measurement. Part A point 2 provided that when measurement is employed the methods used may include sampling, which must be representative of the personal exposure of a worker to the mechanical vibration in question. Part B of the Annex made similar provision in relation to assessment and measurement of WBV.

[8] The Control of Vibration at Work Regulations 2005 (SI 1093) (“the 2005 Regulations”) were introduced in July 2005 to implement Directive 2002/44/EC. Regulation 4 gave effect to the exposure limit values and exposure action values in Article 3 of the directive. Regulation 5 gave effect to Article 4 of the Directive. Schedule 1, Part I set out the formula for calculating the daily exposure for HAV. Schedule 2, Part I set out the formula for calculating the daily exposure for WBV.

[9] In 2005 the Health and Safety Executive (“HSE”) issued Guidance L140 on the 2005 Regulations. The Guidance related almost exclusively to HAV. Paragraph 110 explained that two pieces of information were needed to assess a worker’s daily vibration exposure: (i) the average magnitude of the vibration at the surface in contact with the hand; and (ii) the time for which an employee’s hand is actually in contact with that vibration.

Paragraph 111 explained that vibration magnitude is the level of vibration at the hand position on the tool. Paragraph 113 advised that the 2005 Regulations required employers to assess employees' daily exposures; that it was not important to obtain a precise daily exposure because what was needed was enough information to establish whether it is likely that the exposure action limit value will be exceeded. It stated: "You may be able to do this without having to make vibration measurements in your workplace." Paragraphs 115 and 116 explained that manufacturers or suppliers of tools and machines declared vibration emission values and that other possible sources were government bodies, consultants, technical or scientific publications or online databases. In paragraph 121, Table 2 provided examples of vibration magnitudes which had been measured by the HSE on tools in real work situations. Paragraph 122 identified examples of situations when an employer might need to have vibration measurements made in the workplace. Paragraph 125 explained that exposure time is the "contact time" or "trigger time" for which the operator's hands are actually exposed to vibration. At paragraphs 133-134 the Guidance contained an exposure points system and ready-reckoner (Table 4) for calculating daily vibration exposure using vibration magnitude and exposure time. The exposures for different combinations of vibration magnitude and exposure time were given in exposure points instead of values in $m/s^2 A(8)$. For HAV, the exposure action value ("EAV") was 100 points and the exposure limit value ("ELV") was 400 points.

[10] While it was not set out in the L140, Mr Worthington indicated that a points system and ready-reckoner were also provided by the HSE for calculating daily exposure to WBV. The WBV EAV of $0.5m/s^2$ was equivalent to 100 points, and the ELV of $1.15m/s^2$ was equivalent to approximately 529 points.

[11] Accordingly, at the priority date the regulatory regime focussed on exposure action levels and exposure limit levels. There was a well-recognised distinction between the assessment of vibration and the measurement of vibration. Directive 2002/44/EC, the 2005 Regulations and HSE Guidance L140 made distinct provision for assessment on the one hand and measurement on the other.

[12] Assessment involved calculating vibration exposure by taking an assumed vibration magnitude (provided by the manufacturer, or obtained from some other source, or by carrying out a sample or representative measurement) and multiplying it by the duration of exposure to the vibration. On the other hand, measurement involved measuring the actual vibration over a period that the tool or machinery was in use.

The evidence

[13] The pursuer led evidence from one ordinary witness to fact, Jacqueline McLaughlin; and from three skilled witnesses, Sue Hewitt, Dr Mark Harper and Dr Gordon Povey. The defender led evidence from two ordinary witnesses to fact, Michael Jones and Steven Holmes; and from two skilled witnesses, Dr Robert Brown and Kevin Worthington.

The witnesses other than Mr Jones

[14] Where it is material I will to refer to relevant parts of the evidence of some of the witnesses when I come to discuss the issues. The following outline is provided by way of introduction.

[15] Jacqueline McLaughlin is the chief executive officer of the pursuer. I was given no details of her training or qualifications. She gave factual evidence relating to the Patent. She explained that in implement of the Patent the pursuer had marketed a vibration assessment

device, the HAVmeter. She had inspected the defender's Curo Plus and Q2 and she had read material relating to them. She made observations on those devices.

[16] Sue Hewitt is a noise and vibration expert. Between 1985 and 2018 she was an employee of the HSE. Since 2018 she has been a consultant with Finch Consulting Limited. She was instructed by the pursuer to inspect the Q2. Her report is Joint Bundle ("JB") 70. In oral evidence she accepted that in some respects her report had proceeded on an inaccurate understanding of the Q2's operation.

[17] Dr Mark Harper is a physicist experienced in the field of vibration. He prepared two reports (Expert Report Bundle ("ERB") 1 and ERB 2). He was involved (as the joint inventor) in the development of the HAVSense hand held HAV dosimeter. The Patent relating to that device is GB2413189A. It was published on 19 October 2005 and it has a priority date of 16 April 2004. The HAVSense was produced and marketed by HAVSco Ltd ("HAVSco"). Dr Harper was formerly a director of HAVSco. He remains a minority shareholder, owning 15% of the company's shares. He indicated that he has been attempting to dispose of that shareholding. Dr Harper's evidence dealt *inter alia* with (i) the membership of the skilled team; (ii) the common general knowledge and the state of the art; (iii) what the Patent would have taught the skilled team; (iv) whether the Curo Plus and the Q2 infringed the Patent; and (v) the prior art, obviousness and inventiveness.

[18] Dr Povey is an electronic engineer with knowledge and experience of the technologies and systems involved in vibration monitoring systems. He prepared a report (ERB 3), a supplementary report (ERB 4), and a further supplementary report (JB 77) which revised and corrected certain parts of ERB 3. Dr Povey's evidence dealt *inter alia* with (i) the perspective of the member of the skilled team who was an electronic engineer; (ii) the common general knowledge and the state of the art; (iii) what the Patent would have taught

the skilled team; (iv) whether the Curo Plus and the Q2 infringed the Patent; and (iv) the prior art, obviousness and inventiveness.

[19] Mr Holmes is an electronic engineer who works as a firmware engineer with Audiotel International Limited. He reviewed the design of the Curo Plus for the defender. He was also involved in the design of the Q2. Mr Holmes explained the software and firmware aspects of the Q2.

[20] Dr Brown is an electronic engineer. He described his specialist fields as control engineering, parameter data capture, and accurate data representation. He prepared a report (ERB 7). His evidence addressed four issues: (i) the background and experience of the skilled person; (ii) whether the skilled person would have understood the Patent to relate to the monitoring of HAV, or to have the capacity to monitor both HAV and WBV; (iii) whether the skilled person would have understood there to be any synergistic effect between “the timer being operative in dependence on the vibrational signal” and the use of radio frequency identification (“RFID”) technology as a means of transmitting information; (iv) whether the RFID tag in the Q2 holds information relating to the hand held tool including information on vibration; and (v) whether the Q2 has a timer operative in dependence on a vibration signal to record a duration of vibration of the tool.

[21] Mr Worthington is a chartered engineer. Most of his practice has involved noise and acoustics. However, he also has some experience of vibration monitoring - in particular the health and safety aspects relating to that (more so in respect of HAV than WBV). He prepared a report (ERB 5) and a supplementary letter (ERB 6). He was instructed to assume (see ERB 5, page 18) that the skilled team comprised a person experienced in the health and safety aspects of vibrating power tools and an electrical engineer. He made clear that he is

only qualified to speak to the former perspective and that he has no expertise in the design and manufacture of instrumentation and/or systems for the measurement of vibration.

[22] I am satisfied that each of the above witnesses did their best to assist the court.

However, as will be apparent from the discussion below, I have not found all of their evidence to be reliable.

[23] There is a further matter which I should record in relation to Dr Harper. In paragraph 50 of his rebuttal witness statement Mr Jones suggested that HAVSco is a direct competitor of the defender. He also pointed out that Dr Harper holds 15% of the shares in HAVSco Ltd. In his report Dr Harper made the customary declarations expected of a skilled witness, which included:

“ ...

4. It has been explained to me by Harper Macleod that it is my role to assist the Court in an unbiased manner and that my duties to the Court override any duty I owe to Reactec. I have kept this firmly in mind when preparing this report.

5. I have been provided with a copy of the Law Society of Scotland's Expert Witness Code of Practice and I have read and understood its content.

6. I have also read and understood the discussion of the duties and responsibilities of expert witnesses in (1) the judgment of Mr. Justice Cresswell in *The Ikarian Reefer* [1993] FSR 563; and (2) paragraphs 99-114 of the judgment of Mr Justice Arnold in the English High Court in *Medimmune v Novartis Pharmaceuticals* [2011] EWHC 1669 (Pat), which discuss the preparation of experts' reports in patent cases. I am told by Harper Macleod that these points are as relevant in the Scottish Courts as they are in England.

7. I understand my duty to the Court and I have complied with that duty.

8. In preparing this report, I believe that I have given an objective appraisal of all the issues that I have been asked to discuss. I have been assisted by Harper Macleod in preparing this report, but confirm nonetheless that this report accurately reflects my knowledge and opinions.”

In paragraph 13 of the report Dr Harper set out the history of his involvement in the development of the HAVSense dosimeter, and that from 2000 to the present date he has

been a technical adviser to HAVSco in relation to the HAVSense system. In paragraph 14 he explained that between 2005 and 2009 he had also produced designs for a WBV dosimeter for HAVSco, but that the designed device was not pursued due to a perceived lack of market demand. Paragraph 16 declared:

“16. Apart from the instructions given to me in respect of the present dispute, I have no existing commercial connection with any of the parties, witnesses or advisers involved in this dispute. I know of no actual or potential conflict of interest that might influence the opinions expressed in this report.”

[24] I observe at the outset that if HAVSco is a competitor of the defender it is also a competitor of the pursuer. Be that as it may, no objection was taken to Dr Harper’s evidence either in advance of the proof or when the evidence was led. Moreover, it was not suggested to Dr Harper in cross-examination that he was not an independent and impartial witness. Nor was there any challenge to the declarations which Dr Harper made in paragraphs 4 to 8 and 16 of his report. However, in their closing written submissions counsel for the defender said of Dr Harper’s evidence:

“2.10 Dr Harper was one of the expert witnesses led by the pursuer. It is accepted that Dr Harper was doing his best to assist the court. He did, however, have a continuing financial interest in a competing business... Moreover, he had personally been involved in the design of a hand-worn device for vibration exposure monitoring, the HAVSense.”

There was no further reference to this matter in oral submissions.

[25] Paragraph 2.10 may have been intended to cast doubt on Dr Harper’s independence and impartiality. If so, I am not impressed by that approach. If the defender wished the court to conclude that Dr Harper was not independent and impartial it ought to have raised the matter squarely by objecting to the admissibility of his evidence at the appropriate stage. At the very least, it ought to have challenged his declarations and put it to him in

cross-examination that he was not independent and impartial. Basic fairness required no less if anything was to be made of the point.

[26] Having read Dr Harper's reports and having heard him give evidence, I accept that he is an independent and impartial witness who has duly complied with all of the duties and responsibilities of an expert witness.

Mr Jones' evidence

[27] Mr Jones prepared a witness statement and a rebuttal witness statement. Prior to the proof the pursuer objected to the admissibility of parts of the rebuttal witness statement. The basis of the objection was that the parts objected to were opinion evidence. Mr Jones was an ordinary witness to fact, not a skilled witness. His opinion evidence was inadmissible. Even if he had been otherwise qualified to give opinion evidence it would not have been competent for him to do so because he was neither independent nor impartial.

[28] On 9 July 2019 Lady Wolffe dealt with the pursuer's motion to exclude parts of the rebuttal statement from probation. Paragraphs 44-45, 48, 54-55, 57-64, 77-82 and 85-102 were excluded. Other paragraphs which had been objected to (42-43, 46-47, 49-53, 56, 65-71, and 74-75) were received under reservation of the objection.

[29] In paragraphs 1-27 of his witness statement Mr Jones set out his background and experience, and his connections with the defender. He was formerly a director of the defender, but he is now employed by it as a consultant. He is a minority shareholder of the defender's parent company. His remuneration from the defender is his only source of income. His background is in sales. In the course of his career he has acquired knowledge relating to vibration monitoring. In paragraphs 28-35 he described the monitoring devices which he had invented prior to the Curo Plus and the Q2. In about 2006 he invented the

“Tooltimer”, which was a vibration assessment device which accumulated tool trigger time using what was in effect a stopwatch system. Tooltimer was not tool mounted. In about 2008 he invented the Stikki, which was also a vibration assessment device which measured trigger time, but it was designed to be smaller than Tooltimer, enabling it to be tool mounted and to be transferred to different tools easily. He submitted a patent application for the invention. However, the project was discontinued and it did not come to fruition. In about 2011 he invented the Curo, which was a vibration assessment device which used trigger time and pre-determined vibration magnitudes of tools to provide vibration exposure using the HSE vibration points system. In paragraphs 36-41 he described the Curo Plus. It was a tool mounted assessment device. It was an updated version of the Curo - unlike the Curo it had the advantage of telling the user the tools which had been used to accumulate daily HSE points. In paragraph 42 he set out what he saw as the differences between the Curo Plus and the device taught in claims 1, 2, 7, 8, 11 and 12 of the Patent. In paragraphs 43-45 he referred to his invention of the Q2 in 2017 and he described its features. He stated that it measured magnitude of vibration in real time and that it did not measure the duration of vibration. In paragraph 46 he set out his understanding of the differences between the Q2 and the device taught in claims 1, 2, 4, 7, 8, 11, 12 and 14 of the Patent. In paragraph 47 he expressed the view that RFID is a commonplace technology which he understood from discussions with others had been used as a wireless communication technique for many decades. In paragraphs 48-50 he described the state of the art in relation to vibration meters as at 23 December 2005 with particular reference to the Bruel & Kjaer Type 2239B meter. At paragraph 51 he commented on Ms Hewitt’s report. In paragraphs 5 to 41 of his rebuttal witness statement Mr Jones commented on Ms McLaughlin’s affidavit.

Paragraphs 42, 43, 46, 47, and 49 were comments on Dr Povey's report and paragraphs 50-53, 56, 65-76, and 83-84 were comments on Dr Harper's report.

[30] During Mr Jones' oral evidence it became clear that some parts of his evidence which bore to be matters of fact were not matters which he had himself observed. In some cases they represented information provided to him by others. He also accepted that other aspects of his evidence were not correct. There were further parts of Mr Jones' evidence where I consider that the evidence of other witnesses demonstrated the incorrectness of Mr Jones' position. For present purposes it is unnecessary to elaborate upon those matters.

[31] In closing submissions counsel for the defender confirmed that Mr Jones was adduced as an ordinary witness, not as a skilled witness. Nevertheless, it was submitted that there was a wide range of factual matters which Mr Jones could competently speak to. These included the development by him, and the features of, the Curo Plus and the Q2. As an inventor of vibration monitoring devices at the priority date he was knowledgeable about the relevant health and safety regime. It was submitted that that qualified him to opine as to the membership of the skilled team and the content of its common general knowledge. Those were matters of fact which were within his knowledge. That evidence ought to be admissible, but of course it would be up to the court to decide what weight to attach to it in the whole circumstances, including the fact that Mr Jones was not an independent and impartial witness.

[32] Generally, an ordinary witness must confine himself to matters of fact which are within his own direct knowledge. The general rule is that evidence of opinion is excluded. A witness must speak to facts as observed by him, and not to any inference or opinion which he may draw or form from those facts (W G Dickson, *The Law of Evidence in Scotland* (3rd ed), paragraph 391; W J Lewis *A Manual of the Law of Evidence in Scotland*, page 46; Stair

Memorial Encyclopaedia of the Laws of Scotland, *Evidence* (Reissue), paragraphs 170-173; *Phipson on Evidence* (19th ed), paragraphs 33-01, 33-89; *Kennedy v Cordia (Services) LLP* 2016 SC (UKSC) 59, [39]-[41]; *McMahon v Grant Thornton UK LLP* [2020] CSOH 50, [139]). While the general rule admits of exceptions, I am satisfied that here most of the evidence objected to falls squarely within the prohibition. In my opinion Mr Jones is indeed an ordinary witness to fact. He is not qualified to give skilled opinion evidence. Nor is he qualified to give skilled evidence of fact. Significant portions of his evidence were not matters of fact which he had observed. Matters of fact which he spoke to from his own direct knowledge are admissible, but any inferences or conclusions to be drawn from them and/or from any of the other evidence in the case are matters for the court, not for him.

[33] Mr Jones gave opinion evidence on many matters such as the identity of the person skilled in the art; the common general knowledge of the skilled team; the prior art; obviousness; and the construction of the Patent. He provided extensive opinion commentary on the evidence of Dr Harper and Dr Povey. Most of this evidence was contained in some of the paragraphs in his rebuttal statement which had been objected to. Some of it was given in oral evidence, under reservation as to its admissibility. However, some of it (a lesser part) was adduced, without objection, in his initial witness statement.

[34] In my opinion the pursuer's objection to the admissibility of paragraphs 46, 47, 49, 51, 56, 65-71 and 74-75 of the rebuttal statement and the associated oral evidence is well founded. I sustain that objection. I also sustain the objection to paragraph 50, but only in relation to the final sentence. In so far as Mr Jones proffered opinion evidence or skilled evidence of fact in his initial witness statement without objection, I attach no weight to it where the evidence was contentious because Mr Jones was not qualified to give that evidence and I find his opinion evidence to be of no assistance.

[35] The matters discussed in para [30] above, and Mr Jones' readiness to go beyond the proper scope of matters of fact which he had observed himself and to offer opinion evidence, make me have some reservations about the reliability of his evidence on factual matters where the evidence is contentious. For these and other reasons counsel for the pursuer submitted that I should not accept such evidence unless it was supported by other evidence. I am not persuaded that the difficulties with Mr Jones' evidence are so serious that taking that blanket approach to it is justified. Where Mr Jones' evidence is admissible and he is qualified to speak to the matter to which he speaks I have preferred to consider the relative cogency of Mr Jones' evidence and the competing evidence.

The Patent

[36] The Patent Specification provides (omitting numeral references):

“Description

Field of the invention

[0001] The present invention relates to a monitoring apparatus in particular a hand held tool monitoring apparatus.

Background to the invention

[0002] Many hand held or hand guided tools transmit vibration to the hands and arms of the operator. It is known that such transmitted vibration, which is often termed Hand Arm Vibration (HAV), can cause painful and disabling diseases, such as white finger, following regular long term exposure.

[0003] Apparatus for monitoring exposure to HAV inducing tools is known. GB 2411472A describes a vibration monitor that is worn by the operator. The vibration monitor of GB 2411472A comprises a vibration sensor and memory. The vibration sensor measures the magnitude and frequency of vibration of a tool being used by the operator, the magnitude and frequency of vibration being stored in the memory along with a time and date stamp. GB 2413189A describes a vibration monitor that is held by an operator. The vibration monitor comprises a vibration sensor and processing electronics. The vibration sensor measures the vibration of a

tool being used by the operator and the processing electronics determines the operator's cumulative exposure to the vibration and provides an indication to the operator before exposure to the vibration exceeds a safe level. GB 2299168A describes a vibration monitor that is worn on the wrist of an operator. The vibration monitor comprises a vibration sensor and processing electronics. The vibration sensor measures vibrations experienced by the operator during use of a tool and the processing electronics operates an alarm when an accumulated time that the vibration level exceeds a predetermined threshold exceeds a predetermined duration.

[0004] 'Type 2239, B, Hand-arm Vibration and Integrating Sound Level meter, Hand-arm Vibration Functions' (December 2001...) discloses the hand-arm vibration monitoring functions of a Type 2239 B hand-arm vibration meter. The meter uses an accelerometer to measure vibrations. A mounting bracket is used to attach the accelerometer to a tool or machine to be measured. Straps attached to the mounting bracket are wrapped around the tool and tightened as much as possible. The accelerometer is screwed to a mounting bracket. The type 2239 B hand-arm vibration meter can take measurements over a pre-set time period or can take measurements that are manually timed.

[0005] The present inventor has appreciated that the above described apparatus have disadvantages.

[0006] It is therefore an object of the present invention to provide apparatus for measuring vibration of a hand held tool. It is a further object of the present invention to provide apparatus for measuring a duration of vibration of a hand held tool.

Statement of Invention

[0007] The present invention has been devised in the light of the above noted appreciation and thus there is provided a hand held tool monitoring apparatus according to claim 1.

[0008] In use, the monitoring component is either attached to the mount on the hand held tool or forms part of the hand held tool and the hand held tool is operated. Vibration produced by the hand held tool is sensed by the vibration sensor and the timer is operative in dependence thereon to record a duration of the vibration. When use of the tool is complete, the monitoring component can be removed from the mount. Thus, the monitoring component can, for example, be used by an operator on another hand held tool. The inventors have appreciated that measuring vibrations directly on the tool, in contrast to GB 2411472A, GB 2413189A and GB 2299168A, can provide for more accurate and reliable measurement of vibration experienced by the operator. More specifically, the accuracy and reliability of the apparatus of GB 2411472A, GB 2413189A and GB 2299168A can depend on how the apparatus is used. For example, if a tool is gripped with a hand other than the hand or arm supporting the known apparatus, the vibration level or duration may not be measured properly. Furthermore, measurement of vibration by the known

apparatus is affected by where the apparatus is worn or how the apparatus is held. As the vibration sensor forms part of either the mount or the monitoring component, which, in use, is attached to a hand held tool to be monitored, the present invention involves measurement of vibration directly on the hand held tool and yet provides for removal of the monitoring component from the tool. Thus, the monitoring component can be used, for example, to provide a record of vibration exposure for a particular operator.

...

[0019] Alternatively or in addition, the monitoring component and the mount may have respective surface profiles configured to engage with each other to provide for releasable attachment of the monitoring component to the mount.

[0020] More specifically, the mount may define a recess configured to receive at least a part of a body of the monitoring component.

...

[0029] More specifically, the vibration sensor may comprise a plurality of vibration sensors.

[0030] Alternatively or in addition, the monitoring apparatus may be configured to be operative in dependence upon at least one of a plurality of vibration signals.

[0031] More specifically, the monitoring apparatus may be configured to be operative in dependence upon a selected one of the plurality of vibration signals. For example, the plurality of vibration signals may differ from each other as regards a particular characteristic, such as range of detectable acceleration, sensitivity, noise, range of vibration frequency or axis of vibration.

[0032] In a form, the vibration sensor may be configured to be responsive to a plurality of ranges of detectable acceleration and to provide a vibration signal for each range. Thus, the monitoring apparatus may be configured, to select a vibration signal of greatest amplitude from the plurality of vibration signals. For example, where the vibration sensor comprises three accelerometers with a first accelerometer tuned to be responsive to a low level of maximum acceleration, a second accelerometer tuned to be responsive to a medium level of maximum acceleration and a third accelerometer tuned to be responsive to a high level of maximum acceleration, the vibration signal of greatest amplitude can be selected.

[0033] In another form, the vibration sensor may be configured to be responsive to vibrations in three mutually orthogonal axes and to provide a vibration signal for each axis.

[0034] More specifically, the monitoring apparatus may be configured to select one of the three vibration signals.

[0035] More specifically, the monitoring apparatus may be operative to select a vibration signal on the basis of a comparison amongst the three vibration signals, e.g. to select a vibration signal of highest value representative of a strongest vibration.

[0036] Alternatively or in addition, a root mean square (RMS) value of a vibration signal may be taken. Where there is more than one vibration sensor a root mean square value of a vibration signal' from each vibration sensor may be taken.

...

[0058] In a first form the monitoring component may comprise the vibration sensor and the timer.

[0059] In a second form the mount may comprise the vibration sensor and the monitoring component may comprise the timer. The monitoring component may comprise a microprocessor. Thus, the timer may be comprised as part of the microprocessor.

...

[0083] The term hand held tool as used herein is to be construed as covering hand guided tools and indeed any kind of tool or machine that during use is in contact with an operator's hand or other part of his body.

...

[0098] ...The monitoring component has three coloured indicators, a microprocessor, memory, two tri-axial accelerometers (which constitute a vibration sensor), a reed switch and an RF1D interface. The microprocessor controls the operation of the monitoring component and amongst other things performs a timer function...

..."

The Patent's Claims are (omitting numeral references):

"1. Hand held tool monitoring apparatus comprising:

a mount, which is configured to, in use of the hand held tool monitoring apparatus, form part of a hand held tool, and
 a monitoring component configured to be releasably attached to the mount, the monitoring component comprising an operative part of the hand held tool monitoring apparatus,
 the hand held tool monitoring apparatus further comprising a vibration sensor and a timer, the vibration sensor being operable to sense vibration of

the hand held tool and to provide a vibration signal in response to sensed vibration when the monitoring component is attached to the mount,

characterised in that:

the mount contains a passive Radio Frequency Identification (RFID) tag holding information relating to the hand held tool including information on vibration, and

the timer being operative in dependence on the vibration signal to record a duration of vibration of the hand held tool, and

wherein the monitoring component further comprises an RFID interface operable to actuate the RFID tag when the monitoring component is received in the mount and to receive the information relating to the hand held tool from the RFID tag.

2. Apparatus according to claim 1, wherein the monitoring component and the mount have respective surface profiles that are configured to engage with each other to provide for releasable attachment of the monitoring component to the mount, and the mount and monitoring component are configured to be detached from each other by a single manual operation by a user.
3. Apparatus according to claim 2, in which the mount and monitoring components are configured such that the user detaches the monitoring component from the mount by one of pulling the monitoring component away from the mount; and twisting the monitoring component in relation to the mount.
4. Apparatus according to claim 2 or 3, in which the mount defines a recess configured to receive at least a part of a body of the monitoring component.
- ...
6. Apparatus according to any preceding claim, in which the hand held tool information comprises hand held tool identification information.
7. Apparatus according to claim 6, in which the hand held tool information comprises a predetermined vibration dosage rate.
8. Apparatus according to any preceding claim, in which, where the vibration sensor is configured to be responsive to vibrations in three mutually orthogonal axes, the hand held tool information comprises vibration axis information regarding which measurement axis or combination of axes is to be used for measurement or detection of vibrations.
9. Apparatus according to any preceding claim, in which the monitoring component is configured to be carried by an operator when not in use on a hand held tool.
- ...
11. Apparatus according to any preceding claim, in which the hand held tool monitoring apparatus further comprises a user identification component configured to identify one of a plurality of possible users, the user identification component comprising a specific user component comprising information for a specific user, the user identification component being configured to be carried by the specific user, and the monitoring apparatus comprises a separate, specific user configurable component associated with the vibration sensor to which information for the specific user can be conveyed.
12. Apparatus according to any preceding claim, in which the hand held tool monitoring apparatus further comprises an isolation filter operative to change the

vibration signal to take account of a change in a vibration characteristic between the hand held tool and the operator.

...

14. Apparatus according to any of claim 1-12 further comprising: a base component configured for use at a central location spaced apart from a location of use of the vibration sensor on a hand held tool; and communications apparatus comprising first and second RFID transceivers, the first and second RFID transceivers being configured to wirelessly transmit data between the first and second RFID transceivers, the first RFID transceiver forming part of the base component and the second RFID transceiver forming part of the monitoring component."

[37] It was common ground that the reference in para [0003] to GB2299168A ought in fact to have been to GB2299169A.

The skilled person

[38] The person skilled in the art is the person who is likely to have a practical interest in the subject matter of the invention (*Catnic Components Ltd v Hill & Smith Ltd* [1982] RPC 183).

The skilled person may be a team whose combined skills would normally be employed in interpreting and carrying the patented invention into effect (*General Tire & Rubber Co Ltd v Firestone Tyre & Rubber Co Ltd* [1972] RPC 457 at page 458).

[39] The parties agree that here the Patent was addressed to a skilled team. They also agree that one of the members of the team would have been an electronic engineer.

However they disagree as to the other member of the team. The pursuer maintains that it would have been a mechanical engineer or physicist with a background in vibration. The defender suggests that it would have been someone with experience of the health and safety aspects of vibrating power tools, such as Mr Worthington.

[40] Dr Harper's evidence that the skilled team would have comprised a mechanical engineer or a physicist with a background in vibration and an electronics engineer appears to me to be compelling. In my opinion the skilled team would need to understand the

science of the device which the Patent teaches, including the mathematics of the relevant formulae, in order to interpret the patented invention and carry it into effect. I accept that a mechanical engineer/physicist would have been needed for the physics/engineering aspects, and that an electronic engineer would have been needed for the electronic aspects. Each would have determined the respective design, devices and components which would have allowed the specification to be most closely, conveniently and economically achieved.

[41] In my opinion, looked at as a whole, Dr Brown's evidence tends to confirm rather than refute the need for input by a mechanical engineer or physicist with experience in vibration. While his evidence was that the skilled person would have been an electronic engineer with an understanding of vibration monitoring, at paragraph 54 of his report he noted that technical input from a mechanical/condition monitoring engineer would also have been necessary. Moreover, in oral evidence he agreed that there had been mechanical engineering input in the teams that he had worked with on vibration projects at Monition (International) Limited and Drive Management Services Limited.

[42] Mr Worthington made it clear in his report (page 18) that he was asked by the defender to assume that the skilled team comprised a person with experience of the health and safety aspects of power tools and an electrical engineer. He indicated that he was qualified to speak as to the first of those areas of expertise, but not to the second.

[43] Mr Jones was the only source of the suggestion that the skilled team (i) ought to have included a person with experience of the health and safety aspects of vibrating power tools; and (ii) would not have included a mechanical engineer/physicist with a knowledge of vibration monitoring. He reasoned (i) that the health and safety expert would have been necessary because the skilled team would have to have been cognisant of the regulatory regime relating to vibration; and (ii) that as the mathematical formulae were available in the

regulatory material there would have been no need for any input from a physicist or mechanical engineer.

[44] This aspect of Mr Jones' evidence is inadmissible opinion evidence. In any case, I do not find it persuasive. In my view neither an electronic engineer nor someone knowledgeable as to the health and safety aspects of vibration monitoring would have been properly equipped to carry into effect the aspects of the device requiring an understanding of mechanical engineering or physics. Nor am I convinced that the skilled team would have needed to include someone skilled in the relevant legislation and standards relating to vibration. I accept the evidence that a skilled team comprising a mechanical engineer/physicist and an electronic engineer who were knowledgeable about vibration monitoring would have been cognisant of that material.

Construction of the Patent

[45] The claims of the Patent determine the extent of protection of the monopoly (Patents Act 1977 sections 125 and 130; Article 69(1) of the European Patent Convention ("EPC"); The Protocol on Interpretation of Article 69 ("the Protocol")). The Protocol states:

"1. Article 69 should not be interpreted as meaning that the extent of the protection conferred by a European patent is to be understood as that defined by the strict, literal meaning of the wording used in the claims, the description and drawings being employed only for the purpose of resolving an ambiguity found in the claims. Nor should it be taken to mean that the claims serve only as a guideline and that the actual protection conferred may extend to what, from a consideration of the description and drawings by a person skilled in the art, the patent proprietor has contemplated. On the contrary, it is to be interpreted as defining a position between these extremes which combines a fair protection for the patent proprietor with a reasonable degree of legal certainty for third parties.

2. For the purpose of determining the extent of protection conferred by a European patent, due account shall be taken of any element which is equivalent to an element specified in the claims"

[46] The construction of the claims is a question of law for the court, properly instructed as to the notional skilled addressee. The court construes the Patent objectively, but adopting the mantle of the notional addressee to whom it is directed and in the light of the common general knowledge with which the addressee is assumed to be imbued (*Terrell, supra*, paragraph 9-181). Evidence is admissible to assist the court in reading it through the eyes of the notional person. This includes, in particular, evidence as to (i) the common general knowledge in the relevant art; (ii) the meaning of technical terms; and (iii) the technical consequences of what is described or of any putative construction. As the authors of *Terrell* note, the teaching of the specification, once construed, is a question of fact, as is what the skilled reader would do with that teaching. A distinction is to be drawn between construction - the meaning of the words used - and disclosure - what they would teach the reader. The latter is a question of fact in respect of which evidence is admissible (*Terrell, supra*, paragraphs 9-181 to 9-194).

[47] The claims are to be given a purposive construction. The question is what the person skilled in the art would have understood the patentee to be using the language of the claim to mean (*Icescape Ltd v Ice-World International* [2018] EWCA Civ 2219, [2019] FSR 5, at [60]). Account requires to be taken of the attitudes, perceptions and prejudices of the notional person (*Dyson v Hoover* [2002] RPC 22, [57]).

[48] In relation to claim 1 there were issues as to the proper construction of the following terms: “hand held tool monitoring apparatus”; “information relating to the hand held tool including information on vibration”; “the timer being operative in dependence on the vibration signal to record a duration of vibration of the hand held tool”; and “an RFID interface operable to actuate the RFID tag”. I shall discuss the contentious issues of construction of the Patent when I come to consider infringement.

The defender's devices

Curo Plus

[49] The Curo Plus is a device which assesses vibration. It has a small portable monitor which may be carried by a tool user from one tool to another. A mount (alternatively described as a holster) is fixed to the tool. The monitor is attached to the mount when the tool is to be used and it is released when the user moves on to another tool. A sensor in the monitor detects vibration when the tool is used and a timer in the monitor measures the duration of that vibration. It is common ground that a passive RFID tag within the mount contains information relating to the tool including information on vibration. This information includes the pre-stored vibration magnitude of the tool. The information on the tag is communicated to the monitor by RFID technology, allowing the monitor to use the pre-stored vibration magnitude for the tool and the duration of vibration to calculate vibration exposure. The monitor displays accumulated vibration exposure in terms of HSE points.

Q2

[50] The Q2 measures vibration magnitude. It has a small portable monitor which may be carried by the tool operator from one tool to another. A mount is fixed to the tool. The monitor is attached to the mount by the operator when the tool is to be used, and it is released by him when he moves on to another tool. There are two tri-axial accelerometers in the monitor, and one of them (which one depends upon whether HAV or WBV is measured) measures vibration magnitude in real time when the tool is in use. The passive RFID tag in the mount contains (i) the tag's unique identification number; (ii) whether the vibration to

be measured is HAV or WBV; and (iii) a scaling factor (if one is used) to take account of the fact that the accelerometers are not optimally placed at the gripping point on the tool. The RFID interface in the monitor reads the tag. The Q2 then cross-references the tag number with the tool information stored in its Cloud-based Class Library software. The vibration magnitude measurements made by the accelerometers are averaged every 60 seconds to arrive at the average magnitude for that minute. That is then converted to HSE vibration exposure points (using the average magnitude for the minute and taking the minute as the duration of vibration exposure). The monitor displays the operative's cumulative exposure points as the day progresses.

Infringement of claim 1: Curo Plus

Introduction

[51] The defender maintains that the Curo Plus does not have two essential integers of claim 1 of the Patent. First, that it is not a "hand held tool monitoring apparatus". Second, that it does not comprise "an RFID interface operable to actuate the RFID tag when the monitoring component is received in the mount".

Hand held tool monitoring apparatus?

[52] Dr Harper, Dr Povey, Dr Brown, Mr Worthington and Mr Jones gave evidence as to what the term "hand held tool monitoring apparatus" would teach the skilled addressee.

[53] Dr Brown opined (at paragraph 56 of his report) that the skilled addressee (in his view, an electronic engineer) would appreciate that the term had no special technical meaning. In his view, the skilled addressee would have understood the term to refer to HAV monitoring apparatus (paragraph 58). He explained that he held that opinion because

he “was most aware of the harmful injury referred to as ‘vibration white finger’ logically due to the use of a handheld tool, but not the effects of whole-body vibration”, and because HAV and WBV were quite different. It followed in his view that the skilled person would have understood that the apparatus would use the formula for HAV in the 2005 Regulations rather than the formula for WBV in those regulations. In cross-examination he agreed that he had no knowledge or experience of exposure to WBV. He also agreed that para [0083] of the specification indicated that the expression hand held tool was not restricted to tools coming into contact with the operator’s hand.

[54] Mr Worthington’s reading of the Patent was that it related entirely to monitoring vibration from hand held tools and that it taught devices intended for monitoring HAV rather than WBV. In cross-examination he accepted that paras [0033]-[0036] and [0041] of the specification were consistent with monitoring for WBV. He suggested that, alternatively, the option of selecting and using the dominant axis might have been provided to permit HAV measurement in accordance with a superseded standard (which had used a single axis for measurement of HAV) because such measurements might be used in litigation about historic exposure. He agreed that the extended definition of hand held tool in para [0083] could mean that the expression included tools producing WBV. In re-examination he stated that ultimately para [0083] did not change the views which he had expressed in his report. He adhered to those views.

[55] In paragraph 42(a) of his witness statement Mr Jones opined that the Patent teaches a dedicated hand held tool monitoring apparatus which is configured to calculate HAV using the equation for calculating HAV set out in the 2005 Regulations.

[56] Both Dr Harper and Dr Povey were of the opinion that the skilled team would understand that the Patent taught a monitoring apparatus which could be used to monitor

either HAV or WBV. It would have been obvious to the skilled team that the apparatus described could be used to monitor either. All that would be required was different programming to reflect the different regulatory requirements for, and the different frequencies of, HAV and WBV. In their view it would have been clear to the skilled team from the definition in para [0083] that the expression hand held tool was not confined to a tool producing HAV but also included a tool producing WBV. Dr Harper also observed that the skilled team would have understood from paras [0031]-[0033], [0041], and from claim 8 that the references to selecting and using the dominant axis contemplated measurement of WBV.

[57] The defender submitted that the Curo Plus was not a “hand held tool monitoring apparatus” because it was suitable for monitoring both HAV and WBV. Thus, so the argument ran, on a proper construction claim 1 is restricted to devices which only have capability for monitoring HAV. It is expressly limited to hand-held tools. If the draftsman had intended to cover devices for monitoring WBV that limitation would not be there. The Patent consistently referred to hand held tools and it described the invention as a hand held tool monitoring apparatus. It contained no reference whatsoever to WBV. It focussed throughout on HAV. The scope of a patent was determined by the language of the claims. The description and specification of a patent were merely part of the context in which the claims were construed (*Improver Corp v Remington Consumer Products* [1990] FSR 181, Hoffmann LJ at page 190; *Glaverbel SA v British Coal Corp (No 4)* [1995] RPC 255, Staughton LJ at page 269). The passages in the specification which were said to point towards the invention being used to monitor WBV could not be used to extend the scope of protection of the claim. In any case, those passages could properly be understood to refer to HAV. Para [0083] could not be used to extend the meaning of the term “hand held tool” in

claim 1. Anyhow, on a proper construction, para [0083] merely indicated an intention to cover other forms of tool that were not strictly hand held but that nonetheless generated HAV. Paras [0033]-[0035] did not suggest otherwise. While at the priority date the preference was for HAV to be measured on three orthogonal axes, whereas WBV was measured on the dominant axis, there were circumstances in which HAV measurement on a single axis might have been made. The earlier version of the HAV standard (ISO 5439:1986) had provided for measurement on the dominant axis. Accordingly the facility to measure on one axis might have been used to check historical compliance in the context of litigation. The facility also allowed for the possibility of subsequent change in the standard, and for sale in foreign jurisdictions where different regulatory considerations applied. ISO 5439:2001 recognised that sometimes it may not be possible to measure vibration on three axes, and in those circumstances measurement on one or two axes was permitted with a multiplying factor being applied to the axis of greatest vibration. Moreover, there were indications in paras [0112] and [0133] of the use of a primary vibration axis to detect when vibration had begun - another use of a single axis which was not related to WBV monitoring. It was significant that until the pursuer's solicitors drew para [0083] to the attention of Dr Harper and Dr Povey neither had considered that the Patent dealt with WBV.

[58] For its part the pursuer maintained that para [0083] was not a gloss on the claims. It provided a defined meaning of "hand held tool" which required to be applied when construing the claims. Reference was made to *Kirin-Amgen Inc v Hoechst Marion Roussel Ltd* [2005] RPC 9, [233]. The references in paras [0029]-[0036], [0041] and claim 8 would have been understood by the skilled team to relate to WBV. The references to the use of a single axis would have been understood as relating to WBV. The suggestion that the skilled team would have read them as referring to the possibility of carrying out HAV measurements

under a superseded regime for litigation purposes was fanciful. The skilled team would have been interested in the current regime, not a superseded one. While it was true that ISO 5349:2001 recognised that in some circumstances use of a single axis might be necessary, para [0041] envisaged a choice rather than making do with what was available.

[59] I require to give the claims a purposive construction, adopting the mantle of the person skilled in the art. The best guidance as to how the skilled person would understand the teaching of the claim is likely to come either from Dr Harper and Dr Povey or from Dr Brown. Each of those witnesses is qualified to give opinion evidence on that matter. Mr Worthington and Mr Jones are not. I attach no weight to the evidence of the latter two witnesses on this point because of that. In any case, I did not find their reasoning to be convincing.

[60] I turn then to Dr Brown's evidence. I did not find the reasons which he gave for reaching the conclusion which he did on this issue to be persuasive. In my view they did not adequately address the relevant issues. He did not have any satisfactory response to the proposition that para [0083] provided a definition which was inconsistent with his view. He did not deal at all with the other provisions which tend to undermine his view and support the view of Dr Harper and Dr Povey.

[61] In contrast, each of Dr Harper and Dr Povey were able to explain and support their views in a satisfactory and persuasive way.

[62] I am satisfied that it would have been obvious to the skilled team that the device described in claim 1 could be used to measure HAV or WBV. In my opinion there is no escaping that para [0083] provides a definition of "hand held tool" which is to be applied when construing the claims. I reject the suggestion that it merely indicates an intention to cover other forms of tool that are not strictly hand-held but that nonetheless generate HAV.

[63] The evidence of Dr Harper and Dr Povey was of considerable assistance in elucidating what the Patent would teach the skilled addressee. I am satisfied from their evidence that the skilled team would have appreciated that the obvious implication of para [0031]-[0036], para [0041], para [0083], and claim 8 was that measurement of WBV was contemplated. I reject the suggestion that the skilled team would have understood that the facility to select and measure on a single axis envisaged measurement of HAV for litigation purposes by reference to a superseded standard. I think that is a contrived and fanciful construction. In my opinion the skilled team would have been focussed on prospective use at the priority date and the regulatory regime and standards which were current at that time.

[64] In any case, even if, contrary to my view, "hand held tool" means a tool producing HAV and "hand held tool monitoring apparatus" means an apparatus which monitors tools producing HAV, it would not have followed that the Curo Plus is not a hand held tool monitoring apparatus. In my opinion an apparatus which can be used for monitoring hand held tools for HAV is a "hand held tool monitoring apparatus" whether or not it is also capable of monitoring for WBV. On a proper construction of the Patent, and in particular of claim 1, it is not a condition of an apparatus being a "hand held tool monitoring apparatus" that it must not also be capable of WBV monitoring. It was not in dispute, and it is clear on the evidence, that one of the functions of the Curo Plus is monitoring of hand-held tools for HAV.

[65] It follows that I am satisfied that the Curo Plus is "a hand held tool monitoring apparatus" within the terms of claim 1.

RFID interface operable to actuate the RFID tag when the monitoring component is received in the mount?

[66] Claim 1 of the Patent teaches that “the mount contains a passive Radio Frequency Identification (RFID) tag holding information relating to the hand held tool”; and that

“the monitoring component...further comprises an RFID interface...operable to actuate the RFID tag when the monitoring component is received within the mount...and to receive the information relating to the hand held tool ...from the RFID tag.”

[67] The defender submitted that the claim teaches that the RFID interface must prompt the RFID tag to do something. Where, as with the Curo Plus, an interface does no more than read data on a passive tag, it could not sensibly be said that the interface is operable to “actuate” the tag.

[68] The pursuer submitted that on a proper construction of claim 1 it teaches that the RFID tag would remain passive but that it would be read by the RFID interface. The interface being “operable to actuate” the tag envisaged that the interface’s activity resulted in the information on the tag being capable of being read by the interface and, in that way, communicated to it. The operation taught by the claim was a description of the way in which a passive RFID communication system operated. The Curo Plus operated in that way.

[69] Dr Harper observed that claim 1 made clear that the RFID tag was to be passive. That was the context in which the skilled addressee would have understood the teaching of the expression “an RFID interface operable to actuate the RFID tag”. He would have appreciated that the word “actuate” was used figuratively, and that it was the RFID interface which was active with the tag remaining passive throughout. The interface illuminated the tag with RF energy with the result that the energy was radiated back in a

modified pattern enabling the information on the tag to be read by the interface. That process was functionally identical to the process which occurred with the Curo Plus.

[70] The only evidence to the contrary came from Mr Jones (at paragraph 42(b) of his witness statement and in oral evidence). Mr Jones acknowledged that he had no expertise in RFID technology. He did not dispute Dr Harper's explanation of the RFID communication process which took place with the Curo Plus. However, he disputed that the RFID interface was operable to actuate the RFID tag. In his view, since in the Curo Plus the tag remained passive throughout it could not be said that the interface was operable "to actuate" the tag. At one point in oral evidence he suggested that on a proper construction of the integer it claim 1 it taught an RFID communication process in which the RFID tag did not remain passive. Ultimately, he acknowledged that the RFID communication process which claim 1 teaches is a paradigm of the process which occurs where a passive RFID tag is read.

[71] Once again Mr Jones' evidence is opinion evidence. He is not qualified to proffer an opinion on how the skilled reader would understand what the disputed expression taught. So while the relevant part of his witness statement was not objected to, I am not persuaded that I ought to give the evidence any weight. In any case, I find Dr Harper's evidence on the point coherent and convincing.

[72] I require to construe the disputed term in context, adopting the mantle of the skilled addressee. In my opinion it would be wrong to construe "actuate" literally. Given the context of a passive RFID tag, in my opinion it would be plain to the skilled team that "actuate" did not connote that the tag became active. In my view, on a proper construction the disputed phrase describes the normal process of an active RFID interface interacting with a passive RFID tag. That is the process which is present in the Curo Plus.

Conclusion on infringement of claim 1 by the Curo Plus

[73] It follows in my opinion that if claim 1 is valid the Curo Plus infringes the claim.

Does the Curo Plus also infringe dependent claims?

[74] When it came to closing submissions the pursuer restricted its case of infringement of dependent claims to claims 2, 4, 6, 7 and 9. Subject to its arguments in relation to invalidity, the defender accepted that if the Curo Plus infringed claim 1 then claims 6 and 9 were also infringed; and that if it infringed claims 1 and 2, then it also infringed claim 4.

Claim 2

[75] The contentious issue is whether the mount and the monitoring component of the Curo Plus are configured to be detached from each other by a single manual operation by a user. The mount has two rigid raised lips which curve inwards (see the photograph in JB 51). The monitor (7/30 of process) has two wing components which are very slightly flexible. Each wing component has a rectangular "button" section which is about 1cm long and about 4mm wide. Below the button section there is a slight indent of about a millimetre or so, and beneath that there is a protruding lip about 2mm wide. When the button sections are pressed each wing section (and in particular, the lip) moves slightly inwards. When the monitor is being attached to the mount the operator presses the buttons and places the lips of the wing sections under the raised lips of the mount. When the buttons are released the raised lips are held securely in the indents with the lips of the wing sections firmly underneath them. In order to remove the monitor from the mount the process is reversed. The button sections are depressed causing the wing sections to move slightly inwards, with

the result that while the buttons remain depressed the monitor is no longer fastened in place against the raised lips of the mount and it can be pulled free.

[76] Mr Jones' evidence was that two manual operations are needed to remove the monitor, the first to press the wing buttons to unfasten it and the second to pull it away from the mount.

[77] Dr Harper's evidence was that once the wing sections were depressed the component was no longer attached to the mount. It was free to be taken away. In any case, in his opinion the process of pressing the buttons and removing the component could be done with one hand. In his view the skilled addressee would have understood that to be within the claim's teaching of a single manual operation.

[78] The integer at issue requires to be construed purposively having regard to how the skilled team would understand its teaching. Dr Harper is better placed than Mr Jones to provide an insight into the skilled team's understanding.

[79] In the present context, I think that a manual operation is a process performed by hand. The integer envisages detachment by a single process performed by hand. In my view that is not necessarily the same as a single movement. Some examples of single manual operations are provided in claim 3. One of those is twisting. Where something is untwisted that is a single manual operation, but more than a single manual movement is likely to be required. In Dr Harper's view the skilled team would consider that the single manual operation taught by the claim was apt to include the process of release and removal required to detach the Curo Plus monitor from its mount. That strikes me as unsurprising. The manual process is a simple one involving near simultaneous pressing and pulling. I think it would be artificial to describe it as two separate manual operations. It follows that in my opinion, subject to the invalidity argument, the Curo Plus infringes claim 2.

Claim 7

[80] The issue is whether the hand held tool information in the Curo Plus “comprises a predetermined vibration dosage rate”. It was common ground that the information held by the Curo Plus was a predetermined vibration magnitude. Since that was not the same thing as a predetermined dosage rate, Mr Jones maintained that an essential integer of claim 7 was absent. Dr Harper disagreed. He explained that the skilled team would appreciate that vibration dosage rate was simply the square of vibration magnitude. It would be obvious to convert the magnitude rate to the dosage rate. In effect, the Curo Plus did this because it used the HSE points system. Under that system the square of vibration magnitude was multiplied by trigger time.

[81] In my view the integer at issue ought to be construed purposively having regard to how the skilled team would understand its teaching. Once again, Dr Harper is better placed than Mr Jones to provide guidance on that teaching. I am satisfied that the skilled team would understand that storage of a predetermined magnitude or a predetermined dosage rate would be effectively the same thing, because the one could readily be ascertained from the other as a simple matter of arithmetic. In those circumstances, construing the claim purposively, in my opinion “a pre-determined dosage rate” includes a pre-determined dosage magnitude. Accordingly, the Curo Plus infringes claim 7.

Conclusion in relation to the dependent claims

[82] It follows that, subject to the invalidity argument, the Curo Plus infringes claims 2, 4, 6, 7 and 9.

Infringement of claim 1: Q2

[83] The defender maintains that the Q2 does not have four essential integers of claim 1 of the Patent. Two of those integers are the integers which the defender claims are absent in the Curo Plus, *viz* that it is not a “hand held tool monitoring apparatus” and that it does not have “an RFID interface operable to actuate the RFID tag when the monitoring component is received in the mount”. In those respects the same arguments were advanced *mutatis mutandis* by the defender in relation to the Q2. They fall to be rejected for the same reasons. In relation to these matters the relevant circumstances of the Curo Plus and the Q2 do not differ in any material respect.

[84] The other integers which the defender says that the Q2 does not have are: “the timer being operative in dependence of the vibration signal to record a duration of vibration of the hand held tool”; and that the RFID tag does not hold “information relating to the hand held tool including information on vibration”.

Timer being operative in dependence of the vibration signal to record a duration of vibration of the hand held tool

[85] The Q2 has a Real Time Clock (“RTC”) which operates continuously. When the monitor is put on the mount the RTC logs the time. It also logs the time that the monitor is removed from the mount. The microprocessor in the monitor has two modes - active and inactive. When in active mode an accelerometer in the monitor detects vibration and a signal is sent to the microprocessor which measures the vibration magnitude of the signal. Any vibration magnitude of more than 1m/s^2 is measured. 1m/s^2 is a negligible vibration magnitude. A tool being picked up would be likely to generate at least that level of vibration. At the end of each second a value for vibration magnitude during that second is

recorded as “VibSec” data. Every 60 seconds these readings are accumulated. The average magnitude over the 60 seconds is calculated and is converted to a vibration exposure. The seconds and minutes are timed by the RTC.

[86] In Mr Holmes’ view the Q2 does not contain a vibration timer. Nor did he understand there to be a timer function in its software. He clarified that the Q2 does not use the HAV or WBV formulae (set out in the 2005 Regulations) to calculate vibration exposure. Instead, it uses the HSE exposure points look up tables (there are separate tables for HAV and for WBV) to obtain the operator’s vibration exposure. He agreed that in order to use either table it was necessary to have (i) a figure for a tool’s vibration magnitude; and (ii) the time period for which the operator was exposed to vibration. He also confirmed that the active mode of the Q2’s monitor was operative in dependence of a vibration signal.

[87] The Q2 uses the average vibration magnitude over each 60 seconds and a duration of exposure of a minute in order to obtain a points figure from the relevant table for the vibration exposure for that period. That points figure is recorded in a Minute Tool Log. At that point the VibSec data is discarded. The Q2 holds an accumulative score for a tool (wDoseTool) which is calculated every minute that the monitor is on the mount and a daily accumulated score for the user is also calculated every minute.

[88] Where vibration magnitude has not exceeded 1m/s^2 in every second for 60 seconds the accelerometer goes into standby mode and the microprocessor goes into inactive mode. However, the RTC wakens the microprocessor every 60 seconds. If at that time the vibration magnitude is less than 1m/s^2 the Q2 records a reading of zero vibration magnitude in the Minute Tool Log. The inactive mode is an energy saving feature. It prevents battery life being wasted collecting data on negligible levels of activity.

[89] While the VibSec data is discarded at the end of each minute, it would be possible to retain it. However, the Q2 microprocessor would require a larger memory in order to store 10 hours of VibSec data. The “next size up” of microprocessor would be needed (an ARM3 or an ARM4 rather than the present MSP430FR5944). Since the larger microprocessor would use more battery power when on standby, the Q2 would have to be redesigned to incorporate a larger battery.

[90] The non-zero entries in the Minute Tool Log show the number of minutes in a day during which a tool produced vibration magnitude of more than 1m/s^2 . However, they do not disclose the number of seconds within each minute that vibration magnitude above that level was recorded. Accordingly, particularly where a tool was not used continuously, the number of minutes in a day in which a tool was used was likely to be greater than the duration of the period when the tool was actually producing vibration.

[91] Dr Harper stressed that with any vibration monitoring device the duration of vibration had to be known, for two reasons. First, both vibration duration and vibration magnitude were needed in order to calculate vibration exposure. The HSE points system required both. Second, in terms of ISO 5439:2001, Part I, paragraph 6, the information to be reported included “the total daily duration for each operator”. Dr Harper was of the view that in the Q2 there was timed acquisition of vibration data which was dependent on the vibration signal. The Q2 does not record vibration unless and until the vibration magnitude exceeds 1m/s^2 . When vibration magnitude is below 1m/s^2 , and when the microprocessor is in sleep mode, the Q2 does not record vibration data - it merely records an arbitrary nil reading. The fact of the matter was that when a tool was used so that vibration was produced the vibration magnitude and the times it occurred were recorded. In Dr Harper’s opinion the Minute Tool Log entries with positive readings were a record of the duration of

vibration. For the purposes of calculating HSE exposure points the Q2 treated each minute as being the relevant period of duration of vibration. The VibSec data also recorded the duration of vibration. There was vibration each second that a reading above 1m/s^2 was recorded. If the data had not been discarded at the end of each minute the total number of seconds in which there were such readings could have been added together to give a more accurate duration of vibration than could be discerned from the Minute Tool Log. Whether one had regard to the Minute Tool Log or the VibSec data, the fact was that the commencement and cessation of vibration of the tool were timed and durations of vibration were recorded.

[92] Dr Povey explained that there are a variety of ways to implement a timer function. The most obvious was to start and stop a timer. In his view the Patent also envisaged the possibility of a timing function being implemented by a microprocessor (paras [0059] and [0098]). He considered that there is a timer function inherent in the Q2's system for capturing vibration data. The data was recorded every second that there was vibration above 1m/s^2 . It was accumulated every 60 seconds. Each minute in which there was vibration was treated as a duration of exposure, and the total exposure was obtained by aggregating the minutes of exposure.

[93] In Dr Povey's view the Patent made provision for a vibration monitoring device being either an assessment device or a measuring device. If the skilled team had sought to implement the Patent at the priority date by creating a measurement device, it would have been normal to use a system which incorporated a microprocessor, and analogue measurements from a sensor would be digitised using an analogue-to-digital converter prior to being processed. That would be a sampled system. The measurement would take the form of a digital amplitude value which was considered constant for the duration of the

sample period. With a sampled system there was no need to measure trigger time. The total vibration time did not need to be measured directly because it was easily determined by multiplying the number of non-zero samples (ie those where vibration exceeded a threshold). The timer function was implemented indirectly by the microprocessor. In Dr Povey's view it was just such a sampled system which has been implemented in the Q2. The threshold was vibration above 1m/s^2 , otherwise zero was assumed. The samples were accumulated to obtain vibration exposure and the duration of exposure. The Minute Tool Log showed the total duration of vibration. It might not be an entirely accurate indication of the actual time when the tool was vibrating because there may have been minutes when the tool was used for only part (or parts) of a minute. However, the VibSec data had provided a more accurate indication of the duration of vibration. It had shown the number of seconds during which there had been vibration above the threshold level. While the Q2 discarded the Vibsec data at the end of each minute, it would have been possible to preserve it graphically or numerically.

[94] Dr Brown's view was that the skilled person would have understood "a timer operative in dependence on a vibration signal" to teach a timer which started when it detected a vibration signal of sufficient magnitude and stopped when it ceased to detect such a signal, and which recorded the duration of vibration. That was the ordinary meaning of the words used - they had no special technical meaning. The Q2's RTC was not operative in dependence on a vibration signal. It ran constantly. It did not stop and start in correlation with a vibration signal. In cross-examination he agreed that once vibration started measurements were taken in dependence on the vibration signal.

[95] At paragraphs 45 and 46(d) of his witness statement Mr Jones stated that the Q2 does not measure a duration of vibration using a timer operative in dependence of a vibration

signal, but takes real time measurements at fixed time intervals (32,500 times per minute).

At paragraphs 29 and 31 of his rebuttal witness statement he repeated that the Q2 has no timer which switches itself on when vibration is sensed and which records the duration of vibration. Instead, the Q2 accumulates very many exposure measurements and uses the HSE look up tables to arrive at vibration exposure dosage.

[96] It is clear on the evidence that the Q2 does not contain a timer in the sense of a separate physical component part of the apparatus, or a discrete software function.

However, in my opinion that is not determinative of the present issue if on a purposive construction of the integer "timer" has a broader meaning.

[97] Dr Brown's opinion on what the integer teaches strikes me as being based on an overly-literal reading of it. In my view he focused unduly upon the operation and function of the RTC. Moreover, unlike Dr Harper and Dr Povey, he did not grapple with or analyse the way in which the duration of vibration is in fact measured and recorded by the Q2.

[98] I agree with Dr Harper and Dr Povey that the skilled team would have appreciated that, where the Patent was to be implemented to create a measuring device, a timing function which operated indirectly could be a "timer" within the meaning of the integer. The team would have been aware that a sampled system could be used; that that would involve vibration over a threshold being measured over timed sample periods, with vibration exposure being calculated by reference to the product of the magnitude during the sample period(s) and the duration of the sample period(s). The team would have understood that with a sampled system a conventional "trigger" timer was unnecessary because the duration of vibration would be the sum of the sample periods where vibration magnitude exceeded the threshold. It would have appreciated that there was an indirect

timing function inherent in the recording of those sample periods. It would have understood the teaching of the integer to include such an indirect timing function.

[99] In my opinion, construing the integer purposively, “a timer operative in dependence of a vibration signal” includes such an indirect timing function. I accept that there is indeed in the Q2 an indirect timing function inherent in the sampling system used, and that a consequence of that timing function is that a duration of vibration is recorded by the Q2’s microprocessor. The active mode of the Q2’s monitor is operative in dependence of a vibration signal. Vibration magnitude is recorded in the VibSec data. It matters not that the defender has chosen to accumulate that data every 60 seconds and retain only the accumulated value for the minute, discarding the VibSec when that is done. The defender decided that it was sufficient for its purpose (calculating HSE exposure points) to use the accumulated vibration magnitude for each minute and to treat the duration of exposure as a minute. In my opinion the issue is not whether it is possible to envisage a more accurate or reliable method of recording the duration of vibration. The issue is whether the Q2 has a timer operative in dependence of a vibration signal to record a duration of vibration. In my view it does. The Minute Tool Log is a record of the duration of vibration and (before it was discarded) the VibSec data was a record of the duration of vibration.

Information relating to the hand held tool including information on vibration

[100] It is clear on the evidence that the RFID tag in the Q2’s mount contains (i) a unique number identifying the tag (“the tag ID”); (ii) information as to whether the monitor is programmed to detect HAV or WBV; and (iii) a scaling factor which is used to adjust the vibration recorded to take account of the fact that it is not being monitored at the grip point on the tool, but at a sub-optimal point some distance from the grip point.

[101] Mr Jones' evidence (witness statement paragraph 46(c) and rebuttal statement paragraphs 18, 19 and 23-25) was that none of the information on the tag was "information relating to a hand held tool including information on vibration". The tool information was not in the Q2, it was in the Cloud Class Library database. In his opinion, whether HAV or WBV was to be measured was not information on vibration. He also suggested that the Patent was concerned only with hand held tools and HAV, and therefore the skilled team would not have contemplated that information about whether HAV or WBV was to be measured would be "information on vibration".

[102] Mr Holmes described the tag ID as being a key to information in the Cloud Class Library - the tag could be used to identify the tool make and model.

[103] In paragraph 63 of his report (ERB 7) Dr Brown described the tag ID as "being used to identify the tool to which the mount is attached". He stated that the data on the tag indicating whether HAV or WBV was to be monitored and the scaling factor "are unrelated to vibration attributes of the handheld tool or other vibrating equipment to which the mount is attached". Since in his view the notional person would understand the Patent to teach an apparatus which was only to be used to monitor hand held tools for HAV, that person would not understand the HAV/WBV data on the tag to be information on vibration. In terms of the Patent, monitoring for HAV was a given. As already noted, in cross-examination he acknowledged that para [0083] of the specification appeared not to restrict the invention to monitoring hand held tools for HAV. He confirmed that the information on the tag was used to identify the tool. He also accepted that "in a way" the scaling factor was indeed information about vibration.

[104] Dr Harper and Dr Povey were of the view that the skilled person would regard the tag ID as being a means of identifying the tool. They saw no real difference between tool

identification details being on the tag and tool details being identifiable from the tag ID using the Cloud Class Library database. In their view the skilled team would understand both approaches to fall within the teaching of the integer.

[105] Dr Harper and Dr Povey also thought that the skilled team would regard whether the monitor is programmed to detect HAV or WBV to be information relating to the tool which is also information on vibration. Dr Povey also considered that the scaling factor was information on vibration relating to the tool.

[106] The integer requires to be given a purposive construction, adopting the mantle of the skilled team. In my opinion "information relating to the hand held tool" includes information such as the tag ID. It is clear on the evidence that, given that the tag ID unlocks information relating to the tool in the Cloud Class Library, the skilled team would regard it as being information relating to the hand held tool. In my view Dr Brown's evidence is consistent with that conclusion.

[107] In any case, in my opinion "information on vibration" has a wide meaning. In my view it is apt to include both the HAV/WBV data and the scaling factor. I accept the evidence of Dr Harper and Dr Povey as to what the skilled team would consider the words "information on vibration" taught. Dr Brown's contrary opinion in relation to the HAV/WBV data was based on the false premise that the skilled team would understand that the claimed apparatus was only ever intended to be used to monitor HAV. In relation to the scaling factor, Dr Brown's concession in cross-examination undermined the evidence which he gave in his report (which evidence was, in any case, somewhat terse and lacking in satisfactory explanation). The scaling factor is particular to the tool. It indicates the amount by which vibration must be increased or reduced to get an accurate evaluation.

[108] While the relevant parts of Mr Jones' evidence relating to these matters were not objected to, they were opinion evidence which he was not qualified to give. I attach no weight to that evidence for that reason. In any case, I did not find it to be persuasive.

[109] Accordingly, the RFID tag in the Q2 contains information relating to the hand held tool including information on vibration.

Conclusion in relation to claim 1

[110] It follows that in my opinion, subject to the arguments on validity, the Q2 infringes claim 1.

Does the Q2 also infringe dependent claims?

[111] When it came to closing submissions the pursuer restricted its case of infringement of dependent claims to claims 2, 4, 6, 8 and 9. Subject to its arguments in relation to invalidity, the defender accepted that if the Q2 infringed claim 1 then claims 6 and 9 were also infringed.

Claim 2

[112] The contentious issue is whether the mount and monitoring component of the Q2 are configured to be detached from each other by a single manual operation by a user. The mount has two rigid buttons which protrude. The monitor (7/31 of process) has a circular recess which is designed to fit over the mount. The mechanism of attachment between the two resembles that between the base of a bayonet light bulb (the mount) and a light fitting (the recess in the monitor) (see the photographs in JB 70 and JB 79) (although, unlike the insertion and removal of a light bulb, here it is the component equating to the light fitting

which is attached and detached). To attach the monitor it is aligned over the mount's buttons, pressed down and rotated. To remove the monitor it is pressed down, rotated, and pulled free. The pressing, rotating and pulling are all done with the same hand in quick succession.

[113] Mr Jones' evidence was that three manual operations are needed to remove the monitor, the first to press down on the monitor, the second to turn it, and the third to lift it from the mount.

[114] Dr Harper's evidence was that the skilled team would consider that detachment using a single manual operation includes the sort of operation required to remove the Q2 from the mount. The team would consider that the process of pressing down, turning and removing was a single manual operation. It is done swiftly with one hand in much the same way as a bayonet light bulb is removed from a light fitting in a single manual operation. Mr Jones' view was that it was not a single manual operation.

[115] The integer at issue requires to be construed purposively, and the court requires to adopt the mantle of the skilled team. As before, Dr Harper is better placed than Mr Jones to provide an insight into how the skilled team would understand the teaching of the claim.

[116] In my view, as already indicated, the integer envisages detachment by a single process performed by hand, which is not necessarily the same as a single movement. In Dr Harper's view the skilled team would consider that the single manual operation taught by the claim was apt to include the process of release and removal required to detach the monitor from its mount. That does not surprise me. The manual process is a simple one involving depression, turning and lifting of the monitor, all carried out by the same hand. There are three hand movements, but I think it would be artificial to say there is more than a

single manual operation (just as I think it would be artificial to describe the removal of a bayonet light bulb from a light fitting as involving more than a single manual operation).

[117] It follows that, subject to the invalidity argument, the Q2 infringes claim 2.

Claim 4

[118] In part, claim 4 is dependent on claim 2. However, the defender also maintains that a further essential integer is not satisfied *viz* “the mount defines a recess configured to receive a part of the body of the monitoring component”. It is clear that in the Q2 there is no such recess on the mount, but there is a recess on the monitor which is configured to receive a part of the body of the mount. If it was simply a matter of interpreting the claim in accordance with the ordinary rules of construction it would not have been infringed.

However, the pursuer maintains that it can rely upon the doctrine of equivalents.

[119] In Article 19 of condescence the pursuer averred that the location of the recess in the monitor and the mount does not materially affect the operation of the apparatus, and that that would have been obvious to the skilled team at the priority date.

[120] Dr Harper’s evidence (paragraph 166 of ERB 1) was that the fact that the recess was in the monitor rather than the mount was not significant. In his view the change did not materially affect the operation of the apparatus. The skilled person would know that the purpose of the recess was to allow the monitor to be firmly fixed to the mount. It would be obvious that the same end could be achieved by many physical designs including the one used in the Q2.

[121] The pursuer maintained that all the requirements for application of the doctrine of equivalents were satisfied. In particular, there was nothing in the Patent which suggested that strict compliance with the specified positioning of the recess was a requirement of the

invention. An over-restrictive interpretation was to be eschewed (*Actavis UK Ltd v Eli Lilly & Co* [2017] RPC 21, Lord Neuberger PSC at [71]). The function of the recess was described in paras [0019] and [0020] of the specification. It was just a question of the monitor and the mount fitting into each other. The variation in Q2 in respect of the feature described in the claim was immaterial.

[122] The defender submitted that the pursuer's pleadings were not apt to entitle it to make a case based on the doctrine of equivalents. It had not averred that the skilled team would have understood the limitation to be optional. It merely averred that it would have been obvious to the skilled team that nothing turned on the position of the recess. In any event, the requirements for the application of the doctrine had not been established. Under the doctrine infringement can occur where, although a product does not infringe as a matter of purposive interpretation, it varies from the patented invention in a way or ways that are immaterial: *Actavis UK Ltd v Eli Lilly & Co, supra*, [54]. However, infringement under the doctrine depends on three further questions (*Improver Corp v Remington Consumer Products Ltd, supra*, at page 189, as recast in *Actavis UK Ltd v Eli Lilly & Co*, [66]:

“(i) Notwithstanding that it is not within the literal meaning of the relevant claim(s) of the patent, does the variant achieve substantially the same result in substantially the same way as the invention, i.e. the inventive concept revealed by the patent?

(ii) Would it be obvious to the person skilled in the art, reading the patent at the priority date, but knowing that the variant achieves substantially the same result as the invention, that it does so in substantially the same way as the invention?

(iii) Would such a reader of the patent have concluded that the patentee nonetheless intended that strict compliance with the literal meaning of the relevant claim(s) of the patent was an essential requirement of the invention?

In order to establish infringement in a case where there is no literal infringement, a patentee would have to establish that the answer to the first two questions was ‘yes’ and that the answer to the third question was ‘no’.”

Here question (iii) ought to be answered in the affirmative. The skilled team would not have understood the scope of the Patent's protection to extend to "the opposite" of what was claimed in claim 4. Rather, the team would have been unable to discern any reason for including the limitation. It would have been unable to decide that the limitation could not have been intended by the patentee: *R v Telsonic AG's Patent* [2004] RPC 38, at [50]-[55]; *Societe Technique de Pulverisation (STEP) v Emson Europe Ltd* [1993] RPC 513, Hoffmann LJ at page 522. The team would have assume that the limitation was intentional, for whatever reason.

[123] In light of Article 19 of the summons and the terms of Dr Harper's report I consider that the pursuer gave sufficient notice of this line of argument. No objection was taken to Dr Harper's evidence. I think that the merits of the argument require to be considered.

[124] In my judgment reformulated *Improver* questions (i) and (ii) each fall to be answered in the affirmative. I did not understand the defender to dispute that. While the recess/insert arrangement is the reverse of the configuration in the claim, in my view it achieves substantially the same result in substantially the same way as the invention. The essence of this aspect of the claim is that the monitor and mount should be configured so that they are physical integrated when the monitor is releasably attached, with part of one of the components penetrating the other component. In my opinion it would have been obvious to the skilled team that the variant achieves substantially the same result in substantially the same way as the configuration in the claim.

[125] Question (iii) was where battle lines were drawn. I am satisfied that question (iii) falls to be answered in the negative. In my view the requirement for a recess in the mount is not part of the inventive core of the invention. The reversal of the positions of recess and insert is not a material variation. The configuration described in the claim and the variant

both involve the monitor being physical integrated when releasably attached to the mount, with part of one of the components penetrating the other component. The defender's argument attaches too much weight to the literal wording of the claim and not enough weight to Article 2 of the Protocol. I see no plausible reason why a rational patentee would have wished to limit the scope of protection of the claim to the case where a recess in the mount received a part of the body of the monitor and to exclude from the scope of the protection the reverse arrangement. In my opinion it is very unlikely that the skilled team at the priority date would have concluded that the patentee intended that.

[126] It follows that, subject to the invalidity argument, the Q2 infringes claim 4.

Claim 8

[127] The issue here is whether the hand held tool information "comprises vibration axis information regarding which measurement axis or combination of axes is to be used for measurement or detection of vibration". On the evidence it was clear that the RFID tag indicated whether HAV or WBV was to be monitored. It was also common ground that the Q2 could be used to monitor either HAV or WBV. Dr Harper dealt with this matter at paragraphs 51 to 55 of his supplementary report (ERB 2). His evidence was that any method used for measuring WBV exposure by measuring acceleration must include information as to how the axes of measurement are aligned with respect to the exposed person. It followed in his view that the Q2 must have information as to which axis or combination of axes is to be used. As a matter of logic, that appears to me to be correct. Accordingly, subject to the invalidity argument, the Q2 infringes claim 8.

Conclusions on infringement of dependent claims

[128] It follows that if the Patent is valid the Q2 infringes claims 1, 2, 4, 6, 8 and 9.

Invalidity on the ground of obviousness?

Introduction

[129] A patent may be revoked if the invention is not patentable (Patents Act 1977, section 72(1)(a)). One ground of revocation is that the Patent does not involve an inventive step, ie the invention was obvious in light of the prior art at the priority date (Patents Act 1977, section 1(1)(b) and section 3; *Actavis Group PTC EHF v ICOS Corpn* [2019] RPC 9, [58]). The defender seeks revocation of each of the claims of the Patent. It maintains that none of them involved an inventive step - that in each case the suggested invention was obvious in light of the prior art and the common general knowledge of the skilled team at the priority date.

[130] The invention to be considered is that specified in the claim (*Conor v Angiotech* [2008] RPC 28, Hoffmann LJ at [17]; *Terrell, supra*, at paragraphs 12-51 to 12-52). Obviousness is judged from the standpoint of the person skilled in the art: section 3. The skilled person is deemed to read any prior art document properly, and in that sense with interest: *Asahi Medical Co Ltd v Macopharma (UK) Ltd* [2002] EWCA Civ 466, [21]. The general rule is that it is not possible to mosaic together individual cited documents. There is an exception to that general rule where it is shown that the skilled person would turn to some other citation to supplement the information provided by the first, but that exception only applies where the mosaic is one that could be put together by “an unimaginative man with no inventive capacity” (per Lord Reid in *Technograph v Mills & Rockley* [1972] RPC 346, page 355).

[131] The question of obviousness is commonly addressed by the court adopting a structured method, known as the “*Windsurfing/Pozzoli*” approach (set out in *Pozzoli SPA v BDMO SA* [2007] FSR 37 at [23]). In that case Jacobs LJ reformulated the structured questions which had been posed by Oliver LJ in *Windsurfing International Inc v Tabur Marine (Great Britain) Ltd* [1985] RPC 59, pages 73-74:

“23. The fourth step needs no restatement, though it is worth making explicit that by invention is meant what is claimed. In the result I would restate the *Windsurfing* questions thus:

- (1) (a) Identify the notional ‘person skilled in the art’; (b) Identify the relevant common general knowledge of that person;
- (2) Identify the inventive concept of the claim in question or if that cannot readily be done, construe it;
- (3) Identify what, if any, differences exist between the matter cited as forming part of the ‘state of the art’ and the inventive concept of the claim or the claim as construed;
- (4) Viewed without any knowledge of the alleged invention as claimed, do those differences constitute steps which would have been obvious to the person skilled in the art or do they require any degree of invention?”

The fourth *Windsurfing/Pozzoli* question is the statutory one and the first three questions are designed to discipline the court’s approach (*Actavis Group PTC EHF v ICOS Corpn, supra*, [60]). Hindsight, including knowledge of the patented invention, should not be used in addressing the statutory question of whether or not the invention was obvious at the priority date (*Actavis Group PTC EHF v ICOS Corpn, supra*, [72]; *Haberman v Jackel International Ltd* [1999] FSR 683, [29]). The attributes of the skilled person were described by Jacob LJ in *Technip France SA’s Patent* [2004] RPC 46, [7]-[10]:

“7. It is settled that this man, if real, would be very boring - a nerd. Lord Reid put it this way in *Technograph v Mills & Rockley* [1972] RPC 346 at p355:

‘... the hypothetical addressee is a skilled technician who is well acquainted with workshop technique and who has carefully read the relevant literature.

He is supposed to have an unlimited capacity to assimilate the contents of, it may be, scores of specifications but to be incapable of a scintilla of invention. When dealing with obviousness, unlike novelty, it is permissible to make a 'mosaic' out of the relevant documents, but it must be a mosaic which can be put together by an unimaginative man with no inventive capacity.'

8. The no-mosaic rule makes him also very forgetful. He reads all the prior art, but unless it forms part of his background technical knowledge, having read (or learnt about) one piece of prior art, he forgets it before reading the next unless it can form an uninventive mosaic or there is a sufficient cross-reference that it is justified to read the documents as one.

9. He does, on the other hand, have a very good background technical knowledge - the so-called common general knowledge. Our courts have long set a standard for this which is set out in the oft-quoted passage from *General Tire & Rubber Co v Firestone Tyre & Rubber Co Ltd* [1972] RPC 457 at 482 which in turn approves what was said by Luxmoore J. in *British Acoustic Films Ltd v Nettlefold Productions* (1936) 53 R.P.C. 221 at 250. For brevity I do not quote this in full - Luxmoore J.'s happy phrase 'common stock of knowledge' conveys the flavour of what this notional man knows. Other countries within the European Patent Convention apply, so far as I understand matters, essentially the same standard.

10 The man can, in appropriate cases, be a team - an assembly of nerds of different basic skills, all unimaginative. But the skilled man is not a complete android, for it is also settled that he will share the common prejudices or conservatism which prevail in the art concerned."

[132] I find it useful to ask the *Windsurfer/Pozzoli* questions in the present case.

Question 1(a)

[133] While it is possible that the skilled person who is the addressee of the Patent and the skilled person for the purposes of considering obviousness may not always coincide

(*Schlumberger Holdings Ltd v Electromagnetic Geoservices AS* [2010] RPC 33, Jacobs LJ

at [30]-[70]; *HTC Corporation v Gemalto SA* [2014] RPC 9, Birss J at [34]) it was not suggested that that was the case here. Both parties proceeded on the basis that the skilled team ought to have the same composition for both purposes. As discussed already, in my opinion the

skilled team comprised a physicist or mechanical engineer with knowledge and experience of vibration monitoring and an electronic engineer.

Question 1(b)

[134] I understood it to be common ground, and I find it to be established on the evidence, that the common general knowledge of the skilled team included knowledge of the relevant legislation, standards and HSE Guidance concerning vibration monitoring which were applicable at the priority date. However, I am not persuaded that superseded legislation, standards or HSE Guidance would have been part of the skilled team's common general knowledge.

[135] It was also common ground, and I hold it established, that the skilled team's common general knowledge at that date would have included knowledge of the use of RFID technology in the sorts of applications for which it was then employed, including bar coding, magnetic swipe card technologies, systems for identity verification and asset management, and systems for inventory control.

Question 2: the inventive concept of the claim or construe the claim

[136] In my opinion the inventive concept of the claim is (i) that the vibration monitor is releasably mounted on the tool; (ii) that a timer operates in dependence on the vibration signal to record the duration of vibration; (iii) that the mount contains a passive RFID tag holding information relating to the tool, including information on vibration; and on being connected to the mount, the monitoring component actuates the RFID tag and reads the information. However, the parties telescoped the inventive concept into features (ii) and (iii).

[137] The defender submitted that (ii) and (iii) were distinct and unrelated elements which lacked any synergistic interaction that would justify treating them as a single invention. It was submitted that they were a mere collocation of two claimed inventions which ought to be considered separately (*Sabaf SpA v MFI Furniture Centres* [2005] RPC 10). For its part, the pursuer maintained that there was sufficient interaction and synergy between the features to make it appropriate to treat them as a single invention rather than two inventions as the defender suggests.

[138] In Dr Povey's view the two features interacted with each other in a synergistic way. The interaction was that the apparatus put the two features together to calculate the operator's vibration exposure. Employers required to monitor vibration in order to know whether an operator's exposure action level and exposure limit level were reached or exceeded. There was a regulatory requirement to report the daily vibration dosage of an operator. The interaction enabled the operator's vibration dosage to be determined automatically even where multiple tools were operated over the course of a working day.

[139] In Dr Brown's opinion the Patent did not describe any way in which the two features worked together or interacted. He observed that the apparatus could have used a different means of storing data relating to the tool, such as a different wireless technology or manual recording. Such a change would have had no bearing on the timer being operative in dependence on the vibration signal to record the duration of vibration. Conversely, if a different means of timing and recording the duration of vibration had been used that would have had no impact on the functionality of the RFID technology as the means of storing and communicating data about the tool. The two features appeared to function independently.

[140] In *British Celanese Ltd v Courtaulds Ltd* (1935) 52 RPC 171 at page 193 Lord Tomlin said:

“It is accepted as sound law that a mere placing side by side of old integers so that each performs its own proper function independently of any of the others is not a patentable combination, but that where the old integers when placed together have some working interrelation producing a new or improved result then there is patentable subject-matter in the idea of the working interrelation brought about by the collocation of the integers.”

In *Sabaf SpA v MFI Furniture Centres, supra*, a claim had two separate characterising features each of which had been separately disclosed in the prior art, but there was no item of prior art which taught both. The House of Lords agreed with the trial judge that on the facts found the two features ought not to be treated as a single invention. Lord Hoffmann observed at [26]:

“If the two integers interact upon each other, if there is synergy between them, they constitute a single invention having a combined effect and one applies section 3 to the idea of combining them. If each integer ‘performs its own proper function independently of any of the others’, then each is for the purposes of section 3 a separate invention and it has to be applied to each one separately.”

[141] The collocation principle is limited to cases involving the analysis of known features which are merely juxtaposed. It has no wider implications (*Terrell, supra*, 12-131; *Degussa-Huls SA v C-G* 2005 RPC 29, [34]). Provided that there is a not insignificant degree of interaction the combination may be treated as a single invention (*Abbott Laboratories Ltd v Evysio Medical Devices ULC* [2008] RPC 23, Kichin J at [182]-[185]).

[142] On the question of whether the combination of the features was a mere collocation I find Dr Povey’s evidence to be more persuasive than Dr Brown’s. While in one sense it is fair to say that the two features do function largely independently, I disagree with Dr Brown’s conclusion that there was no interaction. The information relating to the tool, including information on vibration, and the duration of vibration are both essential in order for the apparatus taught by the claim to arrive at vibration dosage for the operator. As Dr Povey observed, without tool information obtained by the RFID technology being tied to

the duration of vibration for a specific user, the operator's total vibration dosage would not be determined automatically when multiple tools or machines are used over the course of a working day. In my view there is enough of an interaction to make the combination a single invention rather than a mere collocation of two inventions. In my opinion Dr Brown's analysis focussed unduly upon whether either feature could be replaced with another. While that is a relevant consideration, in my view it is not determinative. The features here were combined to very good effect. Substituted features might have been employed, but I am not satisfied on the evidence that the result would have been as attractive or as effective. To use Lord Tomlin's language, I think that the existing features have a working interrelation which produces a new and improved result. In my opinion the claim was for one invention rather than two.

Question 3: differences between the inventive concept of the claim and the prior art

[143] The defender relies upon three prior art documents. The first is a manual for the Bruel & Kjaer Type 2239B Sound Level Meter and Hand-Arm Vibration Meter (dated December 2001). The second is a product data sheet for the same device. The third is UK Patent Application GB2299169A (published on 25 September 1996) for a British Gas vibration monitoring device.

[144] Prior art documents generally require to be considered separately. It is not normally legitimate to mosaic together two or more pieces of prior art. It was not suggested that the skilled team would mosaic the three documents. However, it seems to me that it would have been likely to cross-refer between the two documents relating to the Bruel & Kjaer meter because they relate to the same device.

[145] The British Gas patent application (“the British Gas patent”) teaches a vibration assessment device. The vibration monitor broadly resembles a wrist watch. It is designed to be wrist-worn (but it could be worn elsewhere). The monitor contains a sensor for detecting the occurrence of vibration and a timer for determining the duration of vibration. The sensor is a low cost vibration measurement transducer. Since an accelerator was considered to be too expensive to use, instead the transducer is a basic piezo-electric sounder disc which is used in conjunction with suitable signal processing electronics. The sensor is used only to detect that vibration is occurring. It is not designed to be used to measure vibration magnitude. A timer starts when vibration is detected and it stops when it ceases. Predetermined vibration magnitudes for a variety of tools are pre-stored in the monitor. Vibration exposure can be calculated using the duration of vibration and the predetermined vibration magnitude for the particular tool. The monitor is battery powered. In one embodiment the tool being used can be identified by the operator entering the tool code manually in the monitor. In a preferred embodiment the apparatus comprises both the wrist monitor and a unit which is mounted on the tool. The tool mounted unit is self-powered by energy harvested when the tool vibrates. It contains a further sensor (which is similar to the sensor in the monitor), a piezo-electric generator, and a low frequency Radio Frequency (“RF”) transmitter. The monitor unit has an RF receiver which is tuned to the same frequency as the tool mounted unit. When the tool is used the sensor in the tool mounted unit senses the vibration and the transmitter transmits the tool identification code to the monitor. The timer does not log vibration sensed by the monitor’s sensor unless and until the tool identification code has been transmitted to the monitor: the sending of the code provides a cross-check that the tool is vibrating. Using the tool code the monitor identifies

the pre-stored vibration magnitude for the tool. Using the duration of vibration and the vibration magnitude the apparatus is able to calculate the operator's vibration exposure.

[146] In Dr Harper's view the differences between the device described by the British Gas patent and the device taught by claim 1 of the Patent are that: (i) the claimed monitoring component is releasably mounted on the tool, whereas the monitor in the British Gas patent is worn by the operator; and (ii) the mount described by the Patent contains a passive RFID tag which is read by the monitor when the latter is attached to the mount. Dr Povey was of a similar view. I did not understand the defender to dispute that those were indeed the relevant differences.

[147] The Bruel & Kjaer Type 2239B meter documents ("the Bruel & Kjaer documents") teach a device for measuring either sound level or hand arm vibration magnitude experienced by a tool operator. The device may be used to measure vibration from a machine over a pre-set interval or by manually starting and stopping measurement. A mounting bracket is attached to a tool by wrapping the bracket's straps tightly around the tool and tightening them as much as possible. The meter is then screwed to the mounting bracket. An accelerometer which is linked by a trailing wire to the meter is attached to the tool. The meter measures vibration on a single axis. It is a fragile and very expensive instrument which requires careful and experienced handling by a technically proficient person. It is not designed for everyday use by tool operators. It is intended to be used for one-off measurements by specialist users. It can store only 40 records. It was generally used by an expert user in order to obtain typical or representative measurement of vibration magnitude.

[148] The defender maintains that the device described by the Bruel & Kjaer documents and the device taught by claim 1 of the Patent differ in two main respects, namely (i) that the

claim 1 device records the duration of vibration in dependence of the vibration signal; and (ii) that the claim 1 device uses RFID to communicate information about the tool, including information about vibration. Dr Harper agreed with these differences, but in paragraph 95 of his report (ERB 1) he suggested a fuller list of changes which would have to be made if the device described in the Bruel & Kjaer documents were to have the features of the device described in claim 1 of the Patent, namely: (i) render the meter robust, and small enough able to be mounted on the tool and light enough not to modify the tool's vibrations; (ii) make the accelerometer sensor integral with the meter; (iii) change the functionality of the meter so that instead of calculating quantities such as A_{eq} or A_{eq8} it calculates vibration exposure by detecting when the tool vibration level indicates that the tool is in use, and so that it times the duration of vibration; (iv) make the meter capable of wirelessly communicating with a mount unit in order to receive information such as the tool serial number and vibration level; (v) produce a mount unit, able to be fixed permanently and rigidly to the tool, that it is able to communicate wirelessly to the meter a number of data such as tool serial number and vibration level; and (vi) design a mating mechanism whereby the meter unit can be firmly but removably fixed to the mount unit, and quickly and easily detached when desired. Dr Harper's items (iii), (iv) and (v) include defender's two "main differences". Dr Harper also mentioned three further differences in paragraph 95 of his report, but in cross-examination he accepted that they were not in fact matters which were contained in claim 1.

[149] I am satisfied on the evidence that there are indeed more than two differences between the device described in claim 1 and the device taught by the Bruel & Kjaer documents. Dr Harper's enumeration of the differences (i) to (vi) appears to me to be correct.

Question 4: Do the differences constitute steps which would have been obvious to the person skilled in the art or do they require any degree of invention?

[150] Before turning to answer this question in relation to each of the items of prior art I shall deal with the defender's submission that the proper approach is to assume that the skilled team's goal would have been to design a device which was capable of both assessment and measurement. In my opinion that is not borne out by the evidence. I am not satisfied that at the priority date the skilled team would have perceived that there was a need to develop a device which was capable of both assessment and measurement. The lack of a dual capacity device was not viewed as a problem which required to be solved.

[151] On the other hand, the evidence does not indicate that at the priority date those skilled in the art were resistant to innovation. On the contrary, they were interested in developing monitoring devices which would provide a reliable indication of the vibration exposure of individual operators over the course of a working day, and in particular whether the operator's exposure action value and exposure limit value were reached or exceeded. In my view the correct approach here is to posit that they read the prior art with that aim in mind. Reliable monitoring was necessary if employers were to comply with their obligations under the 2005 Regulations, and if the relevant standards and HSE Guidance were to be adhered to. Both assessment and measurement were acceptable methods.

[152] In determining what, if any, improvements would have been obvious to those skilled in the art, regard may be had to their mindset - their relevant understandings and prejudices - at the material time (*Terrell, supra*, paragraphs 8-47, 12-35, 12-54 *et seq*; *Dyson v Hoover, supra*, at [84]-[97]).

[153] The court requires to adopt the mantle of the skilled team. Whether something is “obvious” or “inventive” involves questions of fact and degree. Ultimately, it is a kind of jury question (*Windsurfing International Inc v Tabur Marine (Great Britain) Ltd*, *supra*, Oliver LJ at page 71, citing *Allmanna Svenska Elektriska A/B v The Burntisland Shipbuilding Co Ltd* (1952) 69 RPC 63, Jenkins LJ at page 70). A multi-factorial assessment is required (*Actavis v Novartis* [2010] FSR 18, [41]). The test for obviousness is an objective one. Generally the principal evidence comes in the form of expert evidence from persons who are qualified to opine as to what the skilled person would or would not have taken from the prior art and what the common general knowledge of the skilled person would have been (*Terrell*, *supra*, paragraphs 12-177 to 12-180). Since the ultimate question of obviousness is not one of law it is permissible for expert witnesses to opine upon it. Whether or not the court accepts an expert’s conclusion will depend upon whether the court accepts the reasons the expert gives for his opinion.

[154] The onus is on the defender to establish invalidity on the ground of obviousness. An unusual feature of the present case is that, to a very large extent, the defender chose to rely upon the evidence of Mr Jones in respect of the prior art, the common general knowledge of the skilled team, and the question of obviousness. I have already indicated that in my view that was opinion evidence that Mr Jones was not qualified to give. To the extent that it was objected to it is inadmissible. In so far as it was led without objection, since it was opinion evidence which Mr Jones was not qualified to give I find it to be of no assistance. Dr Brown did not consider the prior art. Mr Worthington touched briefly on certain aspects of the prior art, but his perspective was that of a health and safety expert. In my opinion he was not qualified to, and his evidence did not, shed light on (i) what the skilled team would have

taken from the prior art; (ii) what their common general knowledge would have been; or (iii) the issue of obviousness.

[155] The core evidence on obviousness was the evidence of Dr Harper and Dr Povey. I have carefully considered their views on the prior art and obviousness, and their reasons for their views. However, I am conscious that at the end of the day it is for the court to decide whether on the facts which it finds it should infer that the skilled team would have bridged the gap between the prior art and the invention in light of the skilled team's common general knowledge.

British Gas patent

[156] I understood Dr Harper to accept that, as long as measurement on the tool was at the correct point (ie as close as possible to the grip point), releasable mounting of a vibration monitor on the tool would have been advantageous if the monitor was measuring vibration. Measurement on the tool would be more accurate and more reliable than measurement by a monitor worn by the operator. I also understood him to accept that that fact would have been known to the skilled team at the priority date. Nevertheless, he suggested that at around that time he and some others skilled in the art were of the view that reasonably reliable measurements could also be obtained from held devices such as the HAVSense. They were hopeful that the relevant standards might be amended to reflect an acceptance of such a method of measurement. Dr Harper had been aware that there was a need for held and worn devices to distinguish between vibration caused by the tool and vibration caused by the operator, and that at the priority date further work was required to resolve that problem.

[157] However, in Dr Harper's view taking the step of moving from the British Gas device to a tool mounted monitor for measurement would not have been obvious to the skilled team. He gave two reasons for that. First, measurement accuracy and reliability were not relevant in the case of an assessment device like the device taught by the British Gas patent. That device was designed to detect the occurrence of vibration and to time its duration. It did not need to measure vibration magnitude. Dr Harper stressed that at the priority date assessment was a perfectly acceptable way of monitoring vibration. The 2005 Regulations, Directive 2002/44/EC, the prevailing ISO standards, and the HSE Guidance reflected that. In his view the mindset of the skilled team would have been that assessment was an acceptable way of monitoring. Part of the concept of the British Gas monitor was that it was a simple and inexpensive assessment device. It performed that function adequately and very economically without the need for the monitor to be tool mounted. As a worn device it had the advantage that it provided an easy way of keeping track of the operator's daily exposure. The skilled team would have had no impetus to modify the device to an apparatus which measured vibration. Second, even if the skilled team had been inclined to move from the British Gas apparatus to a measurement device it would not have been obvious to move to a tool mounted monitor. Dr Harper indicated that had he been making such a move at the priority date he would have moved to a monitor held between the operator's fingers.

[158] In Dr Harper's opinion the advantages of tool mounting for an assessment device would not have been significant enough to make it obvious to the skilled team to take the step of tool mounting. The advantages would have included a very marginal increase in the accuracy of monitoring the duration of trigger time - a matter of a fraction of a second. A second advantage would have been the possibility of facilitating detection of excessive levels

of tool vibration in order to report tool malfunction. A third advantage would have been some reduction in interference affecting the RF communication system between mount and monitor in the British Gas device because of their increased proximity. Alternatively, if the monitor was tool mounted that would have made the use of RFID communication practicable. However, Dr Harper did not consider that that would have been a factor which would have been obvious to the skilled team from the teaching of the British Gas patent and the common general knowledge. Although the skilled team would have considered the second advantage in particular to be worthwhile, in Dr Harper's view the sum total of the advantages would not have been significant enough to make the step of tool mounting obvious, particularly in light of the British Gas device's advantages of low cost and of pairing vibration from a tool with a particular operator (because the operator wore the monitor).

[159] In the whole circumstances Dr Harper did not think it would have been obvious to the skilled team from the teaching of the British Gas patent and the team's common general knowledge to take the step of moving to a monitor which was releasably attached to a mount on the tool.

[160] In Dr Harper's view the use of passive RFID to communicate tool information between the unit mounted on the tool and the monitor would not have been advantageous for the worn monitor taught by the British Gas patent. A worn monitor would need to use high levels of power to energise the RFID tag, which would rapidly exhaust the battery.

[161] Dr Harper observed that passive RFID technology had not been used in vibration monitoring devices prior to the Patent. While at one point he appeared to suggest that the use of RFID technology *per se* was inventive, I understood his ultimate position to be that the

inventiveness lay in using passive RFID tag technology to identify a particular tool to a particular operator's monitor which the operator would take with him from tool to tool.

[162] Accordingly, in Dr Harper's opinion the differences between the device taught by the British Gas patent and the device taught by claim 1 of the Patent were not steps which would have been obvious to the skilled team at the priority date.

[163] Like Dr Harper, Dr Povey was clear that if the step of moving from a worn assessment device to a tool mounted device was not taken by the skilled team it would not have been sensible to use passive RFID to communicate tool information between the British Gas unit which was mounted on the tool and the worn monitor. In those circumstances passive RFID would not have been an improvement on the existing RF communication system taught by the British Gas patent. Dr Povey outlined the reasons for that conclusion in his reports and in his oral evidence. Since the conclusion was not challenged it is unnecessary to list those reasons here.

[164] Dr Povey agreed that passive RFID technology was well known at the priority date. Although it had not been used in vibration monitoring devices, he did not think that its use *per se* in that context was inventive. The fact that in claim 1 the RFID tag in the mount and the RFID reader in the monitor were in fixed positions in close proximity when the monitor was attached meant that the RFID system would be very reliable (more reliable for example than RFID systems requiring a swipe or a tap). In his opinion what was inventive here was the creation of an electro-mechanical system which incorporated RFID and which permitted the reliable pairing and identification of different tools with different monitoring devices when they were physically connected by the mounting system, and which enabled the determination of the vibration dosage of individual operators (paragraphs 52, 58 and 64 of his report and his oral evidence). Dr Povey drew the court's attention to what he considered

to be an analogous case where a US patent (US 7,772,975 B2) had been granted in 2010 (with a priority date of 2006) where RFID transponders were used to provide a signal to identify the connection of two or more components.

[165] In relation to the British Gas patent, the question is whether it would have been obvious to the skilled team from its teaching and the common general knowledge to move to a monitor which was releasably attached to a mount on the tool, and to introduce RFID communication between the mount and the monitor when they are attached.

[166] I accept that having a monitor which is releasably attached to a mount on the tool is a more accurate and reliable way of measuring vibration than using a monitor worn or held by the operator. I understood Dr Harper to accept that proposition, as long as measurement on the tool was at the correct point (ie as close as possible to the grip point). I also understood Dr Harper to agree that the skilled team would have known that. In my view that acceptance accords with the evidence, including the terms of ISO 5439:2001. That standard was part of the common general knowledge. It suggested that measurements should be taken on the vibrating surface (paragraph 4.2.3 of Part 1 of ISO 5439:2001) with transducers mounted rigidly on the surface (paragraph 4.2.4 of Part 1 and paragraph 6.1.4.1 of Part 2). It was implicit that measurement on the tool was desirable.

[167] However, Dr Harper did not accept that it would have been obvious from the British Gas patent and the common general knowledge to move to a tool mounted monitor for measurement, first, because the British Gas patent taught an assessment device and there was a mindset that assessment was perfectly acceptable; and second, because if there was to be a move to a measurement device a monitor held in the operator's fingers would have been a realistic option.

[168] I accept that at the priority date there was indeed a mindset that assessment was a perfectly acceptable method of monitoring vibration. However, there was not a mindset against developing better and more reliable measurement and assessment devices. Those skilled in the art were interested in developing such devices. Dr Harper and his colleagues had developed the HAVSense. The Patent (para [0003]) acknowledged the HAVSense and a further worn measurement device (GB 2411472A) as prior art.

[169] Nevertheless, in my opinion the critical points on the issue of moving to a measurement device are (i) that the British Gas device taught an assessment device; and (ii) that the mindset of those skilled in the art was that assessment was an acceptable method of monitoring vibration. In those circumstances I agree with Dr Harper that it would not have been obvious to the skilled team from the British Gas patent's teaching (of an assessment device) and from the common general knowledge to take the step of moving to a releasably attached tool mounted monitor for measurement of vibration. On the evidence I am not satisfied that the skilled team would have combined that teaching with its knowledge that measurement on the tool would be more accurate and reliable (*Terrell, supra*, paragraph 12-46) in order to take that step.

[170] That is sufficient to dispose of the issue of the obviousness of taking the step of tool mounting for measurement. However, I should make clear that I am not persuaded of the soundness of Dr Harper's second reason (*viz* that if it had been obvious to move to a measuring device it would not have been obvious to move to tool mounting because there was also the option of moving to a held device). It is important to bear in mind that Dr Harper is not the personification of the notional person. It does not follow from the fact that at the priority date he favoured held measurement devices that that would also have been the skilled team's preference. In any case, the proper question is not whether a step

was the most obvious step to take in view of the prior art and the common general knowledge. Sometimes a number of things may have been objectively obvious to those skilled in the art. Each course may have had clear technical or practical advantages over the prior art. In such circumstance each course may be obvious. The fact that, relatively speaking, one of them may have been more advantageous than the others does not mean that only the most advantageous course was obvious (*Brugger v Medic-Aid Ltd* [1996] RPC 635, Laddie J at page 661; *Palmaz's European Patents (UK)* [2000] RPC 631, Aldous LJ at [48]). On the other hand, if there was a mindset, prejudice or some other reason why those skilled in the art would have been blind to a course's advantages, then that course would not have been obvious. In the present case if, contrary to my view, it had been obvious to the skilled team from the teaching of the British Gas patent and the common general knowledge to take the step of moving to a measurement device, I am not persuaded that the possibility of moving to a finger held monitor would have made the skilled team oblivious to the clear technical advantages of tool mounting for measurement. At best for the pursuer, the skilled team would have been aware that tool mounted monitors and finger held monitors would both be likely to be more advantageous for measurement than measurement using a monitor worn on the operator's wrist.

[171] The next question is whether it would have been obvious to the skilled team from the teaching of the British Gas patent and the common general knowledge to take the step of moving to a releasably attached tool mounted monitor in order to develop an improved assessment device? Dr Harper's evidence was that it would not have been. While he acknowledged that tool mounting would have resulted in some technical advantages for an assessment device, he did not consider that the skilled team would have seen those advantages as being significant enough to take the step.

[172] On this issue two matters have given me cause for hesitation. First, looking at the matter objectively, the skilled team would have been aware that there were some technical advantages in taking the step. Second, the reality is that the pursuer must in fact have considered that there were sufficient technical advantages to develop an assessment device with a releasably attached tool mounted monitor. The only device it has produced in implement of the Patent - the HAVmeter - is just such a device. I shall deal with the latter point first

[173] In my opinion the fact that the pursuer chose to develop a tool mounted assessment device is neither here nor there. The pursuer had an advantage which the skilled team lacked - it had knowledge of the invention. The question of obviousness requires to be considered without knowledge of the invention. Looking at what the pursuer did with knowledge of the invention involves the use of hindsight. It is not a factor to which regard may be had.

[174] What then of the former point? Dr Harper's assessment that the technical advantages would not have been sufficient to lead the skilled team to take the step was an evaluative judgment by him. When he gave that evidence during cross-examination he was not pressed or challenged on it - counsel for the defender did not explore the matter further. There is no contrary evidence to a different effect from anyone qualified to illuminate the likely thinking of the skilled team. The absence of contrary evidence is, of course, not a conclusive consideration. It is open to the court to look at the facts upon which Dr Harper based his conclusion and to reach a different conclusion. However, in my view it is difficult to see why in the circumstances which I have described the court should be persuaded to gainsay Dr Harper's judgment. It would be a different matter if it was clear to the court that Dr Harper's reasoning was flawed or unsound. However, I am not satisfied that that is

the case. In my view Dr Harper's evidence on this point is the best evidence which the court has to guide it. I accept that evidence. It follows that I am not satisfied that taking the step of moving to a releasably attached tool mounted assessment monitor was obvious over the British Gas patent and the common general knowledge.

[175] I turn to consider the use made of RFID technology in claim 1. It is common ground that at the priority date RFID technology was widely used for bar coding, magnetic swipe card technologies, systems for identity verification and asset management, and systems for inventory control, but that it had not been used in any vibration monitoring apparatus.

[176] It is clear on the evidence that if the step of mounting the monitor on the tool was not taken, using RFID to communicate between the British Gas mounted unit and the wrist worn monitor would not have been obvious to the skilled team. On that scenario the use of RFID would not have been a technical improvement over the British Gas patent. On the contrary, it would have been a poorer solution than the existing system of low frequency RF communication between the mounted unit and the worn monitor.

[177] However if, contrary to my view, it would have been obvious to the skilled team to move from the teaching of the British Gas patent to a releasably attached tool mounted monitor, in my opinion it is clear that there would have been significant technical advantages in using RFID to communicate tool information between the mount and the monitor. On that scenario, and in light of those advantages, in my judgment it would have been obvious for the skilled team to take the step of using RFID.

Bruel & Kjaer documents

[178] Dr Harper's view was that at the priority date it would not have been obvious to the skilled team from the Bruel & Kjaer documents and the common general knowledge to take

the steps needed to get to the device taught by claim 1 of the Patent. Those steps would have involved a radical redesign of the Bruel & Kjaer device. The skilled person would have had no reason to consider that any of those steps were required. In particular, it would not have been obvious to alter the Bruel & Kjaer meter to enable it to record the duration of vibration in dependence of the vibration signal. Nor would it have been obvious to alter it to introduce RFID technology for the purpose of communicating information about the tool including information about vibration. The device was not designed for measurement of the vibration exposure of an operator over the course of his or her working day. It was not designed to record whether an exposure action value or an exposure limit value had been reached or exceeded. It was wholly unsuitable for those purposes. In Dr Harper's view, if the notional person was setting out to developing such a device he would not have used the teaching of the Bruel & Kjaer documents as a starting point.

[179] Dr Povey indicated that the Bruel & Kjaer device was not an integrated vibration monitoring system. It was more of a manual system. There was no need for RFID technology to identify the tool concerned or to gather vibration information from it automatically. It would be clear to the person charged with carrying out a measurement which tool was being monitored. He required to attach the bracket to it, secure the meter to the bracket, and attach a transducer and wire to the tool.

[180] I am not persuaded that the skilled team would have been motivated to move from the teaching of the Bruel & Kjaer documents to design a device which would have been suitable for measurement of an operator's exposure dosage over the course of a day or to monitor how that dosage compared to the operator's exposure action value and exposure limit value. Getting to such a device from that teaching would have required wholesale and radical redesign. I accept that the Bruel & Kjaer documents would not have been seen as a

suitable starting point to achieve that aim. It is no surprise that Dr Harper did not use them as a starting point for the HAVSense and that Mr Jones did not use them as the starting point for any of his inventions. The Bruel & Kjaer meter was a device designed to take representative measurements of the vibration magnitude of tools over short periods, often with a view to those measurements being used as the predetermined vibration magnitudes associated with those tools. In my view, the skilled team would have read the Bruel & Kjaer documents with interest, but then decided that they were of no interest to it as a basis for developing a vibration monitor suitable for measuring an operator's vibration exposure (cf *Terrell*, supra, paragraphs 12-106 to 12-107; *Vernacare Ltd v Environmental Pulp Products Ltd* [2012] EWPC 41, HH Judge Birss QC at [41]).

[181] I accept that it would not have been obvious to the skilled person from the Bruel & Kjaer documents and the common general knowledge to take the step of recording the duration of vibration in dependence of the vibration signal. That feature was an advantage where an assessment device measured the duration of trigger time. It was not obviously an advantage with a measuring device like the Bruel & Kjaer meter. The existing methods of recording time were sufficient for the meter's purposes. In my view there would not have been any reason or motivation to innovate upon them by introducing this feature.

[182] Using RFID technology for the purpose of communicating information about the tool including information about vibration had advantages for vibration monitoring devices, particularly assessment devices, which were designed to monitor a particular operator's vibration exposure because it provided an efficient and reliable way of (i) recording durations of vibration on what might be a succession of tools used by an operator in the course of the day; and (ii) marrying up the pre-stored vibration magnitude of each tool with the duration of vibration. Neither attribute was useful for a measurement instrument of the

nature of the Bruel & Kjaer meter. Once again, there would not have been any reason or motivation to take the step of introducing this feature.

[183] In my opinion, those steps would not have been obvious to the notional person. Neither in my view would any of the other changes which would have been required to address Dr Harper's differences (i), (ii), (v) or (vi) have been obvious. Going down that route would not have been obvious from the teaching of the Bruel & Kjaer documents and the skilled team's common general knowledge.

Conclusions in relation to Question 4

[184] In my opinion it follows that the differences between the inventive concept of the claim and the British Gas patent were not steps which would have been obvious to the notional skilled team. Nor in my view were the differences between the inventive concept of the claim and the Bruel & Kjaer documents steps which would have been obvious to the skilled team. In each case taking those steps would have required a degree of invention.

[185] With step by step approaches to obviousness there is an inherent risk of hindsight being brought to bear (*British Westinghouse v Braulik* (1910) 27 RPC 209, Fletcher-Moulton LJ at page 230; *Technip France SA's Patent, supra*, Jacob LJ at [112]; *Hospira UK Ltd v Genentech Inc* [2014] EWHC 3857 (Pat), Birss J at [240]; *Actavis v Actavis Group PTC EHF v ICOS Corpn, supra*, Lord Hodge JSC at [72]; *Terrell, supra*, paragraphs 12-132, 12-133, 12-136). An example of the use of hindsight here was the suggestion that the advantage of facilitating RFID communication would have been a factor making tool mounting obvious over the British Gas patent. In my view that involves working back from the invention.

[186] The fact is that in some cases taking a combination of steps would not have been obvious to the skilled person who, by definition, lacked any invention. In my opinion that is

the position here. The inventive idea was to combine the integers of claim 1 to produce an improved and more efficient monitoring apparatus (*cf Biogen Inc v Medeva Plc* [1997] RPC 1, Lord Hoffmann at page 34; *Terrell, supra*, paragraphs 12-91 to 12-93). I accept the evidence of Dr Povey and Dr Harper that the combination was inventive (and I accept Dr Povey's fuller description of the inventive idea). In my opinion the skilled team would not have arrived at the combination from either item of prior art and the common general knowledge without the exercise of inventive ingenuity. In my view the Patent discloses something sufficiently inventive to deserve the grant of a monopoly.

Subsidiary claims

[187] The pursuer maintained that even if the essential integers of claim 1 were obvious over the prior art and the common general knowledge, claims 2, 4, 6-9, 12 and 14 would nevertheless be valid because they would still contain an inventive step. Since I have concluded that claim 1 is valid, the question whether these subsidiary claims would be independently valid if claim 1 was invalid is academic. In those circumstances I shall confine myself to saying that, if I had concluded that the claim 1 integers were obvious, I would not have held that any of claims 2, 4, 6 - 9, 12 and 14 was independently valid. In my opinion none of the additional integers in those claims involved a further inventive step. Dr Harper dealt with the issue of obviousness in relation to these additional features at paragraphs 83-90 of his report (ERB 1) (considering obviousness over the British Gas patent) and at paragraphs 99-115 (considering obviousness over the Bruel & Kjaer documents). He also discussed the issue during cross-examination. In my opinion it was clear that his conclusions that the additional integers of these claims were not obvious over the prior art were very largely premised on his view that claim 1 was valid. If that premise had been ill

founded then it would have undermined the arguments that the additional integers were not obvious. I am not satisfied that any of the additional integers of claims claims 2, 4, 6-9, 12 and 14 involved an inventive step. Ultimately, I understood Dr Harper to accept that the only claims where he maintained that the additional integer would not have been obvious if tool mounting and the use of RFID were obvious were claims 8, 12 and 14. I can deal with them briefly. Claim 1 teaches a device which is capable of assessment and measurement. If claim 1 had been invalid then in my view the additional integers of claim 8 which were related to measurement would also have been invalid. So far as claim 12 is concerned, if tool mounting was obvious and one of the advantages of tool mounting was the ability to determine whether tool vibration was excessive, the additional integers of the claim would also have been obvious in my view. In relation to claim 14, if the use of RFID communication between the mount and monitor had been obvious, it is very difficult to see why the use of RFID between the monitor and the base component would not also be obvious.

Conclusion in relation to invalidity

[188] For the foregoing reasons I conclude that none of the claims of the Patent was obvious from the prior art and the skilled team's common general knowledge.

Disposal

[189] The parties requested that I should issue my decision and put the case out by order (i) to discuss an appropriate interlocutor to give effect to it; and (ii) to discuss any further procedure which may be necessary. I am content to follow that course.