SHERIFFDOM OF LOTHIAN AND BORDERS AT EDINBURGH

IN THE ALL-SCOTLAND SHERIFF PERSONAL INJURY COURT

[2021] SC EDIN 55

PIC-PN1550-19

JUDGMENT OF SHERIFF JOHN K MUNDY

in the cause

GARRY MACDONALD

Pursuer

against

(FIRST) CUBE BIKES UK LTD; (SECOND) PENDING SYSTEMS GMBH AND CO. KG

Defenders

Pursuer: Crawford; Advocate; Road Traffic Accident Law (Scotland), Edinburgh
Defender: Stachura; Solicitor Advocate; Brodies LLP, Glasgow

Edinburgh, 15 September 2021

The sheriff, having resumed consideration of the cause, finds as follows:

Findings in fact

1. The pursuer is Garry MacDonald and he resides at [address redacted]. He is employed as a Design and Technology Teacher. His date of birth is 4 February 1975.

2. The first defender is Cube Bikes UK Ltd, a limited company having a place at 27 Stockwood Business Park, Stockwood, Redditch B96 6SX. The second defender is Pending Systems GMBH and Co. KG. They are a limited company having a place of business at Ludwig-Huttner-Str., 5, D-95679, Waldershof, Germany.

3. On 6 October 2018, the pursuer was cycling his Cube Stereo 140 HPC Race 27.5 mountain bike, model year 2018. He was taking part in the Craggy Island Triathlon on the Isla of Kerrera, NEAR Oban. The triathlon was organised by Durty Events Ltd.

4. The triathlon included a 550m swim, a 14km mountain bike race followed by an 8km fell run.

5. The second defender had manufactured the 2018 bike and was the producer of it.

6. The 2018 bike was a mix of carbon mainframe with an aluminium rear triangle. It was a full suspension bike with a welded rear chain stay unit. The rear wheel suspension was designed so that the bicycle could spring up and down easily according to the terrain.

7. The chain stays of the bicycle (the chain stay unit) were welded together and to the main frame of the cycle with a pivot bolt connected through two bearings with one spacer on top. From the point of view of the cyclist sitting on the cycle the pivot bolt was inserted from left to right and secured by entering a thread on the right side into which it was turned.

8. The 2018 bicycle was the second replacement of the bicycle supplied by the second defenders in 2016. The pursuer collected the 2018 bicycle from the first defender on or about 3 April 2018.

9. On 6 October 2018, the pursuer took part in the said triathlon. He completed the 550m swim. During the second element of the triathlon - the bicycle race - the pursuer fell from his bicycle, hitting his head on the stem and falling to his right. He thereby sustained injury. After the fall and following some treatment for his injuries, he remounted his bicycle and finished the triathlon by completing the cycle element and thereafter the running element.

10. The pursuer fell from his bicycle near the end of the cycling element. The terrain on the cycling part of the race was variable. It included climbs and descents. It was variously

muddy, dry, wet and gravelly. At the point where the pursuer fell from his cycle he was travelling at speed on a flat gravel road. He was around 300m from the end of the cycling section and was on a slight downward gradient. He was descending from a plateau. He was in a high gear. Just prior to his fall, he heard a noise, which sounded like a "ting". At about that time the pivot bolt fractured, snapping at the first engaged thread, although it remained in situ. While the bolt was no longer engaged in the thread on the right-hand side, it derived support from the right-hand bearing.

11. The bicycle had not been adequately maintained or serviced by the pursuer prior to the accident. A number of bolts on the rear frame of the bicycle had been overtightened by the pursuer beyond their recommended torque values. A number of the bolt recesses had been damaged by excessive tightening or the use of unsuitable tools.

12. As a consequence of the removal of the bolt from the bicycle for investigation, most of the fractured surfaces of the bolt had sustained mechanical damage and smears, the "ductile dimpling" being characteristic of final failure from overload. The surfaces were uninformative of the fracture mechanism. In particular there were no signs of fatigue cracking.

13. No corrosion was identified on the bolt.

14. There was no defect in the material of the bolt.

15. The fracture of the bolt was caused, not by any defect in its manufacture or in the design of the components; rather, the bolt failed as a result of being overtightened by the pursuer in excess of its recommended torque value of 12 Newton Metres (Nm), causing the bolt to fracture by overload or causing it to fracture during normal cyclic loading resulting in overload.

16. The fracture of the bolt did not render the bicycle unsafe at the time of the accident.

17. The pursuer did not lose control and fall from the bicycle as a consequence of the failure of the pivot bolt.

18. The fracture could have resulted in downward movement of no more than around 2-3mm, which was minimal in the context of a range of movement of the suspension of around 190mm. Any movement caused by the fracturing of the bolt would not have been noticeable to the pursuer.

19. There would not have been any significant movement from side to side. There were no marks on the chain stay unit of the bicycle following the accident indicative of such movement.

20. Notwithstanding the failure of the pivot bolt, the rear frame of the bicycle was stiff and solid, deriving support from the other bolts in the frame.

Findings in fact and law

1) The failure of the pivot bolt was not as a result of a defect in the said bicycle within the meaning of section 3(1) of the Consumer Protection Act 1987.

2) The overtightening of the pivot bolt by the pursuer constituted misuse which was not reasonable.

3) In any event, the failure of the pivot bolt of the bicycle was not causative of the pursuer's accident.

4) Accordingly, the pursuer is not entitled to damages by virtue of section 2(1) of the Act.

5) Separatim, the pursuer is entitled to damages, they ought to be reduced by 50% the accident having been caused or materially contributed to by the fault of the pursuer and that by virtue of the Law Reform (Contributory Negligence) Act 1945.

Interlocutor

THEREFORE assoilzies the second defender from the crave of the writ; finds the pursuer liable to the second defender in the expenses of the cause, except in so far as otherwise dealt with by prior interlocutor; allows an account thereof to be given in and remits same to the auditor to tax and report; certifies Dirk Zedler, Mechanical Engineer, as a skilled person; certifies the cause as suitable or the employment of junior counsel.

NOTE

Introduction

[1] This is an action for damages arising from injuries sustained by the pursuer when he fell from his bicycle while taking part in the Craggy Island Triathlon on the Isle of Kerrera on 6 October 2018.

[2] There were originally two defenders in the action. The action in so far as directed against the first defender was abandoned on the 15 October 2020. The second defender is the manufacturer of the bicycle in question.

[3] Damages were agreed at £5,000 inclusive of interest to the date of proof.

[4] The case is brought under section 2 of the Consumer Protection Act 1987 on the basis that the pursuer's injury was caused by a defect in the bicycle and in particular the pivot bolt which fractured. In the Record the averment is "the pivot bolt snapped as a result of a defect in the manufacturing of the bicycle" (stat.4). This is followed up in stat.6 with the averment, following reference to the statutory provision: "The pursuer was entitled to expect that, without professional maintenance or unreasonable misuse, the pivot bolt would not snap or shear on a bicycle which was only six months old".

[5] As we shall see, the pursuer's case was developed somewhat in the course of the proof. While reliance was placed on behalf of the pursuer of the fact of failure of the bolt being sufficient to infer a defect for the purposes of the legislation, the focus of the proof was largely on the cause, or probable cause, of the bolt failing. There was then the issue of whether any failure would impact on the safety of the bicycle and, connected with that, whether the failure caused or is likely to have caused the pursuer to fall from his bike and injure himself.

[6] At the proof, the pursuer was represented by Mr Crawford, Advocate and the defender by Miss Stachura, Solicitor Advocate. There was evidence over four days followed by submissions on subsequent dates which were accompanied by written submissions.

[7] The pursuer's proof consisted of the evidence of: 1) the pursuer; 2) Jamie Pollock, Consultant Metallurgist and 3) Sandy Gilchrist, Bicycle Mechanic. The defenders proof consisted of evidence from: 1) Dirk Zedler, Mechanical Engineer and 2) Sebastian Martin, of the Zedler Group. All witnesses gave evidence via WebEx, the defenders witnesses giving evidence from Germany.

The pleadings

[8] Prior to referring to the evidence, it is pertinent to note certain relevant passages of the pleadings in this case concerning the circumstances of the accident and suggested causes.

[9] In stat.4 the pursuer avers *inter alia*:

> "The pursuer was 200m from the finish of a 14km mountain bike ride when suddenly and without warning the pivot bolt on his bicycle snapped. He felt a sudden sink in the middle of the bike caused by the detachment of the components on the right side at the point of the pivot bolt. The sink was relatively small, but

> unexpected. The pursuer was jolted forward and fell from his bicycle. As a result he suffered loss, injury and damage…"

There then follows the averment noted above that the bolt snapped as a result of a defect in the manufacturing of the bicycle.

[10] In answer 4 for the defender it is averred *inter alia*:

> "… the 2018 bicycle was supplied to the pursuer by Dales Cycle Ltd… some six months before the index incident. The 2018 bicycle was supplied to the pursuer with a General Handbook. The Handbook confirmed that the 2018 bicycle should be serviced and prescribed intervals in a specialist workshop authorised by the manufacturer. The prescribed intervals stated for normal use were first inspection after the first 200km or two months and every 2000km or once per annum thereafter. For frequent sport or competitive use, the intervals stated were after the first 100km or one month and after 500km or two months thereafter. On the factual basis that no maintenance or servicing records have been produced by the pursuer, it is believed and averred that the 2018 bicycle was not serviced by the pursuer as prescribed in the General Handbook… Furthermore, the 2018 bicycle had not been properly maintained. The General Handbook… provided with the 2018 bicycle provides several warnings of a risk of personal injury and material damage to users. The Handbook provides specific instructions that users are not to change the condition of any part of the bicycle or make any modifications to it. It instructs that any works on the bicycle such as fitting parts must be carried out by a specialist workshop. On the hypothesis of the pursuer, he tightened the pivot bolt, contrary to the instructions provided in the Handbook… Several bolts on the 2018 bicycle had been tightened in excess of their specification. The torque on all but one of the bolts exceeded their specification to a significant degree… Too high a torque value can result in failure of a bolt… It is unlikely that the bolts had been serviced or modified by a specialist workshop, contrary to the instructions provided in the Handbook. Most of the fractured pattern on the surface of the failed pivot bolt was caused by rotational movement. The remainder of the fractured pattern was typical of ductile failure caused by overload. The fractured pattern was indicative of the pivot bolt having been overtightened that is tightened to too high a torque value in excess of the specification. Overtightening of the pivot bolt places it under tension. The higher the tension, the more likely it is to snap. Overtightening could cause it to shear or snap off either at the point of overtightening or during normal cyclic loading. Believed and averred that the pivot bolt snapped as a result of it having been tightened to too high a torque value in excess of the specification. Rotational movement within the bolt cannot occur while the bicycle is being ridden. The pivot bolt was of sufficient operational strength and good ability for its intended use. The pivot bolt on the 2018 bicycle was able to withstand a torque of up to around 18Nm being 50% more than its specified torque. However, as with any bolt, overtightening beyond its specified torque would weaken it and affect its durability. There was no defect with the pivot bolt. The 2018 bike and its pivot bolt were able to withstand the usual cyclic loading within the intended range of use without risk of fatigue failure.

> There were no signs of fatigue failure on the fracture surface of a failed pivot bolt. The 2018 bicycle was around six months old at the time of the incident referred to on Record. Although it had been poorly maintained, the bicycle was not worn out. Fatigue failure would be an unlikely cause of the pivot bolt failing. Esto, the pivot bolt had snapped as averred by the pursuer (which is not known and not admitted) it would not affect the riding stability or safety of the bicycle due to its design. There was no detachment of any of the components of the 2018 bicycle during the triathlon. The pivot bolt remained in situ until removed by the pursuer's experts. The pursuer was able to ride the 2018 bicycle after the accident to complete the race. The 2018 bicycle is a full suspension bicycle with a welded rear chain stay unit. The rear wheel suspension is designed so that the bicycle must spring up and down easily, as stated in the Handbook. The rear travel suspension allows for around 19cm of movement from the ground level. A snapped pivot bolt in the 2018 bicycle would not cause a risk of injury. It would not have any noticeable impact on the handling or performance of the bicycle downhill. There were no markings in the 2018 bicycle indicative of any movement in the area of the chain stay unit. The 2018 bicycle complied with ISO standard 4210. It fulfilled the higher standards of testing by the second defenders as well as the higher and worldwide accepted standard of the Zedler-Institut. There was no manufacturing defect in the 2018 bicycle produced by the second defenders or the pivot bolt, at the time they supplied it".

[11] The second defender, responding to the pursuer's averments regarding a fault in the earlier 2016 bicycle supplied to the pursuer, maintain that the bicycles were materially different and any comparison are irrelevant to the assessment of fault in the instant case. It is fair to say that the history of the previous bicycle did not ultimately feature as a significant matter in this case.

[12] In responding to the defenders averments the pursuer avers:

> "Explained and averred that in preparation for the cycling competition, the pursuer undertook an 'M check' of the bicycle. As part of the check, he tightened the pivot bolt. In doing so, he took a Topeak Combo Torque wrench with a maximum torque value of 12Nm. He did not force the bolt. Further explained and averred that some inevitable damage to the bike and bolt was caused by experts removing the said bolt for inspection".

The evidence

[13] The pursuer was a teacher in design and technology with a degree in polymer engineering. He had previously worked in the car industry as a design engineer and had

tested various materials. He was not an expert in the field with which we are dealing. However, his evidence was that he was nearing the end of the cycling section of the triathlon having descended from a plateau. He was coming down a gravel track at speed. He has previously crossed various different types of terrain including dry, wet and muddy ground. He sped past another cyclist in the race. He heard a high pitched, "ping" or "ting" and immediately noticed a "change in aspect" of the bicycle. His head hit off the stem of the bicycle and he fell to the right scraping along the ground into undergrowth to the right-hand side of the track. His evidence was that in the middle of the bike he felt a loss of rigidity, which he said was nothing to do with the surface he was rising upon. This happened around 300m before the end of the cycling section. He was in a high gear and because of that was not pedalling any quicker than normal. The cyclist he had overtaken stopped to assist and it so happened that an orthopaedic doctor passed by and was able to examine the pursuer. After five or ten minutes the pursuer got back on his feet and back onto his bike and finished the cycling part of the triathlon. I understood his evidence to be to the effect that he mostly freewheeled down the hill for the rest of the race. He said he felt that the cycle was wobbling when he peddled. He did not know the cause at the time. He then gently pedalled. He felt like the cycle dipped on the left-hand side after each pedal stroke. The whole incident when he fell happened very quickly. The pursuer went on to complete the event by taking part in the third cycle ie the fell run. It was after the event that he discovered that the pivot bolt had broken. Prior to the race the pursuer said that he had completed an "M check" on the bicycle which included "checking" the bolts. He had used a torque wrench to do so. A photograph of the torque wrench he identified as using was produced (5/29 at page 266 of the core bundle). This showed the gauge indicating torque values between 0 and 12 newton metres (Nm). He said he was "usually satisfied" as to

this method of measuring the torque of the bolts on the bicycle. He accepted in cross-examination that the maximum level indicated in the torque wrench would not prevent it being exceeded if tightened beyond that torque value. As to servicing and maintenance the pursuer appeared to accept in cross-examination that the bicycle had not been serviced as prescribed although he contended that servicing for normal use rather than sporting use would be appropriate. He indicated his bike had been checked in June 2018, but accepted that that was not a full service. The pursuer maintained that he had "checked" the pivot bolt before the race but had not "tightened" it as averred on Record. He maintained that at the time of the accident he had fallen to his right. The bicycle had not "jerked excessively to the right" as narrated in the report by Sandy Gilchrist dated 12 November 2018. The pursuer maintained that he had experienced a sudden sink in the middle of the bike and that this caused him to fall forwards.

[14] Jamie Pollock spoke to his report dated 26 August 2020 being 5/15 of process and appearing at page 214 of the core bundle. The bicycle in question was taken to the laboratory of Mr Pollock's company Mettek Ltd in March 2020. The failed pivot bolt was still retained in situ in the bicycle frame. Initial efforts to remove the failed bolt were unsuccessful and therefore Mr Pollock requested the assistance of Sandy Gilchrist, using his experience and various jigs. He managed to remove both portions of the failed bolt. In the attempts to remove the bolt it rotated in situ. It is accepted that mechanical damage to the fractured surfaces was caused by the attempts to remove the bolt. The overall length of the failed bolt was 84.7mm. The length of the major portion was 70.3mm and the length of the minor portion 14.4mm. Enhanced visual (macroscopic) examination of both halves of the fracture revealed significant mechanical damage, the majority of both fractured surfaces exhibiting a shiny smeared appearance. The small remainder of both fractures

exhibited a dull non-reflective appearance, typical of a ductile fracture. An SEM/fractographic examination was also carried out. For that purpose it was necessary to cut approximately 14.4mm from the major portion of the bolt. Examination was then carried out of the fracture surfaces of both the minor and major portions of the failed bolt. However, both showed only smearing and mechanical damage or ductile dimpling, the latter being a feature typical of ductile failure. There was no evidence of a pre-existing defect nor a progressive/degenerative mechanism such as fatigue cracking.

[15] Mr Pollock considered that there were two shortcomings in the design of the bicycle, namely:

> "**4.1** The alignment of the pivot pin's first engaged thread with the interface between two of the bicycle's components, where any relative movement would induce a cyclic loading on the vulnerable location in the design critical pivot pin, and secondly, **4.2** Manufacturing the pivot pin in an aluminium alloy which had been machined as a hollow section, with minimal weight saving."

[16] Based on the examinations carried out, Mr Pollock was of the opinion that the failure of the pivot bolt could have resulted from one of three options. His view was that on the balance of probabilities the second option he put forward resulted in the failure. In relation to this option, it is convenient simply to narrate from paragraph 4.4 of his report:

> "The fracture occurred at the pin's first engaged thread. This is the preferential positon for fatigue cracking in a threaded component. (It is highly unlikely that this location coincided with the relocation of a pre-existing, manufacturing defect in the pin. If cyclic loading resulted in the propagation of fatigue cracking across the pin's net section, the reduced (un-cracked) ligament would eventually fail by overload, resulting in a fracture surface of ductile dimpling. Due to the mechanical damage inflicted on the fracture subsequent to its failure (either in service or during removal) the fracture surface was uninformative as to the initial cracking mechanism. However, it is considered highly likely, that failure has resulted from fatigue cracking at the first engaged thread and the small region of the fracture exhibiting ductile dimpling is part of the region of final failure, resulting from overload of the final reduced net section. (Had the failure resulted purely from overload, without the pin being weakened by cracking reducing the net cross section, then the pin may have been expected to have failed earlier in its life when the pedal was loaded)."

[17] When it was suggested to Mr Pollock in cross-examination that the cause of the bolt's failure was overtightening, he indicated that he would not have thought so and would expect it in such a case there to be deformation in the bolt before the fracture or "necking" making the bolt longer and thinner and that there was no evidence of that. He agreed that over tightening to a higher tension would probably be likely to fracture the bolt but indicated that he was not an engineer. He accepted that he himself had not done any fatigue testing on the bolt. He had no knowledge of the actual loads being applied to the bolt. However, he remained of the view expressed in his report. He indicated that the first engaged thread was the preferential position for fatigue cracking. It is clear that following his examination the bolt in question was now in three separate pieces.

[18] Sandy Gilchrist, a bicycle mechanic, had a great deal of experience as a cycling manager, coach and mechanic as is evident from his CV set out in Appendix 1 to the court dated 12 November 2018 (5/1 of process at page 2 of the core bundle). Mr Gilchrist inspected the bicycle on two occasions the first being on 31 October 2018, as a result of which, he compiled the said report. He confirmed that the bicycle in question, the 2018 Cube Stereo 140 Mountain Bike, is a mix of carbon mainframe and aluminium rear triangle. Bolts were used to attach the chain stays to the main triangle. The rear triangle thus moves up and down according to the terrain to get better stability on uneven ground. He said there was movement in the right-hand chain stay and gave the opinion that the pivot bolt was not up to the quality to hold the chain stays together. The pivot bolt moved from left to right screw in to the right-hand chain stay. A "ting" could indicate that the pivot bolt had snapped. Mr Gilchrist indicated that when he rode the bicycle he could feel the backend swinging. There was a slight movement, which he likened to having a soft tyre at the rear. He rode the bike for 300-400 yards. He said that it was not a positive fixed drive. His

conclusion was that the pivot bolt was not up to the quality required to hold the chain stays together. Regular maintenance would not affect this fact. He gives the opinion in his report on the balance of probabilities the pivot bolt holding the chain stays failed causing the pursuer to become unstable on the bike ultimately causing the accident. Mr Gilchrist was asked to examine the bicycle a second time, which he did in February 2021, resulting in his report dated 18 February 2021, comprising 5/23 of process at page 253 of the core bundle. For this purpose Mr Gilchrist rode the bicycle and took a number of videos of the bicycle being ridden both with an intact pivot bolt and also the original pivot bolt which was of course by now 14.4mm shorter than the original major portion due to the cutting of the bolt by Mr Pollock for examination purposes. The videos clearly disclosed a difference when the bicycle was ridden with an intact pivot bolt and when ridden with the original pivot bolt. Using an intact pivot bolt no movement in the chain stays was detected. The bike was stable. However, when the original pivot bolt was inserted there was a slight sideways movement between the chain stay and the main frame of the bike. It was not stable and was very different. There was instability when the right-hand pressure was put on the pedals. There was less movement on the left chain stay unit than the right. The movement of the chain stay units caused the rear wheel to float from side to side and the chain out of alignment with the rear cassette. This made the bike unstable to ride. The bike could be rideable once these factors were taken into consideration.

[19] In cross-examination, Mr Gilchrist accepted that he did not assess the bolt. He did not think that it would fracture as a result of overtightening and loading. He thought that the inner bolt was overtightened, it tended to break at the time of installation and not during the ride. This information was gleamed from talking to a mechanical engineer. It was not within his sphere of expertise. Likewise, whilst he may have been asked to consider

whether the bolt was defective, he was not an expert in that field. Rather, he considered his remit to be the cause of the accident on the basis that the bolt broke. In other words, on the hypothesis that the bolt snapped, could the accident have occurred as contended for by the pursuer (causation). The assumption was that the bolt broke at the time of the accident. When put to Mr Gilchrist that his test ride was carried out when the bolt had been shortened by around 14.4mm he indicated that it made no difference as the original broken pivot bolt had not been fixed in any event. While the right-hand side of the bolt may have been inserted through a bearing it was not engaged in the thread on the right-hand side and therefore not engaged in the chain stay unit. Mr Gilchrist was shown videos taken by the defenders expert Mr Zedler (which did not appear to show movement) but suggested that the bolt appeared to be inserted into the threads on the other side.

[20] Dirk Zedler was a mechanical engineer with 28 years' experience as a bicycle expert in litigation. He spoke to his report reproduced as an English translation from the German at page 346 of the core bundle comprising 6/2/1 of process. He formed the Zedler Institut the purpose being to try and improve bicycles and had testing facilities so that all parts could be tested. Mr Zedler was the expert in his company who gave evidence in court cases. The company prepared around 60 expert reports per annum. For the purpose of giving evidence he spoke English and adopted his report, as also the translation as his evidence. The bicycle in question was examined by him in August 2020, having been shipped over to Germany. There had been various modifications to the bicycle in several areas including tyres and pedals but these are not significant for present purposes. Mr Zedler gave evidence as to the general condition of the bike on the reference to a number of photographs, the conclusion being that the bicycle had been subject to intensive use with various areas of damage highlighted some of which may have been related to the crash as a result of the accident,

but some not. There was a lack of maintenance. Mr Zedler estimated on the basis of the condition of the bicycle it had a mileage of around 2000km. With regard to the area of the bicycle where the pivot bolt would be situated Mr Zedler made reference to the photographs 85 and 86 at page 420 of the core bundle showing that the chain stays were both welded together and connected to the main frame with the pivot bolt and two bearings with one spacer on top. These components were shown in photographs 87 and 88 at page 421 of the core bundle. The pivot bolt serving to fix the rear frame to the main frame was missing when the bicycle was delivered as shown in photograph 57 at page 409 of the bundle. This missing element was enclosed as a separate part as shown in photograph 58. There we can see the bolt in its three separate parts. Mr Zedler was shown a photograph of the right-hand side of the chain stay in production 5/5 at page 174 and he indicated that this is in exactly the position it was supposed to be in and in good order. There was no apparent damage on this photograph or in other photographs at pages 175 and 176. These were photographs apparently taken prior to the removal of the bolt. It was evident that damage was caused by the removal of the bolt and this could be seen in photographs 61, 63 and 64. Mr Zedler sought to make the point that the left and right-hand chain stays were a unit. They were welded together and not held together by the bolt. Another point was that the bolt having been inserted into the frame had most of its functioning as the bearings who were in good order. It was at the time of the incident in situ notwithstanding that the bolt was broken at the first thread. It was inserted into the bearing on the right-hand side. Mr Zedler demonstrated using a similar bicycle how the bolt would be inserted through into the bearing. In relation to torque, Mr Zedler tested a number of bolts on the bicycle for their torque values. Of the eight measured values only one had been tightened according to the specifications of the manufacturer. Several of the bolts were of a clearly too high torque

value. Mr Zedler spoke to a microscopic examination of the fracture surface of the bolt in question. He identified the areas of dimpling denoting the final fracture. Photograph 71 at page 413 of the core bundle showing the major proportion of the failed bolt. There were no indications of fatigue. There was rotational marks caused by turning. Mr Zedler's conclusion was that the failure was likely to have been caused directly by overtightening of the bolt or by overtightening and loading. Mr Zedler spoke to the testing he carried out for the hardness of the bolt. Two sets of bolts were used. One was made available to Mr Zedler by the manufacturer. He also tested the failed bolt. The values measured as a result of the testing demonstrated comparable hardness. Mr Zedler also carried out fatigue testing for which purpose the wheels were dismounted and other components temporarily removed from the bicycle. The testing was designed to replicate use. The frame was fitted to a test rig. A new bolt as supplied by the manufacturer was fitted which was identified and tightened in the same material properties as the bolt which failed. It was mounted according to manufacturer's specifications including torque values and bolt retaining compound. Extensive tests were carried out in which the bicycle was put through a number of fatigue tests measured by the ISO standard. The first was one using pedalling forces of 1200Nn though 100,000 cycles. The second was using vertical forces pushing the saddle through 1200Nm through 50,000 cycles. The bike passed all tests and was then put through the more rigorous Zedler advanced and advanced plus tests, which are recognised worldwide and involve higher loads and testing than the ISO standard. Mr Zedler indicated that the bicycle frame passed all tests applied. The results of the tests are set out in the test report starting at page 422 of the core bundle. Nothing was broken. Nothing had failed and there was no cracking. The bolt used was an identical one and is shown in photograph 81 at page 418 of the core bundle. Mr Zedler's conclusion was, there being no evidence of fatigue,

that there was too much tension in the bolt and that the ductile area displayed overload fracture. There were no signs of stretching but the bolt could not tell the full story because of the damage caused by its removal from the bicycle. Mr Zedler was of the view that there was no material defect in the bolt. Mr Zedler accepted that he did no tests where the bolt was overtightened. However, he opined that Mr Pollock's conclusion that the pivot was inadequate could not be justified without knowing the loads applied to the bolt. He accepted that the weakest point of the bolt would be at the first thread but indicated that this was a design commonly used by many manufacturers. Cube was a worldwide brand and Mr Zedler was not aware that there was a significant problem with the pivot bolt. If the pivot bolt snapped, Mr Zedler said that the bike would be stable, there would always be an element of flex in such a bike but there would be no "jerk to the right" or "sudden sink in the middle of the bike". Mr Zedler indicated that when he and his colleagues rode the bicycle for testing purposes they used a bolt cut exactly to the dimensions it was prior to Mr Pollock cutting the bolt for testing purposes. He said that the bicycle demonstrated a very high level of stiffness. He said that the sink of some 2mm in the bicycle, which might be caused by the bolt snapping had to be looked at in the context of a total of 190mm of movement of the suspension and the tyres. He said that if the bolt broke there was no reason for the pursuer to have hit his head on the stem. There was no reason why the pursuer would be forced forward. The bicycle was stable with the replicated bolt. While it would not be safe in the long-term as the bolt would come out there was minimal movement a little from left to right but not obvious. He agreed with Mr Gilchrist's description of it being like a soft tyre. There was however no reason to jerk excessively to the right. As regards Mr Gilchrist's second test he observed that he would have ridden a bike with the shortened bolt which would be too short to engage with the bearing on the right-hand side

with therefore no possibility of support. This contrasted with the situation in his testing where he replicated the original bolt as broken. Mr Gilchrist would have experienced much greater instability with a shortened bolt. In cross-examination Mr Zedler was not moved from his position. He observed that there was no evidence for the theory that the fracture was as a result of fatigue and that his own testing tended to refute that theory.

[21] Mr Zedler reiterated his conclusion that overtightening was the probable cause of the failure, having ruled out the other possible causes.

[22] Sebastian Martin gave evidence that he was involved in the testing along with Mr Zedler and he spoke to the videos lodged on behalf of the defender showing the testing carried out by him and his colleagues. He rode the bike along with his colleagues using the bolt that had been shortened to replicate the bolt as it would have been at the time of the accident after it had fractured. It was Mr Martin, who took the videos comprising 6/15-6/18 of process. He indicated that any movement in the bike was minimal. One such video showed Mr Martin's colleague proceeding down a set of steps on the bicycle without difficulty.

Submissions for pursuer

[23] Mr Crawford for the pursuer moved the court to grant decree in the agreed sum of damages of £5,000 reserving the question of interest pending agreement between the parties. He also sought certification as skilled witnesses:

1. Mr David Steedman, Consultant in Accident and Emergency Medicine and Surgery;
2. Sandy Gilchrist;
3. Jamie Pollock.

[24] He also moved to the expenses of the cause and also to sanction the employment of junior counsel.

[25] It was submitted that the pursuer was provided with a Cube 2018 bicycle, which was supplied by the defenders. It was provided to replace a 2016 version of the bicycle, which had failed. The replacement 2018 bike was new when it was provided to the pursuer. However, six months later, the pursuer was riding the bike when a key component, the pivot bolt, snapped; it made an audible "ting". The pursuer was going very fast, downhill on a flat section of a triathlon event at the time. The bike, which had been stable and predictable, suddenly changed in aspect and became unstable. The change was surprising and caused him to fall to his injury. It was submitted that there was no dispute amongst the witnesses at proof that the pursuer was entitled to expect that the pivot bolt would last much longer than six months (around 10 years). The pursuer had not used the bike for anything other than normal mountain biking. The pursuer was entitled to damages by virtue of section 2 of the Consumer Protection Act 1987, which provides for strict liability on the part of the supplier in the event of injury caused by a defect. A "defect" is interpreted plainly and favourably to consumers in the sense of what an owner is entitled to expect. The Act did not impose a requirement of "reasonable foreseeability" of harm. It did not require the pursuer to redesign the product or to prove how the defect could have been avoided by better design. The defenders argument that the pursuer was guilty of material "overtightening" of the bolt, which amounted to abuse, lacked any specification and should be rejected. The defenders argument is that the bike ought to have been maintained, including tightening of bolts, was wholly at odds with reality, where the bike was clearly manufactured for ordinary users. In any event, the bike actually had been serviced, but servicing did not identify a failing bolt.

[26] It was submitted that the dispute between the parties concerned:

a) whether the bolt snapped because the pursuer had unreasonably abused the bike (either by not taking the bike to a professional servicing or by overtightening the bolt in any way above the perfect torque of 12Nm);

b) whether the bike remained "safe" after the bolt had snapped;

c) whether the fracture of the bolt caused the pursuer to fall.

[27] Reference was made to the definition of "defect" in section 3 of the 1987 Act. A product is deemed to be defective when it fails to provide safety which persons generally are entitled to expect. It may be defective for a number of reasons. For present purposes, defects could occur in the product's design, which caused the product to break down or otherwise to fail in its operation when put to the intended use. It was submitted that the pursuer need not specify with precision or accuracy the exact way that the product was defective, but instead that it had fallen below the level of safety, which could be generally expected of the product. In some cases, the failure of the product alone is enough to infer the defect. In *Ide* v *ATB Sales Ltd* [2008] EWCA Civ 424, where handlebars on a mountain bike broke unexpectedly, it was inferred that the same were defective in the absence of a credible competing cause, the defendant's argument that the handlebars had failed during the fall being rejected. In the present case, where there was agreement between experts that the bike's pivot bolt should have lasted many years more than it did, a similar inference could be drawn. In other cases, it was accepted that failure alone will not be sufficient to infer the defect. In such cases, the pursuer wold require to prove with further evidence that it occurred because it did something which owners are entitled to expect that it would not do (*Gee* v *DePuy International Ltd* [2018] EWHC 1208 (QB) at paragraph 99). It was submitted

that the essence of strict liability under the statute was whether the presence of any defect in a product made it unsafe.

[28] It was submitted that the defender may offer to prove an alternative cause for the defect. It is not enough for a defender to show mere misuse of the product. Section 3(2)(b) of the Act provided that the circumstances which the court must take into account are: "what might reasonably be expected to be done with or in relation to the product". This provision clearly concentrated on what likely use and misuse of the product should be reasonably anticipated by the supplier. This is wider than what the product was designed for. If there was a likelihood if improper use of a product, which carried some hidden danger, either the hazard ought to be avoided by change of design or, if this cannot be achieved, adequate warnings must be given as an alternative.

[29] Turning to the cause of the bolt snapping it was submitted that the most probable explanation was that the bolt snapped because it had been designed so that it put the most force, through the weakest part of a bolt. In addition, the bolt had been hollowed out, which made it weaker. It had been subjected to normal use, but that would inevitably involve putting repeated impact and force through the bolt. In the pursuer's case, this was too much for the bolt. It had weakened and then snapped. Counsel for the pursuer put forward Mr Pollock's evidence in support of this explanation. In his evidence, the fracture surface of the bolt displayed ductile dimpling or "rough seas" which indicated a sudden fracture. Mr Pollock thought that deficiencies in the actual makeup of the bolt were unlikely. When asked about whether the bolt had fractured due to overtightening, Mr Pollock considered that this was unlikely because there would have been a "necking" effect on the shank of the bolt. He considered the most likely cause of the fracture to be a weakening at microscopic level caused by cyclic loading leading to fatigue cracking and then failure by overload.

Mr Gilchrist's evidence was also put forward in challenging the overtightening theory, as in his experience, a fracture would only happen at the time of the tightening of the bolt.

[30] As to the defenders alternative cause: that the bolt snapped because of overtightening which by inference amounted to abuse or unreasonable misuse taking the failure out-with the protection of the Act, it was submitted that the averments in this regard and the evidence were wholly lacking in specification.

[31] Mr Zedler's evidence was challenged on the basis that he was not a metallurgist. The perfect level of torque for bolt in question was 12Nm. He did not state at what point or technique would have caused the fracture nor had any level been set forth in the pleadings. It was submitted that the testing carried out by Mr Zedler was a restricted exercise with limitations. Further, the evidence of Mr Zedler as to estimating the pursuer's bike mileage was questionable. His limited testing did not possess him of the same knowledge and insight as Mr Pollock on the question of behaviours of metals and distress. He had not considered "necking". On the other-hand Mr Pollock's evidence was well reasoned and was a good explanation for how with all the vagaries of mountain bike use the stress put through the pivot bolt at the weakest point of a hollowed out bolt caused it to weaken and then fracture. In any event, it was submitted that the defect could be inferred from the snapping of the bolt itself (*Ide*, *supra*).

[32] It was submitted that ownership and use of a bike involved tightening of bolts. This is an activity, which would be envisaged by the supplier in the spectrum of normal use. If the fracture of the bolt was contributed to by some minor overtightening, it was still defective. Such minor overtightening would always be anticipated by a supplier providing bicycles to a large number of individuals. There was however, no evidence from which significant overtightening could be inferred.

[33] Counsel then addressed the question of whether the snapped bolt was a defect, which involved danger and a risk to safety. He submitted that the once the pivot bolt had snapped the bike was no longer safe to ride. It was suggested that once a pivot bolt had snapped there were three consequences: 1) the chain stay was no longer held tight to the seat bar with the right side being immediately detached; 2) the bolt would eventually come out completely and 3) the bike becomes suddenly unstable. Mr Zedler accepted that in the long-term the bike would not be safe as the bolt would come out eventually. The defenders argument that because the bolt was temporarily staying in place it was still fairly stable was superficial. It ignored the obvious danger created by the fracture of a bolt, which holds together key components of the bike. No sensible rider other than to test the bike for the purposes of litigation would continue to ride the bike in the knowledge that the bolt had fractured. The simple reason for that was that the bike had become unsafe. This bike was unstable with the bolt fractured, but held in place by some friction and luck.

[34] That brought counsel onto the issue of causation. He submitted that the snapped bolt caused instability in the bike and caused the pursuer's accident. I was asked to accept the pursuer's evidence about the effect which the defect had on is bicycle. It was submitted that the pursuer's account of instability was corroborated by Sandy Gilchrist who had a long experience as a bicycle mechanic and had himself experienced the instability of a bike before the fractured bolt was removed. The evidence of Mr Zedler and Mr Martin for the defenders as to the stability of the bike on testing was challenged. It was admitted that Mr Zedler's efforts to reconstruct the accident was not expert evidence. He had no apparent qualification in this area. His evidence exceeded the proper parameters of opinion evidence (*Stewart* v *Glaze* [2009] EWHC 704 (QB) at paragraph 7). Mr Zedler's theory about the fall mechanism had not been put to Mr Gilchrist so the evidence had no value. It was, it was

suggested, troubling that the appearance of the testing bolt used by Mr Zedler was of having a remaining thread (absent in the original broken bolt). It was clear that the impact of this in knitting the two components of the bike together had not been considered. The pursuer was the only witness to experience the bike from the moment the pivot bolt was intact to the moment when it fractured and it was submitted that his evidence should be preferred on this to the unscientific opinion. Counsel renewed his motion for decree.

Submissions for defender

[35] Ms Stachura for the defender moved the court to grant decree of absolvitor in favour of the second defender and award the expenses of process in its favour save as was otherwise already awarded. She sought certification of Mr Zedler as a skilled witness and to certification of the cause as suitable for the employment of counsel. In the alternative, in the event that the court found that the second defender was liable to the pursuer, it was submitted that there was contributory negligence on the part of the pursuer such that any liability owed by the second defender was either extinguished or reduced.

[36] She said that there was a large measure of agreement on the facts and facts which were not disputed. Reference was made to the basis of the pursuer's claim in statute and also the Council Directive 85/374/EEC the provisions of which the Act sought to implement. It was submitted that in order to establish liability under the Act the pursuer is required to prove the damage, the defect and the causal relationship between the defect and the damage. The pursuer's case proceeded on the basis that the pivot bolt snapped in a six month' old 2018 bike which he claimed caused him to fall. It was accepted that it was not necessary for the pursuer to establish the precise cause, which led the bolt to snap (*Baker* v *KTM Sportmotorcycle UK Ltd* [2017] EWCA Civ 378; [2018] ECC 35). However,

the court would still have to determine that it was more likely than not that the bolt fractured because it was defective within the meaning of section 3 of the 1987 Act (*Ide, supra* approving the decision at first instance and reported at [2007] EWHC 1667 (QB)).

[37] It was submitted that the pursuer's reliance on *Ide* was misplaced and that it did not support the proposition that the court could infer from the mere fact of the occurrence of the fracture itself that there was a defect. That case simply supported the proposition that the precise mechanism of the defect did not require to be proved. However, the defect still did require to be proved. The totality of the evidence must support that the cause of the fracture was more probably than not caused by a defect and not some other cause.

[38] With regard to the pursuer's alternative position, in the event that the court did not draw the inference sought on the mere occurrence of the failure, the pursuer was, it was submitted, in difficulty. The evidence of Mr Pollock that on the balance of probabilities the bolt failed due to fatigue cracking was not one which was based on the averments and there may be an issue for the court in that regard. In any event, Mr Pollock's conclusions were challenged judged against the evidence of Mr Zedler. In relation to the criticism that the bolt was hollow and therefore too weak to withstand applied loads, Mr Pollock could not say what the applied loads were that the bolt required to withstand. Mr Pollock also said that if the bolt was too weak he would have expected it to fail earlier. In relation to the criticism as to the position of the first engaged thread of the bolt in relation to the other components - a suggested defective design - the risk could not be established in the absence of testing. Mr Pollock accepted that he had not tested the bike's mechanism to ascertain if that criticism was well founded. Mr Pollock acknowledged that he was not an expert in bicycles or the design of bicycles and that even commenting on the effect of overtightening of a bolt was beyond his experience. On the other-hand Mr Zedler did test the bike's mechanism through

fatigue testing and neither the bolt nor the bike failed even after the most rigorous of testing which would represent several years of intensive use.

[39] The only reasoning provided by Mr Pollock to support his conclusion of fatigue failure being the more probable cause was that the fracture occurred at the weakest point in the bolt. However, as Mr Zedler said, the first engaged thread is always the weakest point. Failure could have been caused through other mechanisms, which could equally cause the bolt to break at its weakest point. If the bolt was going to fail the likelihood was that it would fail at its weakest point regardless of the mechanism. No inference could be drawn that it was defective nor could a conclusion be reached that it probably failed as a result of fatigue. Mr Pollock, it was submitted, failed to properly consider alternative causes or provide reasoning as to why any of those alternative causes could not be more probable than fatigue failure.

[40] It was submitted that the expert's opinion regarding what the fractured surfaces of the pivot bolt showed was largely in agreement. Most of the fractured surfaces had been mechanically damaged and smeared and that area of the fractured bolt was therefore uninformative of the fracture mechanism. The undamaged fracture surface showed "ductile dimpling" being a characteristic of overload - final failure. Thus far the experts were agreed. Where the experts differed was their opinion as to the most probable cause of the bolt failing in the absence of evidence from the fracture surface.

[41] The approach taken by the defender, it was submitted, was to look at the totality of the evidence and test all theories out of the possible cause of the bolt failing to try and ascertain where the was probable cause was. It was said that the report and evidence given by Mr Zedler was thorough, balanced and well-reasoned. He examined the whole bike and was the only expert to do so. He identified from examination the likely usage of the bike

and its level of maintenance and servicing. He examined the area of the chain stay unit, which is said to have become detached and was able to make observations that there was no sign of any movement of the chain stay unit and everything was where it should be. Indeed Mr Gilchrist agreed that there were no marks or defects around this area suggestive of any damage or movement. Mr Zedler tested the bolts on the rear frame and noticed that only one was set at the correct torque level according to the manufacturer's specification. He had tested an identical and intact bolt, the only limit on such testing being the influence of corrosion. However, none of the experts identified any corrosion on the failed bolt. Mr Zedler was then able to eliminate other possible causes of the bolt fracturing. For example, there was no defect in the material and in this respect he agreed with Mr Pollock. Material fatigue was excluded not only on the basis that the bolt was only six months old, but after testing. The only other possible cause of the bolt fracturing identified by Mr Zedler was faults in the assembly of the bicycle. He identified several bolts that had been overtightened and several tool recesses were damaged either due to excessive tightening or unsuitable tools being used. He was thus able to conclude that it was more probable than not that the bolt failed due to it being overtight which either caused it to fracture through overload or which caused it to fracture during normal cyclic loading resulting in overload.

[42] It was accepted all round that bolts have a tendency to fracture if put under too high a tension. Mr Gilchrist's evidence that an overtightened bolt would normally break at installation was not borne from his own experience but rather by talking to someone else with expertise in that area. Both of the pursuer's experts accepted that the best person to speak to about the effect of a bolt when overtightened was a mechanical engineer. I was invited to accept Mr Zedler's evidence and indeed conclude that the most probable cause of the bolt failing was as a result of it being overtightened by the pursuer.

[43] It was submitted that, where there are two competing theories for the cause of the bolt fracturing and neither of them are improbable, if the court rejects one, it is logical to accept the other as being the cause on the balance of probabilities. What might, at first sight, be improbable or implausible, may become increasingly more probable as and when alternative causes are eliminated (*Ide, supra* at paragraph 6 and *McGlinchey* v *General Motors* [2012] CSIH 91 at paragraphs 35 and 36).

[44] The onus was on the pursuer to prove his averment that there had been a defect in the manufacturing of the bike and it was submitted that the pursuer had not proved that there was such a defect. In any event, Mr Pollock's theory that the bolt failed through fatigue was not established nor was it established that there was any defect in the design of the components.

[45] It was further submitted, under reference to the requirements of the statute, that the entitled expectation in relation to the 2018 bike was not met. It was not established that the bicycle was less safe than other products in the same class (*Hastings* v *Finsbury Orthopaedics Ltd* [2021] CSIH 6 at paragraph 67).

[46] It was submitted that the issue of safety of the 2018 bike struck at the heart of both determining liability under the Act as well as determining causation. It was submitted that even if the defenders submission on the existing of a defect was not accepted by the court, any faults with the pivot bolt would not affect the safety of the 2018 bike to render it defective within the meaning of section 3(1) of the Act. Further, it was submitted that the pursuer would in any event fail upon a consideration of the question of causation. Even if the court were to determine that the bolt fractured due to fatigue failure as a result of some defect such as the design of the 2018 bicycle, it was not such as would cause the pursuer to fall from it. Furthermore, the mechanism of the pursuer's fall as averred on Record as well

as in evidence produced at proof was not consistent with the effect the pursuer says the fractured bolt had on the handling of the 2018 bike.

[47] The evidence of Mr Zedler, which I was invited to accept, in relation to the construction of the bike was that the rear frame was stiff and solid. If one bolt were to fail there are another three bolts to compensate for it. Further, his evidence was that the broken bolt would have had support from the second bearing despite not being engaged in the thread. This would lead to minimum movement perhaps 2-3mm in the context of a complete suspension system of 190mm. Mr Gilchrist, in his test drive inserted a bolt, which was now 14mm shorter than the original broken bolt. The pursuer's reference to *Stewart* v *Glaze* would apply to Mr Gilchrist whose evidence was not scientifically based and who displayed a lack of understanding of the mechanism of the bike. He failed to try and replicate how the bike would actually have ridden with snapped bolt inside and proceeded on an incorrect assumption that the shorter bolt would have made no difference to the stability of the bike if it would not engage in the threads. He failed to take account of the bearings.

[48] In relation to the mechanism of the fall it was submitted that Mr Zedler's evidence should be accepted of how it was that someone could fall forward whilst riding a bicycle. The mechanism of the fall was, according to Mr Gilchrist, a matter he sought to address. The pursuer had not proved that the mechanism of the fall was consistent with the effect of the snapped bolt. There was no evidence produced that a sudden sink in the middle of the bike could cause the pursuer to jolt forwards, hit his face off the stem of the bike and fall. In contrast there was evidence produced by the defender that such a mechanism would not be consistent with the effect the pursuer claimed. In Mr Gilchrist's report the pursuer had stated to him some three weeks after the accident that the bike had jerked excessively to the

right. When asked about this, Mr Gilchrist was clear. Yet when the pursuer was asked his evidence was that he did not state that he had jerked excessively to the right. That called into question the reliability of those witnesses.

[49] In conclusion, it was submitted on behalf of the defender that the pursuer had failed to prove his case and Ms Stachura renewed her motion for decree of absolvitor in favour of the defender.

Discussion

[50] It would be convenient at the outset to set out the relevant sections of the 1987 Act:

> "**2. Liability for defective products**
> (1) Subject to the following provisions of this Part, where any damage is caused wholly or partly by a defect in a product, every person to whom section (2) below applies shall be liable for the damage.
> (2) This section applies to –
> (a) the producer of the product…
> **3. Meaning of 'defect'**
> (1) Subject to the following provisions of the section, there is a defect in the product for the purposes of this Part if the safety of the product is not such as persons generally are entitled to expect; and for these purposes 'safety', in relation to a product, shall include safety in respect of products comprised in that product and safety in the context of risks of damage to property, as well as in the context of risks of death or personal injury.
> (2) In determining for the purposes of subsection (1) above what persons generally are entitled to expect in relation to a product all the circumstances shall be taken into account, including –
> (a) The manner in which, and purposes for which, the product has been marketed, its get-up, the use of any mark in relation to the product and any instructions for, warnings with respect to, doing or refraining from doing anything with or in relation to the product;
> (b) What might reasonably be expected to be done with or in relation to the product; and
> (c) The time when the product was supplied by its producer to another;
> and nothing in this section shall require a defect to be inferred from the fact alone that the safety of a product which is supplied after that time is greater than the safety of the product in question.

4. Defences

(1) In any civil proceedings by virtue of this Part against any person… in respect of a defect in the product it shall be a defence for him to show –
  (d) that the defect did not exist in the product at the relevant time…

(2) In this section 'the relevant time'… means –
  (a) If the person proceeded against is a person to whom subsection (2) of section 2 above applies in relation to the product, the time when he supplied the product to another…"

[51] The 1987 Act bore to implement Council Directive 85/374/EEC dated 25 July 1985 on the approximation of the laws, regulations and administrative provisions of the member States concerning my ability for defective products. The recitals state *inter alia*:

> "Whereas, to protect the physical well-being and property of the consumer, the defectiveness of the product should be determined by reference not to its fitness for use but the lack of safety which the public at large is entitled to expect; whereas the safety is assessed by excluding any misuse of the product not reasonable under the circumstances".

[52] The recital must also state that the contributory negligence of the injured person may be taken into account to reduce or disallow liability.

[53] Article 4 of the Directive provides:

> "The injured person shall be required to prove the damage, the defect and the causal relationship between defect and damage".

[54] Article 6 provides:

> "1. A product is defective when it does not provide the safety which a person is entitled to expect, taking all circumstances into account, including:
> (a) the presentation of the product;
> (b) the use to which it could reasonably be expected that the product could be put;
> (c) the time when the product was put into circulation.
> 2. A product shall not be considered defective for the sole reason that a better product is subsequently put into circulation".

[55] Article 7 provides:

> "The producer shall not be liable as a result of the Directive if he proves:
> (b) that, having regard to the circumstances, it is probable that the defect which caused the damage did not exist at the time when the product was put into circulation by him or that this defect came into being afterwards…."

[56] Article 8 provides *inter alia*:

> "The reliability of the producer may be reduced or disallowed when, having regard to all the circumstances, the damage is caused both by a defect in the product and by the fault of the injured person or any person for whom the injured person is responsible".

[57] The terms of the Directive are relevant when interpreting the 1987 Act in light of section 1(1) of the Act which provides:

> "This part shall have the effect for the purpose of making such provision as is necessary in order to comply with the product liability Directive and shall be construed accordingly".

[58] There is no dispute that the second defender is the manufacturer and producer of the bicycle in question and so comes within the category of persons potentially liable for injury caused by a defective product under section 2 of the 1987 Act.

[59] The first issue to decide is whether or not there was a defect in the product - the 2018 bicycle - and that necessarily involves a consideration of the most probable cause of the pivot bolt failing. There is no question that it did fail.

[60] There was a measurement of agreement as to what the pursuer required to prove. As noted in terms of Article 4 of the Directive the pursuer requires to prove the damage, the defect and the causal relationship between the defect and damage. There was agreement that it was not necessary for the pursuer to establish the precise cause, which led to the bolt snapping (*Ide, supra*). However, the pursuer's position appeared to be that there was an inference in the present case that because the bicycle's pivot bolt should have lasted many years more than it did, then there must have been a defect in it for it to fail. Counsel for the pursuer relied on *Ide* in support of this proposition. However, that was a case, like any other case, decided on its own facts and circumstances where an inference was drawn that there was a defect. Although the Act pointedly dispenses with a need to prove fault, a claimant

must still prove defectiveness. It is not enough merely to show the product failed and caused damage nor that a product is defective and that damage occurred if that damage might equally have some other cause. In the case of *Ide* the facts are clearly distinguishable. The claimant fell from his mountain bike sustaining injury. After the fall, the left handlebar was found to have fractured and broken off. There were two competing explanations of the cause. The claimant claimed that there was a defect in the handlebar because it had insufficient strength to withstand loads imposed upon it in ordinary use as it had suddenly fractured and caused him to fall. The manufacturer argued that the pursuer lost control of the bike and fell and that the handlebar fractured as a result of the fall. In *Ide* the court made a finding that the bicycle had been well-maintained and was regularly serviced. Given the evidence of Mr Zedler in this case I am unable to come to such conclusion. In *Ide* tests were carried out to the handlebar by two metallurgists. The left side, which fractured, could not be tested, but the right side was. Under testing the right side partially fractured when a load of 110kg was applied to it. In a handlebar of a similar design by the same manufacturer the handlebar bent at a maximum 130kg but it did not fracture. The handlebar of another manufacturer was tested and it did not bend until a force of 158kg was applied. The testing led the metallurgists to agree that because the other handlebar of similar design by the same manufacturer had not fractured at the same load as the broken handlebar, the broken handlebar was of lower strength and was more brittle than the new handlebar of the same design. The judge at first instance accepted that evidence and held that the conclusion to be drawn from those tests was that the left side of the handlebar was defective. There was no inference merely from the occurrence of the fracture. As the court observed, the claimant still required to prove a defect. Rather the inference was that if the right side was weaker than other bicycles of the same or similar design the left side was also likely to have been

weaker. Accordingly, the court decided on the totality of the evidence, including the evidence from the metallurgical testing that he left side the handlebar was defective. I agree with the submissions put forward on behalf of the defender that there is no inference of defectiveness merely from the occurrence of the failure in the pivot bolt in this case.

[61] The alternative position put forward on behalf of the pursuer was on the basis of the evidence of Mr Pollock that on the balance of probabilities the bolt failed due to fatigue cracking. As noted, counsel for the defender took the point that there was no averments to support this case. As also noted the averment of the pursuer is "The pivot bolt snapped as a result of a defect in the manufacturing of the bicycle". So in my view there is an additional potential difficulty in that Mr Pollock's evidence was to the effect that the fatigue cracking arose as a result of a defective design rather than a manufacturing defect. Be that as it may, Mr Pollock's report was lodged quite some time before the proof and evidence was led from him on this issue without objection. In these circumstances I think it is too late for the defender to argue that the court is disabled from considering the case advanced on the basis of fatigue cracking. Furthermore, it is clear that the defender's expert Mr Zedler fully considered the position advanced by Mr Pollock in his report.

[62] Both Mr Pollock and Mr Zedler agreed that nothing could be deduced from the fractured surfaces of the failed bolt given the damage that had been caused by its removal for the purposes of examination by Mr Pollock.

[63] Mr Pollock's evidence that the bicycle was defective was in essence theoretical. There was no evident problem with the manufacture of the bolt. His criticisms were directed at the design in two respects. First the alignment of the bolt's first engaged thread with the interface between two components where any movement would induce loading on the vulnerable location of the weakest part of the bolt. Secondly, the bolt was hollow which

meant that it was not as strong as it could be ie a solid bolt. His evidence appeared to be that these two shortcomings caused the bolt to fail through fatigue.

[64] I agree with the submissions for the defender that a conclusion that the hollow bolt was too weak could not legitimately be arrived at without knowing the applied loads expected. It is difficult to see how his conclusion could be justified without further evidence supporting it. Further, in relation to the alignment of the bolt's first engaged thread, I agree with the submission on behalf of the defender that it could be concluded that this was a defective design until it had been tested. It was acknowledged that the first engaged thread of the bolt the interface between the two components would induce loading at its weakest point but it could not be concluded that this was a defective design until it had been tested. Mr Zedler on the other hand did submit the bicycle to rigorous testing. The bolt, which I accept was an identical one to that which would have been originally inserted in the bicycle, passed all tests. He conducted stringent fatigue testing placing on the bolt higher loads than would normally be expected. In my view, this practical testing is to be preferred to the proffering of a theory when it comes to considering probable causes of the failure of the bolt.

[65] Had this design been a problem one would have expected there to be some body of evidence to the effect that it had been a problem in bicycles of this type. However, there was little or no evidence about this. I did not consider that I could attach much weight to information on forums on the internet which information was in any event limited. Mr Gilchrist's evidence about a "prior history" of failed pivot bolts in Cube bikes was information that came from others and was completely lacking in any detail. On the other hand Mr Zedler indicated that around 650,000 bicycles had been manufactured under the Cube brand in 2018 and he had not in his 28 years' experience ever had to report on a pivot

bolt failure which caused injury. If this was a design defect which rendered the bike unsafe it would be surprising in my view that Mr Zedler had not come across it before.

[66] I have accordingly rejected the evidence of Mr Pollock as to the mechanism of failure.

[67] I preferred the evidence of Mr Zedler whose approach was to look at the totality of the evidence and test the possible theories as to the cause of the bolt failure and to ascertain what the most probable cause was. In my view, Mr Zedler's report was thorough, balanced and well-reasoned. He conducted an examination of the whole bicycle, the only expert to do so. He examined the condition of the bike and concluded that it had been inadequately maintained. (In contrast to the motorcycle in *Baker* v *KTM Sports and Motorcycle UK Ltd supra*). Of the eight bolts in the rear frame tested for torque values only one was in accordance with the manufacturer's specification. Some of the bolts were overtightened. There was damage to some of the bolt recesses caused by either overtightening or the use of inappropriate tools. He carried out rigorous testing. He eliminated any defect of the material. He tested for fatigue with a negative result. He identified the only other possible cause as overtightening of the bolt causing it to fracture through overload or which caused it to fracture during normal cyclic loading resulting in overload. It appeared to be accepted all round that the bolt had a tendency to fracture if put under too high a tension. Certainly, this was not contradicted. Mr Pollock was not a mechanical engineer and Mr Gilchrist's evidence about overtightening normally causing failure at installation was information from another. I accept that a mechanical engineer is the appropriate expert to give evidence on the effect of overtightening. Mr Zedler was a mechanical engineer. In light of that, taken together with the compelling evidence of Mr Zedler on the issue, I am not persuaded by the evidence of Mr Pollock as to the effect of overtightening in a bolt and in particular his evidence that the absence of signs of "necking" or stretching of the bolt pointed away from

overtightening. While it is true that the effect of overtightening was not tested by Mr Zedler to determine the torque at which the bolt might fail this does not in my view undermine the essential strength of his evidence on this point.

[68] Therefore, having examined the condition of the bicycle, assessed the level of maintenance, conducted rigorous testing and eliminated the other theories for the bolt fracturing, Mr Zedler was entitled to come to the view that the probable cause of the failure of the bolt was overtightening. I accept his evidence about that. In doing so I have adopted an approach consistent with *Ide* and *McGlinchey* v *General Motors supra.*

[69] In light of that evidence, I do not accept the pursuer's evidence that the bicycle was adequately maintained prior to the triathlon or that the bolt in question was not overtightened. In have concluded that it is likely to have been overtightened and the use of a torque wrench such as the one he used would not have prevented that. The condition of the recesses is consistent with overtightening. Whether the overtightening occurred immediately prior to the event when the pursuer conducted an "M check" or at an earlier stage, I do not know, but it is not necessary for me to decide that.

[70] In relation to the meaning of a "defect" for the purposes of the 1987 Act, as noted, section 3 provides "there is a defect in a product for the purposes of this Part if the safety of the product is not such as persons generally are entitled to expect…" This imports the issue of safety which is also relevant to the question of causation. I agree with the submission on behalf of the defender that the pursuer is not established on a balance of probabilities that the entitled expectation in relation to the 2018 bike at the time it was supplied was not met. On the foregoing evidence, it is not established that the bicycle was less likely to perform safely than other bicycles of the same design (*Hastings* v *Finsbury Orthopaedics Ltd supr*a).

[71] As noted, section 3(2) sets out the factors which are to be taken into account in determining what persons generally are entitled to expect;

> "All the circumstances shall be taken into account, including –
> (a) the manner in which and the purposes for which the product has been marketed, it's getup, the use of any mark in relation to the product and any instructions for, or warnings with respect to, doing or refraining from doing anything with or in relation to the product;
> (b) what might reasonably be expected to be done with what in relation to the product; and
> (c) the time when the product was supplied by its producer to another"

[72] This was a mountain bike for off road cycling and included instructions and warnings provided in the Handbook issued with the 2018 bicycle. The pursuer stated in evidence that he had read and followed the instructions and guidance therein. The Handbook provides several warnings of personal injury and material damage to users. In particular, there were clear warnings provided as to a risk of injury particularly if work was carried out unprofessionally on the bicycle and contrary to the instructions that such work be carried out by a specialist workshop. It provides a warning of risk of personal injury and material damage. It states *inter alia:*

> "many cyclists like to modify their bikes… Working on bikes requires sound trading, sound knowledge and a great deal of experience. Unprofessional working on a bike can lead to a dangerous riding situation, falling, accidents and material damage. You may not change the condition of any part of your bicycle. Having all fitting parts, modifications, servicing and any other work carried out solely by your specialist workshop… The person who modifies a bicycle is also liable for them".

[73] Further, the bolts had a specified torque laser engraved on them. In addition, the bicycle required to be serviced. I accept the evidence that for a bicycle of this sort the Handbook prescribed that bikes should be inspected at the latest after 100km or one month with subsequent inspections it would be 500km or every two months, the rear suspension bearing for full suspension frames being checked every 250km or every two months. I accepted Mr Zedler's evidence that a bike of this sort is in the sporting category. The

evidence was that the pursuer arranged with the bicycle retainer a "check" in June 2018, not a full service. The pursuer ought to have his bicycle serviced every two months, which would include a check of the rear suspension and accordingly it should have been serviced prior to the triathlon in question. I have little difficulty in concluding that the bicycle had not been serviced or maintained in accordance with the relevant schedule in the Handbook. I have come to the view that, with the terms of the recitals to the Council Directive in mind, that while minor overtightening of the bolt might be acceptable in this context, overtightening of the bolt to the extent that the bolt fractured was not reasonable misuse.

[74] If I am right in my conclusions thus far, the pursuer's case fails as no defect within the meaning of section 3 of the 1987 Act is established. However, if I am wrong in that conclusion I should then consider whether the failure of the bolt, on the hypothesis that this was as a result of a defect, caused the accident. In other words, whether this defect caused the pursuer to lose control, fall from his bicycle and sustain injury. In a sense, this is related to the question of whether the defect caused the bicycle to become unsafe for the purposes of establishing a defect in the sense described in section 3(1). However, it is a distinct question of causation which is an essential ingredient of liability in terms of Article 4 of the Directive.

[75] In this context there is the technical evidence as to the effect a snapped bolt would have on the stability of the bicycle. There was also the issue of the mechanics of the pursuer's fall given his evidence as to how this occurred.

[76] The pursuer's evidence was that there was a "change in the aspect of the bike". There was a sound like a "ting". He experienced the bike "sinking". It was small but "big enough to cause a problem". He lost control, fell, hitting his face on the stem and falling to the ground. Its worthy of note that according to the report of Mr Gilchrist the pursuer explained that the bike had jerked excessively to the right. Mr Gilchrist was clear that this

was what had been explained to him. The pursuer indicated that he had not said this. As noted, the Record contains the averment for the pursuer that there was "sudden sink in the middle of the bike". I agree with the submission on behalf of the defender to the extent that the reliability of the pursuer's account must be called into question. I can sympathise as this must have been something that happened very quickly and it may be difficult to remember precisely what occurred. Whether this was a sink in the middle of the bike or a jerk excessively to the right it would not according to Mr Zedler cause the pursuer to be jolted forwards and to hit his face on the stem. I accept that Mr Zedler is qualified to give evidence in this regard in light of his experience in accident reconstruction as part of his preparation for court reports.

[77] Another difficulty I have is with the pursuer's account that following the accident, when the pursuer had remounted the bicycle, it dipped on the left hand side following each pedal stroke. This contrasts with Mr Gilchrist's description, albeit with a shorter bolt, that there was instability when right-hand pressure was put on the pedals with less movement on the left than the right of the chain stay unit.

[78] More importantly in my view is the technical evidence as to the effect of the bolt snapping in the position it did ie at the first engaged thread. An identical bolt was inserted in the bicycle for the purpose of the practical testing carried out by Mr Zedler and his colleagues. I accept that in all material respects the bolt was identical to the one in the pursuer's bike at the time of the accident and which failed. In that situation, I accept Mr Zedler's evidence that while the bolt once fractured would not be engaging in the thread on the right-hand chain stay, it would nonetheless derive support from the bearing on that side. There would in these circumstances be minimal movement of some 2-3mm which would not be noticeable to the rider. This is in the context of maximum suspension

movement of 190mm in this mountain bike. If that was a situation then it is likely that the fracture and failure of the bolt would not have been noticeable to the pursuer at the time it failed and in particular would not have caused instability in the bicycle. It would therefore have no contribution to make to the pursuer's loss of control and fall from the bike.

[79] While it is true that such testing did not exactly replicate the conditions at the time the pursuer fell from his bike, the evidence was that there was no significant instability in the bike. The situation would of course be different if the bolt were not to derive support from the bearing on the right-hand side. In that situation there would be instability. That was the situation in which Mr Gilchrist carried out his testing which was filmed close up by a camera showing some movement in the right-hand chain stay. That was using the original bolt which had been further shortened by Mr Pollock for the purpose of examination. Mr Gilchrist's evidence that he had ridden the bike for the purpose of his first report prior to the removal of the original bolts, has in my view to be looked at with some caution. His evidence was that there was some movement in the rear likening it to a flat tyre but the evidence was lacking in detail. His assessment on that first occasion was not derived from a thorough testing of the bicycle. His photographs at the time did not show marks or defects around the chain stay unit indicative of movement or damage and I accept Mr Zedler's interpretation of those images. On the other hand, the evidence led by Mr Zedler and his colleague Mr Martin that was given after a thorough practical demonstration of an identical bolt. In light of their evidence, I found Mr Gilchrist's evidence that the handling of the bike was similar when ridden with the original bolt inserted and when subsequently ridden with the shorter bolt difficult to accept. I found the evidence of Mr Zedler and Mr Martin to be more convincing given their thorough testing. Their position was that that the rear frame was stiff and solid.

[80] In all the circumstances, I have come to the conclusion that the failed bolt was not such as to make the bicycle unsafe at the time of the accident and that, if there was a defect in the bicycle, it was not causative of the accident for the reasons I have explained.

[81] If I am wrong in my conclusions on liability, on the hypothesis that the pursuer did overtighten the bolt in question, and looking at the matter broadly as a jury question, I would assess contributory negligence on his part at 50% thereby reducing the agreed damages by that amount.

[82] In accordance with the foregoing I have pronounced decree of absolvitor with expenses in favour of the defender and granted the defender's motions for certification of Mr Zedler and sanctioned the employment of counsel which will be apt to cover the work of a solicitor advocate.