DISCIPLINARY COMMITTEE DECISION

REGARDING THE COMPLAINT ABOUT RICHARD JOYCE

Confidential to the parties

In accordance with:
Institution of Professional Engineers Rules
Institution of Professional Engineers Disciplinary Regulations

Prepared by:
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engineering new zealand
Institute of Engineering Professionals

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EXECUTIVE SUMMARY

1. In September 2016, Richard (Dick) Joyce signed Inspection Certificates for seven tuk-tuks (four in Wellington and three in Auckland) that certified they met the structural strength and stability requirements in the Land Transport Rule 31001: Passenger Service Vehicles (the PSV Rules). Mr Joyce had not viewed the strengthening work carried out on the Auckland tuk-tuks before signing the Inspection Certificates.

2. In December 2016, one of the tuk-tuks operating in Wellington was involved in a serious rollover crash and the tuk-tuk did not perform as expected. The New Zealand Transport Agency (NZTA) began an investigation into the circumstances surrounding the crash.

3. NZTA complained to Engineering New Zealand about Mr Joyce. This investigation relates to Mr Joyce's actions in signing the Inspection Certificates for the seven tuk-tuks in 2016.

DECISION

4. Having considered the matter following its hearing held on 26 August 2019, the Disciplinary Committee found that the engineering services provided by Mr Joyce did not meet the standard to be reasonably expected of a Professional Member of IPENZ. [1]

5. In respect of certifying the structural strength of seven tuk-tuk vehicles when the vehicles did not meet the relevant standards, we consider Mr Joyce has acted incompetently. This aspect of the complaint is upheld.

6. In respect of certifying the stability of seven tuk-tuk vehicles, we do not consider there to be enough evidence to show, on the balance of probabilities, that Mr Joyce acted incompetently. Accordingly, this part of the complaint is dismissed.

7. In respect of issuing inspection certificates stating that he had inspected the strengthening work of the three Auckland tuk-tuks, we consider Mr Joyce has acted incompetently and with a lack of care. This aspect of the complaint is upheld. We do not consider there to be sufficient evidence to show that Mr Joyce acted dishonestly; however, that does not change our view that he has acted without reasonable care and competence.

[1] On 1 October 2017, IPENZ changed its trading name to Engineering New Zealand. It also changed its membership pathway and classes. From 1 October 2017 Mr Joyce has been a Chartered Member of Engineering New Zealand. As the Rules that applied at the time of these events were the IPENZ Rules, this document refers to the IPENZ Rules and Disciplinary Regulations rather than the Engineering New Zealand Rules and Disciplinary Regulations, and to the membership class Mr Joyce held at the time.

BACKGROUND

COMPLAINT

9. On 12 April 2017, the NZTA raised concerns with Engineering New Zealand[2] about engineering services provided by Richard (Dick) Joyce.

10. Mr Joyce is a heavy vehicle engineer and, at the time that the engineering activity was carried out, was a Professional Member of IPENZ.

11. The complaint relates to work undertaken by Mr Joyce in 2016 to issue Inspection Certificates for seven tuk-tuk vehicles. NZTA was concerned that Mr Joyce:

    a. acted incompetently in certifying the structural strength and stability of seven tuk-tuk vehicles, when the vehicles did not meet the relevant standards; and

    b. acted dishonestly by issuing certificates stating that he had inspected the strengthening work of three Auckland tuk-tuks when he had not.

INVESTIGATING COMMITTEE

12. Following an initial investigation, the complaint was referred to an Investigating Committee for formal investigation.

13. The Investigating Committee did not consider that there were any grounds to dismiss the complaint and, accordingly, determined on 17 June 2019 that it should be referred to a Disciplinary Committee.

DISCIPLINARY COMMITTEE

14. The Disciplinary Committee heard the matter on 26 August 2019.

15. The members of the Disciplinary Committee are:

    - Jenny Culliford FEngNZ (Chair)
    - Simon Aimer FEngNZ
    - Andrew McMenamin CMEngNZ CPEng
    - Theodora Baker, Barrister and Solicitor of the High Court of New Zealand
    - Hamish Wilson, nominated by Consumer New Zealand

16. The following parties attended the hearing:

Complainant
NZTA staff
Expert witness

Respondent
Richard (Dick) Joyce — Retired, formerly of Tasman SV Consulting Group

Expert witness
Character witness

[2] Then the Institution of Professional Engineers New Zealand (IPENZ).

Engineering New Zealand
Engineering New Zealand staff
Investigating Committee representative

17. This report sets out the decision of the Disciplinary Committee, which considered all the information provided to date, including at the disciplinary hearing on 26 August 2019.

INFORMATION GATHERED

BACKGROUND

18. In 2016, two tourism companies (one Wellington-based one and Auckland-based) imported seven tuk-tuks (rickshaws commonly used as taxis in South East Asia) into New Zealand to offer guided tours to paying customers. Four tuk-tuks were based in Wellington and three were based in Auckland. The tuk-tuks were electrically powered with seating for six passengers and one driver.

19. In New Zealand, tuk-tuks are classified by NZTA as motor tricycles (LE).[3] As the two tourism companies intended to use the tuk-tuks to transport paying passengers, they were also classed as Passenger Service Vehicles (PSVs)[4] and required to comply with the requirements of Land Transport Rule 31001: Passenger Service Vehicle 1999 Rule (PSV Rule).[5]

20. NZTA advised that the tourism companies wanted the tuk-tuks to be exempt from the requirements in the PSV that related to rollover strength, stability and sidewall height. While an exemption was eventually granted from the sidewall height requirements, NZTA was not prepared to exempt the tuk-tuks from the roof strength and stability requirements.

21. NZTA stated:

> *When asked who might have the skills and knowledge to verify rollover strength and stability, the [New Zealand Transport] Agency suggested that a Heavy Vehicle Specialist Certifier who had experience with calculating stability and roof strength of heavy passenger service vehicles (buses) would likely be suitably qualified to provide verification. The owners of the tuk-tuks subsequently engaged Mr Joyce to provide [that] verification.*[6]

22. In early 2016, Mr Joyce was engaged by the Wellington tourism company to certify the tuk-tuks met the rollover strength and stability requirements in the PSV Rule. The Auckland tourism company subsequently engaged Mr Joyce to provide the same engineering services.

23. On 22 December 2016, one of the tuk-tuks was involved in a rollover crash in Wellington while it was operating on Mount Victoria, a hilly residential suburb adjacent to Wellington CBD. The crash caused injury to the passengers riding in the tuk-tuk, with some requiring emergency medical care and hospitalisation. No criminal charges were laid in relation to the crash.

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[3] New Zealand Transport Agency "Motorcycles and mopeds". See further https://www.nzta.govt.nz/vehicles/vehicle-types/motorcycles-and-mopeds/#Classes-LC-LD-LE

[4] PSVs are vehicles used in an operation where carrying passengers is an integral part of the business. See further: New Zealand Transport Agency "Passenger Service Vehicles". https://www.nzta.govt.nz/commercial-driving/taxis-shuttles-buses-and-other-passenger-services/passenger-service-vehicles

[5] Land Transport Rule, Passenger Services 1999 Rule 31001/1999 as at 1 December 2016. Available at: https://www.nzta.govt.nz/assets/resources/rules/docs/passenger-service-vehicles-1999-as-at-1-december-2016.pdf

[6] NZTA Exemption from Specified Requirements of Land Transport Rule: Passenger Service Vehicles 1999, dated 15 September 2016.

24. Following the Wellington tuk-tuk crash, NZTA commenced an investigation into the performance of the Wellington tuk-tuk as well as the certification of all seven of the tuk-tuk vehicles operating as PSVs. As part of NZTA's investigation, it engaged an independent engineer (NZTA's expert witness) to assess the tuk-tuk that was involved in the crash and provide a written report on its compliance with the strength and stability requirements of the PSV Rule.

25. As a result of the NZTA's expert witness' findings, NZTA also chose to review the Auckland tuk-tuks. When the NZTA's expert witness and another NZTA engineer carried out an inspection of the Auckland tuk-tuks on 24 February 2017, they became aware that modifications had been carried out to the rear pillars that were not in accordance with drawings supplied by Mr Joyce. The vehicle owner advised NZTA that Mr Joyce had not seen the modified vehicles before issuing the Inspection Certificates.

26. NZTA commenced their investigation on the basis that Mr Joyce was appointed by them as a Heavy Vehicle Engineering Certifier at the time that he signed the Inspection Certificates. Mr Joyce was indefinitely suspended from his NZTA Heavy Vehicle Specialist Certifier appointment on 13 June 2018.[7]

COMPLAINT TO ENGINEERING NEW ZEALAND

27. On 13 April 2017, NZTA complained to Engineering New Zealand. The complaint alleged that Mr Joyce:

    a. should not have issued Inspection Certificates for the tuk-tuks as they did not meet the required standards, and

    b. acted dishonestly by issuing Inspection Certificates stating that he had inspected the strengthening work of the three Auckland tuk-tuks when he had not.

28. NZTA has advised its investigation is on hold, pending the outcome of the Engineering New Zealand complaints process.

RELEVANT STANDARDS

Land Transport Rule 31001: Passenger Service Vehicles 1999 ("the PSV Rule")

29. The PSV Rule sets out the legal requirements for the design and construction of all PSVs in New Zealand. The tuk-tuks were required by NZTA to comply with the stability and strength requirements of the PSV Rule.

Structural strength

30. The PSV Rule states that the structural strength of a light PSV must be sufficient to provide reasonable protection for the occupants in the event of roof or wall deformation resulting from the vehicle rolling over.[8]

31. There are no provisions in the PSV Rule that set out what is required to establish the structural strength of a light PSV.

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[7] NZTA Media Release on 13 August 2018. Available at: https://www.nzta.govt.nz/media-releases/nz-transport-agency-issues-safety-alert-for-heavy-vehicle-towing-connections/

[8] PSV Rule, r 7.2(1).

32. However, there are provisions in the PSV Rule that set out how to establish the structural strength of a heavy PSV. Those provisions state that a heavy PSV must be able to withstand, without permanent deformation, the simultaneous application of forces as follows: a force, equivalent to the weight of half the gross vehicle mass, applied horizontally at right angles to the longitudinal centre-line of the vehicle at the cant-rail or at the topmost corner of the body; and the unladen weight of the vehicle, applied vertically downwards on the same cant-rail or corner; and the distribution of these forces must be at least approximately proportional to that of the gross vehicle mass along the length of the vehicle.[9] This can be established by either a full-scale test or a calculation.[10]

33. The PSV Rule goes on to state that if compliance with the previous rule is established by calculation for a heavy passenger service vehicle, the calculation must be carried out by:

    a. finite element stress analysis;

    b. the simplified calculation method; or

    c. other calculation methods approved by the Agency for this purpose.[11]

Stability

34. The PSV Rule states that a PSV with a floor not more than 2m above the ground and loaded with weights (representing the mass of the occupants in all seats and the maximum load of any roof rack) must be stable on a surface that is subjected to a sideways tilt of 35 degrees. This can be demonstrated by written documentation from the manufacturer, type approval, calculations or practical testing.[12]

WELLINGTON TUK-TUKS

Exemption application

35. After Mr Joyce's engagement by the owner of the Wellington tuk-tuks, he prepared and signed a document titled "Exemption application for ETUK as a light PSV" dated 23 June 2016. This document sets out Mr Joyce's reasoning for stating that the tuk-tuks complied with the PSV Rule.

> ***Introduction***
>
> *As you are aware, [a Wellington tourism operator] has imported several battery powered TUK TUKs (ETUKs) built in the Netherlands and wishes to operate these as low speed PSV's [sic] in the Wellington Waterfront area. These vehicles have a maximum speed of 40 kph. […]*
>
> ***Calculations***
>
> *A series of calculations were carried out that show that the tilt angle is better than the requirement of section 7, paragraph 7.1.(1)(a) of LT rule 31001 Passenger Service Vehicles 1999 when fully loaded to the gross weight of 1,325 kg.*
>
> *Paragraph 7.2(1) of the above rule requires that the structural strength of a light PSV must be sufficient to provide "reasonable protection" to the passengers. I regarded this requirement as*

[9] PSV Rule, r 7.5(3).
[10] PSV Rule, r 7.5(4).
[11] PSV Rule, r 7.5(9).
[12] PSV Rule, r 7.1.

being rather open-ended and therefore calculated the rollover strength as required by paragraph 7.5(3)(a) the rollover strength required for heavy PSV's [sic].

As the Limo ETUK is fitted with a plastic canvas roof only, the distribution of the vertical rollover induced forces on the vehicle structure was taken as that applied by the gross weight of the vehicle (Para7.5(3)(b) and the horizontal rollover induced forces was taken as that that would be applied by the tare weigh distribution of the vehicle. See calculation sheets 1604058/4 – 1604058/7 attached.

Note that the "A" pillar is sufficiently strong in the as-built condition to cater for the full heavy PSV rollover strength requirements but the "B" pillar falls short. The calculations include a strengthening method that will bring up the "B" pillars up to the full Heavy PSV rollover requirements. These strengthening modifications will be fitted to the ETUK's [sic] prior to them entering service. […].

I believe that we have complied with all of the exemption requirements discussed at our last meeting in Wellington on 19 May 2016, and, subject to the strengthening of the "B" pillar as discussed and the fitting of the advertising hoarding as per the photos, the required exemptions can be issued without delay.

36. Mr Joyce emailed this document to NZTA's Principal Engineer Light Vehicles, along with copies of his calculations relating to vehicle tilt angle, rollover strength calculations including calculations of plating modifications to the rear of the frame, calculation of the "A" pillar strength, and a letter from the manufacturer approving the gross weight to 1,325 kg.

37. On 15 September 2016, NZTA wrote to the owner of the Wellington tuk-tuks advising that NZTA had granted an exemption from the PSV Rule in respect of the height of the sidewalls of the four Wellington tuk-tuks.[13]

38. Included in the conditions of the exemption were:

- The vehicle may only be operated in a Passenger Service on roads with a speed limit of 50km/h or less, and
- The vehicle may only be operated in a Passenger Service for the purposes of conducting a localised tour operation.

39. In Mr Joyce's submissions to Engineering New Zealand on 8 May 2019, he said he was informed by NZTA that the tuk-tuks would be restricted to the Wellington central business district and wharves area (i.e. no hills) and would be restricted to a maximum speed of 30 km/h. According to the manufacturer's specifications, he said, the vehicles' maximum speed was only 30 km/h. Mr Joyce said he was not aware if those restrictions were applied.

40. In his submission to the Disciplinary Committee on 2 August 2019, Mr Joyce stated that in his exemption application to NZTA (set out above):

I requested that these vehicles were to be operated as low speed vehicles in the Wellington Waterfront area and they had a maximum operating speed of 40 kph as quoted by the manufacturer.

[13] To apply for an exemption for a vehicle from NZTA, a form must be completed (usually by the vehicle owner) and submitted to NZTA.

41. At the hearing and in his submissions to the Disciplinary Committee, Mr Joyce referred to an exemption issued by NZTA on 8 April 2016, which stated "the vehicle must only be operated within the Wellington CBD area". That exemption was only valid for two days (9 April 2016 and 10 April 2016) and applied to only one vehicle.

42. Mr Joyce submitted that the restrictions he requested (limiting the speed to 40 km/h and operating area to the waterfront) were not correctly applied to the exemption notice issued by NZTA on 15 September 2016. He said that he considered that the tuk-tuks should not have been operated on Mount Victoria.

Inspection Certificates

43. On 19 September 2016, Mr Joyce issued Inspection Certificates in relation to the Wellington tuk-tuks that stated:

> *This is to certify that, at the time of inspection, the strengthening of the rear rollover frame was carried out in accordance with the recommendations of Land Transport Rule 34001, Vehicle Repair, 1998. The design of the "A" pillar together with this rear rollover frame complies with the structural strength requirements of paragraph 7.5(3) of the Land Transport Rule 31001: Passenger Service Vehicles. Note that as the rollover requirements for light PSV's [sic] has only to be "adequate", the rollover requirements for heavy PSV's [sic] was used.*
>
> *The calculated rollover angle for the above PSV when fully loaded is 35°.*
>
> ***The manufacturer's GVM of 1,325 kg and a tare weight of 900 kg was used in these calculations**. [Mr Joyce's emphasis].*

44. The Disciplinary Committee has been provided with two of the Wellington Inspection Certificates. It has not been provided with a copy of the Inspection Certificate for the tuk-tuk involved in the rollover incident or the fourth Wellington tuk-tuk.

AUCKLAND TUK-TUKS

45. At the hearing, Mr Joyce stated that he had been contacted by the owner of the Auckland tuk-tuks to achieve compliance with the strength and stability requirements of the PSV Rule.

46. On 27 September 2016, Mr Joyce emailed the owners of the three Auckland tuk-tuks with information regarding modifications that had been made to the Wellington tuk-tuks. These were in relation to two modifications made to the rear rollover frames, first to increase the sideways strength when rolling onto its side or roof, and the second to improve the frame's attachment to the vehicle.

47. The email did not explicitly state that further changes were required to the Auckland tuk-tuks; rather, it outlined the changes that were made to the Wellington tuk-tuks and provided drawings and pictures showing those modifications.

48. That same email attached Inspection Certificates for the three Auckland tuk-tuks signed by Mr Joyce. Except for the date and the identifying details that relate to each tuk-tuk, the wording on each Inspection Certificate is identical to the wording of the certificates for the Wellington tuk-tuks.

49. The email also attached the exemption application document prepared by Mr Joyce for the Wellington tuk-tuks, a copy of the exemption obtained by the Wellington tuk-tuk owners, some hand-written calculations and a design labelled "tuk-tuk rollover frame strengthening plate".

THE NZTA INVESTIGATION

The NZTA expert witness' first report – 26 January 2017

50. On 11 January 2017, the NZTA's expert witness inspected the tuk-tuk that was involved in the rollover incident in Wellington and provided a report dated 26 January 2017 (the first NZTA expert report).

Structural strength

51. The NZTA expert witness commented on the adequacy of the calculations carried out by Mr Joyce to establish the tuk-tuk's compliance with PSV Rule 7.5:

> *A review of the PSV calculations used to comply the vehicle, show that an amalgamation between the simplified calculation method, refer PSV Rule 7.5(11), and loads from clause 7.5(3), were used to demonstrate compliance with clause 7.2(1).*
>
> *The simplified method allows the reduction in the horizontal loads applied to the cant rail or top most corner of the body to half of the unladen weight, instead of the force defined in [PSV Rule] 7.5(3)(a)(i). However, [Mr Joyce] has chosen to use half of the gross vehicle mass, distributed forces approximately proportional to the GVM [Gross Vehicle Mass], and then used the assumptions in the simplified method. The [PSV] rule does not allow this approach. A finite element stress analysis to the requirements of [PSV Rule] 7.5(10) should have been carried out.*
>
> *It would seem, for expediency, the assumptions in section [PSV Rule] 7.5(11) were used instead of completing an FEA analysis.*
>
> *The assumptions referred to in Rule 7.5(11) state that if compliance with Rule 7.5(3) is established by the simplified calculation method of heavy passenger service vehicle, a number of assumptions must be made. This includes the roof being a rigid structure, the body is a rigid structure below the waistline, the glazing makes no contribution to the structural strength, and the load imposed by horizontal force is shared by the pillars.*

52. The NZTA expert witness stated that the simplified calculation method is used to calculate the compliance of heavy PSVs (i.e. buses), and that buses usually meet the assumptions required for the simplified method, which are that the roof is a rigid structure and the horizontal load is simultaneously applied to all pillars. In the case of a tuk-tuk, these assumptions do not apply as the roof is not sufficiently stiff to consider it rigid and, in the case of rollover, force would not be simultaneously applied to all pillars as a tuk-tuk is in a delta formation (three-wheeled), which is not the same as a bus (four-wheeled).

53. The NZTA expert witness concluded their report by saying the Wellington tuk-tuk involved in the rollover incident had not been shown to meet the requirements of PSV Rule 7.2(1) or 7.5. He said that Mr Joyce had "used an amalgamation of clauses in the rule to complete his compliance calculations. The vehicle configuration, structural members and connections do not support the use of the simplified method in [PSV Rule] 7.5(11)".

54. The NZTA expert witness further commented that even if the front pillars had adequate strength, the residual space may not have been adequate as the rear pillar height did not provide adequate clearance for seated occupants.

55. In their report the NZTA expert witness also commented that: "rollover events can be extremely complicated and may be affected by many factors such as the angle of impact, collision with road

furniture or off-road obstacles, overloading, and speed. There may be events with unexpectedly poor outcomes, even if a vehicle complies with the rule."

Stability

56. The NZTA expert witness provided an addendum to their report that specifically dealt with the tuk-tuk's stability. They stated that as a rigid body analysis was used to certify the vehicle, [Mr Joyce's] calculation showed the vehicle barely passed the 35-degree requirement without accounting for the vehicle tyre, suspension and chassis compliance (deflections), with a value of 35.3 degrees.

57. The NZTA expert witness concluded that while the tuk-tuk most likely failed to meet the stability requirements of the PSV Rule, it fell within the error limits of the simulation that he had created.

58. They also included the following comments about the PSV Rules on stability testing:

> *"[This Rule] does not provide a reasonable indication of the vehicle's dynamic performance. The position of the centre of gravity about the neutral steering point (NSP), the propensity for 3-wheelers to rollover before side-slipping, combined with corner braking increase the chance of rollover at cornering speeds significantly lower than the values predicted by static stability testing.*
>
> *A perfect storm of events inducing a rollover during cornering is foreseeable given the vehicle configuration which is exacerbated by the regenerative braking system."*

Conclusions

59. The NZTA expert witness' first report concluded that the tuk-tuk did not meet the structural strength requirements of the PSV Rule, and may not meet the stability requirements of the PSV Rule. The inadequate design caused the tuk-tuk to perform poorly in the event of a rollover and did not provide an adequate level of protection to the occupants. The report stated that if the vehicle rollover structure had met the requirements and intent of the PSV Rule, the level of injuries in the rollover incident would probably have been reduced.

NZTA raises concerns with Mr Joyce

60. On 21 March 2017, a member of the NZTA staff wrote to Mr Joyce regarding the tuk-tuk rollover incident and the NZTA investigation. The letter stated that the NZTA's expert witness' first report had identified significant deficiencies in relation to the structural strength requirements for compliance with the PSV Rule.

61. The letter also raised the issue of the Inspection Certificates for the Auckland tuk-tuks. It stated that when officials visited Auckland to view the Auckland tuk-tuks "it was apparent that the design of the rear pillars was different to the rear pillars of… the vehicles we had sighted in Wellington."

62. The NZTA staff member stated in the letter that the owner of the Auckland tuk-tuks had forwarded the email and attachments that Mr Joyce had sent the owner on 27 September 2016.

63. The NZTA invited Mr Joyce to provide comment on its expert witness' first report and the Inspection Certificates for the tuk-tuks by 31 March 2017.

Mr Joyce's first response to NZTA

64. On 13 April 2017, Mr Joyce responded to the NZTA's letter by email. Mr Joyce commented on several points raised in the NZTA's expert witness' first report as follows:

- the NZTA's expert witness' crash site investigation suggested that the driver of the tuk-tuk may have approached the corner at an excessive speed and that the driver made a violent braking action and steering correction, and that together these factors caused the tuk-tuk to rollover;
- he agreed with the comments regarding the stability of the tuk-tuk under combined braking and steering as made in the NZTA's expert witness' addendum to the first report in relation to steering;
- he believed that the right-side A pillar collapsed only when the tuk-tuk struck the kerb. From this he interpreted that the passenger injuries were the result of the tuk-tuk impacting the kerb (as evidenced by concrete dust on the right-hand side A pillar) and "not as a result of the rollover frame failing to protect the passengers as implied in the report". He said, "a large front impact on the A pillar was not considered in the strength analysis of the pillar".
- NZTA should investigate why the tuk-tuk was travelling at an excessive speed when approaching the corner; and
- the performance of the rollover frame did not cause the accident.

65. On 18 April 2017, NZTA wrote to Mr Joyce again and asked him to address issues raised in their initial letter.

Mr Joyce's second response to NZTA

66. On 5 May 2017, Mr Joyce emailed NZTA a further written response addressing the NZTA's expert witness' first report. In his covering email Mr Joyce said he was disappointed with the NZTA's expert witness' first report and that he considered it to be "seriously flawed" because the NZTA expert witness:

- did not consider all the relevant evidence, including the damage details on the tuk-tuk, specifically the position of abrasion and impact marks;
- appeared to have concentrated on the collapsed roof structure and concluded that this was caused by the rollover;
- had a pre-conceived idea of the accident scenario and made assumptions to support this pre-conception; and
- omitted to make a crash site investigation and instead based their conclusions on photographs supplied by a third party.

67. In respect of issuing the Auckland inspection certificates, Mr Joyce said that he intended to issue Statements of Design Compliance instead, that he has no excuse or explanation for the error, and that he apologised for his mistake.

Structural strength

68. In his response to NZTA, Mr Joyce said he believed that while some modifications should have been made in the way he had applied the PSV Rule, the simplified calculation method was entirely satisfactory for this application, given the number of assumptions that must be made when using a finite element analysis (FEA) approach. For example, he said that "the horizontal figures used in [my] calculations were based on a reasonable assumption that the force distribution would be

proportional to the tare weight distribution". He said that there was a good rationale for this approach, as it resulted in a figure of 15.3% of the half gross weight being applied, which was far more realistic than the 30% figure given by the NZTA's expert witness. He said that there was a surprisingly good correlation between the simplified method that he used and the FEA discussed in the NZTA's expert witness' first report.

69. Mr Joyce said that he used half of the gross weight of the vehicle applied horizontally and the full tare weight of the vehicle applied vertically and said that "this is exactly what is required in the code [PSV Rule]." Further, he said:

> *[The NZTA's expert witness'] claim that my approach is not allowed in the code is correct. There is no provision in the PSV rule for light vehicles for calculating the loads applicable to light PSV's [sic]. Note specifically that in my discussions with [the (then) NZTA Principal Engineer Light Vehicles] on 5 May 2016, we discussed how we might approach this case. The NZTA Principal Engineer Light Vehicles and I took the heavy vehicle rollover code and adapted it so that it would apply to this vehicle. We acknowledged that the roof could not be assumed to be a rigid structure and divided the applied loads according to the gross weight and the tare weight of the vehicle accordingly.*
>
> *The (then) NZTA Principal Engineer Light Vehicles agreed with the approach used so that we could put some values against the light vehicle code requirement to "give reasonable protection" to the passengers. Originally, the (then) NZTA Principal Engineer Light Vehicles was happy with my objective of being able to state that the vehicle complied with a certain percentage of the strength requirements for heavy PSV's [sic].*

70. Mr Joyce did not accept that the rollover frame performed poorly due to inadequate design. Rather, he submitted that had the vehicle not been damaged by impacting with the concrete kerb, the driver and passengers would have been provided with adequate protection by the rollover structure and injuries would have been minor.

71. On 23 June 2017, the (then) NZTA Principal Engineer Light Vehicles provided the following response to Mr Joyce's comments:

> *This significantly overstates my input into this discussion. My recollection of that discussion is that Mr Joyce proposed that, as there were no objective performance criteria for light vehicles, it would be reasonable to apply the heavy vehicle criteria set out in the Rule. I agreed that this would appear to be a reasonable approach, but noted that it is up to him to use whatever methodology he considers appropriate. We did not collaboratively adapt the code as Mr Joyce suggests, and I had no input into how the loading might be shared between the various components of the vehicle. In my opinion, Mr Joyce was simply advising me of his proposed methodology. At no stage did he indicate that he was departing from industry best practice or that he was applying a methodology not supported by the PSV Rule, and at no stage did he present a written proposal for me to review.*
>
> *As I am not an expert in the area of heavy PSV rollover structures, I took the view that Mr Joyce was wholly responsible for his calculations and the methodology used. Mr Joyce presented his calculations to me as being in accordance with the heavy vehicle rollover requirements set out in the PSV Rule, and as he was purported to be an experienced expert in this field, it would not have been appropriate for me to approve or sign off on his work.*

72. On 8 May 2019, Mr Joyce made submissions to the Investigating Committee, where he submitted that he engaged extensively with the (then) NZTA Principal Engineer Light Vehicles when he was approached by his client to assist with a compliance solution for the Wellington tuk-tuks. He said he and the (then) NZTA Principal Engineer Light Vehicles were both unhappy with the requirements of the PSV Rule for light vehicles, which simply stated rollover requirements were to give passengers 'reasonable protection'. They therefore decided to use the heavy vehicle requirements, accepting that they may end up with a solution that complied with perhaps 75 percent of the rollover requirements for heavy vehicles, and some other way of distributing the loads to the roof, recognising that the roof was not a rigid structure.

73. Mr Joyce said he tried a range of approaches to the problem, and the proposal he subsequently presented to the (then) NZTA Principal Engineer Light Vehicles could achieve 100 percent of the heavy vehicle rollover requirements, while only having to strengthen the rear frame – and would therefore retain the aesthetics of the tourist vehicle.

74. Mr Joyce said the (then) NZTA Principal Engineer Light Vehicles was happy with this approach, though they both recognised both the stability and rollover strength requirements were "only just compliant" with their proposed adaptation of the PSV heavy vehicle rule. Mr Joyce said:

> *[The (then) NZTA Principal Engineer Light Vehicles] was not overly concerned about this as [they] intended to issue a restriction on the operating conditions [as set out in the exemption application paragraph above] that would apply to the Tuk Tuks". [They] informed me that the vehicles would be restricted to the Wellington Commercial District and the wharves area only, (i.e. no hills) and be restricted to a maximum speed of 30 Kph. (According to the manufacturer's specifications, their maximum speed was only 30 Kph.) the (then) NZTA Principal Engineer Light Vehicles was happy that these restricted operating conditions would compensate for the somewhat marginal stability and rollover strength.*

75. At the hearing, Mr Joyce said again that he had discussions with NZTA, specifically the (then) NZTA Principal Engineer Light Vehicles, and they completed a risk assessment together. Mr Joyce said that the delta configuration of the tuk-tuk was inherently less stable in braking and turning, so he approached the owner of the tuk-tuks, with a proposal not to allow the tuk-tuks to operate on hills, which the owner agreed to. On that basis, Mr Joyce said that he applied to NZTA for an exemption which would limit the speed of the tuk-tuks to 40 km/h and to flat areas. Mr Joyce said that he "never got any answers about restrictions NZTA placed on the vehicle" and "it appears to me that NZTA allowed the tuk-tuks to operate in areas that I did not recommend". Mr Joyce confirmed that the exemption application (set out above) was the only place the maximum speed and intended operating location of the tuk-tuks were mentioned in any of the information provided.

76. Mr Joyce said that the (then) NZTA Principal Engineer Light Vehicles' assistant, also an engineer, was present during these conversations. In respect of written records of these conversations, Mr Joyce advised that he might have some diary notes, but these were not included in the information provided during the investigation or in submissions to the Disciplinary Committee.

77. The (then) NZTA Principal Engineer Light Vehicles is no longer an employee of NZTA and was not present at the hearing.

Stability

78. Mr Joyce said the 35-degree stability requirement was used internationally and he was not surprised when his calculations showed that the tuk-tuk complied with this requirement, if only just. He said, "I

concluded that the vehicle designer had arranged the vehicle componentry carefully to comply with this requirement without compromising other features of the vehicle".

The NZTA's expert witness' second report – November 2017

79. As part of its continued investigation, the NZTA asked its expert witness to provide a second report in response to the issues that Mr Joyce raised about the first report. The NZTA expert witness was provided with Mr Joyce's response to NZTA and his calculations.

80. The second NZTA expert witness' report builds on the first report, clarifies specific design failings, and addresses Mr Joyce's response to the first report.

Structural strength

81. The NZTA expert witness said they did not agree with Mr Joyce's claim that the tuk-tuk had behaved in a reasonable fashion during the crash. The NZTA expert witness said photos taken at the time of the crash were inconsistent with Mr Joyce's statement that the A-pillar failure had occurred because of the tuk-tuk absorbing all of the energy of the crash when it hit the kerb. The NZTA expert witness said that the tuk-tuk had continued over the footpath (as was evidenced by the damage to the fence beside the footpath) and noted the left-hand [front] A-pillar collapsed in the same manner and deflection plane as the right-hand A-pillar even though the left-hand side pillar did not contact the kerb.

82. In respect of the simplified calculation method, the NZTA expert witness said that this was an inappropriate means to assess the structural strength of the tuk-tuks as the critical assumptions of the simplified calculation method were missing in the tuk-tuks, including the strength of the structural members, their configuration and their connections.

83. The NZTA expert witness went on to say that no data had been supplied for the material properties of the pillars and roof frames. The NZTA expert witness said that the Australian Standard for Mechanical equipment – steelwork (AS3990)[14] used throughout heavy vehicle certification stated that if unidentified steel was used and not tested, the yield strength should not exceed 170 MPa. Mr Joyce had used a yield strength of 250 MPa for the tube sections of the pillars and roof frame.

84. Finally, the NZTA expert witness said that Mr Joyce's analysis did not take account of the eccentricity for calculating the maximum bending stresses in the pillars, and that he had assumed an encastre end support condition.[15] The NZTA expert witness said that the installed bolted connections did not justify this assumption.

85. The NZTA expert witness confirmed what they had said in their first report, that there were three straightforward methods available for assessing heavy passenger vehicles. These methods were a physical test of the bus structure, an FEA, and a simplified calculation. However, for a light vehicle such as a tuk-tuk, the PSV Rule provided for specific solutions, these being the FEA method and two international standards.[16]

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[14] Australian Standard for Mechanical equipment – steelwork (AS3990). Preview available at: https://infostore.saiglobal.com/store/previewdoc.aspx?saleitemid=370622

[15] Fixed at the ends, built into its supports.

[16] These standards were not defined in the NZTA's expert witness' report.

Stability

86. The NZTA's expert witness said that they had undertaken the "tilt test" to determine the centre of gravity. They said that the centre of gravity height was incorrectly calculated by Mr Joyce, and the tuk-tuk failed to meet the 35-degree requirement.

Conclusions

87. The NZTA's expert witness' second report concluded that:

- the tuk-tuk vehicle structure had not been shown to meet the requirements of PSV Rule Section 7.2(1) or 7.5;
- the simplified calculation method for heavy PSVs, which was used by Mr Joyce, was an inappropriate means to assess the structural strength of the tuk-tuks:

  > *No reasonable comparison can be made between a heavy PSV structure and the tuk-tuk. The critical aspects of the simplified calculation method are missing in the tuk-tuk structure. A competent and experienced engineer in the design and certification of passenger service vehicles would understand the underpinnings of the simplified method.*
  >
  > *[Mr Joyce] used an amalgamation of clauses in the rule to complete compliance calculations. Several assumptions in the simplified method were used for expediency to complete the calculations despite their obvious limitations. The vehicle configuration, structural members and connections do not support the use of the simplified method in 7.5(11). The engineering formulas used for the front A-pillar do not represent the behaviour of the loaded structure. Even if the [A-pillars'] performance was improved, the residual space may still not be acceptable because the rear pillar height does not provide clearance for seated occupants.*

- the stability assessment did not use the required engineering rigour to confirm compliance with the PSV Rule; and
- the tuk-tuk performed poorly due to inadequate design and did not provide an adequate level of protection to the occupants – if the vehicle rollover structure had met the requirements and intent of the PSV Rule, the level of injuries would probably have been reduced.

DISCIPLINARY HEARING

The NZTA expert witness

88. At the hearing, the NZTA expert witness gave evidence supported by a Powerpoint presentation that summarised and illustrated the points made in the earlier written reports. They explained that there is no significant discussion of the rollover incident in their reports because the incident merely exposed problems with the tuk-tuks' design – their focus was on assessing the tuk-tuk as it stood, outside the events of the incident.

89. In reference to his evidence about the residual space allowances of the tuk-tuks, the NZTA expert witness said:

> *The residual space is the space to be preserved in the passengers' and driver's compartment to provide better survival possibility for passengers, driver and crew in the case of a rollover accident. While the PSV Rule does not use the term explicitly, the concept is implied by clause 7.2(1). To produce the required residual space the structure must not only have sufficient*

strength, but the distribution and height of structural elements must be such as to provide protected space.

Failure of one point of the certified rollover structure would lead to penetration into the residual space. The failure mode would concern any competent engineer and they in turn would give due diligence to the design review.

90. The NZTA expert witness spent some time discussing Mr Joyce's assumptions made in using the simplified calculation method he chose. This included the assumption that the join between the waistline and A pillar of the vehicle was encastre. The NZTA expert witness said this assumption should not have been made for a vehicle of this nature (as compared with, for example, a standard passenger bus) and inspection quickly revealed the connection was not, in fact, encastre. They reiterated that the simplified calculation method was not appropriate or suitable for assessing the tuk-tuks' strength, and that FEA would have been eminently more suitable given the complexity of the vehicles' geometry and structure.

91. Regarding the stability of the tuk-tuks, the NZTA expert witness explained the testing they conducted to investigate the vehicle's stability. They said that while the vehicle had failed his "tilt test" as discussed in their second report, they accepted there were some grey areas around how the vehicle's stability should be assessed and so he did not intend to focus heavily on that aspect of his report.

Mr Joyce's expert witness

92. Mr Joyce's expert witness submitted a report on the tuk-tuks' compliance with the PSV's stability and rollover requirements, in support of Mr Joyce. Mr Joyce's expert witness was present at the hearing and read their report to the Disciplinary Committee.

93. Mr Joyce's expert witness' report stated that:

[A]fter modification of the rear pillars, the body frame met the rollover requirements for heavy PSVs and also exceeded the stability requirement of 35 degrees. This compliance does not take into account the fact that braking a three wheel vehicle while going round a corner can easily cause the vehicle to roll onto its side. […] By limiting the speed to 40 km/hour and confining it to inner city location as stipulated by Mr Joyce in his Certificate of Design Compliance, the likelihood of even a tip over would have been reduced. The three Tuktuks delivered for use in Auckland appear to have been built to a different standard with properly formed cant rails and roof structure which may well have met a full roll over onto the roof situation.

94. In respect of the NZTA's expert witness' reports, Mr Joyce's expert witness stated:

It seems that while concentrating on the minutae [sic] of mathematical variances in Mr Joyces [sic] report it overlooked the basic fact that three wheel Tuktuks with only a rain cover for a roofs [sic], are never going to meet any full rollover requirement so the only options to allow it these vehicle [sic] to be used in NZ cities would be either to limit its speed and area of operation to essentially flat ground, to modify the design to have a full structural roof, which seems to have been provided for in the three Auckland units, or to modify the design to prevent the vehicle from ever rolling further than on its side. […] neither TSV or [Mr Joyce's expert witness' consultancy] would ever use FE analysis for assessing bus frames for PSV rollover.

95. At the hearing, Mr Joyce's expert witness said that when designing rollover frames they do not consider the A pillar to provide any strength for rollover protection.

96. In response to Mr Joyce's expert witness' report, NZTA submitted:

> *[We] suspect [Mr Joyce's expert witness] has looked at some of the Tuktuks that are currently operating in Auckland as PSVs. If so, these are the same ones that Mr Joyce issued certificates for but they have been significantly modified and issued with new exemptions and certificates of fitness. [The redesigned tuk-tuks] have been fitted with full roll protection frames that have been certified as complying with the PSV Rule […].*
>
> *[The redesigned tuk-tuks have] added rollover protection along with the clearance between the heads of passengers and the roll frame which is designed to maintain residual space for the protection of passengers in the event of a rollover.*

97. At the hearing, Mr Joyce's expert witness confirmed that they had not inspected the Auckland tuk-tuks but had seen pictures of them in newspapers.

Mr Joyce

98. Mr Joyce gave evidence, consistent with his written submissions and has been discussed above, including discussion of the restrictions he said he told NZTA should be placed on the tuk-tuks around location and maximum speed. Mr Joyce made the submission that he considered the tuk-tuk to have performed as he expected in a tip-over (as distinct from a rollover) event. Mr Joyce also submitted to the Disciplinary Committee that he thought that the injuries sustained by the passengers and driver of the Wellington tuk-tuk were caused when the tuk-tuk slid across the road and impacted with the curb, not from the tip-over itself. He also suggested that these injuries occurred because the passengers were not wearing seatbelts.

99. Mr Joyce repeatedly referred to his advice that the maximum speed and area of operation of the tuk-tuks should be restricted. However, during the hearing Mr Joyce confirmed to the Disciplinary Committee that the exemption application dated 23 June 2016 was the only document referencing the area of operation and maximum speed.

Character witnesses

100. Mr Joyce provided a written submission to the Disciplinary Committee from a character witness in support of him which details their personal and professional relationship. This character witness was not available to attend the hearing but made themselves available to the Disciplinary Committee to give evidence by telephone if required.

101. Mr Joyce read the character witness' statement out at the hearing. The statement said that they were "not current with the code or code requirement relating to the design of transport vehicles" and "[they] cannot therefore comment on the engineering evidence and calculations provided by Mr Joyce or by [the NZTA expert witness]". The Disciplinary Committee decided it was not necessary to receive further evidence from this character witness by telephone.

102. Mr Joyce provided a written statement from a second character witness to the Disciplinary Committee that detailed their personal and professional relationship with Mr Joyce. The second character witness appeared at the hearing and read their statement.

103. Mr Joyce also provided a letter detailing his health issues during the period between 8 July and 21 November 2016.

104. As the submissions of Mr Joyce's character witnesses relate specifically to his character, they are not relevant to the objective questions of whether Mr Joyce has acted with the competence and ethical conduct reasonably expected of a professional engineer. To the extent that they may provide relevant mitigating factors in support of Mr Joyce, we will consider them at the penalty stage of our decision, as well as the extent to which Mr Joyce's health is relevant to his conduct.

DECISION

THE DISCIPLINARY COMMITTEE'S ROLE

105. Professional disciplinary processes primarily exist to protect the public, uphold professional standards, and maintain public confidence in the profession and its regulation. They do this by ensuring that members of the profession adhere to certain universal (or accepted) professional standards.[17]

106. The role of the Disciplinary Committee in the disciplinary process is to consider whether Mr Joyce has acted in accordance with accepted professional standards and, if not, whether there are grounds for disciplining him in accordance with the IPENZ Rules and Disciplinary Regulations.[18]

THE LEGAL TEST

107. The legal test to assess whether Mr Joyce acted in accordance with acceptable professional standards is whether he acted in accordance with what a reasonable body of his peers would have done in the same situation.

108. The assessment of whether an engineer has acted in accordance with accepted standards may be informed by whether reasonable members of the public would "consider such an act or omission, if acceptable to the profession, were to lower the standard of that profession in the eyes of the public".[19]

109. If the evidence is that Mr Joyce acted in accordance with accepted standards, then we will dismiss the complaint. If the evidence is that Mr Joyce did not act in accordance with accepted standards, then we will uphold the complaint. Where the behaviour meets this criterion, we must consider whether the conduct "falls seriously short of accepted conduct" before imposing a disciplinary sanction.[20]

110. This means that the matter for the Disciplinary Committee to decide in this case is whether the engineering services provided by Mr Joyce, as identified in the complaint, met the standard to be reasonably expected of a Professional Member of IPENZ.

111. Our approach to this question has been to consider the work undertaken by Mr Joyce, the standards that applied to the performance of that work, and whether his performance met those standards.

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[17] *Dentice v Valuers Registration Board [1992]* 1 NZLR 720 (HC).

[18] When referring to the Rules or Disciplinary Regulations, we refer to the IPENZ Rules and the accompanying Disciplinary Regulations that were in place at the relevant time.

[19] *Robinson v RA* (10 July 2015, *Appeal Ruling* #21) Chartered Professional Engineers Council. Available at: http://www.cpec.org.nz/appeal-rulings/appeal-21-10-july-2015-robinson-v-ra.

[20] Ibid.

ANALYSIS

Work undertaken

112. On 19 September 2016, Mr Joyce issued Inspection Certificates for four tuk-tuks based in Wellington that stated they complied with the stability and strength requirements of the PSV Rule.

113. On 26 September 2016, Mr Joyce issued Inspection Certificates for three tuk-tuks based in Auckland that stated they complied with the stability and strength requirements of the PSV Rule. Mr Joyce relied upon the same documents and methodology that he used to issue Inspection Certificates for the Wellington tuk-tuks. Mr Joyce accepts that he did not view the Auckland tuk-tuks before issuing Inspection Certificates.

Relevant standards

114. The Code of Ethical Conduct for Members of IPENZ states that engineers must act competently and must undertake engineering activities in a careful and competent manner.[21] Additionally, the IPENZ Rules state that Members must perform their engineering activities in a careful and competent manner.[22]

Structural strength

115. To comply with the PSV Rule, the structural strength of a light PSV must be sufficient to provide reasonable protection for the occupants in the event of roof or wall deformation resulting from the vehicle rolling over.[23] There are no provisions in the PSV Rule that set out what is required to establish the structural strength of a light PSV.

116. However, there are provisions in the PSV Rule to establish the structural strength of heavy PSVs. To calculate the structural strength of a heavy PSV, the PSV Rule provides for the simplified method, a finite element stress analysis, or an approach approved by NZTA.[24]

117. Mr Joyce's evidence is that he carried out an amalgamated simplified method to calculate the tuk-tuks' structural strength. He says he did "exactly what is required in the [PSV Rule]". While he accepted that some modifications should have been made to the way he had applied the PSV Rule, he said the use of the "simplified method" for determining the required strength was justified and the engineering formulae that he had used were adequate and accepted procedure.

118. We do not accept Mr Joyce's explanation that his calculations were adequate in achieving compliance with the structural strength requirements of the PSV Rule. Objective evidence has been provided by the NZTA's expert witness, and can be read in the PSV Rule, which shows the simplified method used by Mr Joyce was not appropriate for light vehicles like the tuk-tuks in question.

119. Mr Joyce's evidence is that he collaborated with the (then) NZTA's Principal Engineer Light Vehicles, to find a solution that complied with the PSV Rule. In response to this, the (then) NZTA engineer stated that they did not collaborate with Mr Joyce. They said Mr Joyce did not advise them that his

[21] Engineering New Zealand Code of Ethical Conduct (2016) r 4(a)(iii).
[22] IPENZ Rules, r 4.3.
[23] PSV Rule, r 7.1.
[24] PSV Rule, r 7.5(9).

approach was not supported by the PSV Rule, and Mr Joyce did not present the NZTA engineer with a written proposal to review.

120. In accordance with *Robinson v Registration Authority*[25] we need to assess Mr Joyce's actions not against best practice, but against what is reasonable practice – what would a reasonable peer of his have done in the same situation. Mr Joyce's evidence is that he collaborated with the NZTA engineer to adapt the heavy vehicle rollover requirements in the PSV Rule to the tuk-tuks. NZTA's evidence is that its engineer stated Mr Joyce had overstated its engineer's input into their discussion. We are of the view that Mr Joyce's clients engaged him as an expert engineer to certify the tuk-tuks met the rollover strength and stability requirements in the PSV Rule; and not the NZTA engineer, who was not an expert.

121. Mr Joyce's evidence is that, had the tuk-tuk involved in the rollover incident not been damaged by impacting and being brought to a complete stop by the concrete kerb, the driver and passengers would have had adequate protection from the rollover structure and the injuries would have been minor. He also questioned whether the passengers were wearing seatbelts.

122. It is not the role of the Disciplinary Committee to determine the facts and mechanics of the rollover incident, including the significance of where the tuk-tuk was operating, and whether or not the passengers wore seatbelts. It was because of the damage to the tuk-tuk in the accident that questions about the design and certification were raised. The adequacy of the design of the tuk-tuks can be objectively assessed from evidence other than the accident data.

123. In his submission to the Investigating Committee, Mr Joyce said the NZTA engineer told him that the tuk-tuks would be restricted to the Wellington waterfront and their speed to 30 km/h. In his submission to the Disciplinary Committee, and at the hearing, Mr Joyce referred to his exemption application to NZTA, which states (in the introductory paragraph) that the owner had imported the tuk-tuks and "wishes to operate these as low speed PSV's [sic] in the Wellington Waterfront area. These vehicles have a maximum speed of 40 kph".

124. Even if they were relevant considerations, we do not agree with Mr Joyce's submission that the wording of the exemption application could be interpreted as an instruction, or a recommendation to NZTA. They are merely statements of the owner's intention. Nowhere in the application does Mr Joyce say he recommends or requests that these speed or location restrictions be made a condition of the exemption.

125. While speed and location restrictions may have reduced the likelihood that a rollover incident would occur, they have no bearing on the strength and stability requirements that applied to the design of the tuk-tuks. It would have been preferable for a rollover incident to have been avoided, but the relevant question is whether the design of the tuk-tuks was adequate to provide reasonable protection to passengers if a rollover did occur. The speed and location of operation of the tuk-tuks are therefore not relevant considerations as to whether Mr Joyce ensured the tuk-tuks' design complied with the strength requirements of the PSV Rule.

126. The NZTA's expert witness' evidence is that Mr Joyce's approach was to use the simplified method of calculation. The NZTA's expert witness' states that the simplified method is the preferred method for heavy vehicles but is inappropriate for assessing the strength of lightweight tuk-tuks. They

[25] Decision of the Chartered Professional Engineers Council at [36]. Available at: https://www.cpec.org.nz/40-appeal-ruling-29-10-july-2015/file

considered that a finite element stress analysis would have been more appropriate to calculate the structural strength of the tuk-tuks. They identified several specific failings in Mr Joyce's approach, including the strength of the structural members in the tuk-tuks, the configuration of these members and the degree of fixity in their connections. The NZTA's expert witness' considered that these were critical shortcomings in Mr Joyce's approach. As a result of these shortcomings, the tuk-tuk involved in the rollover incident performed poorly due to inadequate design and did not provide an adequate level of protection to the occupants. We agree with the NZTA's expert witness' evidence.

127. We consider the wording of the PSV Rule in respect of structural strength to be explicit. It states that vehicles "must provide reasonable protection in the event of a rollover".[26] We do not consider the arguments put forward by Mr Joyce in respect of his conversations with the NZTA engineer, the limitations he purports to have requested as part of the exemption application, nor whether the passengers involved in the rollover incident were wearing seatbelts to be relevant considerations when assessing whether the tuk-tuks complied with the PSV Rule. Our considerations relate solely to whether or not Mr Joyce acted reasonably in attempting to ensure compliance with the strength requirements of the PSV Rule.

128. The PSV Rule sets clear pathways for demonstrating compliance, and those pathways do not include the amalgamated simplified method Mr Joyce used. We do not consider that Mr Joyce has met the relevant standard, that is, we do not consider the structural strength of the tuk-tuks as certified by Mr Joyce was sufficient to provide reasonable protection for the occupants in the event of roof or wall deformation resulting from the vehicle rolling over.

Stability

129. To comply with the PSV Rule, a vehicle with a floor not more than 2m above the ground and loaded with weights (representing the mass of the occupants in all seats and the maximum load of any roof rack) must be stable on a surface that is subjected to a sideways tilt of 35 degrees.[27]

130. The NZTA's expert witness' has said that while the tuk-tuk most likely failed to meet the stability requirements of the PSV Rule, it fell within the error limits of the simulation that they had created.

131. The certification of vehicles for passenger service is a safety-critical task, and members of the public rightly rely on regulators such as NZTA to protect them from harm. Regulators, in turn, rely upon experts including professional engineers to carry out their role competently.

132. The NZTA's expert witness' has acknowledged that the tuk-tuks' stability was borderline. That is, it is not conclusive whether or not they would have met the PSV stability requirements. In a borderline case, where it is acknowledged by all parties, including Mr Joyce, that three-wheeled tuk-tuks have inherently less stability than a standard four-wheeled vehicle, we consider a professional engineer would reasonably have been expected to do more to ensure compliance with the PSV Rule. Knowing that the vehicles had inherent stability issues, it was all the more important that the structural strength and rollover protection measures were sufficient to protect passengers in the event of a rollover incident.

[26] PSV Rule, r 7.2(1).

[27] PSV Rule, r 7.1.

Conclusion

133. The Disciplinary Committee is of the view that Mr Joyce has struggled to understand the intent and fundamental engineering mechanics around the application of the PSV Rule when applied to the design of the lightweight tuk-tuks.

134. It is clear to us that Mr Joyce has not adhered to the relevant standards for structural strength set out in the PSV Rule, and, in our view, he has significantly departed from the standard expected of a Professional Member of IPENZ, that is, to act in a careful and competent manner. We also consider that the public should reasonably be able to expect better from a Professional Member of IPENZ.

Auckland tuk-tuks

135. On 26 September 2016, Mr Joyce issued Inspection Certificates for three tuk-tuks based in Auckland. Mr Joyce accepts that he did not view the vehicles before issuing Inspection Certificates.

136. NZTA complained that Mr Joyce acted dishonestly by issuing a certificate stating that he had inspected the strengthening work of three Auckland tuk-tuks, when he had not.

137. In his response, Mr Joyce states that he meant to issue Statements of Design Compliance and he had no excuse for having issued Inspection Certificates instead. He apologised for this mistake.

138. We consider that even if Mr Joyce had issued Statements of Design Compliance, he had no way of knowing that the instructions that he sent to the owner of the Auckland tuk-tuks (which set out the modifications made to the Wellington tuk-tuks) had been followed. Without Mr Joyce carrying out an inspection of the tuk-tuks, either before or after the modifications were made, it is difficult for us to accept that Mr Joyce should have issued a Statement of Design Compliance either.

139. We have not been provided with evidence to suggest that Mr Joyce intended to be dishonest by issuing the Inspection Certificates. His evidence is that it was an honest mistake.

Conclusion

140. Regardless of Mr Joyce's intent at the time, we do not consider that issuing Inspection Certificates for the three Auckland tuk-tuks, without inspecting them, meets the standard required of a reasonable Professional Member of IPENZ to act with care and in a competent manner. We consider this action is a significant departure from the accepted standards.

DECISION OF THE DISCIPLINARY COMMITTEE

DISCUSSION

141. The Disciplinary Committee may make an order for discipline if it is satisfied that an IPENZ member has breached their obligations under Rule 4 of the IPENZ Rules, which includes the obligations set out in the Code of Ethical Conduct. Our particular focus in this case is whether Mr Joyce acted competently, in accordance with his obligations under Rule 4.3 of the IPENZ Rules and the Code of Ethical Conduct.

142. In order to determine whether Mr Joyce acted competently, we refer to the decision of *Robinson v RA* which states:[28]

> *Whether engineering services have been performed in an incompetent manner is a question of whether there has been a serious lack of competence (or deficit in the required skills) judged by the areas of competence which in this case are encapsulated by Rule 6 [of the Chartered Professional Engineers Rules (No 2) 2002].*

143. We consider that the Chartered Professional Engineers Council's comments in respect of the Registration Authority and its role as regulator of Chartered Professional Engineers are equally applicable to engineers who have membership with IPENZ.

144. In respect of certifying the structural strength of seven tuk-tuk vehicles, when the vehicles did not meet the relevant standards, we consider Mr Joyce has acted incompetently. This aspect of the complaint is upheld. In respect of certifying the stability of the seven tuk-tuk vehicles, we do not consider there to be enough evidence to show, on the balance of probabilities that Mr Joyce also acted incompetently. Accordingly, this part of the complaint is dismissed.

145. In respect of issuing inspection certificates stating that he had inspected the strengthening work of the three Auckland tuk-tuks, we consider Mr Joyce has acted incompetently. This aspect of the complaint is upheld. We do not consider there to be sufficient evidence to show that Mr Joyce acted dishonestly; however, that does not change our view that he has acted without reasonable care and competence.

146. We find that Mr Joyce's behaviour was a significant departure from the accepted standards required of a reasonable Professional Member of IPENZ.

147. We therefore conclude that Mr Joyce has met the grounds for discipline under Rule 4.3 of the IPENZ Rules and the Code of Ethical Conduct.

DECISION

148. Having considered all the evidence, including written submissions and the oral evidence provided at the hearing on 26 August 2019, we have decided to uphold the complaint about Mr Joyce. We find that by certifying the structural strength of seven tuk-tuk vehicles that did not meet the strength and stability requirements of the PSV Rule, and additionally by issuing inspection certificates for vehicles he had not seen, Mr Joyce breached his professional obligation to act competently. Accordingly, we find that there are grounds for disciplining Mr Joyce under Rule 4.3 of the IPENZ Rules and the Code of Ethical Conduct.

149. Having found Mr Joyce in breach of Rule 4.3 of the IPENZ Rules and the Code of Ethical Conduct, we need to determine what orders, if any, should be made against him.

ORDERS

150. There are a range of disciplinary actions available to us as set out in IPENZ Disciplinary Regulation 17(3).

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[28] *Robinson v RA* (10 July 2015, Appeal Ruling #21) Chartered Professional Engineers Council. Available at: http://www.cpec.org.nz/appeal-rulings/appeal-21-10-july-2015-robinson-v-ra.

151. On 19 September 2019, our reserved decision was sent to the parties and they were invited to make submissions on penalties. NZTA made submissions on 24 September 2019. Mr Joyce made submissions on 1 November 2019.

RELEVANT LAW

152. In *Roberts v A Professional Conduct Committee of the Nursing Council of New Zealand*[29], the High Court outlined a number of principles to be applied by the Health Practitioners Disciplinary Tribunal in determining the appropriate penalty to impose in disciplinary proceedings. The High Court determined that a disciplinary penalty must:

a. protect the public (including through deterrence of other practitioners from engaging in similar conduct);

b. set and maintain professional standards;

c. where appropriate, rehabilitate the practitioner back to the profession;

d. be comparable with penalties imposed on practitioners in similar circumstances;

e. reflect the seriousness of the practitioner's conduct, in light of the range of penalties available;

f. be the least restrictive penalty that can reasonably be imposed in the circumstances; and

g. be fair, reasonable, and proportionate in the circumstances.

153. The High Court also stated that while penalty may have the effect of punishing a practitioner, punishment is not a necessary focus for the Tribunal in determining penalty.

154. The principles in *Roberts* are broadly applicable to our power to make disciplinary orders under Rule 10 of the IPENZ Rules and they are the principles we rely on when considering the appropriate penalty orders in this case.

155. The principles have general application to professional disciplinary proceedings in the light of the Supreme Court's decision in *Z v Dental Complaints Assessment Committee*.[30] In *Z,* the Supreme Court made general statements about the purposes of professional disciplinary proceedings, noting that such proceedings are designed to:

> *Ascertain whether a practitioner has met appropriate standards of conduct in the occupation concerned and what may be required to ensure that, in the public interest, such standards are met in the future. The protection of the public is the central focus.*

156. This is consistent with *Roberts*, as *Roberts* lists public protection and the maintenance of professional standards as the foremost considerations relevant to penalty.

157. The Supreme Court in *Z v Dental Complaints Assessment Committee*[31] also state that while professional disciplinary proceedings are not intended to punish practitioners, they may have a punitive effect in practice. This is also consistent with the principles set out in *Roberts*, in that the penalty must be the least restrictive penalty and that punishment is not a necessary focus of a disciplinary penalty.

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[29] [2012] NZHC 3354.
[30] [2008] NZSC 55.
[31] Ibid.

158. It is appropriate that disciplinary penalties mark the profession's condemnation of the relevant conduct, noting that to do otherwise would not be consistent with the purpose of professional disciplinary processes.

SUBMISSIONS FROM NZTA

159. NZTA submitted that our findings be published, including naming Mr Joyce. Further, it stated that:

> *The reason the Transport Agency laid the complaint was not related to Mr Joyce's transport certifications… Our concern relates to other work he may have carried out, and we believe it is important for his other clients to be aware that they perhaps ought to have any certifications he has completed double checked.*

SUBMISSIONS FROM MR JOYCE

160. Mr Joyce submitted that he has never denied that he made an honest mistake when he issued the inspection certificates for the Auckland tuk-tuks, instead of the Statement of Design compliance. He also referred to the character references and his doctor's letter, suggesting that his health issues may have contributed to his out-of-character error at the time, and requested he be treated leniently. He also provided us with an opinion piece regarding regulatory failures in New Zealand.

161. Mr Joyce's first character a mechanical engineer who has known Mr Joyce since 1964 and advised that he worked for Mr Joyce between 1990 and 1991. The first character witness stated that:

> *This period allowed me to closely observe Mr Joyce professionally and to see how he managed his consulting business. In both regards, he always operated in a thoroughly professional manner and his business maintained the highest ethical standards… I never saw Mr Joyce take short cuts in design or certification work.*

162. Mr Joyce's second character witness stated that they have known Mr Joyce since 1985 and they have employed him since 2004 and are very satisfied with his work and professional standards.

163. Mr Joyce has also provided us with details his presentations with health issues between 8 July and 21 November 2016.

164. Mr Joyce stated his objections to our findings and submitted that no further penalties are warranted.

DISCUSSION

165. Engineers hold significant knowledge and specialised expertise. They are capable of making judgements, applying their skills and reaching informed decisions in relation to their work that the general public cannot. The decisions engineers make and the services they provide often do not just impact the engineer and their client but have wide-reaching effects on the public.

166. The public places significant trust in engineers to self-regulate. As a professional, an engineer must take responsibility for being competent and acting ethically. The actions of an individual engineer also play an important role in the way in which the profession is viewed by the public.

167. The Disciplinary Committee has found that Mr Joyce has departed from what could be expected of a reasonable engineer, and this departure is serious. That is, by certifying the structural strength of seven tuk-tuk vehicles that did not meet the strength and stability requirements of the PSV Rule, and additionally by issuing inspection certificates for vehicles he had not seen, Mr Joyce breached his professional obligation to act competently.

168. In our view, Mr Joyce's actions, if condoned, would undermine the public's trust in the engineering profession and reduce the public confidence in members of Engineering New Zealand. Mr Joyce's actions are serious, and our orders need to reflect our view of the seriousness of the breach of his obligation to act competently.

PENALTY

Membership

169. In respect of membership with Engineering New Zealand, the Disciplinary Committee may order that an Engineering New Zealand member be:

- expelled from membership;
- suspended from membership for any period;
- suspended from membership until such time as the Engineering New Zealand member has fulfilled requirements for professional development as has been specified by the Committee;
- suspended from membership for a period of time if, by a prescribed date, the member fails to fulfil requirements for professional development as has been specified by the Committee;
- fined a maximum of $5,000;
- reprimanded or admonished.

170. Mr Joyce is the subject of orders made by another Disciplinary Committee, that he be suspended from membership of Engineering New Zealand on 18 February 2019 for a period of one year, and until he has fulfilled requirements for professional development as specified by that Disciplinary Committee. We have been advised that Mr Joyce has not (at the date of this decision) undertaken the professional development as ordered by that Disciplinary Committee.

171. In *A v Professional Conduct Committee*[32], the High Court said, in relation to a decision to cancel or suspend a professional's registration, that four points could be expressly and a fifth impliedly derived from the authorities:

> *First, the primary purpose of cancelling or suspending registration is to protect the public, but that 'inevitably imports some punitive element.' Secondly, to cancel is more punitive than to suspend and the choice between the two turns on what is proportionate. Thirdly, to suspend implies the conclusion that cancellation would have been disproportionate. Fourthly, suspension is most apt where there is 'some condition affecting the practitioner's fitness to practise which may or may not be amendable to cure'. Fifthly, and perhaps only implicitly, suspension ought not to be imposed simply to punish.*

172. In the recent decision of *Attorney-General v Institution of Professional Engineers New Zealand Incorporated and Reay*[33], the High Court set out the standard the public expects when an engineer is a member of Engineering New Zealand:

> *…membership of a professional body, such as the Institution, can confer a status that signals trustworthiness to the public. This status reflects the value that society places upon the training*

[32] *A v Professional Conduct Committee* [2008] NZHC 1387 at [81].
[33] [2018] NZHC 3211 at [55].

and skill acquired by members and upon the Institution's ability to maintain the standards of its members through ongoing education, training and disciplinary processes.

173. The Court also went on to set out the public expectation of Engineering New Zealand's role in maintaining the standard of the profession:[34]

> *There is, however, a counterbalance to the public trust that is reposed in members of professional bodies such as the Institution. That counterbalance is the public expectation that the Institution will tightly regulate admission into its ranks and ensure members maintain high professional standards. The public expects that if a person is to be afforded the status of membership of the Institution, then those individuals will maintain professional standards and that those standards will be enforced by the Institution through, if necessary, disciplinary proceedings. If a professional body, such as the Institution, wishes to maintain that public trust, and the value associated with membership status, then it must act in accordance with this expectation.*

174. We have considered Mr Joyce's submission that his actions in issuing inspection certificates for the Auckland tuk-tuks were completely out of character and information regarding his health. Engineers will, from time to time, suffer ill health and where that may pose a risk to their ability to competently and safely carry out their work, they have a professional responsibility to put appropriate measures in place, which may include stopping work for the period of ill health.

175. We have also considered Mr Joyce's character witness statements. Although the first character witness worked for Mr Joyce, this was some 25 years prior to the certification of the tuk-tuks. We do not consider that the first character witness' comments regarding Mr Joyce's professionalism are helpful given the length of time that has elapsed since they were Mr Joyce's employee.

176. In coming to our decision, we have considered the seriousness of Mr Joyce's conduct, along with the fact the he is also subject to orders made by another Disciplinary Committee that include censure and suspension.

177. While we do not consider Mr Joyce has acted dishonestly, we are concerned that Mr Joyce's actions, if condoned, would have a significant negative effect on the value and trust society places upon members of Engineering New Zealand. We do not think a fine is appropriate in this case. However, given our serious concerns about public safety, we have decided to continue the suspension of his membership with Engineering New Zealand for a further three years under the same conditions as his current suspension. We also require that Mr Joyce fulfils the requirements for professional development specified by the previous Disciplinary Committee before he can be considered for readmission to Engineering New Zealand. The previous Disciplinary Committee ordered[35]

> *Mr Joyce to complete a year of supervision with a senior engineer approved by Engineering New Zealand, and professional development to the satisfaction of the supervising engineer. In particular, the professional development will focus on Mr Joyce's competency in heavy vehicle engineering. The supervisor will report back to the Chief Executive of Engineering New Zealand regularly as to Mr Joyce's progress.*

[34] Ibid at [56]
[35] Disciplinary Committee decision *Joyce*, at [155] – [156]:

At the end of the year of supervision, and for Mr Joyce to be considered for readmission to the membership of Engineering New Zealand, Mr Joyce will provide evidence to Engineering New Zealand that he has met the conditions of his supervision and how this will be reflected in his future engineering practice. Mr Joyce's supervisor will also provide a recommendation to Engineering New Zealand as to whether Mr Joyce has suitably fulfilled the requirements of our order. This recommendation should include the supervisor's opinion as to whether Mr Joyce is able to practice engineering work in his practice area competently and with public safety at the forefront of any engineering activity that he undertakes. Engineering New Zealand will decide whether to readmit Mr Joyce as a member.

178. This recognises our view that there needs to be a measure of public protection in our orders while also recognising that there is potential for Mr Joyce to learn from this matter and rehabilitate. In making this order, we are mindful that an engineer suspended from membership is deprived of the peer support and other collegial aspects of belonging to a professional body, but we are of the view that this consideration is outweighed by the need to protect the public.

179. We are also reprimanding Mr Joyce for his behaviour.

180. We consider this is a proportional response to the seriousness of this matter. We note suspension of Mr Joyce's membership does not prevent him from practising as an engineer; it only prevents him from using the postnominal CMEng and holding himself out to be a member of Engineering New Zealand. Mr Joyce has not made submissions on whether he has addressed the concerns relating to his competency. It is on this basis that the Disciplinary Committee considers that supervision during this period of suspension is necessary to protect the public and reinforce the standards of, and public trust in, the engineering profession.

181. As stated above, Mr Joyce's behaviour fell well below the standard expected of a professional engineer, and it is important that Engineering New Zealand condemns this behaviour and that this condemnation is reflected in the penalty ordered.

Costs

182. We can order that Mr Joyce pay costs and expenses of, and incidental to, the inquiry by Engineering New Zealand. The ordering of payment of costs is not the nature of a penalty.

183. When ordering costs, it is generally accepted that the normal approach is to start with a 50% contribution. That, however, is a starting point and other factors may be considered to adjust upwards or downwards that portion. The balance of costs must be met by the profession itself.

184. In respect of the medical profession, the Court in *Vatsyayann v PCC* said:[36]

…professional groups should not be expected to bear all the costs of a disciplinary regime and that members of the profession who appeared on disciplinary charges should make a proper contribution towards the costs of the inquiry and a hearing; that costs are not punitive; that the practitioner's means, if known, are to be considered; that a practitioner has a right to defend himself and should not be deterred by the risk of a costs order; and that in a general way 50% of reasonable costs is a guide to an appropriate costs order subject to a discretion to adjust upwards or downwards.

[36] [2012] NZHC 1138 at [34].

185. We have considered other Disciplinary Committee orders of costs, such as the previous order for costs made against Mr Joyce. We have also considered Mr Joyce's submission that he has sold his business, is retired and is now a pensioner. We have not been provided with any information to give us insight into what Mr Joyce's current financial position might be nor the extent to which he has the ability to pay a portion of costs incurred by Engineering New Zealand.

186. We have considered whether an uplift from the starting point of 50% of costs is appropriate in this case, due to the additional costs that were incurred by Engineering New Zealand in investigating and hearing this matter owing to Mr Joyce's lack of engagement in the process. Other aggravating factors include Mr Joyce's lack of insight in that he has not acknowledged his failures other than the certification of the Auckland tuk-tuks and the fact that this is not the first disciplinary matter involving Mr Joyce. In terms of mitigating factors, we are cognisant of the length of time that it has taken for Engineering New Zealand to hear this matter.

187. Taking all factors into account, it is the decision of the Disciplinary Committee that Mr Joyce pay 60% of the costs incurred by Engineering New Zealand in investigating and hearing this matter. This is slightly above the norm ordered by Disciplinary Committees.

Naming

188. It is open to the Disciplinary Committee to name the Engineering New Zealand member, the order made against the member, publish the nature of the breach in the official journal of Engineering New Zealand, or publicise it in any other manner as may be prescribed by the Committee, or any combination of these possibilities as the Committee might prescribe.[37]

189. Naming is the starting point and will only be inappropriate in a limited number of circumstances where the engineer's privacy outweighs the public interest. In *Y v Attorney-General*[38], the Court of Appeal explored the principles that should guide the suppression of the names of parties, witnesses, or particulars in the civil context. It stated that the starting point is the principle of open justice.

190. The question is then, do the circumstances justify an exception to that principle. In a professional disciplinary context, a practitioner is "likely to find it difficult to advance anything that displaces the presumption in favour of disclosure".[39] This is because the practitioner's existing and prospective clients have an interest in knowing details of the conduct, as this allows them to make an informed decision about the practitioner's services.[40]

191. Consistent with these precedents, the starting point is that naming of engineers subject to a disciplinary order is the normal expectation. This is because public protection is at the heart of disciplinary processes, and naming supports openness, transparency and accountability.

192. NZTA has made a submission that Mr Joyce be named, so that members of the public are notified of his behaviour.

193. We note that Mr Joyce was named by a previous Disciplinary Committee on 18 February 2019.

194. The Disciplinary Committee has considered whether naming would cause extreme hardship, cast suspicion on another person that may cause undue hardship on that person, create a real risk of

[37] Engineering New Zealand Rules, r 10.5
[38] [2016] NZCA 474.
[39] Ibid at [32].
[40] Ibid at [62].

prejudice, endanger the safety of any other person, lead to the identification of another person whose name is suppressed by order or by law, and whether it would prejudice the maintenance of the law.

195. Mr Joyce has chosen not to make a submission to us on this point nor an application for a suppression order. After considering the above factors, the Disciplinary Committee has no factual material to consider justifying the departure from the fundamental principle of naming. In this case, given the seriousness of Mr Joyce's departure from expected standards, we consider it appropriate for Mr Joyce to be named.

SUMMARY OF ORDERS

196. In exercising our delegated powers, we order:

a. The suspension of Mr Joyce's membership with Engineering New Zealand will continue for a further three years from February 2020. During this period of suspension, Mr Joyce must fulfil requirements for professional development as have been specified by the previous Disciplinary Committee, before he can be considered for readmission as a member;

b. Mr Joyce is reprimanded by Engineering New Zealand;

c. Mr Joyce to pay $15,000 towards the costs incurred by Engineering New Zealand in inquiring into Mr Joyce's conduct (approximately 60% of Engineering New Zealand's total costs); and

d. That Engineering New Zealand publish the Disciplinary Committee's final decision on this complaint on its website, in a public press release and in any other communication it considers appropriate, and Mr Joyce's interim name suppression is lifted.

Jenny Culliford FEngNZ
Disciplinary Committee Chair