IN THE HIGH COURT OF THE REPUBLIC OF SINGAPORE

[1989] SGHC 88

Suit 2859/1981

Between

Deutz Far East (Pte) Ltd

… Plaintiff

And

Pacific Navigation Co Pte Ltd

… Defendant

GROUNDS OF DECISION

Commercial Transactions — Sale of goods — Consumer protection; Tort — Negligence — Duty of care

Version No 1: 11 Sep 2026 (01:05 hrs)

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Deutz Far East (Pte) Ltd v Pacific Navigation Co Pte Ltd

[1989] SGHC 88

Suit 2859/1981
Chua F A J
06 October 1989

1 Cur Adv Vult

2 The plaintiffs are the manufacturers and suppliers of Deutz marine engines and spare parts. Their claim against the defendants is for the sum of $42,953.60 being the price of a new top part of the injector pump (NTP) supplied by the plaintiffs to be used on the main engine of the defendants` motor vessel United Glory.

3 The defendants maintain that on or about 8 August 1980, the NTP was properly fitted onto the main engine of the United Glory at Newcastle, Australia, by the ship`s chief engineer and thereafter the vessel set out to sea but unknown to them the NTP was defective in that it had therein four oversized springs. On or about 14 August 1980, on the voyage from Newcastle, Australia, to Lae in Papua New Guinea, due to the oversized springs in the NTP, the main engine was extensively damaged and the vessel was crippled and placed in a position of peril. The repairs. After the temporary repairs, the vessel left for Gladstone, Australia, where permanent repairs were effected. The defendants were put to considerable loss and expense and they claim damages against the plaintiffs.

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4 At the outset of the trial, the parties agreed to have the issue of liability in the counterclaim of the defendants to be tried first. The main issue is whether the consequential loss suffered by the defendants could be attributed to the supply of `oversized springs` in the NTP supplied by the plaintiffs which the defendants alleged are defective and not fit for the purpose.

5 The short facts are these. The vessel United Glory was built in 1955 and fitted with a Deutz eight-cylinder diesel main engine. The defendants purchased the United Glory in 1973. The main engine`s fuel pump consisted of two injector pumps, each of which supplied four cylinders. The first pump was driven by the main engine and it, in turn, drove the second pump to which it was coupled at one end. The top part of each injector pump carried a combination of short springs (72mm) and long retainer nuts (32mm). The injector pump in question in these proceedings is the second pump. Between December 1979 to November 1980 the master of the United Glory was Capt Willy Fabricius and the chief engineer was Radar B Karlsen (DW7).

6 As the second fuel injector pump`s top unit was wearing out, the defendants on 24 July 1980, by telex requested the plaintiffs to supply the United Glory a new top unit identified and described in the catalogue for Deutz spare parts as Part No 01117-606. The plaintiffs on or about 8 August 1980, supplied the NTP to the United Glory.

7 The evidence adduced by the defendants is shortly this. When the chief engineer received the NTP at Newcastle, the unit came assembled and ready to be fitted on to the lower part of the second pump. The existing top part was taken off and replaced with the NTP. The chief engineer had no problem fitting the NTP. After that the main engine was tested. It was working properly.

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8 On 9 August 1980, after the repairs had been completed, the chief engineer got the engine ready for the voyage to Lae. The vessel was tested alongside the wharf. The vessel left Newcastle at about noon on 9 August 1980. On the first day everything was normal. On 14 August 1980, at around 0200 hours, the vessel`s main engine began to fail: the engine speed had dropped down by about 50 revs, ie about one-third and also the exhaust temperature had risen.

9 The engine was stopped and an investigation was carried out. It was found that:

> (a) the adjustment ring in the coupling in front of the first pump, which drove the camshaft that operated both the first and the second pumps, was broken; and
>
> (b) the groove for the key on the camshaft had widened from its original size of 8mm to 14mm. The key itself was damaged.

10 On the same day, the master informed the defendants of the breakdown and the underwriters were informed. Emergency repairs were carried out. The adjustment ring was replaced and a new key was made. The engine was started at 1930 hours on 16 August 1980 and the voyage continued.

11 At 0730 hours on 17 August 1980, the engine speed started to drop again. The main engine was stopped and an investigation carried out. It was the recurrence of the same problem with the same coupling giving way. Temporary repairs were carried out. They were able to get the engine started. Sometimes it was for a few hours, sometimes for a few minutes. During this time, on 18 August 1980, the chief engineer decided to search the whole system when the coupling continued to give way.

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12 Upon opening the first and second pumps, the chief engineer noticed that the springs in the NTP were longer and thicker than the springs in the corresponding top unit of the first pump. The long springs in the NTP were 102mm long, 4.8mm in diameter and 10 turns (coils) whilst the short springs of the first pump were 72mm long, 4mm in diameter and 73/4 turns. Both sets of springs had the same serial number `0117-762`.

13 The chief engineer reported this to the master. As the chief engineer was uncertain as to which of the two sets of springs were of the correct size, the master contacted Bernt Forsell (DW3), the defendants` managing director. Forsell was asked to confirm with the plaintiffs the correct size of the springs bearing the serial number `0117-762`. When Forsell telephoned the plaintiffs` spare parts department to verify, he was informed that the springs` correct size was 72mm, of 4mm diameter and 7 3/4 turns. The master was accordingly informed on 19 August 1980.

14 The chief engineer carried out further repairs. This continued until 28 August 1980, when the main engine could not be restarted any more. The master then called for assistance and the vessel was towed into Lae on 30 August 1980. On 8 September 1980, Ronald Arthur Rannard (DW1), a consultant engineer, surveyor from the London Salvage Association, boarded the United Glory at Lae, to ascertain the cause, nature and extent of the damage suffered by the vessel.

15 When the pumps were opened up in Rannard`s presence, it was noted that the camshaft of the second pump had sheared at the drive coupling between the first and the second pumps. On stripping down the second pump it was found that the NTP had springs that were 30mm longer than the springs in the corresponding unit of the first pump and that they were made of a heavier and

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thicker material than those in the first pump`s top unit, although all the retainer nuts were of the same length. In other words, whilst the top unit of the first pump had 72mm springs with 32mm retainer nuts, the NTP had 102mm springs with retainer nuts also of 32mm.

16 Rannard ascertained the exact measurement of the lift or movement of the pump. He found that the springs in the top unit of the first pump compressed to 47mm, while the springs in the NTP of the second pump when fully compressed had an overall length of 48mm, ie the springs became solid cylinders. This meant that there was insufficient free space in the cylinders of the NTP for the springs to compress fully without becoming solid cylinders and exerting pressure on the cam of the camshaft (see exh D13).

17 Rannard then advised that the long springs in the NTP be cut to reduce their length to 72mm as a temporary repair so that the vessel could proceed to the next loading port of Gladstone in Australia. The defendants were consulted and they agreed. The springs from the NTP were cut by Rannard and the chief engineer to 72mm and later taken ashore to an engineering firm to have the cut ends ground as flat as possible. The cut springs, however, were not used at all because they were made of a thicker material. That would affect the tension of the springs. More power would be needed to compress the new thicker springs even if they were cut down to 72mm. The chief engineer had found an old fuel injector pump top unit in the ship`s stores and installed the four old springs of 72mm into the NTP.

18 After undergoing the necessary repairs and tests at Lae the vessel departed for Gladstone on 13 September 1980.

19 After leaving Lae for Gladstone, everything was working as normal with the main engine. On 15 September 1980 the chief engineer stopped the main engine to inspect the fuel injector pumps and found them in good order and functioning normally. The pumps were not dismantled for detailed examination.

20 On 18 September 1980, however, the chief engineer found that the lower part of the second injector pump was hotter than normal. The main engine was stopped for investigation. He found the shaft for the roller follower broken; the bush bearing holder broken and another bush bearing holder cracked. The broken shaft was replaced as there was a spare on board the vessel. Nothing could be done as regards the bush bearing holders; they were part of the body of the pump itself and could not be repaired. Cylinders 6 and 7 of the second pump were immobilized. The vessel continued the voyage at reduced speed as only six cylinders were operating. The vessel managed to reach Gladstone on 19 September 1980.

21 Rannard was again instructed by the London Salvage Association to proceed to Gladstone and examine further the second pump. He reported:

> *An examination of the damaged pump revealed that the roller follower shaft had broken between the second and third roller aft. This failure has caused the vessel to be minus No 6 and No 7 cylinders and the vessel had proceeded into port with the assistance of tugs on Nos 1, 2, 3, 4, 5 and 8 cylinders with 5 and 8 cylinders being below power.*

22 Rannard reported other damages sustained:

> (1) Fuel pump cam shaft damaged beyond repair.
>
> (2) Set collars broken between No 1 and 2 pumps.
>
> (3) Two rollers indented.
>
> (4) Bearings for shaft heavily worn.

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(5) Two left bodies broken.

23 The second pump was stripped down and spare parts were ordered for the pump from the plaintiffs. The pump was repaired. On 4 October 1980, the engine was tested in the presence of the Bureau Veritas surveyor. It was working satisfactorily and was approved by the Bureau Veritas.

24 On 7 October 1980, the United Glory left Gladstone for Port Moresby and from Port Moresby to Banjarmasin and returned to Singapore on 4 November 1980. This final voyage from Gladstone to Singapore took about 18 sailing days. During this voyage there was no trouble with the engine or the pumps.

25 After the United Glory returned to Singapore, Forsell telephoned the plaintiffs. When the plaintiffs` representative visited him in his office, he complained that the plaintiffs had put in the wrong springs in the NTP. But the plaintiffs` representative told him that he was wrong and showed him a larger spring (exh D17) which he claimed to be the correct one.

26 Forsell then asked his shipowners` association in Sweden to buy from Svenska Deutz the plaintiffs` office in Sweden, a helical spring bearing the serial number `0117-762`. The association bought the spring and sent it to Forsell (exh D16). In December 1985, Forsell himself went to the plaintiffs` office at Gothenburg, Sweden, and bought a helical spring for the fuel pump. He gave the storekeeper the engine model number and the serial number of the spring `0117-762`. He was given a spring (exh D21).

27 Upon comparison it was found that the two springs D16 and D21 were identical and were the same as the springs which were in the top unit of the first

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pump, ie of 72mm length, 4mm thickness and 7.75 turns. Rannard gave the following opinion:

> *In my opinion the only probable logical cause of the damage could be due to overstressing caused by the fitting of heavy springs, ie the springs which I found in the second pump in Lae. In my opinion this overstressing was in all likelihood caused at the time of running with the heavy springs from Newcastle to Lae had not manifested itself until close to or near Gladstone. Not to my knowledge that the damage was not caused by the springs. The pumps and other parts of this engine are constructed in such a way that repair can take place to any part of the machine by replacement with spare parts, this is the normal method used. I would say that it is not a complicated task to fit the top part of the pump to the bottom part of the pump and the whole pump fitted to the engine.*

28 The plaintiffs pleaded that after the receipt of the defendants` order for the NTP, the NTP was specially assembled in Germany and that the four springs in the NTP of 105.5mm were essential components of the NTP for it to perform its function to run the main engine of the United Glory.

29 Dieter Schorn (PW1), the regional service controller with Deutz MWM Far East Pte Ltd, an amalgamation of the plaintiffs and another company, gave evidence on behalf of the plaintiffs. He is a marine engineer and has been employed by Deutz MWM for the past 25 years and has 25 years experience with diesel engines. He has been regional service controller since 1982 and is responsible for the entire diesel engine range up to 10,000 bhp. The NTP is an improved model of the old top part and has been made since September 1955. Schorn in evidence said:

> *The top part was supplied according to the order contained in the telex. The top part that was supplied was suitable for use on the `United Glory`. This top part will function properly if fitted properly by the ship`s engineers. The top part that was supplied was not defective in any way.*

30 He then went to explain why the improvement was made. He said:

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> *The new top part differs from the old top part in that the springs and ... the retainer nuts are of different design. The dimensions of these are also different. The combination of the new top part is a retainer nut of 22mm with spring of 105mm as against a 32mm retainer nut and a 72mm spring in the old top part.*

31 The new top part with this combination ensures even compression. The purpose of the longer and stronger spring is to improve the roil on and roll off effect of fuel pump components on the camshaft. The shorter spring would not follow the camshaft smoothly. Because of the uneven contact of the cam damages to camshaft and to components were experienced. The change in design was to extend the life of those prematurely worn out components.

32 This modification of the new top part has been in existence for many years. This is the first time a complaint has been made that a long spring had been used and subsequently caused all the damages alleged by the defendants.

33 The main question which I have to decide is: what caused the main engine of the United Glory to fail on 14 August 1980? Was it due to longer springs in the NTP supplied by the plaintiffs and installed by the chief engineer on the second pump, or was it caused by some pre-existing defect in the main engine itself, or by the improper fitting of the NTP by the chief engineer.

34 In his submissions counsel for the plaintiffs raised the question of the admissibility of the vessel`s official log-book marked as exhs D26A, B and C for identification. It is submitted that at the conclusion of the hearing, no proper evidence has been adduced by the defendants for the admission of these exhibits in that they failed to produce:

(1) The maker of the documents, ie the master, Capt Fabricius.

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> (2) Evidence to support that the log-book was kept by the master in accordance with the provisions of the Merchant Shipping Act (Cap 172, 1970 Ed).

35 Counsel for the plaintiffs submits that the log-book was not kept in accordance with s 140(4) of the Merchant Shipping Act (Cap 172, 1970 Ed) (the Act) which provides:

> *An entry required by this Act in an official log-book shall be made as soon as possible after the occurrence to which it relates, and if not made on the same day as that occurrence shall be made and dated so as to show the date of the occurrence and of the entry respecting it; and if made in respect of an occurrence happening before the arrival of the ship at her final port of discharge shall not be made more than 24 hours after that arrival.*

36 There are discrepancies in the recording of dates of occurrence and dates of entry in the log-book. For example:

> (a) Occurrence of 12 August 1980, appears at p 2 of D26B and the date of entry was 13 August 1980. Occurrence of 12 August 1980, appears again at p 23 of D26B, with date of entry 12 August, 1980.
>
> (b) In the log-book D26B, occurrences of 15 August 1980 to 20 August 1980 were not entered until September 1980. Occurrences of 21 August 1980 to 31 August 1980 were not entered until September 1980.
>
> (c) Occurrence of 18 August 1980, appears at p 4 of D26B and date of entry was 2 September 1980. Occurrence of 18 August 1980 appears again at p 17 of D26B with date of entry 8 September 1980, after the occurrence of 3 September 1980.
>
> (d) Occurrence of 19 August 1980, appears at p 4 of D26B and date of entry was 2 September 1980. Occurrence of 19 August 1980 appears again at p 17 of D26B with date of entry 8 September 1980, after the occurrence of 3 September 1980.

37 It is further submitted that s 140(5) and s 143 of the Act have not been complied with.

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38 Section 140(5) provides that: `Every entry in the official log-book shall be signed by the master and by the mate or some other member of the crew.` Section 143 provides:

> (1) The master of every ship for which an official log-book is required by this Act shall, upon the discharge of the crew, deliver the official log-book of the voyage to the Superintendent.
>
> (2) Any master of a ship who fails without reasonable cause to comply with this section shall be subject to a fine not exceeding two hundred dollars.

39 At the hearing on 14 October 1987, counsel for the plaintiffs applied for the official log-book of the United Glory to be produced by the defendants. Counsel for the defendants informed the court that it was with the Marine Department, Singapore, and that he would request for the log-book to be produced. On 15 October 1987, counsel for the defendants informed the court that he had made arrangements to pick up the log-book and that it should be in court shortly but it was not produced. At the continued hearing on 29 March 1988, counsel for the defendants informed the court that he had received the log-book from the Marine Department and he tendered it and it was marked exh D26A, B and C for identification. No official from the Marine Department, Singapore, was to testify that they received D26A, B and C from the master of the United Glory.

40 The defendants say that the master Capt Willy Fabricius signed off the vessel in December 1980 in Singapore and that the vessel was sold in late December 1980 and that they have not been able to contact the master. Each entry in the log-book bears only one signature. No attempt was made by the defendants to identify that signature. There is no evidence that it is the signature of the master. The chief engineer cannot attest to the truth or accuracy of the

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contents of the log-book D26A, B and C. The chief engineer has even criticized the master for errors and failure in the recording of the log-book. Section 140(6) provides that `every entry made in an official logbook in the manner provided by this Act shall be admissible in evidence`. In the premises the log-book D26A, B and C is not admissible in evidence.

41 The plaintiffs suggested that the cause of the failure of the vessel`s main engine was the existing poor condition of the engine itself which was installed in 1955.

42 The evidence of the chief engineer was that when he joined the United Glory in December 1977, he checked the engineer`s log-book for the previous year and was satisfied that the engine had been properly maintained. There had been no major breakdowns; there had been no report of any damage to the coupling, cam shaft or injector pump top part. After he joined the vessel in December 1977 up to August 1984, there was no major breakdown of the engine. The engineers carried out normal maintenance work and overhauling of pistons. No one had opened up the coupling. The second pump was the older of the two pumps and the process of wearing out was an on-going one from the time the pump was newly installed a long time ago. He had informed the owners that the second pump needed to be replaced in May 1980. The main engine with the old second pump continued to function satisfactorily and the vessel sailed without any problems during the two months until the NTP was fitted and the engine broke down about 107 hours after that. When the NTP was fitted there was no interference with the coupling.

43 The plaintiffs also suggested that the chief engineer had failed to calibrate or make the necessary adjustments when fitting the NTP and

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contended that the damage to the pump was due to the `inexperience, inability and shoddy repairs` on the part of the chief engineer and his crew.

44 The chief engineer first started work in ships` engine rooms in 1955 and had worked his way up from engine boy to chief engineer. He obtained his engineer`s certificate in 1968 and at present he holds a chief engineer`s licence for motor ships and a first class licence for steamships. The chief engineer said that although this was the first occasion he had worked on a Deutz engine, in principle the Deutz engine was the same as the other engines and he had no problems handling the pumps on the United Glory. From the time he joined the United Glory until 14 August 1980, when the engine broke down, he had no problems handling the engine of the vessel. He also said that he had experience in replacing the top units of fuel injector pumps and that he had done this many times previously. On the other occasions the engine had not failed.

45 As regards the fitting of the NTP and the adjustment screw (calibration), the chief engineer said that not all engines had the same procedure for adjustment, but in this case he followed the instructions in the Deutz manual book in adjusting the screw. He was aware what would happen if the adjustment was not correctly done: the performance of the engine would be reduced and if the adjustment was too far out it could damage the fuel injector pump. That would be noticeable when he started the engine. He said that after he had installed the NTP at Newcastle there was no problem with the engine.

46 ***Cause of damage***

47 The chief engineer said that, when compressed, the longer springs of 102mm needed more power to compress fully. The free space (the distance from the set collar to the retaining nut when the plunger is in the top position) was

about 46mm. When the engine was at full speed, the plungers moved up and down at the rate of 175 times a minute. This would be affected by the longer springs. As the longer springs, when fully compressed, measured about 48mm, there was not enough free space and the springs were then forced sideways. The effect of this on the camshaft was that extra load was needed to lift the plungers to the top centre. The extra load adversely affected the camshaft which, in turn, caused the engine`s speed to slow down.

48 Tests were carried out on the two lengths of springs by Det Norske Veritas (South East Asia) Pte Ltd to determine load displacement properties (exh D18). According to the test results, in the case of the longer spring, it required about three times more power to lift the plunger to the top centre.

49 The chief engineer said that as a result of the extra load needed to lift the plungers due to the long spring, there was more load on the coupling, causing the coupling-key groove to become widened. The consequence of this was that the injection of fuel from the plungers to the cylinders was delayed, thereby delaying the start of firing in the main cylinder, resulting in the loss of power in the main engine.

50 Since the coupling drove the camshaft, the extra load exerted on the coupling by the longer springs was transferred to the small key whose function was only to keep the camshaft from slipping out of the groove.

51 At Lae, the chief engineer tested the alignment and bearing of the pumps by removing their springs and found that, after the drive shaft between the pumps and the engine was dismantled, the pump shaft could be turned freely. This showed that there was nothing wrong with the alignment or the bearing.

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52 Schorn agreed that such loss of engine performance would not lead to the type of engine damage which the United Glory suffered. Schorn agreed that the break down after 107 hours of operation did not occur due to high exhaust temperature. When it was put to him that that would confirm that the adjustment was correctly made, Schorn replied that if it was correctly made `then one can only speak of luck that due to all these installation errors the measurement turned out to be correct`. Schorn also confirmed that the Deutz manual book contained detailed information of all the steps to follow.

53 A test was also carried out at Lae by the chief engineer before the longer springs were cut. And the springs were taken out of the two pumps. The camshaft could be turned freely by hand. The short springs were put in the first pump. The camshaft could be turned freely by hand. Then the short springs were removed from the first pump and the long springs were put in the second pump. The result was that the camshaft could not be turned manually because there was insufficient free space for the long springs when fully compressed.

54 Although the long springs were cut on the advice of Rannard, the chief engineer did not install the cut springs in the second pump. He installed four 72mm springs from an old fuel injector pump which he found in the vessel`s store because more power would still be needed for the thicker springs to be compressed. After the substitution of the springs in the second pump, the main engine was functioning properly.

55 The vessel then left Lae on 13 September 1980 for Gladstone. When the chief engineer stopped the main engine on 15 September 1980 and checked the fuel injector pumps, he found them to be in good order and functioning normally. However, on 18 September 1980 the chief engineer found that the lower part of the second pump was hotter than normal. When he stopped the

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engine and investigated the cause of this, he found that the shaft for the roller follower was broken, one bush bearing holder was broken and another bush bearing holder was cracked.

56 The necessary repairs were carried out but as the bush bearing holders could not be removed for repairs as they were parts of the body of the pump itself, he immobilized cylinders 6 and 7, which were parts before and after the broken bush bearing holders.

57 The vessel then sailed on six cylinders at reduced speed and reached Gladstone on 19 September 1980. After effecting the necessary repairs and passing the survey, the United Glory left Gladstone on 17 October 1980, for Port Moresby, from there to Banjarmasin and returned to Singapore on 4 November 1980. During this last voyage, which covered 18 sailing days, there were no further problems with the main engine or the pumps.

58 The chief engineer was of the opinion that the cause of the breakdown from Newcastle to Lae was the long springs in the NTP which were purchased from the plaintiffs and which were fitted to the second pump. He said:

> *The cause of the breakdown from Lae to Gladstone in my opinion is that the bearing bush holder was cracked during the first breakdown. The other damages also were caused during the first breakdown. It was not discovered in Lae because the crack had been in a place where it is not easy to see. You can`t see if the top part of the pump is taken off.*

59 The opinion of Rannard, who went on board the United Glory at Lae and Gladstone to survey and ascertain for the London Salvage Association, the cause, nature and extent of the damages suffered by the vessel, was that `the only probable logical cause of damage could be due to overstressing caused by the fitting of heavy springs, ie the springs which I found in the second pump at

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Lae.` He was also of the opinion `that overstressing was in all likelihood caused at the time of running with the heavy springs from Newcastle to Lae (which) had not manifested itself until close to or near Gladstone. Not to my knowledge that the damage was not caused by the springs.`

60 Rannard said that the pump would not operate if it was built for a larger spring and a smaller spring was used in its place. He had no doubt at all that the proper spring for the second pump would be the shorter spring. Schorn agreed that the longer springs would exert greater pressure on the camshaft than the shorter springs would. Rannard also was of the opinion that it was not a complicated task to fit the top part of the pump to the bottom part of the pump and the whole pump fitted to the engine.

61 Rannard, when told in cross-examination that the NTP was a modified version and that it had a 22mm retainer nut instead of the 32mm retainer nut found in the old unit said: `It may possibly be a new modification; it only reduces the height of the spring by 10mm not the 30mm required.` He did not agree that the modified top part of the pump could function either independently or together with an old top part pump.

62 Rannard also said that it was possible that even a reputable firm of manufacturers of diesel engines including Deutz could include the wrong parts.

63 Schorn during cross-examination was asked how the top unit was assembled in the factory. He said single components were taken and assembled on to the top part. The person assembling the top unit would pick up the various component parts following the given serial number for each part. He said both the longer springs and the old shorter springs had the same serial number. He agreed that in 1980 the shorter springs were still being supplied by some

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authorized suppliers. He also said that a ship owner had the option to purchase the longer or the shorter springs. The 22mm retainer nuts and the 32mm retainer nuts also had the same serial number. He agreed that it was possible for the person who assembled the top unit, through carelessness, to put in the shorter retainer nuts and the long springs.

64 The plaintiffs suggested that the cause of the breakdown could be attributed to the coupling between the first and second pumps not being properly assembled. The chief engineer said that when he fitted the NTP to the bottom part of the second pump at Newcastle he did not have to remove the bottom part and there was no interference with the coupling.

65 As for the series of breakdowns which occurred since 14 August 1980, Rannard noted that the main problem was with the coupling of the first pump and not the injector pump. He said:

> *In this case the key of the first pump coupling, which is a drive section of the coupling, kept failing and the initial failure was in my opinion caused by excessive cam pressure from the second pump which was caused by the necessity to compress the longer springs and heavier springs a longer distance.*

66 In cross-examination, Rannard was asked if the damage to the camshaft could be attributed to the coupling being badly installed, and he replied: `It could be but I did not find it in that way.` He explained that the failure of the coupling which was the weakest part, was caused by fatigue brought on by excessive loading.

67 He concluded that `the cause of this problem - too much pressure applied to the camshaft of the second (pump) which was transferred, as is normal, to the driven coupling of the first pump`. Referring to the damage which occurred subsequently during the voyage from Lae to Gladstone, Rannard said that it

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could not be caused by the use of the cut springs. When asked if the damage could be caused by the camshaft and key way being slack, Rannard said:

> *I said it could be a cause. It is not a probable cause in this case. As there was no damage to the driven coupling on the second pump it would mean that all the forces required to move the second, ie torsional forces were transmitted to the driving coupling on the first pump which would be normal; in other words, the driving coupling normally takes more of the forces involved than the driven coupling.*

68 Rannard agreed that incorrect seating of the coupling hub could result in damage to the hub. But in this case he did not attribute it to incorrect seating. He said:

> *The hub itself is a machined part and I don`t know if Deutz used manual or not but the bore of the hub and the tapered section of the shaft are supplied by manufacturers ready to be fitted together without further machining or fitting.*

69 When it was suggested to Rannard that wrong alignment could be a possible cause of the engine breakdown he replied:

> *In this particular case it is not probable, it is possible. When the new top half of pump was fitted at Newcastle, the bottom part was said not to have been removed, in which case the coupling would not have been touched or disturbed.*

70 I saw the chief engineer reassemble the complete pumps No 1 and 2 at Lae and fitted on to the engine at Lae. It was done correctly.

71 During the trial the plaintiffs produced a complete injector pump exh P4. Schorn said:

> *Exhibit P4 is a complete pump. This pump was assembled with standard components; in addition, the spring and retainer nut combination was varied to show the court the possibilities of using long and short, short and long, the different combinations, which we marked as A, B, C and D.*

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72 In A combination of 22mm retainer nut and 109mm spring. A represents the new modified version.

73 B has a combination of 32mm retainer nut and spring of 72mm. This represents the combination of the ... original top part of the second pump in the United Glory.

74 C has the combination of 22mm retainer nut with a 72mm spring, short and short.

75 D has a 32mm retainer nut and 105mm spring, long and long.

76 Exhibit P4 was examined by Rannard and the chief engineer. In the course of the cross-examination of Rannard, he was asked to demonstrate on the various combinations A, B and D. Demonstration on combination A: Rannard was asked to turn the camshaft. He found that the spring moved freely and the spring did not compress to a solid or near solid. However, he was not satisfied that the spring was pre-set to the correct tension as shown in the drawing of the new unit exh P3.

77 Demonstration on combination B: This represented the combination of the original top part of the second pump. When Rannard turned the camshaft he said it was slightly lighter (in turning) than in combination A. He agreed that in combinations A and B both functioned smoothly. Demonstration on combination D: When Rannard turned the camshaft he found that he could not move it. Rannard said he could see that the long spring was compressed solid.

78 When asked if with this combination the pump could operate for five minutes without causing extensive damage, Rannard replied that it was possible

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to operate but improbable; that it would depend on the amount of hp being supplied to the unit by the engine; that the resultant effect would be extensive damage only to the pump.

79 Rannard`s evidence was that when he went to the engine room at Lae he found that the two sections of the second pump had been removed from the engine and that he used the first pump to test first the compression of the old short spring and later the compression of the long spring from the NTP and that was when he found that the long spring became a solid cylinder. At that time the fact that the old top part had a long retainer nut of 32mm was not in his mind. He agreed that the result of his test at Lae corresponded exactly with the position he demonstrated in combination D of exh P4, but provided that the pump exh P4 was identical to the one on board the United Glory.

80 Rannard said that the pump exh P4 appeared to be similar to the pump on board the United Glory but he had reservations as to whether they were identical. He said if it was not identical it could have an effect on the tests carried out in court on exh P4 depending on the sizes of the parts. When he checked exh P4, he had the plaintiffs` mechanics measure for him one fuel pump plunger. He noted that this plunger measured just over 20mm in diameter which was the size of the plunger shown on the drawing exh P2 which was the original pump fitted to the United Glory; however, the diameter of the plunger shown on drawing exh P3, which the plaintiffs said was the new modified pump, was 17.5mm. Rannard said that the length of the plunger could make a difference. However, he was unable to scale the length of the two plungers from the drawings exhs P2 and P3 so that accurate comparison could not be made by him.

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81 Rannard also said that he noted that the coupling collar piece in exh P4 was visibly different from that which was on board the vessel: the collar driving faces of exh P4 were of more substantial design and strength than that observed by him on the United Glory.

82 Rannard referred to his report exh D12, p 4 para 3, and said that with the shorter spring fitted, the spring did not become a solid cylinder until it had been reduced in length to 47mm, while the longer spring became a solid cylinder at 48mm. He added: `Those two dimensions were later checked by the method I have already given which, compared, indicated that the correct ... spring to use was the short spring which would still have free compression available whilst the long spring would have been solid.`

83 Referring to the demonstration on exh P4, Rannard said that with the combinations B and D the longer spring would become a solid on compression, whereas with combination A there would be greater room for compression without becoming a solid.

84 Rannard said that the combination of long spring and short retainer nut was not compatible with the pump that was supplied or suitable for the engine that was on the United Glory and such a combination would have led to the damage which the vessel had sustained. He also said that the longer spring with a greater tension was more suitable for a higher capacity engine or a different type of pump than that which was on the vessel.

85 The chief engineer said that the NTP was made for a more powerful engine than that which was on the United Glory.

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86 Rannard explained the basic operation of the engine on the United Glory. The camshaft was powered by the engine through the coupling. The cam of the camshaft lifted the plunger. If the springs in the fuel injector pump were oversized, the cam would exert extra pressure to push up the plunger for the camshaft to rotate. The effect of this would be to push the camshaft downwards. The coupling was the weakest part of the whole system. Normally when the engine was working smoothly the coupling would not break. When the camshaft which drove the plunger moved out of alignment, there would be extra pressure which would lead to failure of the driving key and the tendency would be eventually to spin on the shaft and not drive it. This would result in the coupling being subjected to stress. When this happened the consequences would be:

> (a) that the fuel would be injected prematurely or late which would reduce the power in the cylinder leading to the engine slowing down;
>
> (b) that it would cause wear in the bore of the coupling which would eventually cause slackness and lack of turning of the camshaft and could possibly break the shaft.

87 In the case of the `United Glory`, the coupling key gave way in the second pump, causing the shaft to shear or break adjacent to the end of the coupling. In Rannard`s opinion, the fitting of the heavier springs placed an excessive load on the camshaft and its driving key. This overloading in the pump caused the key to break and the camshaft to shear and this in turn led to the other damages.

88 Referring to the demonstration on combination D in exh P4 when he and others were unable to turn the camshaft manually, Rannard said that he thought that the vessel`s engine could have turned it. This was confirmed by the chief

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engineer who said that when he installed the NTP at Newcastle there was no difficulty in turning using the vessel`s engine.

89 Rannard said that with combination D the United Glory could have sailed. In fact the engine ran for about 104 hours before the engine broke down. Rannard explained that the driving key, which was the part that transmitted power, gradually became fatigued over a period of time. The key was gradually worn in the key way until the engine failed when the key and the key way gave way due to the excessive pressure or load on the camshaft.

90 After the breakdown of the vessel`s engine, the defendants ordered spares for the repairs of the engine at Gladstone from the plaintiffs. Among the spares ordered were four pieces of helical springs bearing Fig Item No 0117-762. Schorn confirmed that the plaintiffs supplied 72mm springs. Schorn explained:

> *The Fig No 0117-606 represents the complete top part fuel pump. This number will cross-reference with our factory into a part number. The technician who will receive the order for this will cross-reference and he will find the engine was built with this part number but there will be a notification that this part has been replaced with a new part. If you order individual parts the supply would be for the old original unit.*

91 Schorn was asked why the NTP Fig Item No 0117-606, which was supplied in July 1980, was fitted with 105mm helical springs and in August 1980 when the defendants ordered helical springs Fig Item No 0117-762 they were unit. Schorn replied:

> *I don`t know if the order suggested that these springs should be for the new top part. But suppose I was the technician in the parts department and you wanted springs one month after you have been supplied with a new modified unit, I would guess that these springs would be for the existing original unit and I would then supply you the short springs.*

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92 Schorn said that the plaintiffs` spare parts book DB129 which was on board the United Glory did not contain any information or notification that the springs had been modified. He explained that the spare parts book DB129 only specified the Fig number and not the part number. He said that there was a separate spare parts book cross-referencing the Fig number with the actual part number. This second book was not with the owners of the vessel. He said that when the defendants ordered the four helical springs they would follow the No 0117-762 and this would `allow the technical people to deliver the exact part number and size of springs`.

93 Schorn said that when ordering a set of helical springs it was not sufficient just to give the engine model number. The serial number of the engine was required and then the plaintiffs would `determine the size of springs fitted in the particular type of pumps` and the correct size helical springs would be supplied. Schorn was asked and he replied that in determining which size of springs to supply, the plaintiffs would inquire whether the pump was a modified one. When asked if in this case when the helical springs were ordered whether such information was sought he replied:

> *I don`t know, I was not present when these springs were ordered.*

94 When asked: `If there was no such inquiry will you agree that the wrong size springs might be supplied?`, he answered: `There is no wrong size spring, short or long both are correct.`

95 Schorn agreed that both the 72mm and 105mm springs bore the same Fig No of 0117-762. According to Rannard, the 72mm and 102mm helical springs should not have had the same serial number. Schorn, when asked

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whether he was in a position to say whether the NTP supplied was assembled according to Fig No 0117-606, answered:

> *I have not seen the pump then, so I cannot confirm.*

96 Schorn was asked: `When you say that the new unit should have had the 105mm springs and 22mm retainer nuts you are of course assuming it.` He replied: `No. With the longer retainer nut the full movement of your pump stroke is not possible.` He was asked: `That would still be an assumption based on your engineering experience.` He replied: `Correct. I did not see what went into the unit.`

97 Schorn when asked what, in his opinion, the cause of the breakdown of the vessel`s engine was on the voyage, he said the coupling was not correctly tightened and that that conclusion was based on `reading the log book, examining the possibilities of the various spring combinations`. He said that that was the only possibility he had arrived at.

98 Schorn agreed that the longer thicker springs would require more power to compress; he said: `That was the purpose of this modification.` He agreed that this would mean that the longer thicker springs would exert greater pressure on the cam than the shorter ones would and that the greater pressure on the cam would be transferred in turn to the coupling. Schorn, however, said that the additional pressure would have no effect on the coupling at all.

99 Schorn said that it was necessary to remove the pump and separate the coupling to carry out the repairs that were carried out by the chief engineer before the vessel sailed for Lae and that the job of refitting the coupling required care and attention to ensure that the components of the coupling were assembled correctly. The evidence is that there were no problems with the coupling until

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the NTP had been installed on the second pump and the vessel had sailed for about five days. Schorn agreed that if the coupling had been incorrectly fitted after the repairs, engine trouble would have manifested itself sooner and ought to have been noticed by the chief engineer. However, the evidence is that no engine trouble or overheating was noted until after five days sailing.

100 Both the 72mm and 102mm helical springs bore the same Fig Item No 0117-762 and both the long and the short retainer nuts bore the same Fig Item number in the spare parts book of the plaintiffs on board the United Glory. Schorn agreed that the short springs were still being supplied as late as 1984. Schorn said:

> *When the defendants placed the order, they checked the spare parts book and identified a Fig number for the complete top part injection pump. Upon receipt of an order like this, either we in Singapore will cross-reference this Fig number with technical information available to us to ensure that the top part which will be supplied is the correct type. In cases where these informations are not available to us, identical work of cross-referencing will be done in the factory. The supply therefore of this component fuel injection top part is identical and will include technical improvements to the components. In other words, the improvements will in no way jeopardize functioning of the component; improvements are to improve performance of this component.*

101 We would have to check with engine records. We are Deutz and we will only keep records for Deutz engines. The engine in use the United Glory was built by Deutz and we have records of this engine.

102 The top part was supplied according to the order contained in the telex. The top part that was supplied was suitable for use on the United Glory. This top part will function properly if fitted properly by the ship`s engineers. The top part that was supplied was not defective in any way.

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103 Schorn said that when a set of helical springs was ordered in order to ascertain which size of springs to supply, it was necessary not only to know the engine model number but also the serial number of the engine.

104 The evidence reveals that when the new top part was ordered by the defendants, the plaintiffs did not ascertain the model engine number nor the serial number of the engine which was on board the United Glory. The Deutz diesel engine was installed on the United Glory in 1955, many years before the new modified top part of the pump came into existence. Both Rannard and the chief engineer said that the combination of long thick springs and short retainer nuts in the NTP was not suitable for the engine that was on the United Glory. The chief engineer said that the NTP was made for a more powerful engine than that on the United Glory.

105 In Rannard`s considered independent opinion, the long thick springs ought not to have been there, and the key of the first pump kept failing, caused by excessive cam pressure from the second pump, which was caused by the necessity to compress the longer and thicker springs a longer distance. He also noted that the cause of the coupling giving way was due to too much pressure being applied on the camshaft of the second pump; as was normal, in such cases, the pressure was transferred from the camshaft to the driving coupling of the first pump. He concluded that the failure of the coupling, which was the weakest part, was caused by fatigue brought on by excessive pressure. The overloading in the pump also caused the coupling`s key in the second pump to break and the cam to shear, in turn leading to the other damages.

106 Rannard was also of the opinion that the combination of long springs and short retainer nuts was not compatible with the pump that was supplied, or suitable for the engine that was on board the vessel and that such a combination

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would lead to the damages which the vessel sustained. He was of the view that the longer springs with greater tension were more suitable for a higher capacity engine or a different pump than that which was on board the vessel.

107 The chief engineer said that according to the test results conducted by Det Norske Veritas (SE Asia) Pte Ltd contained in their report DB132, the longer springs required about three times more power to lift the plunger to top centre. This overloaded the coupling, causing the coupling key groove to become widened, resulting in the mistiming of fuel injection and loss of power in the main engine.

108 Schorn admitted that it was possible for the person who assembled the new top part ordered by the defendants to put into the unit the wrong combination of helical springs and retainer nuts.

109 The evidence is that the vessel did not experience any engine failure before the NTP was installed at Newcastle or after the chief engineer had substituted the 102mm helical springs in the NTP for the old 72mm springs. The vessel completed its last journey from Gladstone to Port Moresby and Banjermasin and Singapore, a total of 18 days sailing, without any further problems with the 72mm new springs in the second pump supplied by the plaintiffs.

110 Rannard and the chief engineer both saw and physically examined the damage and sought its cause and they independently ascertained its cause and came up with the same answer and remedy. Schorn`s evidence was based entirely on assumptions and he arrived at his conclusions without making any enquiry.

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111 After considering all the evidence, I find that the long thicker helical springs and the shorter retaining nuts installed in the NTP were the cause of the engine breaking down. The NTP supplied by the plaintiffs was meant to be installed as delivered without the defendants having to open it up and examine the springs. Even if the defendants had opened up the NTP on delivery, the chief engineer would not have known that it was a wrong combination. The defendants relied entirely on the plaintiffs to supply an NTP which could be used with the engine which was on the United Glory. The wrong combination of 102mm helical springs and 32mm retainer nuts were a hidden and latent defect.

112 Section 14(3) of the Sale of Goods Act 1979 [UK] provides that where the seller sells goods in the course of a business and the buyer, expressly or by implication, makes known to the seller any particular purpose for which the goods are being bought, there is an implied condition that the goods supplied under the contract are reasonably fit for that purpose, except where the circumstances show that the buyer does not rely, or that it is unreasonble for him to rely, on the skill and judgment of the seller.

113 Further, by s 14(2), in the case of a seller who sells good in the course of business, there is an implied condition that the goods supplied under the contract are of merchantable quality, except that there is no such condition as regards defects specifically drawn to the buyer`s attention before the contract is made; or if the buyer examines the goods before the contract is made, as regards defects which that examination ought to reveal.

114 If there has been a breach of contract, it is immaterial whether or not the seller has been negligent; he is equally liable for latent defects in the articles which he sells, as for defects discoverable on reasonable examination.

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115 As the plaintiffs in this case are both the sellers and manufacturers of the NTP supplied to the defendants, they are liable to the defendants both in contract for breach of contract, and in tort for negligence in the manufacture of the NTP.

116 Independent of any warranty, a person who manufactures and sells an article owes a duty to take reasonable care in its design and manufacture. The duty is not to cause injury to the consumer`s person or property (34 ***Halsbury`s Laws of England*** (4th Ed) p 32 para 37).

117 The duty of care arises where the manufacturer sells the article in such a form as to show that he intends it to reach the user in the form in which it left him, without any reasonable likelihood of such intermediate examination as would have revealed the danger, and the article is put to the use for which it is intended (34 ***Halsbury`s Laws of England*** (4th Ed) p 33 para 38).

118 In the result there will be judgment for the defendants on their counterclaim and costs for damages to be assessed.

119 ***Defendants` counterclaim allowed.***

Chua F A J

Tan Wee Kian (WK Tan & Co) for the plaintiffs
S Gunaseelan (S Gunaseelan) for the defendants

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