Siemans Automotive Ltd. v. Van Dorn Demag Corp., [2003] O.J. No. 5235

Ontario Judgments

Ontario Superior Court of Justice

C. Campbell J.

Heard: September 18, 2003.

Oral judgment: September 18, 2003.

Released: December 19, 2003.

Court File No. 93-CU-072833B

[2003] O.J. No. 5235 | 127 A.C.W.S. (3d) 1028

Between Siemens Automotive Limited, plaintiff, and Van Dorn Demag Corporation, Imperial Eastman and Cole Motion Inc., defendants, and Caterpillar Industrial Products, Inc., third party, and Koehler Rubber & Supply Co., fourth party

(117 paras.)

Case Summary

Torts — Suppliers of goods — Negligence — Standard of responsibility — Contributory negligence, misuse — Manufacturers or distributors — Negligence, manufacturers — Defective goods — Liability of manufacturer for negligence of supplier of component parts — Inherently dangerous chattels — Warning, duty of — Defences — Improper use of goods by buyer.

Action by Siemans Automotive for damage caused by a fire on its premises in 1991. The defendant Van Dorn Demag was the vendor of an injection moulding machine which Siemans claimed caused the fire. The parties agreed that damages totalled $218,461 and that the fire resulted from a burst hose in the machine. The hose was supplied by the defendant Imperial Eastman and Cole Motion. The hose was manufactured by the third party Caterpillar, and assembled by the fourth party Koehler Rubber & Supply Co. Siemans claimed damages against the defendants on the grounds that they knew or should have known that the hoses were defective and would rupture. Van Dorn claimed that it was not responsible for the design or manufacture of the hoses in the machine, and that the ruptured hose was caused by negligent maintenance of the machine by Siemans. The hose had been welded and the machine repaired several times before the fire. The defendants claimed that the welded hose should not have been used. Siemans led expert evidence from an engineer indicating that the hose was designed defectively. Experts for the defendants claimed that the welded hose had not been properly attached to the machine, causing it to rupture.

HELD: Action allowed.

It was not possible, on the evidence, to find that the hose was negligently designed or manufactured. The hose had been compromised by the welding. The welded hose should not have been used. A ruptured or leaky hose was not suitable to be put back into service in the injection moulding machine. Siemans was therefore 15 per cent contributorily negligent in its use of the machine. However, the defendants Imperial Eastman and Van Dorn had failed to warn Siemans that a repaired hose should not be used. The manufacturer Imperial Eastman was therefore 15 per cent liable. Van Dorn, as manufacturer and vendor of the machine, was liable for 70 per cent, on the basis that its duty to warn was greater. Siemans was 15 per cent contributorily negligent.

Statutes, Regulations and Rules Cited:

Sale of Goods Act, R.S.O. 1990 c. S-1, s. 15.

Counsel

James E. Regan, for the plaintiff. Jeffrey C. Goldberg, for the defendant Van Dorn Demag. J. Paul Dillon, for the defendant Imperial Eastman.

C. CAMPBELL J. (orally)

1 The Plaintiff Siemens Automotive Limited ("Siemens") claims damages as a result of a fire on January 7, 1991 in an injection moulding machine. The fire resulted from a burst hose that was a part of the machine. The parties have agreed on the resultant damage in the amount of $218,461.37. What is at issue is the precise cause of the burst hose and the responsibility for that cause.

2 As of 1988, Siemens operated an automotive parts plant in Tilbury, Ontario. In order to produce needed plastic parts, it utilized a number of injection moulding machines. At the relevant time there were some 9 in number, 5 being described as 500 tons and 4 as 385 tons.

3 All the machines were of similar design and operation and were purchased by Siemens from the Defendant Van Dorn Demag Corporation ("Van Dorn.") The hoses at issue were used to convey hot lubricating oil under pressure (up to 2500 p.s.i.) to various parts of the machine involved in the injection moulding process.

4 The hoses that were supplied with the machine to Van Dorm's specifications were in turn supplied to it by the Defendant Koehler Rubber & Supply Co ("Koehler.") Imperial Eastman ("Imperial Eastman") in turn purchased the hose in question from Caterpillar Industrial Products, Inc. ("Caterpillar.") Imperial Eastman manufactured the couplings/fittings for the hose(s) which were assembled by Koehler and supplied to Van Dorn for use in the machines.

5 At the time of the loss, Siemens was operating nine plastic injection moulding machines. Each unit was positioned in a rectangular layout to the south central part of the plant. Each unit is 28 ft long by 16 ft. high and 7 ft. wide. Of the nine machines, four were Van Dorn 385 Units.

6 The injection cylinder of the Van Dorn 385 Unit is activated hydraulically by a 38 gmp (gallon per minute) pump governed by a pressure control valve set at 2500 p.s.i.(pounds per square inch) that is connected to the cylinder via a series of hydraulic pipes, couplings/fittings and hoses. The hose involves inner and outer layers of fabric and compound, reinforced with inner plies of steel cord. The end couplings/fittings were formed with steel and were flanged. One end couplings/fittings were straight; the other end had a 22.5 degree bend. The pump was governed by the pressure control valve with a 3000 p.s.i. maximum.

7 All of the injection moulding machines at the Siemens' plant were hydraulically operated and the hoses comprise the two main hydraulic lines which pump the hydraulic oil from the tank to power the unit.

8 The M732 hose at issue in this action appears to have been manufactured by Caterpillar, as it was marked with the year 1988.

9 Siemens acquired the four Van Dorn 385 Units in June of 1989. The Van Dorn 385 Unit that is the subject of this action was designed and installed at the Siemens' premises during that year. This Van Dorn 385 Unit was designated Unit 7 of 9.

10 Two years after the Unit 7 had been purchased and assembled, the Imperial Eastman hoses erupted on the Unit and a fire ensued.

Position of the Parties

(i) Theory of the Plaintiff in Summary

11 The Plaintiff contends that Van Dorn installed Imperial Eastman hoses, which it knew or ought to have known would rupture. Van Dorn, it is alleged, knew or ought to have known the limits of its units. Further, Imperial Eastman, it is alleged, designed defective hoses, which it knew or ought to have known were defective. Both Van Dorn and Imperial Eastman, it is claimed, failed to warn owners and operators of the limitations of the Van Dorn 385 Unit and its attached M732 hoses.

12 The evidence, the Plaintiff urges, clearly demonstrates that Van Dorn and Imperial Eastman knew of several quality control issues from the years of 1987 to 1991, and did nothing to rectify the problem prior to the fire at Siemens in January of 1991.

13 The Plaintiff contends that a design defect existed in the length of the Imperial Eastman hose and that the hose was under-powered for the amount of pressure put through. The Imperial Eastman hose is said to have had an inadequate working rating of 2500 p.s.i., as after the fire it was determined that a hose with a working rating of 3000 p.s.i. worked without ruptures.

(ii) Theory of the Defendant Van Dorn in Summary

14 Van Dorn takes the position that it does not have responsibility for either the manufacture or design of the hoses or the couplings. Van Dorn purchases the complete hose from Koehler but places responsibility for the design and manufacture of the couplings on the hoses manufactured by Caterpillar and Imperial Eastman.

15 More particularly Van Dorn points to what it alleges is inappropriate maintenance on the part of Siemens and improper usage of failed hoses which in accordance with industry standards Siemens knew or ought to have known should have been replaced rather than re-used after repair.

(iii) Theory of the Defendant Imperial Eastman in Summary

16 Imperial Eastman defends on the basis that it had no relationship contractual or otherwise with the Plaintiff. Imperial Eastman states that Van Dorn as manufacturer should have recommended a preventative maintenance/replacement program as otherwise the hose assembly is destined to fail in service. Additionally, Imperial Eastman asserts that neither Van Dorn nor Siemens implemented any safeguards to prevent the numerous hose assembly failures that preceded the incident on January 7, 1991. It is the position of Imperial Eastman that the subject hose assembly should have been destroyed rather than welded and returned to service.

Facts

17 During 1988, Siemens began to purchase injection moulding machines from Van Dorn. The machines came in 3

sizes, which for present purposes operate in the same fashion. In summary, plastic pellets are fed through a hopper into a chamber where they are heated and then injected by a cylinder into a mould. The plastic is then cooled, the mould opens and the product ejected. The hydraulic operation of the cylinder and the mould is provided by heated oil carried through a number of hoses under pressure. The filling and emptying of the cylinder and the opening and closing of the mould clamps operate in 33-second cycles.

18 The hose at issue in this action is described in the Imperial Eastman catalogue under part number 372, as having an inside diameter of 2", an outside diameter of 2.62", a maximum working pressure (expressed as pounds per square inch) at 2500 and a minimum burst pressure of 10,000. The hose is made of seamless, oil-resistant, synthetic rubber. It is reinforced with four spiral plies of high tensile wire.

19 The hose is coupled to the moulding machine by a three-component metal fitting. At the ends, the hose is narrowed or skived to accommodate an approximate 31/2" metal sleeve that fits over the end. That sleeve is then crimped to create a tight fit.

20 Extending out the open end of the sleeve is a cylindrical metal piece approximately 3" in length. At one end the metal section is straight and at the other bent to a 221/2 degrees curve. At the open end of the straight section is a bell-shaped flange that connects to the machine end with the addition of a rubber O ring.

21 The parties are agreed on the proximate cause of the fire. The hose ruptured at a point at or near the hose end of the covering metal sleeve. The escaping oil under pressure ignited in contact with the metal heater bands of the machine. What the parties are not agreed on is the cause or causes of the rupturing of the hose in question.

22 In order to weigh the competing causes of the rupture, it is useful to review the history of the hose at issue, as well as similar hoses purchased at or about the same time contemporaneously.

23 The hose in question was originally on Van Dorn machine #9. No precise information is available as to whether it was in continuous use between the time of its purchase and July of 1990, when it failed for the second time. At that time, the second weld was made. The hose was put in storage and replaced onto machine #7 in December of 1990. It is not known precisely, with the plant shutdown for the Christmas period, just how much use the hose had before the fire on January 7, 1991.

24 Van Dorn, as the manufacturer, is responsible for the designation of the hose in question on its 385 machine. The basis of this designation appears to have been an operating pressure of 2500 p.s.i. and the temperature of the fluid not to exceed 121. The hose assembly in question has the name of 'Imperial Eastman' on it with a code identifying the history of manufacture, including the name of the hose manufacturer (Caterpillar.) In fact, Van Dorn purchased the hose Koehler Rubber (not a party to the action.) Imperial Eastman purchased the hose itself from Caterpillar and provided the cut hose and metal fittings to Koehler for the purposes of assembly. The crimping that is alleged to be at least partially responsible for the hose failure was done by Koehler.

25 When problems with hoses developed at Siemens, Siemens personnel would call either Van Dorn to arrange for the purchase of a new hose assembly, or Cole Motion Inc. (a nearby Canadian company that was a distributor of Imperial Eastman hose assemblies) for a replacement. Indeed, an identical hose to the one in question was on machine #8 and failed in March of 1990, and was returned to Van Dorn and replaced because it was within the warranty period.

26 A variety of causes of hose rupture were put forward by different experts for the parties.

27 All parties agreed that each of those individuals put forward as an expert possessed sufficient qualification to give expert evidence in this action. The experts each had different background expertise, and brought a different perspective to bear on the issue of causation. The weight of each opinion will impact on the determination of cause.

Evidence for the Plaintiff, Siemens

Robert Holohan

28 Mr. Holohan has practiced as a forensic engineer since 1970, having graduated from the University of Waterloo in 1965. He is a member of the Society of Automotive Engineers, the standard-setting body for various kinds of mechanical machinery and parts, including hydraulic hoses.

29 Holohan's conclusion about the cause of the fire, which he investigated on January 9, 1991, has been generally accepted by all parties, namely the escape of hydraulic fluid igniting on a contact with the heater bands on the machine.

30 Based on his observations, inspections and certain test results performed by others, it was his opinion that the hose was not adequate for the purpose since it ruptured. Pressure spikes in the course of normal operation of the machine could have been a contributing factor. Mr. Holohan concluded from the lack of damage to the painted surface on the metal couplings, that the weld was not a factor.

Brian Hazelhurst

31 Mr. Hazelhurst has been employed by Siemens since 1987. Prior to that, he took a two-year course at St. Clair College in Electronics. He later became a licensed electrician. During the relevant time, he was first a maintenance hand and then the maintenance lead hand.

32 Mr. Hazelhurst's job involved maintenance on the injection moulding machines acquired by Siemens from Van Dorn and included the ordering of parts to enable the machines to run more or less continually.

33 In his evidence, the operation of the machines was explained, including the role of the operator, who was not directly involved in maintenance issues. Operators were, however, expected to report problems to their supervisors.

34 Hazelhurst outlined the Siemens priority for maintenance issues. These are seven in number, the first in priority being a danger that needed to be fixed immediately, down to the seventh being a project to be worked on sometime in the future. If a hose leaked, an operator would contact a maintenance technician, who would determine the priority for repair.

35 Hazelhurst explained that he had two training sessions at Van Dorn's plant, each lasting about five days. At the first, he went with several others from Siemens shortly after machines were purchased. He went to the second by himself.

36 Among other things, he learned how the Van Dorn machines operated, including the hydraulics. It was his practice for serious problems to contact Van Dorn on the manufacturer's hot line.

37 When a new machine arrived from Van Dorn, it was his recollection and that of Tom Murray (the operations manager at Siemens at the appropriate time), that a Van Dorn representative was present to help with the start-up.

38 Mr. Hazelhurst recited the problems with hoses on a number of the injection moulding machines, not just the 385 ton machine between 1987 when Siemens commenced installation of the machines to January 1991 when the fire started.

39 With the passage of over a decade since the fire in question, it is recognized that the memories of those involved may be less than complete. Allowance for this must be made in the areas where witnesses could not recall specific conversations that did not seem important at the time.

40 Hazelhurst did recall hose leaks from time to time in between 1987 and 1991, and could only talk generally about them, apart from the one in question, because they did not result in fire or other significant damage.

41 In general, when hoses leaked, they were taken out of service and if within the warranty period, they were sent back to Van Dorn for replacement. On other occasions, where hoses needed fixing beyond the warranty period, Siemens dealt with Cole Motion, which was known as a Canadian supplier/distributor, for Imperial Eastman.

42 Between March and December of 1990, Hazelhurst estimated around 10 hoses failed. Most of the failures were either at the metal coupling end or ruptured at the end of the sleeve like the hose at issue in this case. In instances where there was a crack and a leak in the coupling, the crack might be welded if a replacement were not readily present.

43 Ultimately the solution for the failed hoses on the Van Dorn machines, recommended by Cole Motion and accepted by Siemens, was to utilize hoses with greater working pressure, namely, 3000 p.s.i. on the 385 ton machines and 5000 p.s.i. on the larger tonnage machines.

44 Hazelhurst testified that there has not been a hose problem since the replacement to the larger working pressures. On the machine in question, a 3000 p.s.i. hose was installed, along with a block that eliminated the need for a 221/2 degrees flange end.

The Hose In Question

45 From the information available at the time of trial (Exhibit 14), it would appear that the hose in question was originally on Van Dorn 385 Unit #4. The documentary records from each of the parties to the action are less than complete, due at least in part to the passage of time. The #4 machine was purchased in 1998, and whether the hose in question was used continually is not known.

46 What is known about the hose in question is that it was welded at least once before it was taken out of service, and welded again on the other end on July 9, 1990. It was then put in storage and used on machine #7 after the rupture of the hose on that machine on December 19, 1990.

47 These records that were produced show at least for the Van Dorn machine #7 during 1990, repair of oil leaks and repair & replacement of hydraulic lines on several occasions.

To Repair or Not To Repair

48 A central issue to the legal responsibility in this case is the question of whether it was appropriate for Siemens to put welded fitting hoses back in service.

49 In cross-examination, Hazelhurst was referred to the Van Dorn manual and the iImperial Eastman catalogue, with both of which he was familiar.

50 Under the section entitled "Hose Assembly Inspection" in the Imperial Eastman catalogue, on p. 7 (Exhibit 11), it states as follows:

> IMPORTANT: Hose Assembly Inspection - We recommend that hose assemblies be inspected after each shift or on a daily basis, depending on use. Check for leakage, bulges, coupling slippage, cut or abraded covers, kinking or other signs or wear or damage. Worn or damaged hoses should be removed from service at once and be replaced.

51 Section 4.2 and 4.3 of the SAE Recommended Practice, which appears on p. 19 of the same publication, states follow:

> 4.2 Visual Inspection - Any of the following conditions requires replacement of the hose:

(a) Leaks at fitting or in hose. (Leaking fluid is a fire hazard.)

(b) Damaged, cut or abraded cover (Any reinforcement exposed.)

(c) Kinked, crushed, flattened or twisted hose

(d) Hard, stiff, heat-cracked, or charred hose.

(e) Blastered, soft, degraded or loose civer,

(f) Cracked, damaged or badly corroded fittings.

(g) Fitting slippage on hose.

52 Hazelhurst stated that while he was familiar with the Van Dorn maintenance manual, Siemens no longer has the Imperial Eastman catalogue, but likely had it in 1991.

53 When confronted with the above admonition regarded removal and replacement of a leaking hose, Hazelhurst responded that he was never given any advice to suggest that a repair was not appropriate to weld a cracked fitting, as in his view, a welded fitting would produce a hose equally as good as before. A welded fitting was to be contrasted with a burst hose, which he recognized must be replaced.

54 Hazelhurst was emphatic that neither he nor anyone at Siemens had been told that repair of cracked fittings with a weld was not appropriate or was a crack any evidence that a hose was likely to rupture. Much of the contact by Hazelhurst as lead hand and Siemens in general relating to hose problems was with Cole Motion. (No longer a party and no witness of which was called at trial.)

55 Hazelhurst relied on Cole Motion to provide replacement fittings when required and only ordered replacement hoses from Van Dorn, when either a hose was clearly under warranty and a replacement was free, or where parts were not available from Cole Motion.

56 An example of contact with Van Dorn was given by the witness in respect of a 500 ton machine. In March of 1990, Hazelhurst ordered a 2 inch hose, part # 88902 directly from Van Dorn at a cost of US$500. The form accompanying the order advised Van Dorn as follows:

> "Hydraulic hose blew apart. We had to cut the end of the fittings off and have them welded to a new hose, as no one in our area had proper fittings. I was talking to Jay in Parts about this in February."

57 Hazelhurst had no other recollection about the conversation referred to above, but other than he remembered talking to "Jay," an employee of Van Dorn. It was suggested to Hazelhurst that Jay had no memory of the conversation. Jay was not called to confirm that that proposition by Van Dorn.

58 Based on the evidence of Hazelhurst, I reached the following conclusions:

1. While Siemens had available to it the Imperial Eastman catalogue, the warnings of the factors affecting hose life, mainly that to replace a worn or damaged hose, it did not have a preventative maintenance program to replace based on either time in service of number of cycles used.
2. Siemens did not appreciate any risk associated with welding cracked fittings and in particular the risk of hose rupture.
3. Hazelhurst did not appreciate the risk that might be associated with a burst hose, namely, fluid escaping and igniting.
4. Siemens' maintenance was based on the passage of time, not on the number of cycles the machine had worked.

5. Siemens relied on others, including Cole Motion and Van Dorn, to provide information and to assist with hose problems.
6. Siemens was not told by any of Cole Motion , Van Dorn or Imperial Eastman, that a cracked fitting should result in the replacement of the entire hose assembly and under no circumstances (even on a short-term basis) should a re-welded fitting be put back in service.

These conclusions are borne out by the evidence of other Siemens witnesses, namely Gene Reaume and Gail Salisbury, who were the machine operators at the time of the fire, and by Tom Murray, the plant operations manager at the relevant time.

Roger Salter

59 Salter is an independent welder who was called in by Cole Motion to weld a cracked fitting on the hose in question. It was a "fillet" weld that does not penetrate through the steel. He was of the view from his experience that heat from the weld would not transfer down to the hose. I found Salter to be an experienced welder and with experience on doing welds on fittings for hoses under similar circumstances for other customers. He saw nothing wrong with so doing.

Brian James

60 Mr. James is a certified fire and explosion investigator. He testified regarding the heat transfer associated with welding. Mr. James was of the opinion that the weld did not affect the temperature of the hose and he did not criticize the maintenance undertaken by Siemens.

61 In cross-examination, Mr. James was of the view that since the Imperial Eastman recommendation, which is contained at SAE Standard J 1273, says "replace," that does not mean that a weld cannot be made. James was of the view that a weld would not affect the ability of the hose assembly to work at least on a temporary basis. He did agree, however, that a new hose should be ordered when this occurred.

62 The other party of Mr. James' evidence was based on his qualification as a forensic engineer, in particular with respect to fire investigation. The subject of his investigation was whether heat applied to metal at the flanges as a result of the welding process (following the earlier ruptures) would transfer and adversely affect the rubber hose.

63 Using thermal couples and based on laboratory measurements, it was Mr. James' opinion that while some heat from the weld is conducted through the metal to the location of the hose, the quantity would not adversely affect the integrity of the hose and make it more likely to rupture.

64 Mr. James' test methodology and results were criticized by, among others, Dr. Richard Murray, a distinguished retired professor called by Van Dorn. In the absence of any scientific evidence that would point to a different result, I accept the conclusion of Mr. James that the heat associated with the welds did not in itself directly contribute to the hose rupture. This conclusion is supported by John Clayton, the metallurgist who testified for Imperial Eastman.

65 I do not accept the opinion of Mr. James that supported the practice of reusing welded hoses. It is to be noted that Mr. James is not a member of the Society of Automotive Engineers, a standards body more appropriately to be relied in dealing with this issue. His practical experience on this issue was limited and dated.

66 Mr. James supported the causal conclusion of Professor Murray, namely, that the failure to properly crimp and attach the hose to the fitting led to its rupture.

Evidence of Van Dorn

67 The evidence of Van Dorn was presented through two company employees and an expert.

Brian Ralph

68 Much of the evidence of Brian Ralph, a design engineer with Van Dorn, dealt with the history of hose failures not just on the 385 machine, but on other machines of similar design.

69 In view of the conclusions I reach based on later evidence, it is not necessary to deal in depth with all of his evidence. The following conclusions are largely uncontested:

1. From 1987 onward, there were a variety of hose problems on Van Dorn machines, not just those purchased by Siemens, and in particular those involving the R-12 2500 p.s.i. hose that is at issue in this action.
2. By September 14, 1989, the R-12-32 hose used on the Van Dorn 400 ton machine was changed to an R-11-32, which had a 3000 p.s.i. rating and was described to be "used in most severe high pressure applications." (See Exhibits 11 and 18.)
3. The 700 ton and 1000 ton machines were changed in early 1990 to a 100 R-11 hose, as was the wall coupling increased in strength.
4. Revision from the 100 R-12-32 to the R-11-32 on the machine in the question, namely the 385 ton machine, was made on January 10, 1991, just four days after the fire at issue. (See Exhibit 23.)
5. In November of 1990, the 100 R-11 hose because the standard part of Van Dorn where 3000 p.s.i. working pressure was required. (See Exhibit 24.)
6. Following the incident at issue and other failures, Van Dorn's policy and procedural manual provided flexibility in line pressure of hoses, depending on application conditions.
7. Prior to the fire at issue, Van Dorn did not advise Siemens that it had changed the hose designation for other machines, nor the reason why. The only explanation given for the absence of specific mention of the 385 ton until January of 1991, was that Van Dorn was no longer making that machine.

Loren Mills

70 At the relevant time, Mr. Mills was and still is the Product Safety Manager of Van Dorn. In March of 1989, having become aware of some hose failures, he got concerned about the human and product safety issues and started an investigation.

71 Mr. Mills quickly learned that Van Dorn was having problems with a number of hoses in a number of installations and set about trying to ascertain the cause. There had only been one other previous fire prior to the one in question, and that in Indiana.

72 Mr. Mills took part in various meetings, including the August 1990 meeting between Koehler, Van Dorn, Imperial Eastman and Caterpillar, trying to find the cause or causes of hose failure.

73 An issue arose during the evidence of Mr. Ralph and continued during the cross-examination of Mr. Mills regarding documents produced by Van Dorn during the course of the action and at trial. Over the weekend, prior to giving his evidence, Mr. Mills received a number of documents not previously produced from fellow employees at Van Dorn. These were produced to the other side and the trial was adjourned for a day to enable counsel to deal with the new information.

74 It was suggested during submissions that an inference should be drawn since the documents dealt directly with hose failures and revisions to hose design made as a result. I am satisfied, having heard the evidence and submissions of counsel, that the lack of fulsome and timely disclosure, while regrettable, was not purposeful.

75 There is more than a ring of veracity to the problem associated with a search for documents that comes years after the event, when records have been transferred from paper to fiche and from fiche to computer.

76 It appears that the effort of Mr. Mills, who was the company representative in charge of preparing the company's defence at the time that the Affidavit of Documents was prepared, was not as careful or complete as it could or should have been. What is clear from his evidence is that during a period of at least 18 months before the fire in question, Mills and others at Van Dorn and various people at Imperial Eastman, were attempting to find out and eliminate the cause of hose failures. This involved various kinds of tests and discussions, but at no time was the nature of the concern or what was being done about it, passed on to Siemens.

77 Revision to hoses for the other machines as a result of failures, was not communicated to Siemens, nor were the specifications changes discussed at a meeting in August communicated either.

The Evidence of Imperial Eastman

Michael Chermak

78 Mr. Chermak retired after being a long-term employee at Imperial Eastman and I have no doubt a competent engineer familiar with the design and maintenance of hoses.

79 Mr. Chermak investigated the fire in question on behalf of Imperial Eastman. He explained the process involved in the manufacture of the hose in this case, and explained that Imperial Eastman bought hoses in bulk from Caterpillar and then had those hoses cut to the appropriate lengths. The hoses, together with the couplings that were manufactured by Imperial Eastman, were then sold by it to Koehler. Koehler then arranged for the crimping of the couplings to the hoses, using a large 1000 ton machine according to directions provided by Imperial Eastman.

80 According to Chermak, Koehler then sold the assembled hose to Van Dorn, which in the ordinary course would then run the hose for a day or two to test it before selling it to a customer such as Siemens.

81 Mr. Chermak attended the Siemens plant immediately after the fire and participated in the investigation of its cause. Chermak had been involved from as early as 1987 in attempting to assess the cause of hose problems on Van Dorn machines of various tonnages. While Imperial Eastman was involved in the hose procurement, it was not directly involved with Van Dorn customers. On the evidence it would appear that there was little, if any, direct contact either before the incident or after, between Imperial Eastman and Siemens.

82 Mr. Chermak was of the view, which I accept, that a leak or burst at any part of the hose, whether at the coupling or the hose itself, represents a hose failure. Any such hose should not be returned to service, in his opinion, under any circumstances. Welding, even as a stop-gap measure, according to Mr. Chermak, was "unacceptable, and should never be done... it should be thrown out."

83 Chermak was responsible in a supervisory way for a variety of tests run on hoses from various machines under different circumstances, including those of pressure and temperature in an attempt to ascertain the cause of hose failures.

84 In August of 1988 (T-44), Chermak wrote Van Dorn with seven different suggestions, including switching to a 5000 p.s.i. (N6) hose on the 500 model machines as a result of hose failures. Another alternative was to continue using the R-12 hose with heavier wall tubing and a coupling.

85 These suggestions followed a meeting at Van Dorn, which was called the "Leak Administration Workship" to which Imperial Eastman, Koehler, Van Dorn and other suppliers were invited. There were no customers such as Siemens present.

86 I am satisfied that Imperial Eastman, through Chermak, was concerned to determine the cause of hose failures on the various Van Dorn machines and assisted in a responsible fashion to ascertain the specific cause(s) of failure and to fix these.

87 At the very latest, some months before the failure in question, and the fire in January of 1991, Imperial Eastman was aware of problems with the R-12 M732 hose in question and indeed stopped buying hose from Caterpillar in August of 1990. Imperial Eastman was concerned with the pressure to which the hoses were subjected, recognizing that 2500 p.s.i. of working pressure could rise in practice to spikes of pressure considerably above that level. Lower oil temperatures proved that hoses could last longer in some of the tests conducted.

88 Mr. Chermak assumed without specific knowledge, that Van Dorn was keeping its customers, such as Siemens, advised with respect to the investigation of leak issues. He confirmed that had he been aware that Siemens was welding leaking couplings, he would have told them not to do it.

John Clayton

89 Mr. Clayton was qualified as an expert in failure analysis of materials. His formal training in engineering is as a metallurgist, and in addition he has experience in welding. Mr. Clayton was first retained by Cole Motion when it was a party to the action.

90 Mr. Clayton disagreed with the opinion of Dr. Murray for Van Dorn that the skive on the hose in question was too long, and the hose not inserted all the way into the coupling. Mr. Clayton was of the opinion that the skived area on the hose at issue was pulled back, due to the violence of the explosion when it ruptured.

91 Mr. Clayton was of the opinion that welding did not cause this failure, as he was of the view that the heat from the welding could not get down far enough to do damage to the hose. However, he agreed with Mr. Chermak and others that the weld should not have been made. He was critical of Siemens' maintenance and more so of Van Dorn's failure to investigate promptly and correct the problem when failures started to occur.

92 Mr. Clayton agreed that the hose in question should not have been put back on the machines prior to the fire. In his view, hose vibration associated with the pressure spikes while in operation, may have contributed to the fatigue-type failure that his analysis concluded was the proximate cause of the rupture.

Analysis

93 I agree with a number of the witnesses that the precise cause of the hose failure in question may never be known. Of the causes, spiked pressure over time associated with a high operating oil temperature seems most likely contributors. This would point to an inadequately reinforced hose in the first place. Inadequate crimping is another possibility.

94 I accept that the proximate cause of the rupture was an inadequate hose, which was at further risk, having been welded following a previous failure.

95 I accept the evidence of the defence witnesses that a failed hose, for whatever reason, should not be returned to service.

96 The case the Plaintiff put forward is on the grounds of both contract and negligence. The Plaintiff relies on the Sale of Goods Act, *R.S.O. 1990 c. S.1* and in particular s. 15 which deals with an implied condition that goods will be reasonably fit for the purpose to which the goods were required, where the buyer relies on the seller's skill and judgment.

97 In addition, the Plaintiff alleges negligence in the design and construction of the hoses. Thirdly, the Plaintiff

submits that there was a failure on the part of the Defendants to adequately warn the Plaintiff about the risk associated with the hoses, given their knowledge of previous failures.

98 For their part, the Defendants submit that the entire responsibility for the fire damage is due to improper maintenance by the Plaintiff and in particular its re-use of a welded hose, which should not have been put back into service under any circumstance.

99 I am not satisfied that the hose in question was not reasonably fit for the intended purpose. I have reached this conclusion since on the evidence before me it is not possible to precisely pinpoint the cause of the rupture to the hose.

100 Any of improper crimping, under-sizing (in the sense of p.s.i. rating) and lack of proper maintenance may have caused or contributed to the failure. Since any of these may be significant causes, it would not be appropriate to conclude that the hose was on a balance of probabilities improperly designed or manufactured or not fit for the purpose.

101 Most important, it would appear, is the failure to warn. It is somewhat disturbing to learn that a sophisticated parts manufacturer such as Siemens and its apparent competent employees did not know of the risks and dangers associated with the use of hoses that had failed in service. It would appear from the evidence of Mr. Hazelhurst that while he knew hoses could fail in use, in his view and that of others, at Siemens, it was perfectly acceptable to put a re-welded hose back into use. From the evidence of not only the witnesses of Imperial Eastman and Van Dorn, I conclude that they did not think that practice acceptable but regarded it as dangerous.

102 The leading case on the duty to warn is Bow Valley Husky (Bermuda) Ltd. v. Saint John Shipbuilding Ltd. *(1997), 153 D.L.R. (4th) 385* (S.C.C.). A summary of the legal principle is set out by McLachlin J. (as she then was) at paragraph 19:

> The law may be simply stated. Manufacturers and suppliers are required to warn all those who may reasonably be affected by potentially dangerous products: Lambert v. Lastoplex Chemicals Co., *[1972] S.C.R. 569*, and Hollis v. Dow Corning Corp., *[1995] 4 S.C.R. 634*. This duty extends even to those persons who are not party to the contract of sale: Rivtow Marine Ltd. v. Washington Iron Works, *[1974] S.C.R. 1189*. The potential user must be reasonably foreseeable to the manufacturer or supplier -- manufacturers and suppliers (including a builder-supplier like SJSL) do not have the duty to warn the entire world about every danger that can result from improper use of their product.

Elaboration of that duty is set out at paragraph 22:

> I agree with the Court of Appeal that knowledge that there may be a risk in some circumstances does not negate a duty to warn. Liability for failure to warn is based not merely on a knowledge imbalance. If that were so every person with knowledge would be under a duty to warn. It is based primarily on the manufacture or supply of products intended for the use of others and the reliance that consumers reasonably place on the manufacturer and supplier. Unless the consumer's knowledge negates reasonable reliance, the manufacturer or supplier remains liable. This occurs where the consumer has so much knowledge that a reasonable person would conclude that the consumer fully appreciated and willingly assumed the risk posed by use of the product, making the maxim volenti non fit injuria applicable: Lambert, supra.

103 I have concluded that each of the Defendants is in breach of a duty to warn. The position of Imperial Eastman is akin to that of the manufacturer of the hose (although the assembly and actual sale to Van Dorn was from Koehler), Imperial Eastman and in particular Mr. Chermak were responsible for the information regarding hose use set out in the Imperial Eastman catalogue.

104 As noted above, that warning about replacement of defective hoses made no mention of placing a repaired

hose back into service. By way of contrast, the SJ1273 Recommended Practice, which was in force as of 1996 (Ex. 34), in s 6.6 makes specific reference to "not reusing" under certain conditions. This was not in the standard at the relevant time.

105 I conclude on the evidence before me that had it been clearly brought home to Siemens that it was not to re-use a hose that caused problems under any circumstance, the hose in question would not have been re-used. I find the failure to clearly warn on the part of Imperial Eastman as the "hose manufacturer" to contribute to the damage to the extent of 15%.

106 Van Dorn was the vendor to Siemens. I conclude in the absence of evidence to the contrary that its employee "Jay" was aware that Siemens welded cracked fittings and led Siemens to believe it would be appropriate to put repaired hoses back into service. More importantly I conclude on the evidence that over time and certainly well before the replacement of the hose in question on machine #7, Van Dorn knew there were problems with hoses on its machines and did not communicate any concern to Siemens. I accept that it did not know the precise cause of failure, but it did know enough about the potential causes that customers like Siemens should have been notified about the risks associated with "over using" a hose. By that is meant not checking to determine spiked temperatures or monitoring the cycles a hose was in use, as well as ascertaining that the maintenance practices of Siemens were including whether hoses were being re-used.

107 In my view, Van Dorn should have kept Siemens advised of the potential problems associated with long-term usage and of the investigation undertaken as to the cause of various hose failures.

108 I am satisfied that had Siemens been apprised and in particular warned of the danger associated with placing a repaired hose back in service, that the hose in question would not have been in service when it ruptured on January 7, 1991.

109 Van Dorn as the manufacturer of the entire machine and vendor to Siemens had the greater responsibility to warn of the risks and of the need for careful maintenance. On this basis I assess the responsibility of Van Dorn for the damages agreed to at 70%.

110 Both Imperial Eastman and Van Dorn were critical of Siemens' maintenance. While I am satisfied that Siemens was not told explicitly not to put a repaired hose back in service, the company should have known that it may not have been adequately maintaining its hoses and sought no guidance from Van Dorn.

111 Siemens knew hoses could fail in use. It does not appear that it had any maintenance plan that would allow for regular replacement given the usage of hoses. Common sense would dictate that there was a further risk of failure in respect of a repaired hose, particularly one that had been previously repaired.

112 There was no inquiry made by Siemens of anyone as to whether its maintenance or monitoring were appropriate or safe, when repeated hose failures occurred. I am satisfied that if Siemens had initiated a frank discussion with either Imperial Eastman or Van Dorn when failures continued and in particular about re-using repaired hoses, they would have been advised not to.

113 I assess the contribution of the negligence of Siemens to the total damage at 15%.

Conclusion

114 Each of Imperial Eastman and Van Dorn failed in their respective duties to warn Siemens about use of the hydraulic hoses on Van Dorn machines. Each is responsible to the Plaintiff under the Negligence Act, R.S.O. 1990 in the respective percentages of 70% to Van Dorn and 15% for Imperial Eastman.

115 Siemens is contributorily negligent in respect of 15% of the damages agreed to in the sum of $218,461.37.

116 Siemens shall have judgment accordingly.

117 The parties may make written submissions in respect of costs. Those of the Plaintiff should be received by January 9, 2004 and those of the Defendants ten days after.

C. CAMPBELL J.
