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**STATE OF MINNESOTA
IN COURT OF APPEALS
A17-0538**

Mark Kedrowski,
Appellant,

vs.

Lycoming Engines, a division of AVCO Corporation,
Respondent.

**Filed May 15, 2018
Affirmed
Hooten, Judge
Dissenting, Randall, Judge***

Ramsey County District Court
File No. 62-CV-12-9581

Eric J. Magnuson, Robins Kaplan LLP, Minneapolis, Minnesota; and

Thomas W. Fuller, Cortney S. LeNeave, Hunegs, LeNeave & Kvas, P.A., Wayzata,
Minnesota; and

Sharon L. Van Dyck, Fafinski Mark & Johnson, P.A., Eden Prairie, Minnesota; and

Stephen P. Watters, Watters Law Office, Minnetonka, Minnesota (for appellant)

Steven J. Wells, Timothy J. Droske, Andrew B. Brantingham, Dorsey & Whitney LLP,
Minneapolis, Minnesota; and

Daniel A. Haws, John Paul J. Gatto, HKM, P.A., St. Paul, Minnesota (for respondent)

* Retired judge of the Minnesota Court of Appeals, serving by appointment pursuant to
Minn. Const. art. VI, § 10.

Considered and decided by Hooten, Presiding Judge; Johnson, Judge; and Randall, Judge.

UNPUBLISHED OPINION

HOOTEN, Judge

Appellant pilot challenges the district court's grant of judgment as a matter of law (JMOL) in favor of respondent manufacturing company after a jury found that manufacturing defects in respondent's fuel pump caused his single-engine airplane to crash. Appellant argues that the district court abused its discretion when it excluded his expert's causation opinion because it lacked foundational reliability. He also argues that even without his expert's causation opinion, he presented sufficient evidence for the case to go to the jury. We affirm.

FACTS

Appellant Mark Kedrowski was the pilot and only occupant of a single-engine airplane when it crashed into a soybean field near the Lake Elmo Airport on September 3, 2010. Kedrowski took off from the airport, attempted to climb, then made a right-hand turn and crashed into the field shortly after takeoff. Immediately after the crash, Kedrowski told emergency responders that he "lost power and was trying to get back to the airport." Kedrowski was severely injured and now has no memory of the crash or the preceding flight.

In December 2012, Kedrowski sued respondent Lycoming Engines (Lycoming), alleging that the airplane's engine, which was a model originally designed, manufactured, and sold by Lycoming, lost power and caused the crash. Kedrowski retained Donald

Sommer, an engineer and undisputed expert in aircraft accident reconstruction, to investigate the crash. Sommer explained that the airplane, a Glasair RG Super IIS, was “amateur built, which means it wasn’t built by a big airplane company,” and that the airplane was certified by the FAA as “special-use experimental.” According to Sommer, Lycoming originally built the engine in 1973 to be installed in a helicopter, and it was later modified by another entity to be used in this airplane.

Sommer authored two expert reports and concluded that the airplane’s crash was caused by design and manufacturing defects in the engine’s diaphragm-style fuel pump (the accident fuel pump), a Lycoming LW-15473 that was manufactured in 2008. Despite acknowledging that he had never before overhauled or tested a diaphragm-style fuel pump, Sommer opined that the accident fuel pump had design and manufacturing defects that caused it to leak, decreased the fuel flow to the airplane’s engine, and caused the airplane to crash.

In a pretrial motion in limine, Lycoming moved to exclude evidence and Sommer’s testimony regarding causation and his testing of the accident fuel pump for lack of foundational reliability. The district court denied Lycoming’s request to exclude evidence of Sommer’s testing “subject to [Lycoming’s] right to interpose foundation and other appropriate objections at trial.” The district court similarly did not grant the request to exclude Sommer’s testimony but limited its scope and noted that a final ruling on the admissibility of his testing would be made at trial.

The case proceeded to a nearly month-long jury trial in January 2016. Sommer testified during the trial that he believed that design and manufacturing defects in the

accident fuel pump caused the crash. Specifically, he testified that internal leaks in the accident fuel pump's valves resulted in an insufficient fuel flow to the airplane's engine and therefore the engine could not produce sufficient power for the airplane to remain in flight. Sommer described in detail the tests he conducted on various components of the airplane's engine. One of the tests he performed was a flow-bench test on the accident fuel pump. The purpose of the flow-bench test was to measure the accident fuel pump's fuel-flow-output capability in order to determine whether it was sufficient to power the airplane's engine. Sommer opined that the flow-bench test revealed that the accident fuel pump was defective and incapable of supplying steady and adequate fuel flow to the airplane's engine. At several points during Sommer's testimony, Lycoming objected to his causation opinion and the flow-bench testing, claiming a lack of foundation. The district court overruled these objections.

At the conclusion of Kedrowski's case-in-chief, Lycoming moved for JMOL. *See* Minn. R. Civ. P. 50.01. Lycoming argued that Kedrowski failed to prove causation because Sommer's causation opinion and the flow-bench test lacked foundational reliability. The district court denied Lycoming's motion, calling the question on causation "very close." The district court reasoned that whether Sommer properly conducted the flow-bench test was a question for the jury to decide, not for the court to resolve as a matter of law. As a result, the trial continued and Lycoming's experts testified about the tests that they conducted on the accident fuel pump and their analysis of Sommer's flow-bench test data, which they testified showed no evidence of insufficient fuel flow. In response to Kedrowski's design-defect claim, Lycoming's experts also testified that a certain amount

of internal leakage was known and accounted for in Lycoming's specifications and that there were no design defects. Lycoming also presented evidence, and argued, that the crash was due to pilot error.

In a special verdict form, the jury found no design defects or pilot error, but found that the accident fuel pump had unreasonably dangerous manufacturing defects and that these manufacturing defects caused the crash and thereby Kedrowski's injuries. The jury awarded Kedrowski \$27.7 million in damages.

After the verdict, Lycoming renewed its arguments that there was insufficient foundational evidence for Sommer's causation opinion and that it was entitled to JMOL.¹ See Minn. R. Civ. P. 50.02. The district court granted Lycoming's post-verdict JMOL motion, determining that Sommer's causation opinion and the analysis of the results of the flow-bench test lacked foundational reliability, and that there was no other evidence sufficient to support Kedrowski's argument that the accident fuel pump caused the airplane

¹ Lycoming also brought a motion for a new trial on the basis that the jury's verdict was improperly influenced by attorney misconduct and repeated violations by Kedrowski's attorneys and Sommer of the district court's order prohibiting evidence of alleged prior failures of this model of fuel pump. The district court denied Lycoming's motion for a new trial on damages, but conditionally granted the motion for a new trial on liability, concluding that the misconduct and "the cumulative impact of [these] repeated violations of pre-trial orders prohibiting evidence and arguments about prior failures . . . were so prejudicial and inflammatory that Lycoming's right to a fair trial was substantially prejudiced." The dissent is correct that, for the purpose of defending the district court's grant of JMOL, Lycoming is not contesting that the accident fuel pump had manufacturing defects. But Lycoming is challenging the jury's finding as being the result of misconduct by Kedrowski's attorneys and disallowed references to prior fuel pump failures, and the district court granted Lycoming a new trial on those grounds.

to crash. Because Kedrowski was unable to establish the necessary causation element, the district court concluded that Lycoming was entitled to JMOL.

Kedrowski appeals.

DECISION

Kedrowski argues that the district court erred in granting JMOL in favor of Lycoming and requests that we reverse and remand for reinstatement of the jury verdict and entry of judgment. Lycoming asks us to affirm the district court or, alternatively in a conditional cross-appeal, requests a new trial on liability and damages in the event of a remand.

I.

Minn. R. Civ. P. 50.01(a) allows for entry of JMOL after “a party has been fully heard on an issue and there is no legally sufficient evidentiary basis for a reasonable jury to find for that party on that issue.” After a jury returns its verdict, a party may renew its preverdict motion for JMOL under Minn. R. Civ. P. 50.02. A post-verdict grant of JMOL is proper when an expert’s causation opinion “should not have been received because [it was] based on assumptions which were not established by the evidence.” *Rochester Wood Specialties, Inc. v. Rions*, 286 Minn. 503, 509, 176 N.W.2d 548, 552 (1970). Under Minn. R. Evid. 702, “expert testimony is admissible if: (1) the witness is qualified as an expert; (2) the expert’s opinion has foundational reliability; (3) the expert testimony is helpful to the jury; and (4) if the testimony involves a novel scientific theory, it must satisfy the *Frye-Mack* standard.” *State v. Obeta*, 796 N.W.2d 282, 289 (Minn. 2011) (citing Minn. R. Evid. 702).

The key issue in this case is whether there was foundational reliability to support Sommer's causation opinion that manufacturing defects in the accident fuel pump led to insufficient fuel flow to the airplane's engine, causing it to lose power and the airplane to crash. In considering the foundational reliability of an expert's testimony, rule 702 requires district courts to: (1) analyze the testimony in light of its proposed purpose; (2) take into account "the underlying reliability, consistency, and accuracy" of the testimony's subject matter; and (3) determine whether the proffered testimony is reliable. *Doe v. Archdiocese of St. Paul*, 817 N.W.2d 150, 167–68 (Minn. 2012). "The burden of laying the proper foundation for the admission of the expert testimony is on the party offering the expert, and admissibility must be shown by a preponderance of the evidence." *Allison v. McGhan Med. Corp.*, 184 F.3d 1300, 1306 (11th Cir. 1999); *see also In re Source Code Evidentiary Hearings in Implied Consent Matters*, 816 N.W.2d 525, 538–39 (Minn. 2012).

Minnesota appellate courts "review a district court's evidentiary rulings, including rulings on foundational reliability, for an abuse of discretion." *Doe*, 817 N.W.2d at 164. Even if we would have reached a different decision regarding the sufficiency of foundation, we will not reverse the district court's decision absent a clear abuse of discretion. *Gross v. Victoria Station Farms, Inc.*, 578 N.W.2d 757, 761 (Minn. 1998); *see also Kumho Tire Co. v. Carmichael*, 526 U.S. 137, 142, 119 S. Ct. 1167, 1171 (1999) ("[T]he law grants a district court the same broad latitude when it decides *how* to determine reliability as it enjoys in respect to its ultimate reliability determination.").

After the crash, Sommer and his reconstruction team analyzed every part and component of the engine and, utilizing a differential-diagnosis approach, eventually

narrowed their focus to the accident fuel pump. Sommer explained that the accident fuel pump is operated by a push rod that goes up and down so that when the rod goes down, a diaphragm forms a cup, and when the lever goes back up, the diaphragm goes flat so that it changes the volume of the pumping chamber. A cover assembly holds together two check valves: an inlet check valve and an outlet check valve. These valves allow fluid to flow through them in only one direction. The fuel is sucked into the inlet check valve, pumped through the pumping chamber into the outlet check valve and into a filter, and then goes through a fuel injector servo. The fuel injector servo measures air flow, fuel pressure, and controls the flow of fuel into the engine.

The record reflects that the engineering principles pertaining to the operation of a diaphragm-style fuel pump were uncontroverted. There is an inverse relationship between outlet pressure and fuel flow. Stated otherwise, when there is less outlet pressure, there is more fuel flow, and when there is more outlet pressure, there is less fuel flow. Illustrative of this relationship between fuel flow and outlet pressure are the performance specifications set forth in Lycoming's assembly drawings of its diaphragm-style fuel pump, as well as the assembly drawings for a similar fuel pump made by Aero Accessories (Aero). According to Lycoming's specifications, at an outlet pressure of 2 pounds per square inch (psi) at 600 revolutions per minute (rpm), the fuel pump should produce 240 pounds of fuel flow per hour, and at an outlet pressure of 2 psi at 1800 rpm, it should produce 270 pounds of fuel flow per hour. Toward the other extreme, as outlet pressure increases, the fuel flow should decrease until it hits the shutoff pressure at 25–30 psi, at which point no fuel is flowing through the fuel pump.

Sommer testified that if a fuel pump meets its design specifications, it is not defective. But the district court observed, and the record supports, that Sommer did not test the accident fuel pump to determine whether it met its design specifications. Specifically, the district court noted that Sommer failed to perform a flow-bench test at an outlet pressure of 2 psi as set forth in Lycoming's assembly design. Sommer never denied that he did not test the fuel pump at this outlet pressure level. Instead, he testified that testing at 2 psi was not necessary because the engine could not operate at that pressure level and he was "interested in finding out why this engine didn't run[,] not what some blueprint said."

Sommer testified that an outlet pressure of 10 psi is required for the fuel injector servo to operate and allow fuel to flow into the engine. He also testified that at an outlet pressure of 18 psi the engine would operate at full power. But he never tested the accident fuel pump at either psi level. In fact, he only tested the fuel flow at outlet pressure levels of 5–8, 22–25, and 25 psi at fluctuating rpm settings. He testified that he obtained 218 pounds of fuel flow at approximately 700 rpm for outlet pressures of 5–8 psi. But, he did not testify that the fuel flows at the outlet pressure levels of 5–8 were insufficient. And, most importantly, he did not test the accident fuel pump at outlet pressures between 10 and 22 psi, which is the range in which the engine could be operated.

Instead, Sommer testified regarding the results he obtained from the flow-bench test for fluctuating outlet pressures of 22–25 psi and at 25 psi. He explained that in the flow-bench test, he obtained 60 pounds per hour at approximately 600 rpm at an outlet pressure of 22–25 psi and 48.4 pounds per hour at approximately 1800 rpm at an outlet pressure of

25 psi. At an outlet pressure of 22–25 psi, Sommer opined that the fuel flow should have been 240 pounds per hour rather than 60 pounds per hour. At an outlet pressure of 25 psi, Sommer opined that the fuel flow should have been 270 pounds per hour rather than 48.4 pounds per hour. However, according to Lycoming’s specifications, which are based on the inverse relationship between pressure and fuel flow in diaphragm-style fuel pumps, an outlet pressure of 25 psi—which Sommer admitted is at or near shutoff—should result in low or no fuel flow. In fact, Sommer’s testimony for what the flow should have been at or near the fuel pump’s shutoff point are essentially the same as the specifications set forth in the assembly drawings for 2 psi.

Sommer claimed his analysis of inadequate fuel flow at or near 25 psi was based upon information he received in an email from an employee at Aero, which purportedly contained the following specifications for a diaphragm-style fuel pump as follows: “40 [gph] @ 600 cpm = cycle per minute, one cycle from a fuel pump actuating arm up and down. 45 [gph] @ 1800, 24-30 psi.” In interpreting the specifications set forth in the email, Sommer testified that “40 [gph]” or gallons per hour is equivalent to 240 pounds per hour and “45 [gph]” or gallons per hour is equivalent to 270 pounds per hour. But Sommer, interpreting the specifications set forth in the email as applying to the outlet pressure levels at or near shutoff or 25 psi, obviously did not realize that his conversion calculations rendered an expected fuel flow that was essentially identical to fuel flow levels at 2 psi as required by the Lycoming and Aero design specifications. Sommer acknowledged that none of his other tests of the accident fuel pump quantified the fuel flow at the different pressure levels.

At trial and over vigorous foundational reliability objections from Lycoming, Sommer expressed his opinion that the airplane crashed because of insufficient power to the engine caused by inadequate fuel flow in the accident fuel pump. He formulated this opinion on the basis that the crash was caused by the engine's failure to operate according to its rated horsepower, leaking in the valves of the accident fuel pump provided insufficient fuel to the engine, and this insufficiency was demonstrated by the flow-bench testing. While the district court overruled these foundation objections at trial and denied Lycoming's JMOL motion at the end of Kedrowski's case-in-chief, the district court ultimately granted Lycoming's post-trial JMOL motion after determining that Sommer's opinion lacked foundational reliability. The district court reasoned that Sommer, who admitted that a fuel pump that met its own design specifications could not be defective, never actually tested the accident fuel pump in a manner to see whether it performed as designed. And though the district court did not question the raw numbers of the flow-bench test, it was critical of the fact that Sommer did not test the accident fuel pump according to Lycoming's or Aero's drawing specifications.

Minnesota caselaw has long established that if an expert's opinion is based on assumptions not established by the evidence, the opinion lacks foundation and is inadmissible. *Huseby v. Carlson*, 306 Minn. 559, 560–61, 238 N.W.2d 589, 590 (1975); see also *Whitney v. Buttrick*, 376 N.W.2d 274, 277 (Minn. App. 1985) (explaining that “[e]xpert opinion must be based on readily ascertainable facts” and not mere speculation or conjecture), review denied (Minn. Jan. 23, 1986). And when expert testimony is based on a scientific test, “the proponent of a test [must] establish that the test itself is reliable

and that its administration in the particular instance conformed to the procedure necessary to ensure reliability.” *Goeb v. Tharaldson*, 615 N.W.2d 800, 814 (Minn. 2000) (emphasis added) (quotation omitted); *see also Gen. Elec. Co. v. Joiner*, 522 U.S. 136, 146, 118 S. Ct. 512, 519 (1997) (“A court may conclude that there is simply too great an analytical gap between the data and the [expert] opinion proffered.”).

Kedrowski argues on appeal that the district court improperly weighed the evidence underlying Sommer’s opinion and thereby invaded the province of the jury in determining the cause of the airplane crash. But the cases Kedrowski relies on to support his argument that there was foundational reliability for Sommer’s causation opinion are factually distinguishable. At least three of his cited cases concluded that expert testimony was not required to prove causation because the issues were within the jury’s common knowledge.² Numerous other cases emphasize the deference given to the district court’s evidentiary rulings and ultimately upheld the district court’s decision that an expert’s opinion was foundationally reliable after determining the methodology and testing to be scientifically valid and supportive of the expert’s opinion.³ Kedrowski cites a few cases in which an

² *See Osborne v. Twin Town Bowl, Inc.*, 749 N.W.2d 367, 380 (Minn. 2008); *Schulz v. Feigal*, 273 Minn. 470, 476, 142 N.W.2d 84, 89 (1966); *see also Sappington v. Skyjack, Inc.*, 512 F.3d 440, 446 (8th Cir. 2008).

³ *See Gianotti v. Indep. Sch. Dist.* 152, 889 N.W.2d 796, 802 (Minn. 2017); *Sentinel Mgmt. Co. v. Aetna Cas. & Sur. Co.*, 615 N.W.2d 819, 824–25 (Minn. 2000); *Shymanski v. Nash*, 312 Minn. 304, 308, 251 N.W.2d 854, 857 (1977); *LeMieux v. Bishop*, 296 Minn. 372, 384, 209 N.W.2d 379, 386 (1973); *see also In re Zurn Pex Plumbing Prods. Liab. Litig.*, 644 F.3d 604, 614 (8th Cir. 2011); *Shuck v. CNH Am., LLC*, 498 F.3d 868, 874–75 (8th Cir. 2007); *Quiet Tech. DC-8, Inc. v. Hurel-Dubois UK Ltd.*, 326 F.3d 1333, 1346 (11th Cir. 2003).

appellate court reversed a district court's foundational reliability analysis, but nearly all of these cases involved appeals from summary judgment or other pretrial stages of litigation.⁴

What is clear from the caselaw is that the district court, as a gatekeeper of expert evidence to be presented to a jury, had to perform a thorough evaluation of Sommer's testimony to ensure that the premise for his conclusions was both reliable and consistent with his testing methods. See *Samaan v. St. Joseph Hosp.*, 670 F.3d 21, 32 (1st Cir. 2012) (requiring district courts to "ensure that there is an adequate fit between the expert's methods and his conclusions") (citing *Daubert v. Merrell Dow Pharm., Inc.*, 509 U.S. 579, 591, 113 S. Ct. 2786, 2795 (1993)); see also *United States v. Frazier*, 387 F.3d 1244, 1260 (11th Cir. 2004) (explaining that the district court's gatekeeping function inherently requires "an exacting analysis of the *foundations* of expert opinions to ensure they meet the standards for admissibility" (quotation omitted)); *Pugliano v. United States*, 315 F. Supp. 2d 197, 199 (D. Conn. 2004) ("In deciding whether a step in an expert's analysis is reliable, the court must undertake a rigorous examination of the data on which the expert relies, the method by which he draws his opinions from such studies and data, and the application of the data and methods to the case at hand.").

⁴ See *Pfeiffer v. Allina Health Sys.*, 851 N.W.2d 626, 638–39 (Minn. App. 2014) (reversing because district court failed to conduct any rule 702 analysis), *review denied* (Minn. Oct. 14, 2014); see also *Lauzon v. Senco Prods., Inc.*, 270 F.3d 681 (8th Cir. 2001) (holding that district court abused its discretion in granting summary judgment and ruling that testimony of plaintiff's expert was inadmissible without conducting a pretrial *Daubert* hearing); *Bednar v. Bassett Furniture Mfg. Co.*, 147 F.3d 737, 739–40 (8th Cir. 1998) (noting that there was scientific support for expert's opinion in negligence case regarding formaldehyde exposure even though expert could not test precise emission rate at time of exposure).

In determining whether there is sufficient foundational reliability for an expert opinion by a preponderance of the evidence, the district court's role as the gatekeeper is to "keep unreliable and irrelevant information from the jury because of its inability to assist in factual determinations, its potential to create confusion, and its lack of probative value." *Allison*, 184 F.3d at 1311–12. And, in doing so, the court must "ensure that the proposed expert testimony . . . logically advances a material aspect of the proposing party's case" or has "a valid scientific connection to the disputed facts in the case." *Id.* at 1312 (citing *Daubert*, 509 U.S. at 591, 113 S. Ct. at 2796). In rendering his conclusions, the expert must employ "the same level of intellectual rigor that characterizes the practice of an expert in the relevant field." *Carmichael*, 526 U.S. at 152, 119 S. Ct. at 1176.

After an exhaustive review of Sommer's testimony, we conclude that the district court did not abuse its discretion in excluding Sommer's causation opinion for a lack of foundational reliability. Sommer acknowledged that a fuel pump could not be defective if it met its design specifications. The design specifications in the assembly drawing for the accident fuel pump upon its manufacture required testing at 2 psi and at or near the shutoff point at 25–30 psi. Sommer conceded that he did not test at 2 psi. He also acknowledged that the inverse relationship of outlet pressure to fuel flow—a basic engineering principle for a diaphragm-style fuel pump—would mean that the pounds per hour of fuel flow would be lower at outlet pressure levels near the shutoff point. But, contrary to his own acknowledgment of these basic engineering principles, Sommer opined that the fuel flow should have been 270 pounds per hour at or near the shutoff level of 25 psi—which coincidentally is the amount of fuel flow expected for an outlet pressure of 2 psi, according

to the performance specifications. Sommer's testimony in this regard contradicts his other testimony and calls into question his understanding of the fundamental engineering principles for this type of fuel pump. It is illogical, confusing, and provides no guidance to a jury in its determination of whether there was insufficient fuel flow from the fuel pump that caused the airplane to crash.

Moreover, in five days of testimony, Sommer did not present any evidence from the flow-bench test indicating that there was insufficient fuel flow at any other relevant outlet pressure level. He testified that an outlet pressure of 10 psi is required for the fuel injector servo to operate and allow fuel to flow from the fuel pump through the servo and into the engine, but he did not test the accident fuel pump at 10 psi. Sommer also testified that for full power he would expect an outlet pressure of 18 psi. But he did not test the accident fuel pump at that pressure either. Though he did conduct the flow-bench test at a pressure level of 5–8 psi, the test indicated that there was 218 pounds of fuel flow, which is only slightly lower than the expected fuel flow of 240 pounds of fuel per hour for an outlet pressure of 2 psi at 600 rpm, as set forth in Lycoming's assembly drawings.

Finally, none of Sommer's other tests provide sufficient foundation for his opinion that the accident fuel pump's leaks led to a deficit in fuel flow to the airplane's engine. The Water Brake Dynamometer (dynamometer test) led Sommer to believe that the engine was not producing sufficient horsepower, which told him that the engine was not running right and he needed to figure out why. The dynamometer test did not explain why the engine was not producing sufficient horsepower. Sommer also testified about a sub-performing spring, but conceded that he was unable to measure the impact that the spring had on the

accident fuel pump’s ability to provide sufficient fuel flow. And, in the tests to measure the leakage in the fuel pump—the air pressure test and vacuum test—Sommer did not quantify any alleged decrease in fuel flow or determine that any such decrease was sufficient to cause the airplane to lose power.

Because Sommer’s causation opinion does not survive the intellectually rigorous application of the basic engineering principles involved in the operation of this style of fuel pump, and therefore lacks foundational reliability, we conclude that the district court’s denial of its admission was not an abuse of discretion. As the district court noted, its “ruling simply held Mr. Sommer to the standard he set for himself.” Based upon this record, we conclude that this is *not* a case where the district court inappropriately weighed competing scientific evidence provided by the parties’ experts. Rather, the district court concluded that Sommer failed to provide reliable scientific evidence regarding causation that could be weighed.

II.

Kedrowski contends that the district court erred in granting JMOL in favor of Lycoming based on its post-trial ruling that Sommer’s testimony lacked foundational reliability and is therefore inadmissible. The district court should grant JMOL

only in those unequivocal cases where (1) in the light of the evidence as a whole, it would clearly be the duty of the [district] court to set aside a contrary verdict as being manifestly against the entire evidence, or where (2) it would be contrary to the law applicable to the case.

Jerry’s Enters., Inc. v. Larkin, Hoffman, Daly & Lindgren, Ltd., 711 N.W.2d 811, 816 (Minn. 2006) (quotation omitted); *see also Glorvigen v. Cirrus Design Corp.*, 796 N.W.2d

541, 549 (Minn. App. 2011), *aff'd*, 816 N.W.2d 572 (Minn. 2012). “Viewing the evidence in a light most favorable to the nonmoving party, this court makes an independent determination of whether there is sufficient evidence to present an issue of fact for the jury.” *Jerry’s Enters., Inc.*, 711 N.W.2d at 816; *see also Daly v. McFarland*, 812 N.W.2d 113, 119 (Minn. 2012) (“A motion for judgment as a matter of law is reviewed de novo.”). We will not set aside a jury verdict “if it can be sustained on any reasonable theory of the evidence.” *Pouliot v. Fitzsimmons*, 582 N.W.2d 221, 224 (Minn. 1998).

In this case, as we discussed previously, “there is simply too great an analytical gap between the data” from the flow-bench test and Sommer’s causation opinion for us to conclude that his opinion is grounded in valid scientific evidence. *See Joiner*, 522 U.S. at 146, 118 S. Ct. at 519.

Kedrowski first claims that it is fundamentally unfair to grant a post-verdict JMOL on this ground because he did not have the opportunity to cure the purported deficiencies in Sommer’s testimony. He argues that, in relying upon the district court’s prior rulings, he chose not to lay additional foundation or call additional witnesses, and that such foundation determinations should be made when the evidence is offered, not “after the jury’s verdict has been returned, because the latter approach substantially usurps the role of the jury.” *Reinhardt v. Colton*, 337 N.W.2d 88, 92 n.1 (Minn. 1983).

We agree with the district court that Kedrowski’s counsel was well aware of Lycoming’s objection to the foundation for Sommer’s testimony as early as 2014 as the issue was raised in Lycoming’s motions in limine before trial and in repeated objections throughout trial. Kedrowski’s counsel cannot claim to have been surprised or caught off

guard by Lycoming's position, and they were well aware that it would be important to offer all of the evidence they had which might support the foundational reliability of their expert's causation opinions. See *Weisgram v. Marley Co.*, 528 U.S. 440, 455–56, 120 S. Ct. 1011, 1021 (2000) (“It is implausible to suggest . . . that parties will initially present less than their best expert evidence in the expectation of a second chance should their first try fail. We therefore find unconvincing [petitioner's] fears that allowing courts of appeals to direct the entry of judgment for defendants will punish plaintiffs who could have shored up their cases by other means had they known their expert testimony would be found inadmissible.”).

Additionally, after the close of Kedrowski's case-in-chief, Lycoming moved for JMOL based in part on the lack of foundational reliability for Sommer's causation opinion. If the district court had granted Lycoming JMOL at that time, Kedrowski could not have reopened the record to attempt to supply additional foundation. And, after Lycoming presented its evidence, much of which was Lycoming's expert witnesses analyzing the same data from Sommer's flow-bench test and testifying that the flow-bench tests that were done showed sufficient fuel flow, Kedrowski's counsel had the opportunity to present rebuttal evidence but did not do so. See *Farmers Union Grain Terminal v. Indus. Elec. Co.*, 365 N.W.2d 275, 277 (Minn. App. 1985) (defining “rebuttal evidence” as evidence that “explains, contradicts, or refutes the defendant's evidence. Its purpose is to cut down [the] defendant's case and not merely to confirm that of the plaintiff”), *review denied* (Minn. June 14, 1985). Furthermore, Kedrowski's ability to cure was limited by the scope of the expert opinions that he disclosed during discovery. See Minn. R. Civ. P. 26.01(b),

26.05, 37.03(a). Kedrowski could not cure, at trial, what Sommer *never did*. We conclude that the district court's grant of Lycoming's post-trial motion for JMOL did not unfairly prohibit Kedrowski from providing sufficient evidence to support the foundational basis for Sommer's opinions.

Kedrowski next argues that, even without Sommer's causation opinion based on the flow-bench test, there was sufficient evidence in the record for the jury to find that Lycoming manufactured a defective fuel pump that caused the airplane to crash.

Lycoming contends that, due to the technological complexity of this case, Kedrowski needed an expert opinion on causation for the jury to determine whether there was insufficient fuel flow because of defects in the accident fuel pump and whether this deficit in fuel flow caused a loss of power to the engine. We agree. "Expert opinion is required to prove causation if the issue is outside the realm of common knowledge." *Gross*, 578 N.W.2d at 762; *Bernloehr v. Cent. Livestock Order Buying Co.*, 296 Minn. 222, 225, 208 N.W.2d 753, 755 (1973) (noting that expert opinion is required to prove causation if the issue is outside of the common knowledge of "the ordinary layman"). There is no doubt that the functionality of a fuel pump in a single-engine airplane is beyond the scope of common knowledge or experience. Other than Sommer, none of Kedrowski's witnesses presented any evidence that the leaks in the accident fuel pump caused a deficit in fuel flow to the airplane's engine that led to the airplane's loss of power and crash.

Kedrowski argues that, through process of elimination, and by proving that Lycoming's manufacturing process produced a leaky fuel pump, it is possible to infer that the leakage caused a loss of power during the airplane's ascent. The record reveals that

Sommer reviewed photographs from the crash site and the post-crash condition of the airplane's propellers, which led him to believe that the airplane had lost power prior to crashing. There is also evidence that Kedrowski told a first responder at the scene of the crash that "he lost power" and was trying to return to the airport before the crash. Kedrowski had also advised Sommer of three instances prior to the crash in which, while the airplane remained idle on the ground, he used the airplane's boost pump to start the engine but the engine died when he turned the boost pump off. But none of this is competent scientific evidence demonstrating that the accident fuel pump's leaks caused a decrease in fuel flow sufficient to cause the engine to lose power and the airplane to crash.

Kedrowski also relies significantly on Sommer's dynamometer test, which led Sommer to opine that the engine was not producing sufficient horsepower, and Lycoming's testing of the accident fuel pump on a Cessna 177RG test airplane. While Sommer opined that the dynamometer test showed that the engine was not producing sufficient horsepower, the dynamometer test could not explain *why* the engine was not producing sufficient horsepower. Without such explanation, Kedrowski's evidence is insufficient to prove that the accident fuel pump—rather than another component of the engine—was responsible for a lack of power. As discussed previously, Sommer depended on the flow-bench test to determine why the engine was producing less horsepower. And, while the record reflects that the Cessna airplane needed significant cranking after the accident fuel pump was installed and the parties disputed the reasons for the difficulties in starting the Cessna airplane, Sommer agreed that "[t]hey were eventually able to get the system running and get the pump providing some fuel to the engine." At most, the Cessna airplane test showed

difficulties starting the engine with the accident fuel pump. But neither the dynamometer test nor the Cessna test demonstrated that leaks in the accident fuel pump caused an insufficient flow of fuel to the engine while airborne.

After a thorough review of the evidence in the record, we conclude that without Sommer's causation opinion, there is insufficient evidence of causation. There is no evidence in the record that validates Kedrowski's theory that the accident fuel pump's leaks were a substantial causal factor in the engine's loss of power. *See Bernloehr*, 296 Minn. at 224, 208 N.W.2d at 754 ("Proof of a causal connection must be something more than merely consistent with the plaintiff's theory of the case. If the facts furnish no sufficient basis for inferring which of several possible causes produced the injury, a defendant who is responsible for only one of such possible causes cannot be held liable." (citations omitted)); *Rients v. Int'l Harvester Co.*, 346 N.W.2d 359, 362 (Minn. App. 1984) ("In any theory of products liability, the plaintiff must show a causal link between the alleged defect and the injury."), *review denied* (Minn. Oct. 30, 1984).

Finally, Kedrowski argues that the district court should not have granted JMOL because the district court made an erroneous evidentiary ruling prohibiting his counsel from introducing evidence of other incidents in which the same model of fuel pump had failed. In its pretrial order, the district court excluded evidence of other accidents, incidents, and complaints regarding the fuel pump on the basis that Kedrowski "failed to establish that the other incidents were the same or substantially similar to the incident and alleged product defects at issue in this case." Therefore, the district court reasoned that this evidence was not relevant. *See Held v. Mitsubishi Aircraft Int'l, Inc.*, 672 F. Supp.

369, 390 (D. Minn. 1987) (“In general, where evidence of other accidents involving a product is concerned, a party seeking to introduce evidence must show that the other accidents occurred under ‘substantially similar circumstances’ and involved ‘substantially similar’ components or products.”). Given our narrow standard of review and the record in this case, we cannot conclude that the district court abused its discretion in excluding this evidence. *See Lines v. Ryan*, 272 N.W.2d 896, 902 (Minn. 1978) (holding that evidentiary ruling is within sound discretion of district court and that appellate court will not reverse except for clear abuse of discretion).

Based upon this record, Kedrowski failed to establish the necessary causal connection between any internal leaks in the accident fuel pump, any decrease in fuel flow, the airplane’s loss of power, and its subsequent crash. *See Huseby*, 306 Minn. at 560–61, 238 N.W.2d at 590. We hold that the district court did not err by concluding that Sommer’s causation opinion lacked foundational reliability and by granting Lycoming’s post-trial JMOL motion. Because we affirm JMOL in favor of Lycoming, we need not address Lycoming’s conditional cross-appeal of the district court’s denial of its motion for a new trial on the issue of damages or Kedrowski’s challenge to the district court’s grant of a new trial on the issue of liability.

Affirmed.

RANDALL, Judge (dissenting)

“A plane fell out of the sky. The fuel pump failed.”

I respectfully dissent.

The district court improperly substituted its own judgment for the judgment of an expert, should not have interfered with fact questions left to the jury, and should not have taken away the jury’s consistent verdict.

After the jury reached a plaintiff’s verdict in favor of appellant Mark Kedrowski, the district court granted respondent Lycoming Engine’s (Lycoming) motion for judgment as a matter of law (JMOL) on the basis that the causation opinion of Kedrowski’s expert, Donald Sommer, was improperly admitted during the trial. The district court determined that several of Sommer’s opinions relating to the cause of Kedrowski’s airplane crash lacked “foundational reliability.” In the same order, the district court denied in part Lycoming’s motion for a new trial on the issue of damages. Kedrowski appeals the dismissal of his action. Lycoming filed a conditional cross-appeal for a new trial on damages in the event of a remand.

Minnesota appellate courts “review a district court’s evidentiary rulings, including rulings on foundational reliability, for an abuse of discretion.” *Doe v. Archdiocese of St. Paul*, 817 N.W.2d 150, 164 (Minn. 2012). Minn. R. Evid. 702, which governs the admissibility of expert testimony, directs district courts in considering the foundational reliability of an expert’s testimony to: (1) analyze the testimony in light of its proposed purpose, (2) take into account the underlying reliability, consistency, and accuracy of the

testimony's subject matter, and (3) determine whether the proffered testimony is reliable. *Id.* at 167-68.

For testimony based on a scientific test to be foundationally reliable, the test itself must be reliable and its administration must conform to procedures that ensure its reliability. *Sentinel Mgmt. Co. v. Aetna Cas. & Sur. Co.*, 615 N.W.2d 819, 824 (Minn. 2000). But, an expert's extrapolations from a test necessarily *go to the weight, not the admissibility, of his testimony*. See *id.* at 824-25 (plaintiff's expert's extrapolation from positive asbestos samples goes to the weight of his opinion regarding the likelihood that individuals may develop a compensable illness in the future); *LeMieux v. Bishop*, 296 Minn. 372, 381, 209 N.W.2d 379, 385 (1973) (“[A]ny error in calculations or in the assumption of facts or data upon which the opinion was based *goes to the weight of the testimony, not to its admissibility.*” (emphasis added)); see also *In re Zurn Pex Plumbing Prod. Liab. Litig.*, 644 F.3d 604, 614 (8th Cir. 2011) (noting that “[a]s a general rule, the factual basis of an expert opinion goes to the credibility of the testimony, not the admissibility”) (quotation omitted).

The district court determined that Sommer's evaluation of the accident fuel pump was based on “inherently unreliable methodology” because he chose not to test the pump according to Lycoming's “Trial Exhibit 91” specifications and failed to precisely follow the Aero Accessories (Aero) specifications. The district court criticized Sommer for using parameters from “an unknown document” and for not verifying the accuracy of the specifications he used. But when there is a dispute regarding “the specific numbers” applied in an otherwise reliable scientific test, the alleged flaws constitute attacks on the

accuracy of the expert's results, not the reliability of his methods. *Zurn*, 644 F.3d at 614 (quoting *Quiet Tech. DC-8, Inc. v. Hurel-Dubois UK Ltd.*, 326 F.3d 1333, 1345 (11th Cir. 2003)). By picking and choosing what performance specifications Sommer should have used in an otherwise reliable flow-bench test, the district court "selectively identified certain evidence in the record" in deciding that Sommer's testimony lacked foundational reliability. *Pfeiffer v. Allina Health Sys.*, 851 N.W.2d 626, 638 (Minn. App. 2014), *review denied* (Minn. Oct. 14, 2014). It is the province of the jury, not the district court, to decide whether an expert's opinion is right or wrong. *See Sentinel*, 615 N.W.2d at 824-25 (explaining that purported deficiencies in expert witness's procedures "went to the weight, rather than the admissibility of [expert's] testimony"). The district court's decision to evaluate Sommer's parameters of the flow-bench test "intruded upon a function customarily reserved for the fact-finder at trial." *See Pfeiffer*, 851 N.W.2d at 638-39. The issue was for cross-examination by Lycoming and then for the jury, not the district court.

The majority concludes that, with or without the flow-bench test, Sommer failed to provide the causal link between the defects in the accident fuel pump and the airplane's crash. The parties do not dispute on appeal that the accident fuel pump suffered from manufacturing defects.

Kedrowski needed to prove causation to prevail, and it was up to Sommer, his causation expert, to establish that his opinions were based on factual foundation, not speculation or conjecture. *See Walton v. Jones*, 286 N.W.2d 710, 715 (Minn. 1979) ("[E]xpert testimony must demonstrate a reasonable probability that defendant's negligence was the proximate cause of the injury." (emphasis omitted)). Again, the

reliability of an expert's testimony with respect to causation necessarily goes to the testimony's "relative weight" and not its admissibility. See *Pfeiffer*, 851 N.W.2d at 639 (quotation omitted). The majority makes the same error as the district court. The majority retries Sommer's opinions and flyspecks every detail of his opinions and the basis for his conclusions as to causation. The majority then balances the credibility and weight of Sommer's testimony, and finds that it lacked the requisite foundation. That issue, the crux of this case, is for the jury, not for the district court and not for an appellate court on review.

Beyond the flow-bench test, there was other evidence in the record that tends to corroborate Sommer's causation opinions. Sommer testified that the dynamometer testing revealed that the airplane's engine was operating at 40% less horsepower. Kedrowski also informed Sommer that in several instances before the crash, the engine would die if the boost pump was turned off. And the fire chief who spoke to Kedrowski immediately after the crash testified that Kedrowski told him that the airplane "lost power" before it crashed. The district court's explanation that these factors "could be explained by potential causes apart from a defective engine-powered fuel pump" implies the district court improperly weighed the evidence and suggests that the district court inappropriately placed the burden on Kedrowski to rule out other possible causes. See *Schulz v. Feigal*, 273 Minn. 470, 476, 142 N.W.2d 84, 89 (1966); see also *Jensen v. Linner*, 260 Minn. 22, 33, 108 N.W.2d 705, 712 (1961) (explaining that "if the circumstances supporting a theory of negligence are of greater weight than the evidence supporting the theory of no negligence, then it becomes a question of fact for the jury").

The jury returned answers to 16 interrogatories in a special-verdict form that was consistent in all respects. The jury found that the accident fuel pump in the airplane's engine was defective in its manufacturing but not its design. *The jury determined that Lycoming was negligent in testing and inspecting the accident fuel pump and that this negligence was a direct cause of Kedrowski's injuries.* The jury answered "Yes" to the following interrogatories:

3. Was the LW-15473 fuel pump that was installed on plaintiff's engine at the time of the September 3, 2010 crash in a defective condition unreasonably dangerous because of a defect in its manufacture by Kelly Aerospace Power Systems, Inc.?
4. If you answered "Yes" to Question 3, answer this question: Was the defective manufacture a direct cause of any injuries sustained by Mark Kedrowski?
5. Answer this question only if you answered "Yes" to Question number 4: Was Kelly Aerospace Power Systems, Inc. negligent in its manufacture of the LW-15473 fuel pump?
6. If you answered "Yes" to Question 5, answer this question: Was the negligence a direct cause of any injuries sustained by Mark Kedrowski?
7. Answer this question only if you answered "Yes" to Question number 4: Was Lycoming Engines negligent in testing or inspecting the LW-15473 fuel pump?
8. If you answered "Yes" to Question 7, answer this question: Was the negligence a direct cause of any injuries sustained by Mark Kedrowski?
The jury answered "Yes".

The jury, however, answered “No” to this interrogatory:

11. Was Mark Kedrowski negligent with respect to his own safety on September 3, 2010?
The jury answered “No.”

The trial took several days over the course of a month. Kedrowski’s expert, Sommer, was on the stand testifying for five days. The trial transcript of Sommer’s testimony was approximately 600 pages. Lycoming’s attorneys had every opportunity, and then some, to cross-examine and try to break Sommer’s testimony to the jury. They didn’t.

Kedrowski’s injuries from the crash were massive. He underwent extensive orthopedic surgeries, such as the amputation of his left leg and the complete reconstruction of his right ankle. Kedrowski suffered massive facial disfigurement, including having “essentially every bone in his face” broken due to the trauma. By the time the first responders arrived to the crash, Kedrowski was crying and screaming in pain. Some of the first responders started crying when they saw Kedrowski. He had to undergo significant neurosurgical procedures and had to re-learn how to walk and read. The jury calculated \$13 million in damages for past pain, disability, disfigurement, embarrassment, and emotional distress (\$10 million), past medical expenses (\$2 million), and past loss of earnings (\$1 million). The jury calculated damages of \$14.7 million for future pain, disability, disfigurement, embarrassment, and emotional distress (\$6 million), future medical expenses (\$5.4 million), and loss of future earnings (\$3.3 million).

In November 2014, Lycoming filed motions in limine to exclude Sommer’s tests and his testimony. The district court denied these motions. The court concluded it would reserve ruling on the admissibility of Sommer’s testimony relating to the tests until trial,

when the evidence, foundation, and objections were provided for on the record. Lycoming made several foundation objections to Sommer's testimony during trial. These objections were overruled by the district court. Importantly, when Sommer testified that the accident fuel pump "wasn't coming anywhere near the specifications that we received," the district court overruled Lycoming's objection for lack of foundation. In denying Lycoming's motion for JMOL at the end of Kedrowski's case-in-chief, the district court stated the following ruling on the record:

A jury can conclude based on the evidence adduced and there are reasonable inferences supporting the conclusion that the engine lost power without necessarily turning off, that due to the propeller evidence, the engine was not under power at the time of impact. A jury could reasonably infer that other possible causes of engine failure or loss of power due to the mechanical operation of the engine were ruled out. Based on the expert testimony of McSwain and Sommer, a jury could conclude that the fuel pump did not meet specifications applicable to it.

There's going to be debate, and there is a debate as to whether Mr. Ehrlich's supplied numbers are accurate, whether Mr. Sommer misunderstood them, and Mr. Seader, and whether they misunderstood the use of those numbers, but those inconsistencies are an issue for the jury to resolve and are not for me to resolve as a matter of law because they are subject to debate.

. . . .

The standard is a reasonable probability that the injury occurred due to the defendant's conduct, and that it was more likely to have occurred from the defendant's conduct than anything else. The caselaw further indicates that causation issues are generally matters of fact for the jury, and only in the clearest of cases does the question become one of law, and this is not so clear a case. In fact, *it's a close case*.

With the above ruling by the district court, there is nothing left in this case but to reverse and reinstate the jury's verdict!

The district court was correct in its analysis. Only a few things changed after the district court denied Lycoming's motion to strike the expert's opinion. First, the district court received Lycoming's presentation of evidence—much of which interpreted the data and analysis of Kedrowski's experts. And any discrepancy between the methods used by these competing experts goes to the weight of their opinions. *See Rainforest Cafe, Inc. v. State of Wis. Inv. Bd.*, 677 N.W.2d 443, 451 (Minn. App. 2004) (stating that “[w]hen conflicting opinions of expert witnesses have a reasonable basis in fact, the trier of fact must decide who is right” (alteration in original) (quotation omitted))). Second, the jury returned its verdict which, as detailed above, was both consistent and decisive.

The district court granted Lycoming's JMOL motion under Minn. R. Civ. P. 50.01(a). A JMOL motion should only be granted in “unequivocal cases.” *Moore v. Hoff*, 821 N.W.2d 591, 595 (Minn. App. 2012) (quotation omitted); *see also Longbehn v. Schoenrock*, 727 N.W.2d 153, 159 (Minn. App. 2007) (“The jury's verdict will not be set aside if it can be sustained on any reasonable theory of the evidence.” (quotation omitted))).

Somehow, this case went light years from the district court's ruling that it was a “close case” to an “unequivocal case!” The district court denied Lycoming's motions in limine, repeatedly overruled Lycoming's foundation objections, and denied Lycoming's JMOL motion halfway through trial. The district court's change in course to grant Lycoming's post-trial JMOL motion is inexplicable.

In light of the rulings on this record, the granting of the post-trial JMOL motion was a severe abuse of the district court's discretion. The Minnesota Court of Appeals should not compound that error.

I would reverse the district court's decision to grant Lycoming's post-trial JMOL, reinstate the jury's verdict, and direct the district court to enter judgment in favor of Kedrowski.

I would deny Lycoming's conditional appeal for a new trial on the issue of damages. "Kedrowski earned his money."

I dissent.