United States Court of Appeals for the Federal Circuit

MEADWESTVACO CORPORATION AND MEADWESTVACO CALMAR, INC.,
Plaintiffs-Appellees,

v.

REXAM BEAUTY AND CLOSURES, INC. AND REXAM DISPENSING SYSTEMS S.A.S.,
Defendants-Appellants,

AND

VALOIS OF AMERICA, INC.,
Defendant-Appellant,

AND

VALOIS S.A.S.,
Defendant.

2012-1518, -1527

Appeals from the United States District Court for the Eastern District of Virginia in No. 10-CV-0511, Judge Gerald Bruce Lee.

Decided: September 26, 2013

ANTHONY J. VIOLA, Edwards Wildman Palmer, LLP, of New York, New York, argued for plaintiffs-appellees. With him on the brief were SCOTT D. WOFSY, of Stamford, Connecticut and ADAM P. SAMANSKY, of Boston, Massachusetts. Of counsel was PETER CUOMO, of Boston, Massachusetts.

GENE S. WINTER, St. Onge Steward Johnston & Reens, LLC, of Stamford, Connecticut, argued for defendant-appellant Rexam Beauty and Closures, Inc., et al. With him on the brief were BENJAMIN J. LEHBERGER and MICHAEL J. KOSMA.

CONSTANTINE L. TRELA, JR., Sidley Austin, LLP, of Chicago, Illinois, argued for defendant-appellant Valois of America, Inc. With him on the brief was HUGH A. ABRAMS. Of counsel was SCOTT BORDER, of Washington, DC.

Before PROST, O'MALLEY, and TARANTO, *Circuit Judges*.

PROST, *Circuit Judge*.

Rexam Beauty and Closures, Inc. and Rexam Dispensing Systems S.A.S. (collectively "Rexam") and Valois of America, Inc. and Valois S.A.S. (collectively "Valois") appeal from a final judgment of the United States District Court for the Eastern District of Virginia based on: (1) the construction of several terms in U.S. Patent Nos. 7,718,132 ("'132 patent") and 7,722,819 ("'819 patent"); (2) the district court's grant of summary judgment of nonobviousness; (3) the district court's denial of summary judgment of indefiniteness; (4) the district court's denial of Rexam's motion to exclude expert testimony; (5) and the district court's finding, after a bench trial, of infringement of claims 15 and 19 of the '132 patent. *See MeadWestVaco Corp. v. Rexam PLC*, 807 F. Supp. 2d 537

(E.D. Va. 2011) ("*Claim Op.*"), *MeadWestVaco Corp. v. Rexam* PLC, 809 F. Supp. 2d 463 (E.D. Va. 2011) ("*Summ. J. Op.*"); *MeadWestVaco Corp. v. Rexam PLC,* No. 1:10-cv-511, ECF No. 597 (E.D. Va. April 12, 2012) ("*Trial Op.*"). We find that the district court erred in granting summary judgment of nonobviousness in favor of plaintiffs MeadWestVaco Corporation and MeadWestVaco Calmar, Inc. (collectively "MWV"), the assignees of the '132 and '819 patents, and therefore vacate the summary judgment of nonobviousness. However, we affirm the district court's claim constructions, denial of Rexam's motion to exclude, and findings of infringement. We also find that Rexam and Valois waived their indefiniteness arguments by failing to pursue them at trial. Accordingly, we affirm-in-part, vacate-in-part, and remand for further proceedings consistent with this opinion.

BACKGROUND

I. Technology

Rexam, Valois, and MWV are competitors in the perfume packaging industry. Each company designs, manufactures, and assembles custom-made "dispenser assemblies," i.e., spray pumps with an attached dip tube,[1] for dispensing fragrances. Each of these companies sells spray pumps to its customers, fragrance houses such as Estee Lauder and Chanel, who in turn incorporate the pumps into bottles of perfume for sale to retailers and consumers.

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[1] The dip tube extends from the pump into the liquid fragrance in a perfume container and draws liquid from the container into the pump.

A. MWV's Patented Dip Tubes

MWV developed an "invisible" dip tube for perfumes that appears to disappear when immersed in liquid, enhancing the aesthetic appearance of the perfume bottle. The inventors of the '132 and '819 patents investigated various materials that had the properties necessary for an invisible dip tube. In doing so, they recognized the need for a transparent material with a refractive index[2] close to that of the perfume liquid so that the tube would appear invisible. For the most part, perfumes have a refractive index of 1.37 to 1.39.

In 2003, Daikin Industries, a plastics supplier, began promoting the fluoropolymer EFEP.[3] EFEP is a highly transparent fluoropolymer with a refractive index of 1.38. The inventors experimented with using EFEP, but their original tubes were hazy and brittle. To improve the tubes, they tried different production techniques, including a quenching process. Quenching, which is typically performed by immersing extruded plastic into a cool water bath, is a well-known manufacturing technique. Over the course of several months, the inventors optimized their manufacturing processes to produce a dip tube with their desired properties, which they called the NoC® (pronounced "no-see") tube. In 2005, they filed patent applications claiming fluid pumps with invisible dip tubes. The patent applications eventually issued as the '819 and '132 patents. The '132 patent is a continuation of the '819 patent. All of the claims of the '819 patent are specific to fragrance dispensers; some of the claims of

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[2] The refractive index of a material is a measure of how much light bends as it passes through the material.

[3] A polymer is commonly thought of as a plastic. A fluoropolymer is a polymer that includes fluorine within its chemical structure.

the '132 patent are specific to fragrance dispensers and others are directed to generic dispensers. *See* '819 patent col. 7 l. 40-col. 8 l. 65; '132 patent col. 7 l. 24-col. 8 l. 59.

Claims 15 and 19 of the '132 patent, the generic dispenser claims at issue, read:

> 15. A dispenser assembly for dispensing a liquid comprising:
>
> a transport assembly; and,
>
> a tube connected to the transport assembly;
>
> wherein the tube consists essentially of an extruded and *quenched* crystalline fluoropolymer having an *XRD crystallinity* not greater than about 13%, the tube has a *transparency* of about 80% or more,
>
> and the tube has a refractive index of from about 1.36 to about 1.38.
>
> 19. The dispenser assembly of claim 15, wherein the fluoropolymer is ethylene tetrafluoroethylene.

'132 patent col. 8 ll. 14-22, 56-57 (emphasis added).

B. Rexam's V1 and V2 Tubes

After MWV began marketing the NoC® tube in late 2005, Rexam obtained a sample from one of its customers. Rexam analyzed the sample and obtained the commercially available EFEP from Daikin. In May 2006, Rexam launched its first invisible tube, the "V1" tube. In 2008, after learning of MWV's patent applications, and in particular the claims' crystallinity limitations, Rexam worked to develop a tube with an XRD crystallinity higher than 13%. It eventually settled on blending together different grades of EFEP to produce the "V2" tube, which Rexam contends has an XRD crystallinity of greater than 13%. *See Trial Op.* at 24-26.

C. Valois's "Old" and "New" Tubes

Valois learned about the NoC® tube from a customer in March 2006. It then sent samples of the NoC® tube to its tube supplier, who then began making EFEP tubes using a water-quenching process. The water-quenched tubes are referred to as the "Old" tubes. Once Valois learned about MWV's patent applications, it instructed its supplier to investigate ways to design around the patents. Eventually, Valois and the supplier concluded that extruding the tubes without water quenching was the best option. The redesigned "New" tube is cooled by running the tube through an air chamber. In the bottom of the chamber, below the tube, a pump recirculates chilled water to maintain the air temperature in the chamber. *Summ. J. Op.*, 809 F. Supp. 2d at 471.

II. Procedural history

MWV brought suit against Valois and Rexam in May 2011, accusing each defendant of infringing the '819 and '132 patents. In response, Valois and Rexam counterclaimed for declaratory judgments of noninfringement and invalidity. On August 17, 2011, the district court issued its claim construction opinion, construing seven terms including "quenched," "transparency," "XRD crystallinity," and "crystalline content." *Claim Op.*, 807 F. Supp. 2d 537. Thereafter the court decided various summary judgment motions filed by the parties. The court granted MWV summary judgment of nonobviousness and denied Rexam's and Valois's motions for summary judgment of indefiniteness. *Summ. J. Op.*, 809 F. Supp. 2d 463.

MWV waived its right to seek monetary damages, and after a thirteen-day bench trial, the district court found that Valois and Rexam did not infringe the asserted perfume-specific claims of the '819 and '132 patents, but did infringe the generic dispenser claims of the '132 patent. *Trial Op.* at 36. The district court then entered a

permanent injunction against Valois of America, Inc. and Rexam Beauty and Closures, Inc. *MeadWestVaco Corp. v. Rexam PLC*, No. 1:10-cv-511, 2012 WL 2153165 (E.D. Va. June 12, 2012) ("*Inj. Op.*"). Valois and Rexam appeal. We have jurisdiction under 28 U.S.C. §§ 1292 and 1295.

DISCUSSION

This appeal presents a variety of issues. First, both defendants argue that the district court erred in granting summary judgment of nonobviousness. Second, Valois argues that the court erred in construing the term "quenched" and in finding that the "New" tubes are quenched under the court's or Valois's construction. Third, Valois also argues that the court erred in construing the term "transparency" and in finding infringement under a correct construction. Fourth, Rexam argues that the court erred in allowing MWV's expert to testify on the "XRD crystallinity" limitation and in finding infringement based on XRD crystallinity. Finally, both Valois and Rexam argue that the district court erred in its opinion denying their motions for summary judgment of indefiniteness. We address each of these issues in turn.

I. Obviousness

Prior to trial, MWV moved for, and the district court granted, summary judgment of nonobviousness of the asserted claims of both patents. *Summ. J. Op.*, 809 F. Supp. 2d at 474. Valois and Rexam both opposed summary judgment, arguing that material issues of fact necessitated a trial.

A patent claim is invalid as obvious "if the differences between the subject matter sought to be patented and the prior art are such that the subject matter would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains." 35 U.S.C. § 103(a). Obviousness is a question of law based on specific factual findings,

including (1) the scope and content of the prior art; (2) differences between the claimed invention and the prior art; (3) the level of ordinary skill in the art; and (4) any relevant secondary considerations, including commercial success, long-felt but unsolved needs, and the failure of others. *Graham v. John Deere Co.*, 383 U.S. 1, 17-18 (1966). To establish invalidity, the supporting facts must be shown by clear and convincing evidence. *WMS Gaming, Inc. v. Int'l Game Tech.*, 184 F.3d 1339, 1355 (Fed. Cir. 1999).

Summary judgment is appropriate if "the movant shows that there is no genuine dispute as to any material fact and the movant is entitled to judgment as a matter of law." Fed. R. Civ. P. 56. The court draws all reasonable inferences in favor of the nonmovant. *Monarch Knitting Mach. Corp. v. Sulzer Morat GmbH*, 139 F.3d 877, 880 (Fed. Cir. 1998). We review the grant of a summary judgment motion de novo. *Abbott Labs. v. Baxter Pharm. Prods., Inc.*, 334 F.3d 1274, 1277 (Fed. Cir. 2003).

The district court found that Valois and Rexam "cannot establish that Plaintiffs' patents are obvious through clear and convincing evidence because the *Graham* factors weigh in favor of MWV." *Summ. J. Op.*, 809 F. Supp. 2d at 474. Notably, the court's obviousness analysis repeatedly emphasized that it would not have been obvious to use EFEP in a fragrance product. For example, the court pointed to evidence of some belief that fluoropolymers were carcinogenic and therefore should not be used with a fragrance product. *Id.* at 475 ("[F]luoropolymers were unsafe for use in personal beauty products because such materials were thought to be carcinogenic."). The court also credited evidence advanced to show long-felt need and commercial success specific to the perfume industry. *Id.* ("Plaintiffs fulfilled a need because the visibility of a dip tube detracted from the overall aesthetics of a perfume bottle for perfume manufacturers. Plaintiffs have won industry-wide acclaim for the invisible dip

tube . . . ."). Finally, the court pointed to evidence that Valois and Rexam reverse-engineered their own invisible tubes from MWV's NoC® tube. *Id.* ("Both Defendants attempted to create an invisible dip tube, but succeeded only after . . . Defendants obtained samples of MWV's tube from perfume manufacturers.").

The central problem with the district court's analysis is that it fails to treat claims 15 and 19, which are not limited to fragrance products, differently from the asserted fragrance-specific claims.[4] Obviousness, like other grounds of invalidity, must be analyzed on a claim-by-claim basis. *Ortho Pharm. Corp. v. Smith*, 959 F.2d 936, 942 (Fed. Cir. 1992) (concluding that all grounds of invalidity must be evaluated against individual claims, as required by the plain language of 35 U.S.C. § 282). The district court's analysis of the secondary considerations of nonobviousness involved only fragrance-specific uses, but the claims now at issue are not fragrance-specific, and "'objective evidence of non-obviousness must be commensurate in scope with the claims which the evidence is offered to support.'" *Asyst Techs., Inc. v. Emtrak, Inc.*, 544 F.3d 1310, 1316 (Fed. Cir. 2008) (quoting *In re Grasselli*, 713 F.2d 731, 743 (Fed. Cir. 1983)). MWV did not present evidence teaching away from using EFEP in general purpose liquid-dispenser tubing or showing that EFEP

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[4] While it is true that at the summary judgment phase the court had not yet concluded that the fragrance-specific claims were not infringed, Valois called claim 15 to the court's attention by separately arguing that claim 15 was anticipated by various Daikin sales presentations related to EFEP.

tubing enjoyed commercial success or met any long-felt need.[5]

In addition to not analyzing claims 15 and 19 separately from the fragrance-specific claims, the district court resolved material issues of fact in favor of MWV, which is inappropriate at the summary judgment stage. *See Transocean Offshore Deepwater Drilling, Inc. v. Maersk Contractors USA, Inc.*, 617 F.3d 1296, 1305 (Fed. Cir. 2010) (reversing grant of summary judgment of nonobviousness for failure to view facts in the light most favorable to the nonmoving party). For example, Valois presented evidence contradicting MWV's claims of commercial success. Valois Br. 47 (explaining that at least one large customer elected not to use the more expensive invisible tube). Valois also cast doubt on MWV's teaching away evidence by presenting evidence that EFEP was marketed for use in "water purification systems, biomedical tubing, catheters, and food products." *Id.* at 43-44 (citing Daikin presentation materials). Finally, Valois put forth evidence that one of ordinary skill in the art—a polymer engineer—would not have believed EFEP was carcinogenic. *Id.* (noting that MWV's evidence of teaching away did not come from polymer scientists, but from

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[5] That is not to say that Valois and Rexam will necessarily prevail on obviousness on remand. MWV has argued that the only Daikin EFEP tubing disclosed in the prior art is a multilayer tube. J.A. 4553, 4561, 6527. Claim 15 requires a tube "consisting essentially of" a fluoropolymer having specific properties, and dependent claim 19 limits the fluoropolymer to ethylene tetrafluoroethylene. At trial, MWV will have the opportunity to argue that it would not have been obvious to one of ordinary skill in the art to make a tube "consisting essentially of" extruded and quenched material meeting the claims' requirements.

marketing and business executives, and presenting documents that Valois's and Rexam's engineers did not perceive a carcinogen risk).

In sum, Valois's evidence created material issues of fact inappropriate for resolution on summary judgment, which necessitates a remand. Because the district court erred in granting summary judgment of nonobviousness, we vacate and remand for a trial on that issue.

II. Quenching

Claim 15 requires an "extruded and quenched" crystalline fluoropolymer tube. Valois disputes the construction of "quenched" and the district court's finding that Valois's "New" tube is quenched.[6]

A. Claim Construction

Claim construction is a question of law reviewed de novo. *Cybor Corp. v. FAS Techs., Inc.*, 138 F.3d 1448, 1451 (Fed. Cir. 1998) (*en banc*). The words of the claim "are generally given their ordinary and customary meaning," which "is the meaning that term would have to a person of ordinary skill in the art in question at the time of the invention." *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312-13 (Fed. Cir. 2005) (*en banc*).

Below, Valois and MWV submitted competing constructions for the term "quenched." Valois proposed "a process by which a plastic tube is subjected to rapid cooling by immersion into a cooling liquid" and MWV proposed "rapidly cooled." *Claim Op.*, 807 F. Supp. 2d at 541. The district court adopted MWV's construction, finding that "rapidly cooled" is consistent with the ordi-

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[6] Valois conceded that the water-quenched "Old" tube infringes the '132 patent. *Summ. J. Op.*, 809 F. Supp. 2d at 471.

nary meaning of quenched and that nothing in the patents limited the cooling medium to a liquid instead of air. *Id.* Valois now argues that the district court should have construed quenching as "rapid cooling by immersion in a cooling medium." Valois Br. 51.[7]

As noted by the district court at the claim construction stage, "[t]he term 'immersion' is immaterial because the tube can either be immersed in either air or water; the cooling medium restriction is the material argument set forth by Valois." *Claim Op.* at 541 n.1. We agree with the district court that "quenching" is not limited to "rapid cooling by immersion into a cooling liquid" but encompasses rapid cooling "by any cooling medium." *Id.* at 541. Despite Valois's protests, there is no dispute that the "New" tube is "immersed" in air; Valois's dispute is over whether the air in the tank is a "cooling medium," an issue relevant to infringement, not claim construction. We therefore affirm the court's construction of "quenched" as "rapidly cooled."

B. Infringement

On appeal from a bench trial, this court reviews the district court's conclusions of law de novo and findings of fact for clear error. *Brown & Williamson Tobacco Corp. v. Philip Morris Inc.*, 229 F.3d 1120, 1123 (Fed. Cir. 2000). A determination of infringement, whether literal or under the doctrine of equivalents, is a question of fact and is

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[7] On appeal, Valois also argues that the district court "redefined" the term "quenched" post-trial. Valois Br. 53. We are not persuaded. The court was merely comparing different examples of quenching in its infringement analysis and providing further support of its decision to credit MWV's expert over Valois's, not adopting a new construction of the term "quenched." *See Trial Op.* at 46.

reviewed under the clearly erroneous standard. *Golden Blount, Inc. v. Robert H. Peterson Co.*, 365 F.3d 1054, 1058 (Fed. Cir. 2004).

Applying the construction of quenched used at trial, "rapidly cooled," we find no clear error in the district court's finding of infringement.

Valois's primary argument is that the "New" tube is "freely extruded into warm ambient air," Valois Br. 52, and cools substantially more slowly than the quenching process disclosed in the '132 patent.

First, we reject Valois's position that the air surrounding the extruded tube is merely "warm ambient air." As discussed above, Valois's "New" tube is extruded and then passed through a "'cooling tank,' which uses a constant flow of chilled water that removes heat from the tube via the air in the tank." *Summ. J. Op.*, 809 F.Supp.2d at 471. We also note that although the air in the tank is hotter than ambient air, the water used in the quenching process disclosed in the '132 patent is kept at 80°F to 90°F. '132 patent col. 5 ll. 7-17. This is essentially the same temperature as the air in Valois's chamber.

Second, we note that "rapidly cooled" does not require a specific cooling rate. *Trial Op.* at 47. We see no clear error in the district court's conclusion that a tube is "rapidly cooled" when it cools from a temperature of 500 degrees to 75 degrees in 3.5 seconds. *Summ. J. Op.*, 809 F. Supp. 2d at 481 (denying Valois's motion for summary judgment of noninfringement).

Because Valois has failed to point to any clear error in the district court's infringement analysis regarding "quenching," we affirm the court's finding that Valois's "New" tube infringes claims 15 and 19 of the '132 patent.

III. Transparency

Claim 15 requires a tube having "a transparency of about 80% or more." Valois argues that the district court erred in construing the term "transparency" and that under Valois's proposed construction MWV did not prove infringement. Valois Br. 55-56.

Valois argues that "transparency" should be construed as "a measurement of the percent transmission of light having a wavelength of 500 microns passing through a 3 mm thick sample," based on an alleged definition in the specification. *Claim Op.*, 807 F. Supp. 2d at 542; '132 patent col. 4 ll. 33-36. The district court rejected Valois's argument and construed "transparency" using the Cambridge Dictionary of American English's definition of the adjective "transparent," to wit, "allowing visible light through so that objects can be clearly seen through it." *Claim Op.*, 807 F. Supp. 2d at 542.

MWV defends the district court's plain meaning construction and accuses Valois of attempting to limit the claims to a specific embodiment. *See Phillips*, 415 F.3d at 1323.

We agree with MWV that the '132 patent does not define transparency, and that the district court correctly construed the term using its plain meaning. *See Claim Op.,* 807 F. Supp. 2d at 542 (finding that the court's construction "is the ordinary and plain meaning of the term."). The passage of the specification cited by Valois is not a special definition. The passage refers to "one embodiment" of the dip tube, and other portions of the specification discussing transparency are not tied to Valois's purported definition. *Compare* '132 patent col. 4 l. 33 ("according to one embodiment") *with* col. 2 ll. 5-17 (discussing "substantially transparent" perfume containers) *and* col. 5 ll. 6-25 (discussing "high transparency" tubes).

Because the district court did not err in construing the term "transparency," we need not address Valois's noninfringement arguments based on its overly narrow construction.

IV. XRD Crystallinity

Claim 15 requires a fluoropolymer tube "having an XRD crystallinity not greater than about 13%." A brief discussion of X-ray diffraction (XRD) crystallinity is necessary to understand Rexam's infringement arguments.

XRD testing is one method of measuring the crystalline content of a material. An XRD test is conducted by striking a sample of the material with a monochromatic X-ray beam and examining the pattern of X-rays formed on a detection surface as the X-rays are scattered by the electrons of the atoms within the sample. The X-ray scattering is dependent on the atomic arrangement within the sample, and a more ordered pattern indicates a more ordered atomic structure. X-rays that diffract off of a crystalline polymer produce a ring-like pattern on the detection surface. X-rays that diffract off of an amorphous, or noncrystalline, structure appear as a "relatively broad amorphous 'halo'" on the detection surface. *Trial Op.* at 18. The crystalline content of the polymer is then measured by comparing the relative intensities of the diffraction patterns.

The construction of the terms "XRD crystallinity" and "crystalline content" is not in dispute. Rexam and MWV stipulated to construing the XRD terms as "crystallinity as measured by x-ray diffraction (XRD) using at least the XRD characterization parameters identified in the '132 patent at column 4, line 66 to column 5, line 6." *Claim Op.*, 807 F. Supp. 2d at 543. The parameters referenced in the patent are:

> Voltage: 45 kV, Current: 40 mA, XRD Machine: Bruker D8 Discover w/Gadds Detector, 0.3 mm slit, 0.3 mm collimation, Cu Radiation, Goebel Mirror (parallel beams), 0.5 mm oscillation along tube length, 5 frames (~15°/frame), 72 seconds/frame, Omega=7°, midpoint for detection frames=14°, 29°, 44°, 59°, 74°.

'132 patent col. 5 ll. 1-6. The parties agree that the parameters listed in the '132 patent are inadequate to fully describe an XRD test. For example, "[t]he patent specification does not provide the sample-to-detector distance, nor does it specify the software for the analysis of the XRD data and the calculation of the XRD crystallinity." *Trial Op.* at 22.

At trial on the issue of infringement, Rexam and MWV engaged in a battle of the experts on XRD crystallinity. Rexam's expert, Dr. Ortega, placed his samples 15 cm away from the XRD detector and used the TOPAS software to analyze his results. *Trial Op.* at 38. MWV's expert, Dr. Reibenspies, placed his samples 5 cm away from the XRD detector and used the GADDS Full Method software to analyze his results. *Trial Op.* at 41. Unsurprisingly, the experts arrived at different conclusions. Dr. Reibenspies found that Rexam's V1 and V2 tubes had an XRD crystallinity of 8 to 9%, and therefore infringed the '132 patent. Dr. Ortega opined that the crystallinity was 23 to 24%, and therefore concluded Rexam did not infringe the '132 patent. *Trial Op.* at 38, 41.

On appeal, Rexam argues that the district court erred in allowing testimony from MWV's expert, Dr. Reibenspies, because he did not follow all of the testing parameters set forth in the '132 patent. Rexam also argues that the court erred in finding infringement based on Dr. Reibenspies's testimony. Finally, Rexam argues that the XRD crystallinity terms, as construed, are indefinite. We

address Rexam's first two arguments below. Indefiniteness is addressed at Part V, *infra*.

A. Expert Testimony

Rexam asked the district court to exclude infringement testimony from Dr. Reibenspies. *MeadWestVaco Corp. v. Rexam PLC,* 1:10-cv-511, ECF No. 411 (E.D. Va. Aug. 22, 2011) (Rexam Mot. to Exclude). The court allowed the testimony, finding it "relevant and admissible." J.A. 7712. Here, Rexam argues again that this testimony should have been excluded because Dr. Reibenspies did not follow all of the XRD parameters listed in the '132 patent. Therefore, according to Rexam, his testimony is legally irrelevant to proving infringement. Rexam Br. 55; s*ee also* Rexam Mot. to Exclude 3 (citing cases precluding testimony which tends to contradict a court's claim construction). MWV counters that any differences between Dr. Reibenspies's testing and the claims goes to proof of infringement, not admissibility. MWV Br. 59.

Evidentiary rulings are reviewed under the law of the regional circuit. *Advanced Cardiovascular Sys., Inc. v. Medtronic, Inc.*, 265 F.3d 1294, 1308 (Fed. Cir. 2001). In the Fourth Circuit, the denial of an evidentiary motion in limine is reviewed for abuse of discretion. *United States v. White*, 405 F.3d 208, 212 (4th Cir. 2005); *Malone v. Microdyne Corp.*, 26 F.3d 471, 480 (4th Cir. 1994) (reviewing ruling on motion in limine for abuse of discretion).

We agree with MWV that Rexam's arguments go to infringement and not admissibility. Dr. Reibenspies's testimony was not an attempt to apply a new claim construction to the XRD crystallinity terms. Dr. Reibenspies opined that using his testing parameters, which differed slightly from the claim construction, he was able to conclude that the V1 and V2 tubes infringed the '132 patent when applying the court's construction. Dr. Reibenspies's deviations from the claim construction, discussed in more detail below, gave Rexam an opportunity to cast doubt

upon his infringement conclusions, which Rexam did through cross-examination and opposing expert testimony. But it did not make Dr. Reibenspies's testimony legally irrelevant. Rexam does not raise any other basis for excluding Dr. Reibenspies's testimony. Because Rexam failed to show that the district court abused its discretion in allowing Dr. Reibenspies to testify, we affirm the court's denial of Rexam's motion to exclude.

B. Infringement

Rexam's noninfringement case centered solely on the XRD crystallinity limitation. The district court found that Rexam's V1 and V2 tubes had an XRD crystallinity of less than 13%, and therefore infringed claims 15 and 19 of the '132 patent. *Trial Op.* at 57.

As discussed above, the XRD crystallinity limitation came down to a battle of the experts. The district court credited MWV's expert and found Rexam's expert unreliable. *Trial Op.* at 39-40. The trial court is given "broad discretion in determining credibility because the court saw the witnesses and heard their testimony." *Energy Capital Corp. v. United States*, 302 F.3d 1314, 1329 (Fed. Cir. 2002). Rexam makes no effort to dislodge the court's credibility findings. Instead, Rexam urges us to disregard Dr. Reibenspies's testimony as legally irrelevant to infringement. We decline to do so.

The court found that Dr. Reibenspies did not use the 0.3 mm slit, Goebel mirror or oscillator as required by the claim construction. *Trial Op.* at 41. At trial, Rexam cross-examined Dr. Reibenspies on each of differences between his test protocol and the claims. The testimony revealed that Dr. Reibenspies used alternate equipment to mimic the results achieved by claim parameters. For example, the combination of the 0.3 mm slit and Goebel mirror produce parallel X-ray beams 0.3 mm apart. Dr. Reibenspies used a graphite monochromator with a fixed slit to produce the same X-ray arrangement. *See* MWV

Br. 56 (citing Dr. Reibenspies's testimony); *Trial Op.* at 42. The same is true with regard to oscillation. Dr. Reibenspies's XRD machine did not have an oscillator, so he manually repositioned the samples to mimic oscillation. *Trial Op.* at 41.

The court found that Dr. Reibenspies's testing "deviations were insignificant and could not have substantially affected the test results." *Trial Op.* at 42. Rexam counters that "MWV presented no evidence quantifying how much the differences impacted the XRD crystallinity results." Rexam Reply Br. 12. While it is true that MWV did not quantify the differences, MWV did present testimony that Dr. Reibenspies's protocol "would have had only a minor effect on the test results." *Trial Op.* at 42. The court credited this testimony as "reasonable," *id.*, and Rexam has not pointed to any clear error in that conclusion. We find no reversible error in the district court's analysis, and therefore affirm the finding of infringement.

V. Indefiniteness

Rexam and Valois moved for summary judgment of indefiniteness based on the terms "XRD crystallinity" and "quenched," respectively. The district court denied both motions, stating that "Plaintiff's patent is not indefinite as a matter of law . . . ." *Summ. J. Op.*, 809 F. Supp. 2d at 478 (XRD crystallinity), 484 (quenched).

The district court's holding that the "patent is not indefinite as a matter of law" can be interpreted in one of two ways. First, the court could mean that the moving party failed to meet the summary judgment standard. In other words, they failed to show that the patents were "indefinite as a matter of law." On the other hand, the court could mean that "as a matter of law the claims are not indefinite," sua sponte granting summary judgment of definiteness in favor of MWV.

We construe the court's denial of Rexam's motion for summary judgment of indefiniteness as a denial for the failure to meet the summary judgment standard. The court listed six reasons for its ruling on this point, the concluding one being that "there are material issues of fact remaining for the jury, and it will be the finder of fact's responsibility to determine whether there was sufficient information to test for crystallinity." *Summ. J. Op*. at 477-78.[8]

This reading is also supported by the parties' summary judgment briefing on the issue. MWV's Brief in Opposition Summary Judgment begins by noting "MWV need only show that there are genuine issues of material fact which would preclude a finding by this Court that the patents are indefinite as a matter of law." *MeadWestVaco Corp. v. Rexam PLC*, No. 1:10-cv-511, ECF No. 318 at 7 (E.D. Va. June 27, 2011) (MWV Br. in Opp. to Summ. J. by Rexam). MWV's argument section begins with the statement that "[t]here is no question that there are disputed facts . . . that preclude summary judgment." *Id*. at 16. MWV's conclusion contains a similar statement. *Id*. at 33 ("[T]here are numerous genuine fact issues that

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[8] We also note that the district court seems to have relied heavily on the proposition that the claims "are amenable to construction because the parties have already stipulated to their meaning." Summ. J. Op., 809 F. Supp. 2d at 478-480. This is not an accurate statement of our law on indefiniteness. "The fact that [a patentee] can articulate a definition supported by the specification . . . does not end the inquiry. Even if a claim term's definition can be reduced to words, the claim is still indefinite if a person of ordinary skill in the art cannot translate the definition into meaningfully precise claim scope." *Halliburton Energy Servs., Inc. v. M-I LLC*, 514 F.3d 1244, 1251 (Fed. Cir. 2008).

preclude a finding that Rexam has met its heavy burden of proving indefiniteness as a matter of law.").

We reach the same resolution regarding the court's denial of Valois's motion for summary judgment. Here, the court again stated that "Plaintiffs' patent is not indefinite as a matter of law . . . ." *Summ. J. Op.*, 809 F. Supp. 2d at 484. The court identified four reasons for denying the motion "after viewing the evidence in the light most favorable to the nonmovant." *Id.* MWV, not Valois, was the nonmoving party. If the court were sua sponte granting summary judgment to MWV, it would have been legally erroneous to view the facts in favor of MWV. Thus, we can only conclude that the court again found that Valois failed to meet the summary judgment standard and left the issue open for trial.[9]

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[9] Regardless of waiver, on appeal, Valois's primary argument in support of indefiniteness is that the district court's construction "'does not restrict the actual cooling rate or cooling medium.'" Valois Br. 60 (quoting *Trial Op.* at 47). The district court however is not required to place a numerical limit (i.e., a cooling rate) on the claims where it is not warranted by the specification. *Exxon Research & Eng'g Co. v. United States*, 265 F.3d 1371, 1381 (Fed. Cir. 2001). Similarly, the court correctly declined to limit the "cooling medium" because the specification did not so require. Valois's surprise that its design-around failed does not render the claim indefinite. *SmithKline Beecham Corp. v. Apotex Corp.,* 403 F.3d 1331, 1340-41 (Fed. Cir. 2005) ("The test for indefiniteness does not depend on a potential infringer's ability to ascertain the nature of its own accused product to determine infringement, but instead on whether the claim delineates to a skilled artisan the bounds of the invention.").

Although the parties proffered Findings of Fact and Conclusions of Law suggesting that the indefiniteness issue was final, the district court did not adopt those findings. Following the bench trial, the district court never entered final judgment on the issue of indefiniteness, suggesting that it believed the matter was not pursued by either party during trial and was abandoned. At the summary judgment stage, MWV clearly believed there were issues to be resolved by the fact-finder, and the district court appeared to agree. Because it is improper to appeal a denial of summary judgment, *see, e.g., Glaros v. H.H. Robertson Co.*, 797 F.2d 1564, 1573 (Fed. Cir. 1986) ("a denial of summary judgment is not properly reviewable on an appeal from the final judgment entered after trial"), we conclude that Rexam and Valois waived the issue of indefiniteness by failing to raise it at the bench trial.

CONCLUSION

For the reasons set forth above, we vacate the district court's grant of summary judgment of nonobviousness; affirm the district court's claim constructions, denial of Rexam's motion to exclude, and findings of infringement; find that indefiniteness was waived; and remand for further proceedings consistent with this opinion.

AFFIRMED-IN-PART, VACATED-IN-PART, AND REMANDED