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Muddy Waters: Infringement Analysis
After Markman and Warner-Jenkinson

Clyde F. Willian & Joseph S. Miller *

Introduction

A patent grants a property interest in the classical sense: it gives its owner the power to exclude others.1 As a result, one cannot resolve any patent infringement dispute without first marking out the "territory" over which the patentee can exercise this power to exclude. After the scope of the patent claim has been established, one can determine whether the accused infringer has "trespassed" on it, i.e., practiced the invention circumscribed by the claim.

The Federal Circuit recently summarized the accepted framework for analyzing the question of infringement as follows:

An infringement analysis requires two separate steps. First, the court must construe the claims asserted to be infringed as a matter of law in order to establish their meaning and scope. Second, the claims as construed are compared to the allegedly infringing device or process. To literally infringe, the accused device or process must contain every limitation of the asserted claim. Even if the accused device or process does not literally infringe, it may infringe under the doctrine of equivalents if the differences between the claimed invention and the accused device or process are insubstantial.2

Of course, this method of analysis is far easier to describe than to apply. Indeed, one cannot reliably determine whether a given product or process

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1 "The power to exclude has traditionally been considered one of the most treasured strands in an owner's bundle of property rights." Loretto v. Teleprompter Manhattan CATV Corp., 454 U.S. 419, 435 (1982). See also Morris R. Cohen, Property and Sovereignty, 13 CORNELL L.Q. 8, 12 (1927) ("the essence of private property is always the right to exclude others"); Guido Calabresi & A. Douglas Melamed, Property Rules, Liability Rules, and Inalienability: One View of the Cathedral, 85 HARV. L. REV. 1089, 1092 (1972).

infringes a particular patent without referring to the extensive body of case law that applies this analytic framework.

The last three years have made it all the more important to keep up with case law developments on the fundamentals of infringement analysis, for we have been cursed to live in "interesting times." Specifically, two basic elements of the infringement analysis framework—claim construction and the doctrine of equivalents—have undergone enormous scrutiny since early 1995. Both the Federal Circuit (sitting in banc) and the U.S. Supreme Court have struggled with the questions whether the construction of a patent claim presents a question of law or fact, and whether the doctrine of equivalents infringement should survive and, if so, in what form. The question of claim construction arose in the case now known as Markman, and the continued viability of the doctrine of equivalents was the subject of the case now known as Warner-Jenkinson. The courts' decisions on these fundamental questions will continue to have a profound affect on the trial of patent cases and on the advice we give to our clients.

We have three objectives in this paper. First, we discuss the backgrounds of these two important cases, including the splits of authority that brought about the need for comprehensive consideration of the issues of claim construction and the nature of the doctrine of equivalents. Second, we discuss the outcomes of the cases and the questions that they have answered. Third, we discuss some of the many questions that the decisions either left unresolved or raised themselves. Taking the issues in logical order, we first discuss claim construction, then the doctrine of equivalents.

I. Claim Construction

A. Fact or Law?

The scope of the patent claim determines the outer boundaries of the area that the patentee can protect in an action for literal infringement. That scope is a function of the specific terms used in the claim, and the standard rules used to resolve disputes about the meaning of claim terms are familiar. Claim terms have their ordinary meaning, unless it is clear from the written description of the invention preceding the claims, known as the "specifica-

tions,” that the patentee intends for a given term to have a special meaning. Indeed, the patentee’s right to define his or her own claim terms is one of the reasons that the specification must be used to construe the claim, no matter how clear the claim appears to be on its face. Other claims in the same patent should be consulted for any guidance they may provide as to the best interpretation of a disputed term. Finally, the public record of the applicant’s negotiations with the Patent Office, called the “prosecution history” or “file history,” can also help to determine what claim terms mean.

The goal of the claim construction process is, of course, to determine what the claim means to an artisan of ordinary skill in the relevant field. Although this presents an “objective” question, like the familiar “reasonable person” standard in tort law, one can readily see that a particular artisan’s subjective opinion testimony about the meaning of the claim might be helpful to the judicial actor who must construe the claim. Not surprisingly, expert witness testimony has long been a regular fixture in patent infringement trials. And this is the germ of the conflict that ultimately led to the Markman case.

As a practical matter, one can see that claim construction involves both legal interpretation and fact finding. The patent is a legal document, like a statute or a contract, but at the same time it is grounded in facts about a particular technological domain. Patent interpretation, like the patent itself, is thus a hybrid of law and fact, and the hybrid nature of patent interpretation inevitably causes systemic tensions. First, we allocate decisional authority at trial based on the law/fact distinction (juries find facts, judges declare law), and claim construction does not fit easily into either category. Second, under the U.S. Constitution’s Seventh Amendment, the jury’s fact-finding role has constitutional significance. As a result, the proper allocation of decisional

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5 Bell Communications Research, Inc. v. Vitalink Communications Corp., 55 F.3d 615, 621 (Fed. Cir. 1995) (“While nothing within claim 6 considered in isolation impeaches the construction that Vitalink prefers, it is legal error to construe a claim by considering it in isolation. A claim must be read in view of the specification of which it is a part.”).

6 For example, according to an interpretive principle known as “claim differentiation,” one should avoid interpreting a term in an independent claim in a way that makes a related dependent claim superfluous. See, e.g., Transmatic, Inc. v. Gulton Indus., 53 F.3d 1270, 1277 (Fed. Cir. 1995). In addition, a claim term must be construed the same way in each claim in which it appears. See, e.g., CVI/Beta Ventures, Inc. v. Tura LP, 112 F.3d 1146, 1159 (Fed. Cir. 1997).

7 The Seventh Amendment provides that “[i]n suits at common law... the right to trial by jury shall be preserved, and no fact tried by a jury shall be otherwise reexamined in any Court of the United States, than according to the rules of the common law.” U.S. Const., amend. VII.
authority over claim construction presents a constitutional question. Third, appellate judges apply very different standards of review to findings of fact and to conclusions of law: findings of fact are reviewed quite deferentially on appeal and thus are rarely disturbed, whereas conclusions of law are given plenary, or "de novo," review and thus are often modified on appeal. Again, claim construction does not fit easily within either standard of appellate review.

Every patent infringement case in which an expert witness plays an important role in the claim construction phase highlights the awkwardness of treating claim construction as a matter of law exclusively for the court. So it should come as no surprise that, prior to the Markman case, a fault line had developed in the Federal Circuit's cases on claim construction's status as a question of fact or law. Although all cases treated the "ultimate question" of claim construction as a question of law, one line of cases treated the entirety of the claim construction process as a question of law exclusively for the court, and a conflicting line of cases treated the meaning of a disputed claim term as an underlying question of fact for the jury. In November 1993, the Federal Circuit ordered that the Markman case be reheard in banc in order to resolve the conflict between these two lines of authority.

B. Markman

Markman alleged that Westview's invoicing system infringed his patent for an inventory control device capable of monitoring and reporting upon the location of articles of clothing in a dry cleaning or laundry establishment. The case turned on the interpretation of the terms "report" and "inventory" in the patent claims. At trial, Markman presented an expert witness who testified that "report" meant "invoice," and that "inventory" meant "cash or invoices." The jury returned a verdict of infringement in Markman's favor, but the district court set the verdict aside on a deferred motion for directed

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9 See, e.g., Palumbo v. Don-Joy Co., 762 F.2d 969, 974 (Fed. Cir. 1985) (reversing grant of summary judgment of noninfringement) ("If the language of a claim is not disputed, then the scope of the claim may be construed as a matter of law. But when the meaning of a term in the claim is disputed and extrinsic evidence is necessary to explain that term, then an underlying factual question arises, and construction of the claim should be left to the trier or jury under appropriate instruction."); McGill Inc. v. John Zink Co., 736 F.2d 666, 672 (Fed. Cir.), cert. denied, 469 U.S. 1037 (1984).
verdict. Concluding that claim construction was a matter of law for the court, the trial judge rejected the definitions of key claim terms advanced by Markman's expert witness:

These definitions are contrary to the ordinary and customary meaning of these terms, as well as the obvious meaning intended by the patentee, determined from the specifications, the drawings and the file histories of the original patent and the patent-in-suit. . . . Plaintiff's technical expert's testimony is based on an artificial interpretation of key words and phrases . . . .

The fact of noninfringement followed readily from the claim construction adopted by the district court, and judgment was entered in Westview Instruments' favor.

By a vote of 8 to 3, the Federal Circuit affirmed the district court's decision. First, the court overruled prior Federal Circuit cases that treated any aspect of claim construction as a question of fact, holding that "the court has the power and obligation to construe as a matter of law the meaning of language used in the patent claim." Second, the court allowed that "extrinsic evidence" (i.e., expert and inventor testimony, dictionaries, learned treatises) "may be helpful to explain scientific principles, the meaning of technical terms, and terms of art that appear in the patent and prosecution history," and left it within the trial court's discretion to receive these types of evidence. The court also warned, however, that such "[e]xtrinsic evidence is to be used for the court's understanding of the patent, not for the purpose of varying or contradicting the terms of the claims." Finally, the court suggested that the trial court should construe the claims early on in the case, and certainly before sending the question of infringement to the jury. Two concurring opinions and one dissent criticized the majority's decision in the strongest possible terms and on a number of fronts.

The sharp disagreement among the Federal Circuit's judges on so fundamental a question of patent law virtually guaranteed that the U.S. Supreme Court would agree to review the case, and it did so in mid-1995. Turning aside Markman's claim to a Seventh Amendment right to have a

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11 Id. at 1537.
12 Markman, 52 F.3d at 979; see also id. at 981 ("The district court's claim construction, enlightened by such extrinsic evidence as may be helpful, is still based upon the patent and prosecution history. It is therefore still construction, and is a matter of law subject to de novo review.").
13 Id. at 980.
14 Id. at 981.
15 Id. at 981-82 ("the trial court . . . should have instructed the jury as to the meaning of the claims").
jury, rather than a judge, determine the meaning of disputed terms in his patent claims, the Supreme Court affirmed the Federal Circuit’s decision in April 1996. According to the Supreme Court, “the construction of a patent, including terms of art within its claim, is exclusively within the province of the court.” The Court determined that, as an initial matter, existing case law did not clearly demonstrate that Markman was entitled under the Seventh Amendment to have a jury interpret his patent claims. Next, it looked to two practical considerations, such as the relative interpretive skills of judges and juries and the statutory policies that ought to be furthered. Several factors favored giving the task of claim construction to the judge: (a) judges often construe written instruments, and so have more experience with the task than juries; (b) even though juries historically have been entrusted with credibility determinations, a judge “is in the better position to ascertain whether an expert’s proposed definition [for a disputed claim term] fully comports with the specification and claims and so will preserve the patent’s internal coherence”; and (c) treating claim construction as a question of law promotes the necessary “uniformity in the treatment of a given patent.” As a result, the Court affirmed the Federal Circuit’s decision.

16 Markman, 116 S. Ct. at 1387.
17 Id. at 1389-93.
18 Id. at 1395-96. This “question of law”/uniformity link results from the interaction of two other features of the system. First, one court—the Federal Circuit—decides appeals from all patent infringement cases. Second, the “plenary review” standard that applies to legal determinations allows the Federal Circuit to resolve conflicting decisions in two or more infringement cases on the same patent in different district courts. Consider the following hypothetical:

The patentee brings suit in two different district courts against two different infringers who sell identical products. One accused infringer offers a highly persuasive expert witness in favor of his claim construction, and the other accused infringer offers a far less persuasive expert. The jury who hears the highly reputable witness finds in favor of the accused infringer, whereas the other jury finds in favor of the patentee. Because the accused products in the two cases are identical, we know that the juries’ inconsistent interpretations of the claim are causing the inconsistent verdicts. Both cases are appealed. Will both verdicts be affirmed? Should both verdicts be affirmed?

If the Federal Circuit were to review claim construction like a factual finding, both verdicts would be affirmed. The two juries heard different evidence on the proper construction of the claim and their respective decisions are both supported by substantial evidence. Note the perversity of this result: the same patent claim has two mutually inconsistent meanings. If, however, the Federal Circuit were to review claim construction like a legal determination, subject to plenary review, one proper meaning would be determined for the claim and applied to both cases. As a result, the claim would have the same meaning for all accused infringers.
By emphasizing the primary importance of the patent documents themselves in the claim construction process, as well as the need for a single meaning for a patent claim and the subservience of expert testimony to the overriding goal of preserving "the patent's internal coherence," the Supreme Court clearly sought to increase the predictability of patent infringement determinations. As the Court recognized in the course of its Markman decision,

the limits of a patent must be known for the protection of the patentee, the encouragement of the inventive genius of others and the assurance that the subject of the patent will be dedicated ultimately to the public. Otherwise, a zone of uncertainty which enterprise and experimentation may enter only at the risk of infringement claims would discourage invention only a little less than unequivocal foreclosure of the field, and the public would be deprived of rights supposed to belong to it, without being clearly told what it is that limits these rights.\(^2\)

Only the passage of time will reveal whether infringement determinations become more predictable as a result of treating claim construction as a matter of law exclusively for the court. We can, however, already see some changes in the wake of the Markman decisions.

C. Post-Markman Developments

I. Earlier Claim Construction

Trial courts have started to take up the task of claim construction at earlier stages of patent litigation. Prodded by the Federal Circuit's statement in Markman that the trial court "should have instructed the jury as to the meaning of the claims," as well as similar statements in subsequent Federal Circuit cases,\(^2\) district courts have shown a willingness to settle disputes about the meaning of critical claim terms in advance of the trial itself, rather than postponing the determination until the close of the evidence at trial.

In particular, at the request of litigants, many district courts have held separate pre-trial "Markman hearings" to resolve disputed claim construction issues. These mini-trials on claim construction typically involve short (e.g., one to two days) presentations by each side as to the correct meaning

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19 See id. at 1395 ("In the main, we expect, any credibility determinations [about the experts who testify in a given patent case] will be subsumed within the necessarily sophisticated analysis of the whole document, required by the standard construction rule that a term can be defined only in a way that comports with the instrument as a whole.") (emphasis added).

20 Id. at 1396 (internal quotations, additions, and citations omitted).

21 See, e.g., Exxon Chem. Patents, Inc. v. Lubrizol Corp., 64 F.3d 1553, 1554 (Fed. Cir.) ("The duty of the trial judge is to determine the meaning of the claims at issue, and to instruct the jury accordingly."), cert. denied, 116 S. Ct. 2554 (1996).
of the claim, as well as written and/or oral submissions from expert witnesses and post-hearing briefing. On the basis of the information adduced and the arguments made at the Markman hearing, the district court enters a decision on claim scope. At this point, the litigants and the court can better assess whether to proceed with the remainder of the infringement trial and, if so, whether any given information is relevant to the remaining issues in dispute.

We can also expect more patent infringement cases to be resolved in summary judgment proceedings. Disputed issues of fact pertaining to the accused product or process will still require trial, but, after Markman, it is clear beyond doubt that disputes as to the meaning of claim terms do not require trial. As the Federal Circuit has recently held, where the only matter genuinely in dispute is the meaning of a claim term, "the question of literal infringement collapses to one of claim construction and is thus amenable to summary judgment."23

2. Preliminary Injunction Proceedings

To obtain a preliminary injunction against continuing infringement, the patentee must show, inter alia, a likelihood of success on the merits of the infringement allegation. Of course, the likelihood of the patentee's success is largely a function of the district court's construction of disputed claim terms. The question arises, then, whether claim construction's status as a matter of law would require the district court to construe the asserted claim definitively at the preliminary injunction stage.

The arguments on both sides of the issue are straightforward. On the one hand, since the district court must resolve other legal questions definitively when ruling on a motion for preliminary injunction (e.g., the legal elements of the underlying cause of action), it makes sense to require the district court to resolve claim construction issues definitively in that same context. On the other hand, if claim construction presents especially difficult technological


23 Athletic Alternatives, Inc. v. Prince Mfg., 73 F.3d 1573, 1578 (Fed. Cir. 1996); see also Phonometrics, Inc. v. Northern Telecom Inc., 133 F.3d 1459 (Fed. Cir. 1998) ("Disputes concerning the meaning of claims do not preclude summary judgment, because the resolution of those disputes is part of the process of claim interpretation, a question of law.").
questions, and the district court wants to receive more extrinsic evidence to hone its understanding of the underlying technology, it does not seem improper for the court to deny a preliminary injunction on the ground that the patentee has not shown the clear entitlement that this drastic form of relief requires.

The Federal Circuit squarely addressed this question in its March 1997 decision in International Communication Materials, Inc. v. Ricoh Company, Ltd.24 The district court denied Ricoh's motion for a preliminary injunction, in part because, in its view, "there are substantial open issues and questions that must be litigated before a finding of infringement can be made, including claim interpretation."25 Ricoh appealed, contending that it was improper for the court to delay arriving at a definitive claim construction. The Federal Circuit disagreed:

It seems to us that where a district court judge, as in the present case, acknowledges that "there are substantial open issues and questions that must be litigated" pertaining to claim construction and has made a determination that the movant is unlikely to succeed on the merits (prove infringement), our role as an appellate court, absent an abuse of discretion, should be to provide the district judge and parties the opportunity to complete the picture. We do not regard it as our function under these circumstances to definitively construe claim 1 of the '603 patent, or to review as if from final judgment the district court's tentative construction without the more complete record that the district court deemed necessary to its own final decision.26

In other words, district courts are permitted to arrive at and act upon a "tentative construction" of the claim.

The Federal Circuit's reasoning in the Ricoh case raises the interesting possibility of a claim construction that changes over the life of the patent suit. Consider the following scenario: A district court grants a patentee's motion for a preliminary injunction on the basis of a tentative claim construction. On appeal, the Federal Circuit sustains that preliminary injunction and, by inference, the tentative claim construction. Later, as the litigation proceeds, the district court no longer adheres to that tentative claim construction, but instead definitively construes the claim in a way that precludes infringement and enters judgment in the defendant's favor. Will this judgment also be affirmed on appeal? It may or may not be, depending on whether the Federal Circuit agrees with the district court's definitive claim construction. In any event, under the logic of Ricoh, the fact that the Federal Circuit sustained the preliminary injunction against the accused infringer is not a "law of the case"

24 108 F.3d 316 (Fed. Cir. 1997).
25 Id. at 313 (quoting district court's decision).
26 Id. at 318-19.
that would preclude judgment in the defendant's favor on the basic question of infringement.

Ramifications of the *Markman* decision, such as the one explored in the *Ricoh* case, will no doubt occupy the Federal Circuit for some time to come.

3. *Canons of Claim Construction*

As we noted above, in *Markman* both the Federal Circuit and the Supreme Court emphasized the patent's status as a legal document in deciding to leave its construction entirely to the trial judge. Indeed, the Federal Circuit went so far as to make an extended comparison between a patent and a statute:

Statutes, like patents, are enforceable against the public, unlike private agreements between contracting parties. When interpreting statutes, a court looks to the language of the statute and construes it according to the traditional tools of statutory construction, including certain well known canons of construction. A court may also find it necessary to review the legislative history of the statute, which is itself a matter of public record, just as the specification and prosecution history of a patent are public records. While a court may seek from the public record to ascertain the collective intent of Congress when it interprets a statute, the subjective intent of any particular person involved in the legislative process is not determinative. . . . Similarly, the subjective meaning that a patentee may ascribe to claim language is also not determinative. Thus, it is from the public record that a court should seek in a patent infringement case to find the meaning of claim language.27

The court's analogy reinforces the principle established earlier in its opinion, and echoed by the Supreme Court, that patent claims must be construed primarily by reference to the public patent record that is available to everyone, rather than by reference to the testimony of an expert who is unknown before the trial, or the self-serving testimony of the inventor.28

Under this document-focused regime, general canons of claim construction are likely to play an increasingly important role.

New canons of claim construction have begun to appear in the Federal Circuit's decisions. For example, two cases from 1996 follow a rule akin to *contra proferentum*, according to which an ambiguous contract provision is

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27 *Markman*, 52 F.3d at 987 (internal citations omitted).

28 *Id.* at 981 (“Extrinsic evidence is to be used for the court's understanding of the patent, not for the purpose of varying or contradicting the terms of the claims.”); *see also Markman*, 116 S. Ct. at 1395 (an expert's testimony must "fully comport[] with the specification and claims and [thus] preserve the patent's internal coherence"); *Bell & Howell Document Management Prods. v. Altek Sys.*, 132 F.3d 701, 45 U.S.P.Q.2d (BNA) 1033, 1038 (Fed. Cir. 1997) (“Patents should be interpreted on the basis of their intrinsic record, not on the testimony of such after-the-fact ‘experts’ that played no part in the creation and prosecution of the patent.”).
construed against the drafter. In Athletic Alternatives, Inc. v. Prince Mfg., Inc., the first such decision, the court exhaustively analyzed the claim language, the written description of the invention, and the patent’s prosecution history. It concluded that “neither the claim, the specification, nor the prosecution history establishes[d] the meaning of the” disputed phrase. To break the tie between the equally plausible claim interpretations with which it was confronted, the court took guidance from the public notice function embodied by the requirement, found at 35 U.S.C. § 112, ¶ 2, that the patentee particularly point out and distinctly claim the invention. According to the Federal Circuit, “[w]here there is an equal choice between a broader and a narrower meaning of a claim, and there is an enabling disclosure that indicates that the applicant is at least entitled to a claim having the narrower meaning, we consider the notice function of the claim to be best served by adopting the narrower meaning.”

The Athletic Alternatives rule has been applied again in at least one subsequent Federal Circuit case, Ethicon Endo-Surgery, Inc. v. United States Surgical Corp. In Ethicon, the court construed the disputed claim narrowly on the ground that “a patent claim may be interpreted only as broadly as its unambiguous scope,” citing Athletic Alternatives. Other canons of claim construction are sure to follow.

4. The Changing Role of the Expert Witness

In Markman, the Supreme Court acknowledged that claim construction has been, and will remain, “a mongrel practice.” It involves both law and fact. Giving all aspects of claim construction to the courts probably has increased the predictability of patent infringement determinations, at least as to literal infringement, because judges are at least marginally (if not significantly) more likely than jurors to accord primary importance to the publicly available patent record.

Of course, no amount of judicial control over claim construction, and no amount of aspiration for a process that resolves claim construction disputes entirely on the basis of the paper record, can remove the expert witness from the courtroom. Why not? Because, at a minimum, generalist judges will

29 See, e.g., Lippo v. Mobil Oil Corp., 776 F.2d 706, 714-15 (7th Cir. 1985).
30 73 F.3d 1573 (Fed. Cir. 1996).
31 Id. at 1581.
32 93 F.3d 1572 (Fed. Cir. 1996).
33 Id. at 1581. See also id. ("[T]o the extent that the claim is ambiguous, a narrow reading which excludes the ambiguously covered subject matter must be adopted.").
34 Markman, 116 S. Ct. at 1390.
continue to require tutorials on the dizzying array of technologies that patent cases bring before them. Indeed, the Supreme Court and the Federal Circuit agreed, in their respective decisions in *Markman*, that a district court enjoys broad discretion to receive evidence extrinsic to the patent documents if doing so will help it to better construe the disputed claim terms.\(^{35}\)

And so the fact/law tension at the heart of claim construction that predated *Markman*, and that helped to cause the split in authority that brought about the need for *Markman*, has remained. On the one hand, the patent record is the primary and determinative source of a claim term's meaning. On the other hand, the final arbiter of the claim term's meaning—a district court judge, or a panel of Federal Circuit judges—can rely on expert testimony and other extrinsic evidence as much as is necessary, so long as the hazy boundary between "understanding the patent" technology and "varying or contradicting claim terms" is not crossed.\(^{36}\)

Not surprisingly, the Federal Circuit continues to grapple with the proper use of expert testimony at the claim construction phase, and to police the boundary between "understanding the patent" and "varying or contradicting claim terms." In *Markman* itself, the Federal Circuit approved of the district court's rejection of the expert testimony that the patentee offered in his behalf. The district court found the expert testimony "artificial" and at odds with the documentary record, and the Federal Circuit agreed.\(^{37}\) The Supreme Court endorsed this approach by emphasizing the subservience of expert testimony to the primary goal of preserving "the patent's internal coherence."\(^{38}\)

The Federal Circuit has further elaborated on the proper and improper uses of expert testimony in its decisions. For example, in *Vitronics Corp. v. Conceptronic, Inc.*,\(^{39}\) a case involving a method for soldering devices to a printed circuit board, infringement turned on the proper meaning of the phrase "solder reflow temperature." Specifically, the patentee contended that "solder reflow temperature" should be construed as "peak reflow temperature" (i.e., the temperature at which the solder is completely melted and

\(^{35}\) Such extrinsic evidence could include the testimony of experts (including the inventor), treatises, and technical and regular dictionaries. In addition, the district court has complete discretion as to the weight, if any, to be given such extrinsic evidence.

\(^{36}\) *Markman*, 52 F.3d at 981 ("Extrinsic evidence is to be used for the court's understanding of the patent, not for the purpose of varying or contradicting the terms of the claim.").

\(^{37}\) The Supreme Court did not express any view on the particulars of the expert testimony in the case, having granted review on the Seventh Amendment jury right question alone.

\(^{38}\) *Markman*, 116 S. Ct. at 1395.

\(^{39}\) 90 F.3d 1576 (Fed. Cir. 1996).
moves freely), whereas the accused infringer contended that the "solder reflow temperature" should be construed as the "liquidus temperature" (i.e., the temperature at which the solder begins to melt). The patentee relied on the specification, which expressly and carefully distinguished reflow from liquidus temperature. The accused infringer countered with extrinsic evidence, including the testimony of an expert witness, tending to show that in some contexts (i.e., other than the specification) reflow and liquidus temperature were used interchangeably. Reversing the district court's decision in favor of the accused infringer, the Federal Circuit commented on the proper use of such extrinsic evidence:

The claims, specification, and file history, rather than extrinsic evidence, constitute the public record of the patentee's claim, a record on which the public is entitled to rely. In other words, competitors are entitled to review the public record, apply the established rules of claim construction, ascertain the scope of the patentee's claimed invention and, thus, design around the claimed invention. Allowing the public record to be altered or changed by extrinsic evidence introduced at trial, such as expert testimony, would make this right meaningless. Expert testimony tending to show that those skilled in the art would, in certain circumstances, understand "solder reflow temperature" to mean the solder liquidus temperature is entitled to no weight in light of the clear contrary meaning shown in the specification. Because the specification clearly and unambiguously defined the disputed term in the claim, reliance on this extrinsic evidence was unnecessary and, hence, legally incorrect.

Throughout its analysis, the court emphasized the importance of using the public patent documents as the alpha and omega of claim construction. Some subsequent Federal Circuit and district court decisions have remained true to this approach.

40 Id. at 1580.
41 Id. at 1583-85 (internal citations omitted); see also id. at 1585 ("Indeed, opinion testimony on claim construction should be treated with the utmost caution, for it is no better than opinion testimony on the meaning of statutory terms.").
42 See, e.g., O.I. Corp. v. Tekmar Co., 115 F.3d 1576, 1581-82 (Fed. Cir. 1997) ("[W]e conclude that one skilled in the art reading the claims, description, and prosecution history would conclude that the term 'passage' in claim 17 does not encompass a smooth-walled, completely cylindrical structure. Because the [written] description adequately explains the meaning of 'passage' as used in this patent, we need not consider extrinsic evidence.") (citing Vitronics) (emphasis added); Bell & Howell, 45 U.S.P.Q.2d (BNA) at 1038 ("any expert testimony that is inconsistent with unambiguous intrinsic evidence should be accorded no weight").
43 See, e.g., P.A.T., Co. v. Ultrak, Inc., 948 F. Supp. 1506, 1511 (D. Kan. 1996) ("Extrinsic evidence cannot be used to explain ambiguity in claim terminology or to vary the claim terms.") (citing Vitronics).
When combined with the canon of claim construction established in *Athletic Alternatives* and *Ethicon*, according to which ambiguities in claim scope are construed *against* the patentee (i.e., against a finding of infringement), the *Markman/Vitronics* approach establishes a powerful framework for reliably analyzing any infringement question. The framework is as follows:

A. Review the claims (asserted and nonasserted), the written description of the invention preceding it, and the prosecution history to determine whether the disputed term has a clear definition to one of ordinary skill in the relevant art.

B. If the term *is* clearly defined, apply that definition.

C. If the term *is not* clearly defined, adopt whichever one of the competing interpretations results in a claim of narrower scope (i.e., gives the patentee a smaller area from which to exclude others).

Under this regime, the *only* use that a trial court can properly make of expert testimony and other extrinsic evidence is to improve its general background understanding of the technology at issue. In addition, because the proper use of extrinsic evidence is carefully constrained, the trial court's discretion to admit such evidence should not undermine the predictability of outcomes that both the Federal Circuit and the Supreme Court sought to enhance in the *Markman* decisions.

Sadly, some post-*Markman* decisions stray from this predictability-enhancing methodology. For example, in *Hoechst Celanese Corp. v. BP Chemicals Ltd.*, a case authored by the *Markman* dissenter in March 1996 (prior to both the Supreme Court's affirmance of *Markman* and the Federal Circuit's decision in *Vitronics*), the court affirmed a jury verdict in the patentee's favor on the basis of the named inventor's testimony. The patent documents did not clearly favor one of the parties' competing definitions over the other, and both parties presented dictionary definitions that supported their respective interpretations of the claim, as well as testimony from technical experts. To break the tie between the competing definitions, the court relied on the testimony of the named inventor of the patent, noting that the district court had found him "highly credible" and indicating that his testimony enhanced the panel's understanding of "the usage of the disputed terms." The court's approach in *Hoechst* sharply contrasts both with *Vitronics* and *Markman*, which treat self-serving inventor testimony

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45 Id. at 1580.
with the utmost suspicion, and with *Athletic Alternatives* and *Ethicon*, which require the court to construe ambiguities in claim scope against, not in favor of, the patentee. Those who advocate for a more predictable method of infringement analysis can only hope that *Hoechst*, authored during the transition before the Supreme Court affirmed *Markman*, remains an anomaly.

5. The Future of Claim Construction

The professed goal of both *Markman* decisions is to make infringement analysis more predictable and reliable. To help realize this goal, both the Federal Circuit and the Supreme Court drew a distinction between using extrinsic evidence to learn more about the technology at issue and using it to resolve the choice between competing constructions of a disputed claim term. In decisions like *Vitronics*, the Federal Circuit continues to clarify and to police this hazy boundary between "understanding the patent" technology and "varying or contradicting claim terms." Without such continued elaboration and vigorous policing, the unconstrained discretion that *Markman* gives to trial judges to receive as much or as little extrinsic evidence as they like, and to give any piece of that testimony as much or as little weight as they like, may well undermine the predictability that *Markman* sought to achieve. In other words, to allow the trial court the unfettered discretion to receive and rely on evidence outside the patent documents without strictly policing the substantive use to which the court puts it destabilizes infringement analysis, rewarding the patentee who inartfully drafts his claims with an opportunity at trial to reframe his claims (with the help of a persuasive "hired gun" expert) after his patent has issued and he has the benefit of access to his competitor's product.

Although decisions such as *Vitronics* and *Ethicon* suggest that the Federal Circuit is serious about requiring district courts to construe claims by exhausting the guidance that the patent documents themselves provide, rather than simply picking the more persuasive of two competing experts, conflicting decisions such as *Hoechst Celanese* are already in the reports. Unless the judges of the Federal Circuit continue to enforce the mandate and the goal of *Markman* consistently and vigorously in the years to come, any gains in predictability will be fleeting and the elimination of juries from the claim construction process will have been for naught.

II. The Doctrine of Equivalents

A. Claims and Equivalents: A Doomed Alliance?

Our courts have applied the doctrine of equivalents since the era of the first patent statute. Justice Story, riding circuit, observed that "[m]ere colorable
differences, or slight improvements, cannot shake the right of the original inventor.\textsuperscript{46} The Supreme Court first endorsed the doctrine in 1854, in \textit{Winans v. Denmead},\textsuperscript{47} and reaffirmed its viability a century later, in \textit{Graver Tank \& Mfg. Co. v. Linde Air Products}.\textsuperscript{48}

But the doctrine of equivalents, despite its excellent pedigree, has never been free from controversy. \textit{Winans} and \textit{Graver Tank} were both split decisions, with sharp dissents complaining that the doctrine of equivalents injects uncertainties into infringement analysis that would harm the long-term health of the market for technological innovation.\textsuperscript{49} The underlying problem has always been the same: namely, how does one adequately protect the patentee from an infringer who trespasses on the “spirit” (if not the letter) of the claimed invention, while at the same time giving the public adequate notice of the scope of the claimed invention so that it can reliably design around the claimed invention and/or avoid infringement liability? Rather than sacrifice one of these two goals—full protection for the patentee, to the other—adequate public notice of the scope of patent protection, the courts

\textsuperscript{46} Odiorne v. Winkley, 18 F. Cas. 581, 582 (C.C.D. Mass. 1814) (No. 10,432).

\textsuperscript{47} 56 U.S. (15 How.) 330 (1854).

\textsuperscript{48} 339 U.S. 605 (1950).

\textsuperscript{49} In \textit{Winans}, the patent in suit covered a cylindrical railroad car with a cone-shaped bottom, whereas the accused railroad car was octagonal with an octagonal bottom. 56 U.S. at 338-39. The circuit court had held that, as a matter of law, there could be no infringement, and the Supreme Court reversed by a vote of 5 to 4. According to the Court, “[t]here was evidence tending to prove that, considered in reference to the practical uses of such a car, the octagonal car was substantially the same as the circular.” \textit{Id.} at 340. In essence, the Court concluded that it would be unfair to limit patent protection to cover literal infringements alone. \textit{Id.} at 341-44. The dissent concluded that such expansive protection for the patentee was contrary to the Patent Act’s requirements of an enabling disclosure and of claims that “particularly specify and point out” the invention. \textit{Id.} at 347 (Campbell, J., dissenting). In addition, the dissent predicted that the doctrine of equivalents would be “mischievous” and lead to “oppressive and costly litigation” and “vexatious demands” on the part of patentees. \textit{Id.}

In \textit{Graver Tank}, the patent in suit covered welding compositions containing magnesium silicate, whereas the accused welding composition replaced magnesium silicate with manganese silicate. 339 U.S. at 610. The district court found infringement under the doctrine of equivalents, which finding the circuit court of appeals sustained. The Supreme Court, by a vote of 6 to 2, also affirmed the district court’s judgment, adhering to the doctrine of equivalents. \textit{Id.} at 607-12. In dissent, Justice Black complained, as did the dissenters in \textit{Winans} before him, that the doctrine could not be squared with the requirements of the Patent Act or with the business community’s need for a predictable method of determining infringement without resort to litigation. \textit{Id.} at 612-18.
have struck a balance between them: the patentee can recover against those whose activities are "beyond any permissible interpretation of the claim language," but only if the departure beyond the scope of the claim language is "insubstantial." This balance is, at best, precarious.

Implementing the doctrine of equivalents has caused its share of trouble for the Federal Circuit over the years. In the mid-1980s, the court became divided over whether infringement under the doctrine of equivalents should be assessed by comparing the claimed invention as a whole to the accused product or process as a whole, or rather by determining whether every claim limitation is met literally or by an equivalent. In 1987, the Federal Circuit, sitting in banc in the Pennwalt case, resolved this controversy in favor of the "limitation by limitation" approach, now known as the "all limitations rule."

Similarly, in the early and mid-1990s, the court became divided over whether the doctrine of equivalents is a truly equitable doctrine, available only after a showing of some bad faith conduct on the accused infringer's part, or instead was available to every patentee who could show that the accused product or process differed only insubstantially from the claimed product or process. The doctrine had, of course, long been acknowledged as a way to provide patentees the full measure of protection for their inventions, and was thus a matter of fairness to all patentees. But the Federal Circuit began to suggest that the doctrine was truly equitable, like injunctive relief, and warned that its application should be "the exception [and] not the rule." Indeed, some lower courts took the bait, imposing an equitable threshold test before permitting a patentee to assert infringement by equivalents. As the "invention as a whole"/"all limitations rule" controversy
receded into the past, the “equitable threshold”/”every case” controversy took its place, and this latter controversy stood at the center of the Warner-Jenkinson case.

B. Warner-Jenkinson

Hilton Davis alleged that Warner-Jenkinson infringed its ‘746 patent, directed to a process for purifying dye solutions by “ultrafiltration” through porous membranes at specified pressures, pore diameters, and pH levels. Claim 1 of the ‘746 patent, the only independent claim asserted in the case, was limited to a process conducted at “a pH from approximately 6.0 to 9.0.”56 Warner-Jenkinson’s process, unlike the claimed process, operated at a pH of 5.0; prior to trial, Hilton Davis thus conceded that there was no literal infringement, and proceeded solely on a doctrine of equivalents theory.1

The jury found in Hilton Davis’ favor. The district court denied Warner-Jenkinson’s motion for a post-verdict judgment of noninfringement as a matter of law, and a sharply divided Federal Circuit affirmed the judgment of infringement.58 By a 7-5 vote, the Federal Circuit held that (a) the doctrine of equivalents is a legal (not an equitable) doctrine available to every patentee who can show that the accused product or process meets every limitation of the claim either literally or by an equivalent, (b) the question of equivalency is one of fact for the jury (if properly demanded), and (c) the proper standard for equivalency is “insubstantial differences,” one measure of which is the familiar tripartite “function/way/result” test from Graver Tank.59 In doing so, the court expressly rejected Warner-Jenkinson’s contention that the Patent Act of 1952, and particularly its provision for “means-plus-function” claims, abrogated the doctrine.60 Finally, on the particular facts of the case, the court concluded that Hilton Davis had successfully proved infringement under the doctrine of equivalents according to the proper standards.

One of the defenses the Federal Circuit rejected in affirming the judgment in Hilton Davis’ favor was prosecution history estoppel. This constraint on the doctrine prevents the patentee from using the doctrine of equivalents to recapture coverage that was relinquished during prosecution of the patent.61

57 Id. at 1516.
58 Id. at 1515-16.
59 Id. at 1516-22.
60 Id. at 1525-27.
It was undisputed that Hilton-Davis had added the “pH from approximately 6.0 to 9.0” limitation to claim 1 during prosecution in order to overcome a prior art rejection based on a patented process operating at pH levels above 9.0.62 Warner-Jenkinson contended that this claim amendment should estop Hilton Davis from asserting equivalent infringement, but the Federal Circuit disagreed. Because the prior art involved pH levels above 9 only, and did not address pH levels below 6, the court concluded that the “amendment surrendered pHs above 9, but does not bar Hilton Davis from asserting equivalency to processes such as Warner-Jenkinson’s operating sometimes at a pH below 6.”63

On March 3, 1997, in a unanimous opinion, the Supreme Court reversed part of the Federal Circuit’s decision and remanded the case for further proceedings.64 Indeed, the Supreme Court reversed only one aspect of the Federal Circuit’s decision, using the case to create a new presumption of prosecution history estoppel that applies whenever the patentee cannot explain the reason for a claim amendment made during prosecution. According to the Court, in its prior decisions on the question, “prosecution history estoppel was tied to amendments made to avoid the prior art, or otherwise to address a specific concern—such as obviousness—that arguably would have rendered the claimed subject matter unpatentable.”65 In the case at bar, however, the prior art rejection explained only the upper bound of 9.0 included in the amendment, and not the lower bound of 6.0. The Court was thus confronted with the choice between two default rules regarding unexplained amendments: (a) unexplained amendments run in favor of the patentee, i.e., do not create an estoppel; or (b) unexplained amendments run in favor of the accused infringer, i.e., do create an estoppel. Out of “deference to the role of claims in defining an invention and providing public notice,” the Court chose the latter rule:

Mindful that claims do indeed serve both a definitional and a notice function, we think the better rule is to place the burden on the patent-holder to establish the reason for an amendment required during patent prosecution.66 The court then would decide whether that reason is sufficient to overcome prosecution history estoppel as a bar to

62 Hilton Davis, 62 F.3d at 1515-16.
63 Id. at 1525.
65 Id. at 1049.
66 Note that this is the very same justification the Federal Circuit gave in Athletic Alternatives for its decision to construe ambiguities in claim scope against the patentee. Athletic Alternatives, 73 F.3d at 1581. In this regard, the Supreme Court’s decision confirms the correctness of the canon of claim construction adopted in Athletic Alternatives.
application of the doctrine of equivalents to the element added by that amendment. Where no explanation is established, however, the court should presume that the PTO had a substantial reason related to patentability for including the limiting element added by amendment. In those circumstances, prosecution history estoppel would bar the application of the doctrine of equivalents as to that element.  

Because the Federal Circuit had effectively followed the opposite rule, letting the Hilton Davis' unexplained addition of the lower bound of 6.0 to the claim run in the patentee's favor, the Supreme Court reversed this aspect of the decision and remanded the case for further proceedings on this point.

The Supreme Court shared the Federal Circuit's views on the remaining questions presented. First, the Court rejected the contention that the doctrine of equivalents was abrogated by the 1952 Patent Act. Second, the Court endorsed the strictest adherence to the "all limitations rule," holding that "the doctrine of equivalents must be applied to individual elements of the claim, and not to the invention as a whole," and that "the doctrine, even as to an individual element, is not allowed such broad play as to effectively eliminate that element in its entirety." Third, the Court concluded that the doctrine of equivalents is a legal, not an equitable, doctrine available to every patentee. Fourth, the Court endorsed the Federal Circuit's conclusion that the proper time for assessing equivalency "is at the time of infringement, not at the time the patent was issued." Fifth, and finally, the Court left it to the Federal Circuit to craft the proper test of the fact of equivalency, indicating that "[d]ifferent linguistic frameworks [i.e., "insubstantial difference" versus "function/way/result"] may be more suitable to different cases, depending on their particular facts." In short, nearly all aspects of the Federal Circuit's decision in the case remain intact.

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68 Id. at 1047-48 ("Absent something more compelling than the dubious negative inference offered by petitioner, the lengthy history of the doctrine of equivalents strongly supports adherence to our refusal in Graver Tank to find that the Patent Act conflicts with that doctrine. Congress can legislate the doctrine of equivalents out of existence any time it chooses. The various policy arguments now made by both sides are thus best addressed to Congress, not this Court.").
69 Id. at 1049; see also id. at 1054 (requiring a "focus on individual elements and a special vigilance against allowing the concept of equivalence to eliminate completely any such elements"), 1054 n.8 ("if a theory of equivalence would entirely vitiate a particular claim element ... judgment should be rendered by the court").
70 Id. at 1051-52.
71 Id. at 1052-53.
72 Id. at 1554.
One point regarding the Supreme Court's decision remains. Because the Court reversed the Federal Circuit's decision insofar as it held in the patentee's favor on the legal limitation of prosecution history estoppel, the case no longer properly presented the question whether assessing equivalency is a task for the judge or the jury. As a result, the Supreme Court's decision does not speak conclusively to this issue. The Court did, however, make two important observations on the matter: first, the Court noted that "[t]here was ample support in [its] prior cases for" the Federal Circuit's holding that the question of equivalents is one of technological fact for the jury; second, the Court expressly stated that "[n]othing in [its] recent Markman decision necessitates a different result than that reached by the Federal Circuit." As with the proper test for equivalency, the Court effectively left the question in the Federal Circuit's hands.

C. Post-Warner-Jenkinson Developments

The Supreme Court decided *Warner-Jenkinson* only recently, and it is thus too early to obtain a reliable or detailed sense of how the lower courts, including the Federal Circuit, will implement the new presumption of prosecution history estoppel announced by the Supreme Court. We can, however, report a number of developments.

First, in the wake of *Warner-Jenkinson*, the Supreme Court vacated three other Federal Circuit decisions and remanded them to that court for further consideration in light of *Warner-Jenkinson*. Two of the cases involve the "all limitations rule" problem, and the third, like *Warner-Jenkinson* itself, involves an unexplained claim amendment. At present, no remand decision has yet been rendered in any of these cases. The Federal Circuit will thus have multiple opportunities, in these cases and in others, to apply and to elaborate upon critical aspects of the Supreme Court's decision in the future.

Second, the Federal Circuit has already acted on the remanded *Warner-Jenkinson* decision itself. On June 12, 1997, the Federal Circuit, acting in banc, issued an order remanding the case to the district court for further development of the record. Specifically, the court "remand[ed] th[e] case to the district court to conduct an inquiry to ascertain whether Hilton Davis can

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73 *Id.* at 1053.

rebut the presumption by showing the reason for its addition of the lower bound of a pH of 6 to the claim, leaving it to the district court's discretion "to decide whether hearings are necessary or whether the issue can adequately be determined on a written record." In addition, the court reconsidered its decision in light of the Supreme Court's insistence that the "all limitations rule" be applied rigorously, concluding that the judgment in Hilton Davis' favor does not "vitiate" the "pH from approximately 6.0 to 9.0" claim limitation.

Third, on March 7, 1997, four days after the Supreme Court's Warner-Jenkinson decision, the Federal Circuit announced its decision in Tanabe Seiyaku Co. v. United States International Trade Commission. In that decision, the Federal Circuit adhered to its views that equivalency is determined according to the "insubstantial differences" standard and that the question of equivalent infringement is one of fact for the factfinder, not the court, acknowledging in both instances that the Supreme Court had left these questions to the Federal Circuit.

What more does the future hold for the doctrine of equivalents? Again, it is too soon to tell. Many issues have been resolved. The doctrine is alive and well, if a little narrower in scope. The courts have been cautioned not to let the doctrine run roughshod over claim limitations, and the new presumption of prosecution history estoppel, however it is implemented, shifts the balance in favor of accused infringers. We know, however, that far more remains to be said regarding the proper way to implement the Federal Circuit's "insubstantial differences" standard for assessing the technological fact of equivalency. We also know that the full force of the "all limitations rule" is uncertain, but that it could well emerge as an increasingly significant constraint on the ability of patentees to proceed under the doctrine of equivalents. In short, we have no choice but to watch closely for these developments and to remain alert for many others that we cannot now predict.

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76 Id. at 1163-64.
78 Id. at 729.
79 Id. at 731.
80 For a recent and exceptionally robust application of the "all limitations rule," see Sage Products, Inc. v. Devon Industries, Inc., 126 F.3d 1420 (Fed. Cir. 1997).
Conclusion

Intellectual property lawyers know that it is a difficult task to determine with a high confidence level whether a product or process infringes a given patent. In the Markman and Warner-Jenkinson cases, the courts have wrestled with fundamental questions about core components of the framework for analyzing infringement. They have done so in an effort to reconcile conflicting lines of authority and resolve tensions between different parts of the framework. By clarifying some aspects of the law, the Federal Circuit and the Supreme Court have probably made it marginally easier to confidently predict the outcome of a patent infringement trial. But only the passage of time, and the resolution of many more cases applying Markman and Warner-Jenkinson, will reveal the full measure of their success.