

United States Court of Appeals  
for the Federal Circuit

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ARCELORMITTAL FRANCE AND  
ARCELORMITTAL ATLANTIQUE ET LORRAINE,  
*Plaintiffs-Appellants,*

v.

AK STEEL CORPORATION,  
*Defendant-Appellee,*

AND

SEVERSTAL DEARBORN, INC. AND  
WHEELING-NISSHIN INC.,  
*Defendants-Appellees.*

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2011-1638

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Appeal from the United States District Court for the  
District of Delaware in case no. 10-CV-0050, Judge Sue L.  
Robinson.

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Decided: November 30, 2012

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CONSTANTINE L. TRELÀ, JR., Sidley Austin LLP, of  
Chicago, Illinois, argued for plaintiffs-appellants. With  
him on the brief were DAVID T. PRITIKIN and CONSTANTINE  
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Before DYK, CLEVENGER, and WALLACH, *Circuit Judges*.

Opinion for the court filed by *Circuit Judge* DYK. Opinion dissenting-in-part filed by *Circuit Judge* WALLACH.

DYK, *Circuit Judge*.

ArcelorMittal France and ArcelorMittal Atlantique et Lorraine (collectively “ArcelorMittal”) appeal from a final judgment of the United States District Court for the District of Delaware. The judgment is based on a jury verdict finding that defendants AK Steel Corporation, Severstal Dearborn, Inc., and Wheeling-Nisshin Inc. (“AK Steel”) did not infringe ArcelorMittal’s U.S. Patent No. 6,296,805 (“the ’805 patent”) and that the asserted claims were invalid as anticipated and obvious. ArcelorMittal challenges both the district court’s claim construction and the jury’s verdict.

We uphold the district court’s claim construction in part and reverse it in part. We also reverse the jury’s verdict of anticipation. With respect to obviousness, a new trial is required because the district court’s claim construction error prevented the jury from properly considering ArcelorMittal’s evidence of commercial suc-

cess. We therefore affirm-in-part, reverse-in-part, vacate-in-part, and remand for a new trial.

#### BACKGROUND

The '805 patent covers boron steel sheet with an aluminum-based coating applied after rolling the sheet to its final thickness. The steel is used for "hot-stamping," a process which involves rapidly heating the steel, stamping it into parts of the desired shape, and then rapidly cooling them ("quenching"). The rapid heating and cooling alters the crystalline structure of the steel, converting it to austenite and then martensite. By altering the steel's microstructure in this manner, hot-stamping produces particularly strong steel. Because hot-stamped steel is so strong, parts created by hot-stamping can be thinner and lighter than steel parts produced by other processes while being just as strong. This is particularly desirable in the manufacture of automobile parts because strong parts are required for safety and light parts promote fuel efficiency.

Although hot-stamping has clear benefits, its use has historically been limited because of problems associated with the process. The high temperatures required for hot-stamping cause oxidation, resulting in the formation of "scale" on the steel's surface. Scale must be removed before the steel can be painted or welded, but removing it requires expensive and environmentally harmful "shot-blasting" and "pickling" operations, in which the steel is blasted with an abrasive material and immersed in a chemical bath. Shot-blasting is also problematic because it can damage thin parts, undermining the strength and efficiency advantages of hot-stamping. Oxidation also causes the loss of carbon from the steel's surface ("decarburization"), which weakens the steel.

The aluminum-based coating claimed in the '805 patent prevents oxidation from occurring during hot-

stamping. As a result, scale does not form and decarburation does not occur when the claimed steel is hot-stamped. This makes hot-stamping less costly, reduces its environmental impact, and allows its use in the production of parts that are too delicate to survive shot-blasting.

The asserted claims of the '805 patent are claim 1 and dependent claims 2, 5, 7, and 16. Claim 1, the only asserted independent claim, reads:

1. A hot-rolled coated steel sheet comprising a hot-rolled steel sheet coated with an aluminum or aluminum alloy coating, wherein the steel in the sheet comprises the following composition by weight:

0.15%<carbon<0.5%

0.5%<manganese<3%

0.1%<silicon<0.5%

0.01%chromium<1%

titanium<0.2%

aluminum<0.1%

phosphorus<0.1%

sulfur<0.05%

0.0005%<boron<0.08%, the remainder being iron and impurities inherent in processing, and the steel sheet has a very high mechanical resistance after thermal treatment and the aluminum or aluminum alloy coating provides a high resistance to corrosion of the steel sheet.

'805 patent col. 4 l. 64 to col. 5 l. 15.

On January 22, 2010, ArcelorMittal brought an infringement action against AK Steel in the United States District Court for the District of Delaware, alleging that AK Steel’s aluminum coated steel sheet products infringe the asserted claims of the ’805 patent. The parties agreed upon an expedited trial schedule in which AK Steel agreed to limit itself to two invalidity defenses and to arguing non-infringement based on the construction of two claim terms.

Pursuant to that schedule, on December 16, 2010, the district court issued a claim construction decision interpreting the claim terms “a hot-rolled steel sheet coated with an aluminum or aluminum alloy coating” and “the steel sheet has a very high mechanical resistance after thermal treatment.” *ArcelorMittal Fr. v. AK Steel Corp.*, 755 F. Supp. 2d 542, 545 (D. Del. 2010). The court first construed the term “hot-rolled steel sheet.” *Id.* at 546–49. The court noted that those of ordinary skill in the art distinguished between “hot-rolled” and “cold-rolled” steel sheet based on which process is used to reduce the sheet to its final thickness. *Id.* at 547. Relying on evidence of this industry convention, the court concluded that ArcelorMittal “did not claim a ‘sheet’ generally but rather ‘specifically claimed a sheet made by hot-rolling.’” *Id.* at 548. Consequently, the court assigned “hot-rolled steel sheet” the meaning “a steel sheet that has been reduced to its final thickness by hot-rolling.” *Id.* at 549. This construction excluded steel that was first hot-rolled and then cold-rolled to its final thickness.

The court next examined the term “the steel sheet has a very high mechanical resistance.” *Id.* The court noted that there is no applicable industry standard defining “very high” mechanical resistance. *Id.* at 550. The court relied on the statements in the specification that “high” and “substantial” mechanical resistance “may exceed 1500

MPa.” *Id.* at 550–51. Accordingly, the court construed “the steel sheet has a very high mechanical resistance” to mean that “the flat-rolled steel has been subjected, after rolling, to additional controlled heating and cooling and has an ultimate tensile strength of 1500 MPa or greater.” *Id.* at 550.

None of AK Steel’s accused products literally infringed the claims as construed, so the district court prohibited ArcelorMittal from asserting literal infringement. Memorandum Order, *ArcelorMittal Fr. v. AK Steel Corp.*, No. 10-CV-00050 (D. Del. Jan. 4, 2011), ECF No. 205. The case proceeded to trial on the basis of the doctrine of equivalents, and the jury returned a verdict on January 14, 2011, finding that AK Steel did not infringe the ’805 patent and that the asserted claims were both obvious and anticipated. ArcelorMittal then moved for judgment as a matter of law on the invalidity issues and for a new trial on infringement. The district court denied those motions and entered final judgment for AK Steel on August 25, 2011. *ArcelorMittal Fr. v. AK Steel Corp.*, 811 F. Supp. 2d 960 (D. Del. 2011). ArcelorMittal timely appealed. We have jurisdiction under 28 U.S.C. § 1295(a)(1).

#### DISCUSSION

This court “review[s] a district court’s denial of . . . judgment as a matter of law without deference, and its denial of a motion for [a] new trial for abuse of discretion.” *CytoLogix Corp. v. Ventana Med. Sys., Inc.*, 424 F.3d 1168, 1172 (Fed. Cir. 2005). We review de novo the district court’s claim construction. *Markman v. Westview Instruments*, 52 F.3d 967, 979 (Fed. Cir. 1995) (en banc), aff’d 517 U.S. 370 (1996).

## I Claim Construction

### A. “Hot-rolled steel sheet”

All claim construction issues concern claim 1, the only asserted independent claim in the patent. ArcelorMittal first argues that the district court erroneously construed the term “hot-rolled steel sheet,” improperly excluding from the scope of the claim steel sheet that has been cold-rolled to its final thickness following initial hot-rolling. AK Steel replies that the district court properly interpreted the term in accordance with its ordinary and customary meaning in the art. We agree with ArcelorMittal.

By its use of the term “comprising,” claim 1 expressly contemplates additional, unstated steps such as cold-rolling. “The transition ‘comprising’ creates a presumption . . . that the claim does not exclude additional, unrecited elements.” *Crystal Semiconductor Corp. v. TriTech Microelectronics Int'l, Inc.*, 246 F.3d 1336, 1348 (Fed. Cir. 2001). To rebut this presumption, AK Steel offers only the conclusory assertion that “[t]he very definition of ‘hot-rolled steel sheet’ is steel sheet that has been reduced to its *final* thickness by hot-rolling.” Appellee’s Br. 36–37. It is true that there is ample extrinsic evidence establishing that the ordinary meaning of “hot-rolled steel sheet” in the industry refers to steel sheet that has not been cold-rolled. Expert witnesses for both ArcelorMittal and AK Steel agreed that this definition was customary in the industry. Furthermore, a leading steel-making treatise classified steel sheet according to this industry usage.

However, while AK Steel is correct that the ordinary meaning of the term in the industry is clear, the specification is not consistent with that meaning. In *Phillips v. AWH Corp.*, we emphasized that the specification is the primary guide to claim interpretation, recognizing that

“the specification is ‘the single best guide to the meaning of a disputed term.’” 415 F.3d 1303, 1320–21 (Fed. Cir. 2005) (en banc) (quoting *Vitronics Corp. v. Conceptronic, Inc.*, 90 F.3d 1576, 1582 (Fed. Cir. 1996)). Although definitions based on dictionaries, treatises, industry practice, and the like often are important aids in interpreting claims, they may not be “used to contradict claim meaning that is unambiguous in light of the intrinsic evidence.” *Id.* at 1324. Here, the specification makes clear that the claim term “hot-rolled steel sheet” does not preclude a cold-rolling step.

References to an optional cold-rolling step abound in the specification of the ’805 patent. ’805 patent col. 1 ll. 47–48, col. 2 ll. 30–31, 37–40, col. 3 ll. 7–9. AK Steel argues that these references describe “distinct products” and that the specification elsewhere uses the word “sheet” where it means to refer to both steel that has been hot-rolled to its final thickness and steel that was also cold-rolled. Appellee’s Br. 29. The district court based its claim construction on similar reasoning. See *ArcelorMittal*, 755 F. Supp. 2d at 546–47. However, that is not a coherent reading of the specification for at least two reasons.

First, the specification contemplates that “[t]he sheet according to the invention . . . may be cold-rerolled again depending on the final thickness desired.” ’805 patent col. 2 ll. 37–40. It also describes the invention’s purpose as including the production of “cold-rolled steel sheet.” *Id.* at col. 1 ll. 37–38. This directly contradicts the district court’s claim construction, under which the sheet must be reduced to its *final* thickness by hot-rolling. The claims and specification should be read “in a manner that renders the patent internally consistent.” *Pfizer, Inc. v. Teva Pharm. USA, Inc.*, 429 F.3d 1364, 1373 (Fed. Cir. 2005)

(quoting *Budde v. Harley-Davidson, Inc.*, 250 F.3d 1369, 1379–80 (Fed. Cir. 2001)).

Second, the specification describes an embodiment “having a thickness of approximately 1 mm.” ’805 patent col. 4 ll. 8–9. That thickness, at least at the time of the invention, could only have been achieved by cold-rolling. Indeed, the specification states that “[a]ccording to the invention” the sheet’s thickness may be as low as 0.25 mm, ’805 patent col. 3 ll. 44–46, a thickness that even AK Steel concedes is achievable only by cold-rolling. To be sure, patent protection does not extend to subject matter disclosed but not claimed. *Unique Concepts, Inc. v. Brown*, 939 F.2d 1558, 1562–63 (Fed. Cir. 1991). However, “[w]e normally do not interpret claim terms in a way that excludes disclosed examples in the specification.” *Verizon Servs. Corp. v. Vonage Holdings Corp.*, 503 F.3d 1295, 1305 (Fed. Cir. 2007).

Because the specification unambiguously contemplates cold-rolling, the district court erred by interpreting the claim term “hot-rolled steel sheet” to exclude steel sheet subsequently cold-rolled.<sup>1</sup> The correct construction of “hot-rolled steel sheet” is “a steel sheet that has been hot-rolled during its production.”

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<sup>1</sup> This conclusion is not contradicted by the prosecution history. Although ArcelorMittal amended claim 1 to remove the explicit reference to optional cold-rolling, the initial rejection of the claim was because it was ambiguous whether the coating was optional, and the substitution of the “comprising” language made clear that optional additional steps were still contemplated. Nothing in the prosecution history amounted to a disclaimer of cold-rolling.

### B. “Very high mechanical resistance”

ArcelorMittal also disputes the district court’s interpretation of the claim term “very high mechanical resistance.” The district court interpreted that term to mean “the flat-rolled steel has been subjected, after rolling, to additional controlled heating and cooling and has an ultimate tensile strength of 1500 MPa or greater.” *ArcelorMittal*, 755 F. Supp. 2d at 549–50. We agree with the district court. We begin with the specification, which states that a “high” or “substantial” mechanical resistance “may exceed 1500 MPa.” ’805 patent col. 2 ll. 51–54, col. 3 ll. 52–54. The specification does not define “very high” mechanical resistance, but it implies that the 1500 MPa level is necessary for “high” mechanical resistance. If 1500 MPa is high mechanical resistance, then very high resistance must be at least 1500 MPa. ArcelorMittal argues that “very high” mechanical resistance can include a resistance as low as 1000 MPa, pointing to language in the specification stating that the invention “makes it possible to obtain a mechanical resistance in excess of 1000 MPa.” *Id.* at col. 1 ll. 40–42. However, the specification does not refer to 1000 MPa as “high” much less “very high.” *Id.* Thus, the specification supports the district court’s construction.

Turning to the extrinsic evidence, the district court observed that the term “very high mechanical resistance” is not a term of art in the steelmaking industry and does not have any ordinary meaning. *ArcelorMittal*, 755 F. Supp. 2d at 550. ArcelorMittal points to various documents suggesting that steel with mechanical resistance as low as 700 MPa may be considered “ultra high” strength steel, but the record does not establish that these references concern boron steel comparable to that described in the patent. On the other hand, one of the inventors of the ’805 patent coauthored an article on heat-treated boron

steel before the patent was filed. This article is prior art. The article describes steel with “high mechanical characteristics (UTS > 1500 MPa and YS > 1100 MPa)” after heat treatment. X. Bano & JP. Laurent, *Heat Treated Boron Steels in the Automotive Industry*, in *XXXV 39th MWSP Conf. Proc. ISS* 673, 673, 677 (1998) (“Bano”). Prior art can “help to demonstrate how a disputed term is used by those skilled in the art.” *Vitronics Corp.*, 90 F.3d at 1584. Thus, while testimony regarding an inventor’s subjective understanding of patent terminology is irrelevant to claim construction, *Howmedica Osteonics Corp. v. Wright Med. Tech., Inc.*, 540 F.3d 1337, 1346–47 (Fed. Cir. 2008), when an inventor’s understanding of a claim term is expressed in the prior art, it can be evidence of how those skilled in the art would have understood that term at the time of the invention. *Markman*, 52 F.3d at 991 (“[E]vidence, in the form of prior art documentary evidence or expert testimony, can show what the claims would mean to those skilled in the art”); *Howmedica*, 540 F.3d at 1347 & n.5. By defining “high” mechanical resistance as greater than 1500 MPa, the prior art here suggests that “very high” mechanical resistance would be understood to be at least that high.

Accordingly, both the intrinsic evidence and extrinsic evidence support the district court’s conclusion that “a very high mechanical resistance” means a mechanical resistance of 1500 MPa or greater. Therefore, we affirm the district court’s construction of “the steel sheet has a very high mechanical resistance.”

At oral argument, AK Steel’s counsel conceded that at least some accused products have a mechanical resistance of 1500 MPa or greater. However, as a result of the district court’s incorrect claim construction of “hot-rolled steel sheet,” the jury was instructed at trial to consider direct infringement only under the doctrine of equiva-

lents. Final Jury Instructions, *ArcelorMittal Fr. v. AK Steel Corp.*, No. 10-CV-00050, at 22 (D. Del. Jan. 14, 2011), ECF No. 212. Thus, there has been no determination below regarding which accused products would or would not literally infringe under the correct claim construction. That infringement issue will need to be addressed in the first instance on remand, either by the court on summary judgment or by a jury in a new trial. Because the jury found no infringement under the doctrine of equivalents, and ArcelorMittal has not challenged that aspect of the verdict, any infringement analysis found to be necessary on remand should be limited to literal infringement.

## II Anticipation

ArcelorMittal argues that the evidence cannot support the jury's anticipation verdict. "Anticipation is a question of fact, reviewed for substantial evidence when tried to a jury." *Finisar Corp. v. DirecTV Grp., Inc.*, 523 F.3d 1323, 1334 (Fed. Cir. 2008). The jury's finding of anticipation was based on Bano. The Bano article was written and presented by inventor Jean-Pierre Laurent and his colleague Xavier Bano during the development of the pre-coated steel claimed in the '805 patent, and the parties agree that it discusses hot-stamping boron steel. AK Steel argued, and the jury found, that the article disclosed the entire invention. ArcelorMittal challenges that finding on the grounds that Bano disclosed neither coating the steel sheet before thermal treatment nor coating the steel sheet with aluminum or an aluminum alloy. We conclude that there is not substantial evidence that Bano disclosed coating with aluminum or aluminum alloy.

A claim is anticipated only where "each and every limitation is found either expressly or inherently in a single prior art reference." *Celeritas Techs., Ltd. v. Rock-*

*well Int'l Corp.*, 150 F.3d 1354, 1361 (Fed. Cir. 1998). Anticipation must be proven by clear and convincing evidence. *Microsoft Corp. v. i4i Ltd. P'ship*, 131 S. Ct. 2238 (2011). Bano does not expressly disclose either pre-coating or particular coating compositions. However, it does state that “it is advisable to protect heat treated finished parts with coatings” and that “[i]t is possible to coat this new heat treated boron steel after degreasing as with conventional steels.” Bano at 676.

As discussed in the next section, these statements could have supported a jury finding that Bano disclosed pre-coating. However, the jury’s apparent conclusion that Bano disclosed coating with aluminum or aluminum alloy is more problematic. In denying JMOL, the district court relied on *In re Petering*, 301 F.2d 676 (C.C.P.A. 1962), to hold that “aluminum was a member of a very small class of metals suitable for use in coating boron steel,” and therefore inherent in Bano. *ArcelorMittal*, 811 F. Supp. 2d at 967–68. *Petering* establishes that when a prior art reference discloses a “definite and limited class” of suitable members within a general formula, it may be read to disclose each member of that class. *Petering*, 301 F.2d at 681. Yet Bano does not even explicitly refer to coating with metals; indeed, the only specific coating it references is “phosphatization . . . followed by cataphoresis.” Bano at 676. That process refers to coating with paint, not metal, and it is not clear how paint and metal coatings would both fit into any general formula comparable to that found in the prior art in *Petering*. Moreover, even if paint and metal were part of the same general formula, the record does not support a finding that there is a “definite and limited class” of coatings for steel sheet. There is insufficient evidence that the varieties of paints and metal alloys are sufficiently narrow that one of ordinary skill in the art would “at once envisage *each member* of

this limited class.” *Petering*, 301 F.2d at 681 (emphasis added).

Without an explicit disclosure of aluminum coating or substantial evidence that aluminum belonged to a sufficiently definite and limited class of possible coatings, the jury verdict of anticipation based on Bano cannot stand. We therefore reverse the district court’s denial of JMOL as to anticipation.

### III Obviousness

ArcelorMittal also urges us to overturn the jury’s obviousness verdict, arguing both that the jury’s verdict was not supported by substantial evidence and that the jury was foreclosed from consideration of the secondary factor of commercial success by the district court’s incorrect claim construction. “We review [the] jury’s conclusions on obviousness, a question of law, without deference, and the underlying findings of fact . . . for substantial evidence.” *Cordis Corp. v. Boston Scientific Corp.*, 561 F.3d 1319, 1332 (Fed. Cir. 2009) (alterations in original) (internal quotations omitted).

#### A. Prima Facie Case

ArcelorMittal concedes that “each element of the invention” was known in the prior art. Appellant’s Br. 3. The jury found the asserted claims of the ’805 patent obvious in view of Bano in combination with French Patent No. 1,297,906 (“French ’906 patent”). The French ’906 patent describes coating steel with aluminum to protect against oxidation during hot forging (the missing element in the anticipation finding). We agree that Bano

together with the French '906 patent supported a jury finding of a prima facie case of obviousness.<sup>2</sup>

The aluminum-based coating described in the '805 patent is applied to the steel sheet prior to hot-stamping in order to prevent oxidation. Regarding that pre-coating requirement, AK Steel argues that Bano in discussing coating distinguishes between "heat treated *finished parts*" and "boron steel," and that the reference to coating the latter inherently discloses coating before hot-stamping. Appellee's Br. 44–45. Further, AK Steel argues that the reference to coating after degreasing makes clear that the coating is applied before hot-stamping. ArcelorMittal counters that the "degreasing" language could refer to the removal of oil applied after hot-stamping and that the article's discussion of decarburization problems is inconsistent with pre-coating.<sup>3</sup> What a prior art reference discloses is a factual question. *Tegal Corp. v. Tokyo Electron Am., Inc.*, 257 F.3d 1331, 1345–46 (Fed. Cir. 2001). We think the resolution of this factual dispute was up to the jury, and that the jury could

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<sup>2</sup> Because the correct claim construction broadens the scope of the claims, it does not undermine the prima facie case of obviousness found by the jury.

<sup>3</sup> The Bano reference contains graphs that show decarburization which would not occur if the steel was coated in accordance with claim 1 of the '805 patent. However, there is no evidence that other coatings not covered in claim 1 would have prevented decarburization. Moreover, Bano only states that "[i]t is possible to coat this new heat treated boron steel." Bano at 676. This language suggests that coating is only an optional step, and there is no reason to assume that the steel would have necessarily been coated for the purposes of measuring decarburization during thermal treatment. Thus, the graph is of limited use in evaluating whether or not Bano disclosed pre-coating.

properly conclude that Bano teaches applying the coating before thermal treatment.

As for coating with aluminum, the French '906 patent disclosed coating steel with aluminum during hot forging<sup>4</sup> to protect against the same oxidation and decarburization problems that the '805 patent was intended to address. AK Steel thus urges that the invention described in the '805 patent is no more than the application of known solutions to equivalent problems in an analogous context. The thrust of ArcelorMittal's objection to this reasoning is that the hot forging described in the French '906 patent is so different from hot-stamping that there would be no motivation to combine. ArcelorMittal points to several differences between the hot forging process described in the French '906 patent and hot-stamping and cites evidence that those skilled in the art did not think that an aluminum coating would survive hot-stamping. ArcelorMittal's implication appears to be that hot-stamping and hot forging are not analogous art. For its part, AK Steel points to the similarity of the problems confronted by the two patents and evidence that aluminum coatings were known to survive thermal treatment and quenching. Whether a particular technology is analogous art is a question of fact. *Wyers v. Master Lock Co.*, 616 F.3d 1231, 1237–38 (Fed. Cir. 2010). As with the evidence about whether a skilled artisan would read Bano to disclose pre-coating, we think this factual dispute was for the jury to resolve. We also conclude that substantial evidence supports the jury's determination that there was a sufficient motivation to combine. AK Steel provided significant expert testimony that a person of ordinary skill in the art would have had the knowledge to combine the

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<sup>4</sup> Hot forging does not involve the rapid heating and cooling of hot-stamping and does not change the steel's microstructure.

aluminum coating disclosed by the French 906 patent with the pre-coating that the jury found Bano disclosed and would have expected to succeed. In short, the jury properly concluded that AK Steel had established a *prima facie* case of obviousness.<sup>5</sup> The district court properly denied ArcelorMittal's JMOL motion of non-obviousness.

### B. Secondary Considerations

The final issue is whether the district court's erroneous claim construction of "hot-rolled steel sheet" requires a new trial on obviousness. ArcelorMittal argues that a new trial is necessary because under the district court's claim construction the jury could not consider the commercial success<sup>6</sup> of their cold-rolled commercial product. Although ArcelorMittal's commercial success evidence was before the jury, the district court instructed the jury only to consider "[c]ommercial success or lack of commercial success of products *covered by the asserted claims.*" Final Jury Instructions, *ArcelorMittal Fr. v. AK Steel Corp.*, No. 10-CV-00050, at 37 (D. Del. Jan. 14, 2011) (emphasis added). The jury was also instructed that only steel sheet hot-rolled to its final thickness was covered by the asserted claims. *Id.* at 20. Thus, the jury was proscribed from considering the commercial success of ArcelorMittal's cold-rolled steel sheet.

A district court's incorrect claim construction may require a new trial, *Ecolab Inc. v. Paraclipse, Inc.*, 285 F.3d 1362, 1374–76 (Fed. Cir. 2002), but only where the party

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<sup>5</sup> We conclude that ArcelorMittal's assertion that claim 7 would not have been obvious even if claim 1 would have been obvious was waived. Claim 7 must stand or fall with claim 1.

<sup>6</sup> ArcelorMittal makes passing reference to other secondary considerations such as copying and unexpected results, but ArcelorMittal has not briefed those issues sufficiently to preserve them.

seeking a new trial shows that they were prejudiced by the error. *Verizon Servs. Corp. v. Vonage Holdings Corp.*, 503 F.3d 1295, 1307 (Fed. Cir. 2007).

AK Steel argues that it is not necessary to consider the commercial success of the cold-rolled product because of the well-established principle that claims which read on obvious subject matter are unpatentable even if they also read on nonobvious subject matter. *Muniauction, Inc. v. Thomson Corp.*, 532 F.3d 1318, 1328 n.4 (Fed. Cir. 2008) (noting the “long-established rule that ‘[c]laims which are broad enough to read on obvious subject matter are unpatentable even though they also read on nonobvious subject matter.’” (quoting *In re Lintner*, 458 F.2d 1013, 1015 (C.C.P.A. 1972))). AK Steel urges that even if the claims included both hot-rolled steel (which was not cold-rolled) and cold-rolled steel, the jury’s verdict that the hot-rolled steel embodiment was obvious rendered the whole claim obvious whether or not the cold-rolled embodiment is nonobvious in view of its commercial success. However, this is not a situation in which the claims themselves describe distinct alternative embodiments of the invention, and where the obviousness of one embodiment would invalidate the entire claim. Rather, it is a situation in which the claim is limited to steel that is hot-rolled, but contains “comprising” language permitting the performance of an additional (cold-rolling) step. In such circumstances our cases make clear that the commercial success of the embodiment with additional unclaimed features is to be considered when evaluating the obviousness of the claim, provided that embodiment’s success has a sufficient nexus to the claimed and novel features of the invention. *In re Kao*, 639 F.3d 1057, 1068 (Fed. Cir. 2011); *In re Glatt Air Techniques, Inc.*, 630 F.3d 1026, 1030 (Fed. Cir. 2011); *Applied Materials, Inc. v. Advanced Semiconductor Materials Am., Inc.*, 98 F.3d 1563, 1570

(Fed. Cir. 1996) (“[A] patentee need not show that all possible embodiments within the claims were successfully commercialized in order to rely on the success in the marketplace of the embodiment that was commercialized.”)

Thus, in *Kao*, we required consideration of a patent applicant’s commercially successful controlled release painkiller even though the success was not proven across the full range of claimed dissolution rates. 639 F.3d at 1069. However, we emphasized that the required consideration of commercial success includes a threshold determination of whether the commercial success has the necessary nexus with the claimed invention. *Id.* at 1068–69; *see also Wyers*, 616 F.3d at 1246. The same rules apply here. The commercial success of ArcelorMittal’s cold-rolled embodiment must be considered to the extent that its success results from the claimed combination of elements that constitutes the invention, rather than from cold-rolling, which was not claimed and already known in the prior art, or from other unclaimed features. In other words, whether there is a nexus here depends upon a comparison between cold-rolled steel produced by the patented process and cold-rolled steel produced by alternative processes to see if the former achieved material commercial success over and above the latter. Absent a demonstrated nexus, ArcelorMittal’s commercial success evidence is not significant. *See Ormco Corp. v. Align Tech., Inc.*, 463 F.3d 1299, 1312 (Fed. Cir. 2006) (“[I]f the feature that creates the commercial success was known in the prior art, the success is not pertinent.”).

The remaining issue is whether a new trial on obviousness is required to address the issue of commercial success. We think this is not a case in which the *prima facie* case so strong that, as a matter of law, it would overcome ArcelorMittal’s commercial success evidence.

*See, e.g., Wyers*, 616 F.3d at 1245. Therefore, we conclude that the district court's claim construction prejudiced ArcelorMittal with respect to obviousness. Accordingly, we vacate the jury's obviousness verdict and remand for a new trial addressing only the commercial success aspect of obviousness and infringement under the correct claim construction.

#### IV Conclusion

On remand, the district court must address whether, under the correct claim construction, the asserted claims of the '805 patent are obvious in light of any evidence of commercial success of hot-rolled steel that is also cold-rolled and that has the required nexus with ArcelorMittal's claims. Additionally, as discussed above, the district court must address the issue of literal infringement under the correct claim construction. In remanding for a limited new trial addressing only infringement under the correct claim construction and whether ArcelorMittal has pertinent commercial success evidence sufficient to overcome the *prima facie* case of obviousness, we do not foreclose the district court from entertaining a motion for summary judgment on these issues that might obviate the need for a further trial.

**AFFIRMED-IN-PART, REVERSED-IN-PART,  
VACATED-IN-PART, REMANDED**

COSTS

Costs to neither party.

# United States Court of Appeals for the Federal Circuit

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ARCELORMITTAL FRANCE AND  
ARCELORMITTAL ATLANTIQUE ET LORRAINE,  
*Plaintiffs-Appellants,*

v.

AK STEEL CORPORATION,  
*Defendant-Appellee,*

AND

SEVERSTAL DEARBORN, INC. AND  
WHEELING-NISSHIN INC.,  
*Defendants-Appellees.*

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2011-1638

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Appeal from the United States District Court for the  
District of Delaware in case no. 10-CV-0050, Judge Sue L.  
Robinson.

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WALLACH, *Circuit Judge*, dissenting-in-part.

I do not agree that “very high mechanical resistance” means a mechanical resistance of 1500 MPa or greater. Rather, because I conclude that intrinsic evidence supports a reading of this term to mean a mechanical resistance in excess of 1000 MPa, I respectfully dissent.

The disputed term “very high mechanical resistance” is not defined expressly in the specification. “Mechanical resistance” and “resistance,” however, are discussed in multiple passages. Their references throughout the specification are instructive, and they necessarily conflict with the majority’s construction for the following reasons.

The majority’s focus on “very high,” “high,” and “substantial” is unwarranted because these terms, and other similar laudatory terms, are used interchangeably in the ’805 patent. *See Bid for Position, LLC v. AOL, LLC*, 601 F.3d 1311, 1317-18 (Fed. Cir. 2010) (holding “bid” and “value of the bid” to have the same meaning because the claim language and specification used the terms interchangeably). For example, the patent is entitled, “Coated Hot- and Cold-Rolled Steel Sheet Comprising a *Very High* Resistance After Thermal Treatment.” ’805 patent col. 1 ll. 1-4 (emphasis added). The “subject of the invention” is then described as a steel composition that ensures a “*very high* mechanical resistance after thermal treatment” and a “*high* resistance to corrosion.” *Id.* col. 1 ll. 47, 61-63 (emphases added). Also, the “purpose of the invention” is purported as producing a coated steel sheet with a mechanical resistance in *excess of 1000 MPa* after thermal treatment, which is described as “*substantial* resistance to shocks, fatigue, abrasion and wear” and a “*good* resistance to corrosion.” *Id.* col. 1 ll. 37-43 (emphases added). In another instance, the patent states that the “description which follows will make the invention clearly understood . . .” and recites a steel sheet that exhibits “a *high* mechanical resistance after thermal treatment and a *high* resistance to corrosion . . .” *Id.* col. 2 ll. 34-35, 43-44 (emphasis added).

Other passages in the specification further exemplify the interchangeability of these terms. For instance, the patent reads in one paragraph that “[t]he thermal treat-

ment applied . . . makes it possible to obtain *high* mechanical characteristics which may exceed 1500 MPa” and in the very next paragraph, describes a “*substantial* resistance to abrasion, wear, fatigue, shock, as well as a *good* resistance to corrosion . . . .” *Id.* col. 2 ll. 49-52, 59-60 (emphases added). Likewise, the claimed steel sheet is disclosed as having a “*substantial* resistance to corrosion in the delivery state, during shaping and thermal treatments as well as during usage of the finished casting,” and after thermal treatment, is described as having “a *substantial* mechanical resistance, which may exceed 1500 MPa . . . .” *Id.* col. 3 ll. 49-53 (emphases added). Finally, the specification explains that modulation of certain elements in the composition of the steel including “carbon makes it possible to achieve *high* mechanical characteristics . . . .” *Id.* col. 4 ll. 20-21 (emphasis added).

The patentee’s use of “very high,” “high,” and “substantial” shows that these terms are used interchangeably. It does not appear the patentee made technical distinctions as to varying resistance levels with the use of these terms. On the contrary, the patentee used these terms interchangeably and in a laudatory fashion without any limiting purposes. *See Minton v. Nat'l Ass'n of Sec. Dealers, Inc.*, 336 F.3d 1373, 1381 (Fed. Cir. 2003) (declining to construe “traded efficiently,” in part, because “efficiently” on its face does not inform the mechanics of how the trade is executed and concluding that it is a laudatory term characterizing the result of the executing step); *see also Allen Eng'g Corp. v. Bartell Indus., Inc.*, 299 F.3d 1336, 1346-47 (Fed. Cir. 2002) (declining to hold that the “fast steering” language in the preamble was limiting because it was laudatory, merely setting forth the intended purpose of the claimed combination). As such, the interchangeable use of these laudatory terms does not shed light on the disputed claim’s proper scope.

I would instead focus on the touted increase in mechanical resistance the '805 patent purports to achieve over prior art—namely, the obtention of mechanical resistance “in excess of 1000 MPa.” *Id.* col. 1 ll. 41-42. In particular, “very high,” “high,” and “substantial” were used to promote the invention’s improved levels of resistance without the “detriment of shaping properties”—a problem in the prior art. *Id.* col. 1 ll. 10-11. The majority’s construction of requiring a mechanical resistance of “at least 1500 MPa” unduly contracts the wide breadth of the invention the patentee discloses. Without clear language providing otherwise, 1500 MPa cannot be set as the floor of a range of mechanical resistance levels recited in the patent, principally because “excess of 1000 MPa” is stated as within the range of resistance levels that satisfy the purpose of the invention. *See Apple Comp., Inc. v. Articulate Sys., Inc.*, 234 F.3d 14, 25 (Fed. Cir. 2000) (“[T]he claim must be interpreted in light of the teachings of the written description and purpose of the invention described therein.”). Additionally, other values of resistance levels, including 1500 MPa, are recited in permissive form, and therefore, are less than instructive in determining the scope of “very high mechanical resistance.” '805 patent col. 2 ll. 51-53 (“*may exceed* 1500 MPa for mechanical resistance . . . .”) (emphasis added); *id.* col. 4 ll. 52-61 (Table 2 illustrating ranges with examples of “maximal resistance of the steel sheet according to the invention after thermal treatment,” ranging from 1665 to 1695 MPa).

The majority nevertheless takes a different approach. It implies that the use of the terms, “high” or “substantial,” correspond only to a mechanical resistance that “*may exceed* 1500 MPa.” Based on this reading, the majority determines that “if 1500 MPa is high mechanical

resistance, then very high resistance must be at least 1500 MPa.” Majority Op. 10.

As discussed above, however, the specification shows that “high,” “substantial,” and other similar terms are used to describe varying levels of mechanical resistance. Specifically, in addition to references to “may exceed 1500 MPa” as “high” or “substantial” resistance, the patent recites “excess of 1000 MPa” as “substantial” resistance. *Compare* ’805 patent col. 3 ll. 52-53 (“[A] substantial mechanical resistance, which may exceed 1500 MPa . . . .”) (emphasis added), *with id.* col. 1 ll. 40-43 (“[M]akes it possible to obtain a mechanical resistance in excess of 1000 MPa, a substantial resistance to shocks, fatigue, abrasion and wear . . . .”) (emphasis added). The specification thus describes both 1500 MPa and 1000 MPa as “substantial.”

“High” or “substantial” interchangeably describe in similar context the mechanical resistance level of 1500 MPa, giving “high” and “substantial” similar meaning. Hence, “high” or “substantial” likewise may describe interchangeably the mechanical resistance level of “excess of 1000 MPa.” Applying the majority’s logic, if 1000 MPa characterizes both “substantial” and “high” mechanical resistance, then “very high” resistance must be in excess of 1000 MPa. Accordingly, “very high mechanical resistance” should be construed as a mechanical resistance in excess of 1000 MPa. I find the specification sufficiently instructive, and therefore, no need to turn to extrinsic evidence.