

Keywords: All elements rule; doctrine of equivalents; claim construction; means-plus-function claims; literal infringement; prosecution history estoppel.

General: Under the “all-elements rule”, infringement cannot be found by way of the doctrine of equivalents if even one limitation of a claim or its equivalent is not present in the accused device. Thus, when determining the scope of a means-plus-function claim under the doctrine of equivalents, the absence of an element in the accused device that performs the properly construed function, or its equivalent, precludes a finding of infringement.

Lockheed Martin Corp. v. Space Systems/Loral Inc.
66 U.S.P.Q.2d 1282 (Fed. Cir. 2003)
March 24, 2003

I. Facts

Initially, Lockheed Martin Corp. (Lockheed) brought an action for patent infringement against Space Systems/Loral Inc. (SSL) in the Northern District of California. Specifically, Lockheed alleged that SSL infringed its patent entitled “Roll/Yaw Body Steering for Momentum Biased Spacecraft,” U.S. Pat. No. 4,084,772 (“the ‘772 patent”). Essentially, this patent claims a structure and method for altering the attitude of a satellite in an inclined geosynchronous orbit.

By way of background, a typical geosynchronous (or geostationary) satellite orbits directly above the equator and in a period that corresponds with the Earth’s rotation (i.e. a twenty-four hour orbit). However, certain gravitation effects may cause a satellite to incline from its equatorial orbit into an inclined north-south orbit. In such an orbit, the satellite maintains a 24 hour period, however, the orbit passes over both the northern and southern hemispheres. Accordingly, the attitude (i.e. the aimed direction) of the orbiting satellite must be adjusted.

Simply put, the ‘772 patent claims a control system for a satellite which adjusts satellite attitude via a pair of gyroscopes respectively disposed on the “yaw” axis and the “pitch” axis of the satellite. Accordingly, by varying the rotational speeds of the respective gyroscopes, the attitude of the satellite may be adjusted. In short, by increasing the rotation speed of the “yaw” axis gyroscope in one direction, the satellite points to the north. Conversely, by increasing the rotation speed of the “yaw” axis gyroscope in the alternate direction, the satellite points to the south. Thus, by varying the rotation of the “yaw” axis gyroscope in a sinusoidal manner (12 hours pointing north and 12 hours pointing south), the proper attitude toward the equator is maintained.

Unfortunately, typical satellites comprise positioning circuitry that attempts to automatically adjust for any variations in the attitude of the satellite. Thus, the ‘772 patent also claims an adjustment circuit which “fools” the positioning circuitry into ignoring the intentional adjustments of the gyroscope.

In the relevant parts, the ‘772 patent claims:

- b. means for rotating said wheel in accordance with a predetermined rate schedule which varies sinusoidally over the orbit at the orbital frequency of the satellite...

- c. means responsive to said transverse wheel when rotating for generating a signal indicative of the speed and direction of the said wheel..., [and]
- f. said orientation means including means responsive to said wheel speed and direction signal....

As it stands, the “transverse wheel” relates to the yaw axis gyroscope, the means for recited in limitation [b] relates to the sine generator, the means for recited in limitation [c] relates to a tachometer for the yaw axis gyroscope and the means responsive to in limitation [f] relates to the adjustment circuitry.

The district court, during a *Markman* hearing, concluded that “varies sinusoidally” means “a sine-shaped variation that passes through zero.” The court declined Lockheed’s suggestion to construe the foregoing limitation to include variations that do not pass through zero.

Again for the purposes of the background, the SSL satellite, at its core, adjusts attitude via a “V-Wheel”. The V-Wheel operates by straddling a pair of gyroscopes in a V-shape about the pitch axis. Thus, by altering the respective rotational speeds of the gyroscopes, the attitude of the SSL satellite may be adjusted. Additionally, the SSL satellite employs an “L-Wheel” which sits on the yaw axis of the satellite. If one of the V-Wheels were to fail, the L-Wheel would kick in to compensate for the failing wheel.

Neither party contested that the SSL satellite did not literally infringe the claims of the ‘772 patent. Rather, the contention arose when the doctrine of equivalents was presented. By applying “function-way-result” analysis, the district court determined the appropriate scope of the contested claim. Based on its previous claim construction, the district court determined that the “way” the SSL L-Wheel operated was not substantially similar to that of the claims in the ‘772 patent. Specifically, the court determined that the interpretation suggested by Lockheed of the claim limitation “varies sinusoidal” would vitiate this limitation. Accordingly, the district court granted SSL summary judgment of noninfringement.

On appeal the Federal Circuit affirmed the summary judgment on the grounds that prosecution history estoppel barred the application of the doctrine of equivalents to limitation [b], the critical limitation in the instant case. The Supreme Court, in light of its decision in *Festo*, summarily vacated, along with other similar infringement cases, the Federal Circuit’s instant decision and remanded the case back to the Federal Circuit for consideration in light of the *Festo* ruling.

II. Issues

- A. Was the district court’s interpretation of the scope of the ‘772 patent proper?
- B. Is a summary judgment of noninfringement appropriate in light of the proper claim interpretation?

III. Discussion

- A. No. Both parties agreed that the relevant claim is a means-plus-function claim, and, as such, should be analyzed under 35 U.S.C. § 112, ¶ 6. To determine the scope, the first step of a means-plus-function claim is to determine the claimed function. *See*

Chiuminatta Concrete Concepts, Inc. v. Cardinal Indus., Inc., 145 F.3d 1303, 1308, 46 USPQ2d 1752, 1755-56 (Fed. Cir. 1998).

The district court concluded that the function claimed was “rotating said wheel”. However, the Federal Circuit disagreed, and concluded that the district court’s interpretation was overly broad. In contrast, the Federal Circuit determined that the claimed function was, “rotating said wheel in accordance with a predetermined rate schedule which varies sinusoidally over the orbit at the orbital frequency of the satellite.” Accordingly, the Federal Circuit concluded that for either literal or equivalent infringement, the accused device must have a “predetermined rate schedule that varies sinusoidally” or an equivalent thereof. Indeed, the Federal Circuit narrowed the scope of the claim in comparison to the district court.

- B. Yes. Again, both parties agreed that the SSL satellite did not literally infringe the ‘772 patent. However, Lockheed contended that the SSL satellite infringed the ‘772 patent via the doctrine of equivalents and that a factual dispute regarding such still existed. Specifically, Lockheed presented the testimony of an expert who proposed that the SSL satellite employs a sinusoidal curve that is shifted above the X-axis. That is, although the L-Wheel does not change rotational direction, its rotational speed still varies sinusoidally. Moreover, Lockheed’s expert posited that the SSL satellite had the capability of being operated in a purely sinusoidal basis.

The Federal Circuit disagreed with Lockheed’s contentions. The Federal Circuit maintained a claim interpretation which held that “sinusoidal” requires a change in direction of rotation and, as such, a point in time in which rotation stops or is zero. In light of this interpretation, the Federal Circuit determined, under the all elements rule, the SSL satellite did not contain a wheel which stopped and changed direction or an equivalent thereof. Indeed, under the all elements rule, there can be no infringement under the doctrine of equivalents if even one limitation of a claim or its equivalent is not present in the accused device. See *Penwalt Corp. v. Durand-Wayland, Inc.*, 833 F.2d 931, 935-36, 4 USPQ2d 1737, 1739-40 (Fed. Cir. 1987) (*en banc*). Thus, if a court determines that a finding of infringement under the doctrine of equivalents “would entirely vitiate a particular claim[ed] element,” then the court should rule that there is no infringement under the doctrine of equivalents. See *Bell Atl. Network Servs., Inc.*, 262 F.3d 1258, 1280, 59 USPQ2d 1869, 1879 (Fed. Cir. 2001) (quoting *Warner-Jenkinson v. Hilton Davis Chem. Co.*, 520 U.S. 17, 39, n.8). Accordingly, the Federal Circuit determined that doctrine of equivalents did not apply and, as such, the summary judgment of noninfringement was affirmed.

Additionally, because the Federal Circuit determined that the doctrine of equivalents did not apply, they found no need to address the *Festo* ruling. Indeed, the Federal Circuit explicitly stated that, “our disposition of this appeal on grounds other than prosecution history estoppel literally complies with the Supreme Court’s order in that sense the, ‘in light of *Festo*,’ we have ‘further consider[ed]’ the case and concluded that the judgment of the district court should be affirmed on another ground.”

IV. Conclusion

In the specification, the drafter of the ‘772 patent should have taken more care defining what “sinusoidally” was. However, at the time of the application, it appears that Lockheed intended to claim a change in direction of rotation.