IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF DELAWARE

QUEST INTEGRITY USA, LLC, Plaintiff, v. CLEAN HARBORS INDUSTRIAL SERVICES, INC., Defendant.	)	Civ. No. 14-1482-SLR

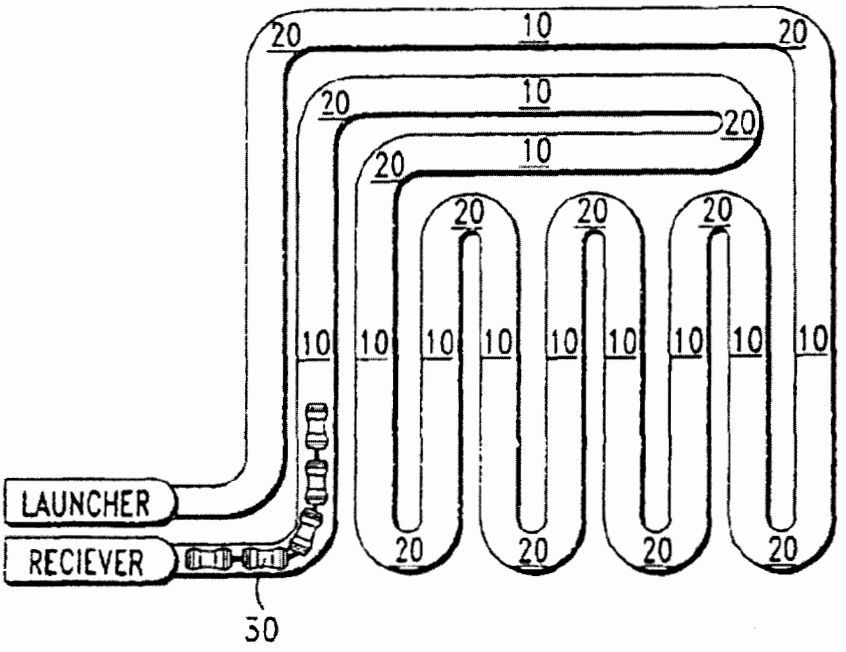
QUEST INTEGRITY USA, LLC, Plaintiff, v. COKEBUSTERS USA INC., Defendant.	)	Civ. No. 14-1483-SLR

MEMORANDUM ORDER

At Wilmington this 28th day of June, 2016, having heard argument on, and having reviewed the papers submitted in connection with, the parties' proposed claim construction;

IT IS ORDERED that the disputed claim language of U.S. Patent No. 7,542,874 ("the '874 patent") shall be construed consistent with the tenets of claim construction set forth by the United States Court of Appeals for the Federal Circuit in *Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005), as follows:

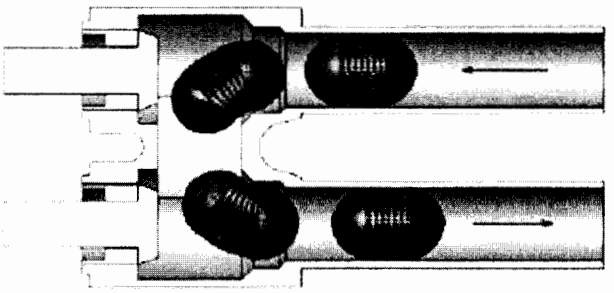
1. **"Bend:"**[1] "A curved section of tubing." The specification explains that "a furnace is generally comprised of several hundred to several thousand feet of serpentine tubing that is characterized by straight tube segments . . . interconnected by angled bends . . . ." (1:26-30) Moreover, the "present invention is directed to a furnace tube inspection system for a furnace that comprises a plurality of tube segments connected by a plurality of bends, such as the furnace shown in [figures] 1A-1C." (4:27-30)



(Figure 1C) Plaintiff criticizes the construction,[2] arguing that the angle of the bend is not dictated by the specification. The adopted construction does not require a particular angle; indeed, the "bends" shown in figure 1C above may be said to be at a 90° angle or 180° angle. To the extent plaintiff seeks to capture a particular type of connection of the

[1] Found in claims 1, 11, 24, 33, 37, and 40.
[2] Proposed by defendants and adopted by the court.

tube ends – "mule ears" (shown below), which internally present two 90° square turns in immediate succession – the court concludes that the specification does not describe these sharp turns, characterized by a lack of roundness.



(Civ. No. 14-1483, D.I. 55 at § 48)[3]

2. **"Partition said inspection data at a plurality of data markers:"**[4] "Divide the inspection data into subsets of smaller size, each of which begins and ends with a data marker."[5] **"Partitioning said inspection data at said data markers:"**[6] "Dividing the inspection data into subsets of smaller size, each of which begins and ends with a data marker." **"Partitioning said inspection data at said bends:"**[7] "Dividing the inspection data into subsets of smaller size, each of which begins and ends with a bend." The specification explains that

> the inspection data and/or sensor data collected from the furnace may be analyzed to generate a plurality of data markers each of which identifies a physical feature of the furnace. The inspection data is then partitioned at

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[3] **Extrinsic evidence.** "Curved" means "to have or take a turn, change, or deviation from a straight line or course or from a level surface typically with a rounded gradual effect and without sharp breaks or angularity." *Merriam-Webster Unabridged* (2016).
[4] Found in claims 1 and 11.
[5] The court adopts defendants' proposed construction. Plaintiff proposed "dividing the inspection data into subsets of smaller size at a plurality of data markers," which construction only differs as to the "plurality of data markers" language.
[6] Found in claims 24 and 40.
[7] Found in claim 33.

the data markers so as to correlate the inspection data to the physical geometry (e.g., the appropriate tube segments) of the furnace.

(4:34-40) It follows from this explanation that each "subset" would begin and end at a data marker.[8]

3. **"Correlate said inspection data to said physical geometry of said furnace:"**[9] "To put in relation the inspection data to the arrangement of the tube segments in the furnace."[10] **"Correlate said inspection data to an appropriate one of said tube segments of said furnace:"**[11] "To put in relation the inspection data to the appropriate one of the tube segments in the furnace." The specification explains that the prior art furnace tube inspection systems were not able "to correlate the inspection data collected from the furnace with the physical geometry of the furnace," because the inspection tool did not progress through the furnace at a constant rate. This made it difficult "to identify the precise locations of the worn sections and/or hot spots of the furnace." (1:65-2:19) The current invention uses a computer "to partition the inspection data at the data markers so as to correlate the inspection data to the appropriate tube segments of the furnace." (3:21-23; 4:37-40) Any type "of physical features may . . . be used to correlate the inspection data to the physical geometry of the furnace." (4:43-57) The specification further explains that "[t]he inspection data collected by the ultrasonic transducers may also be used to identify the locations of the

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[8] Plaintiff argued that the additional language was repetitive and potentially confusing to a jury. The court is unable to discern at this juncture why the additional language in the adopted construction would create confusion.
[9] Found in claims 1, 11, and 40.
[10] The court declines to construe "correlate" and "physical geometry" out of context as requested by the parties.
[11] Found in claims 24 and 33.

bends of the furnace and, thus, assist in correlating the inspection data to the physical geometry of the furnace." (5:29-32) The specification describes using "relational data" (such as "a plurality of time intervals") in the storage device of the system that, along with "inspection data," help in generating the data markers that identify the locations of, e.g., furnace bends. (7:16-28; figures 3, 4, and 8)[12]

4. **"A furnace with a specified physical geometry:"**[13, 14] "Arrangement of tube segments in the furnace." The specification explains that the inspection data is correlated "to the physical geometry (e.g., the appropriate tube segments) of the furnace." (4:37-40) Also, "the physical geometry of a furnace is not always consistent such that either the wall thickness or the inside radius of the furnace may change from one tube segment to another." (11:5-8)

5. **"Generate a display of at least a portion of said partitioned inspection data arranged to represent said physical geometry of said tube segments:"**[15] "To create a visual representation of at least a portion of the inspection data to depict or portray the arrangement of the tube segments." **"Generating a display of at least a portion of said partitioned inspection data arranged to represent said physical geometry of said tube segments:"**[16] "Creating a visual representation of at least a portion of the inspection data to depict or portray the arrangement of the tube

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[12] **Extrinsic evidence.** "Correlate" is defined in the dictionary as "one of two related things viewed in terms of its relationship to the other." *Merriam-Webster Unabridged* (2016).
[13] Found in claims 1, 11, and 40.
[14] Having declined to construe "physical geometry" out of context, the court is left with this limitation, which includes the term.
[15] Found in claims 1 and 40.
[16] Found in claims 11 and 24.

segments." **"Generating a two dimensional or three-dimensional representation of at least a portion of said inspection data arranged to represent a physical geometry of a plurality of said tube segments:"**[17] "Creating a two dimensional or three-dimensional visual representation of at least a portion of the inspection data to depict or portray the arrangement of the tube segments." **"Generating a two-dimensional or three-dimensional representation of said inspection data collected from a plurality of said tube segments, said data arranged to represent a physical geometry of said tube segments:"**[18] "Creating a two dimensional or three-dimensional visual representation of the inspection data collected from a plurality of said tube segments to depict or portray the arrangement of the tube segments."[19]

6. The parties principally disagree on whether the limitations include "strip charts." The specification explains that the inspection data is "partitioned at the data markers so as to correlate the inspection data to the physical geometry (e.g., the appropriate tube segments) of the furnace. It will also be seen that the inspection data is displayed in a manner that enables the visual detection of problem areas within the furnace." (4:35-42) The examples provided in the specification "illustrate different approaches that may be used to correlate the inspection data to the physical geometry of the furnace and display the inspection data in a manner that enables the visual detection of problem areas within the furnace." (9:42-47)

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[17] Found in claim 33.
[18] Found in claim 37.
[19] The court declines to separately construe "represent."

7. Example 1 of the specification describes certain strip charts, by reference to figures 3 and 4. Figure 3 depicts the "wall thickness readings for each of the time intervals . . . plotted vertically across the height of the horizontal strips." The "various wall thickness readings displayed on strip chart 300 are color-coded in accordance with a color legend 302," which "wall thickness readings range from 0.15 inches (shown in dark blue) to 0.35 inches (shown in dark red)." (10:8-14) In figure 4, "the inside radius readings are plotted successively in time from left-to-right and bottom-to-top, and the inside radius readings for each of the time intervals are plotted vertically across the height of the horizontal strips." The "various inside radius readings displayed on strip chart 400 are color-coded in accordance with a color legend 402," ranging "from 0.00 inches (shown in dark blue) to 5.00 inches (shown in dark red)." (10:18-26) In figures 3 and 4, each horizontal strip represents a sixty second period of time. (10:36-37) Assuming a speed of the inspection tool of 2 ft/sec, "each horizontal strip displays the readings collected from 120 feet of furnace" tubing. (10:36-40) A data analyst identifies the locations of the furnace bends by analyzing the strip chart. Specifically, the location of the bends "may be identified by visually detecting one or more 'data clues' on the strip charts," including

> an increase in the variation of the wall thickness readings and/or inside radius readings within a particular time interval (which will be depicted as different colors across the height of a horizontal strip) and/or a decrease in the number of wall thickness readings and/or inside radius readings within a particular time interval (which will be depicted as white spaces or gaps across the height of a horizontal strip).

(10:48-57) After identifying and marking the bends, the computer is programmed to generate the data markers and mark the tube segments. "The various readings are thus partitioned at the data markers to thereby correlate the readings to the appropriate

tube segments of the furnace." (10:58-67) The data analyst may also use "a mechanical drawing of the physical layout of the furnace" and "the known lengths of the various tube segments" to help identify the bends or ends of straight tube segments. (11:1-19) Using the strip charts, the analyst can determine if any tube segments are flawed and should be repaired or replaced. (11:20-35) The specification concludes "that strip charts 300 and 400 are merely examples of the types of displays that may be used to visually detect problem areas within the furnace." After "generation of the data markers, the wall thickness readings and/or inside radius readings could be displayed as a stacked set of bars wherein each bar represents one tube segment of the furnace" or "in a three-dimensional format in which the structure of the tube segments matches the actual physical geometry of the furnace." (11:36-48)

8. In example 2, the computer generates the chart shown in figure 5, "in which all of the wall thickness readings for a plurality of time intervals are plotted across a plurality of vertical bars. Each vertical bar displays the wall thickness readings from a single tube segment." In example 3 and figure 6, "all of the wall thickness readings for a plurality of time intervals are plotted across a plurality of vertical bars. Similar to the chart of [figure] 5, each vertical bar displays the wall thickness readings from a single tube segment." In both of these examples, "the tube segments are positioned in their proper orientation (but with the connecting bends removed)." (11:52-12:55)

9. During prosecution, the independent claim was amended in April 2008[20] to recite:

> A system for displaying inspection data collected from a furnace with a specified physical geometry, said system comprising:

[20] After two prior amendments.

a storage device for storing said inspection data; and

a computer programmed to:

partition said inspection data at a plurality of data markers each of which identifies a location of a physical feature of said furnace so as to correlate said inspection data to said physical geometry of said furnace;

generate a display of said partitioned inspection data **arranged to represent said physical geometry of said furnace** to thereby enable visual detection of problem areas within said furnace; and

wherein said inspection data is collected by one or more devices selected from the following group: an ultrasonic transducer, a laser profilometer, and combinations thereof.

(D.I. 136 at JA268) (emphasis added) The patent office rejected such claim as obvious in view of the prior art, U.S. Patent No. 6,359,434 ("Winslow") and U.S. Patent No. 6,978,690 ("Van der Heide"). The patentee distinguished Winslow arguing that:

> Winslow is directed to approximating the location of defects in a water pipeline with respect to joints within that pipeline. The physical geometry of the water pipeline is not known and, as such, the defects are not correlated to the actual physical geometry of the pipeline. Rather the defects are merely correlated to detected pipe joints of the water pipeline in order to provide an approximate location of such defects. Indeed, because the segments of a water pipeline are not generally stacked, the location of a defect in a particular segment in relation to the location of a defect in another segment is not instructive of a global problem within the water pipeline. As such, the claimed invention would not be necessary to the detection of defects in a water pipeline. By contrast, in the furnace tube inspection system and method of the present invention, the collected inspection data is displayed such that the data is arranged to represent the known physical geometry of the furnace. The collected inspection data is not merely correlated to particular tube segments of the furnace. Rather, the collected inspection data is displayed in such a manner that the data is arranged to represent the actual physical geometry of the furnace, which simplifies the detection of problems within a particular region of the furnace.

(D.I. 136 at JA283-84) In December 2008, the patentee amended the claim to recite:

A system for displaying inspection data collected from a furnace with a specified physical geometry, **wherein said furnace comprises a plurality of tube segments interconnected by a plurality of bends so as to allow stacking of at least a portion of said tube segments**, said system comprising:

a storage device for storing said inspection data; and

a computer programmed to:

partition said inspection data at a plurality of data markers each of which identifies a location of a physical feature of said furnace so as to correlate said inspection data to said physical geometry of said furnace;

generate a display of **at least a portion of** said partitioned inspection data arranged to represent said physical geometry of **a plurality of said tube segments and** enable visual detection of a problem area **comprising one or more of said tube segments**; and

wherein said inspection data is collected by one or more devices selected from the following group: an ultrasonic transducer, a laser profilometer and combinations thereof.

(D.I. 136 at JA372) (emphasis added) Addressing the examiner's continued rejection of the claim as obvious in view of Winslow and Van der Heide, the patentee argued that:

In particular, attorney Carlson explained that the claimed invention was directed to a system for displaying inspection **data collected from a furnace comprising a plurality of tube segments interconnected by a plurality of bends to allow stacking of the tube segments, which physical geometry is very different from that of a water pipeline as disclosed in Winslow.** Attorney Carlson pointed out that although Winslow teaches the partitioning of inspection data, it does not teach or suggest the display of partitioned inspection data that is arranged to represent the physical geometry of plurality of tube segments of a furnace and enable visual detection of a problem area comprising one or more of the tube segments of the furnace.

(D.I. 136 at JA386-87) (emphasis added)

10. Winslow describes the prior art as using a remote field technique ("RFT") measurement device to evaluate the wall thickness of water pipes. "As the

measurement device travels along a body of tube, the detector signal's phase and amplitude are determined by the RFT instrument and are digitally recorded and/or displayed in strip chart form." Figure 2 "is an example of such strip chart data." Figure 2 shows a chart of signal amplitude vs. distance and a chart of phase vs. distance, i.e., it is representing continuous data as determined by the RFT instrument. (Winslow, 1:67-2:4) Winslow provides a method for analyzing RFT data from a data file, including "parsing the data file into pipe lengths, calculating a phase profile for the data points within each pipe length, [and] locating potential defects in the pipe length using the Phase Profiles . . . ." (Winslow, 4:36-44)

11. "A patentee may, through a clear and unmistakable disavowal in the prosecution history, surrender certain claim scope to which he would otherwise have an exclusive right by virtue of the claim language." *Vita–Mix Corp. v. Basic Holding, Inc.*, 581 F.3d 1317, 1324 (Fed. Cir. 2009) (citing *Purdue Pharma LP. v. Endo Pharms. Inc.*, 438 F.3d 1123, 1136 (Fed. Cir. 2006)). "Prosecution disclaimer does not apply to an ambiguous disavowal." *Computer Docking Station Corp. v. Dell, Inc.*, 519 F.3d 1366, 1375 (Fed. Cir. 2008) (citations omitted). The claims of the '874 patent are each directed to a furnace. The two claim amendments presented above focus the "generating a display" step to the physical geometry of the inspected furnace. The applicant distinguishes Winslow from the patent at bar, arguing that Winslow does not teach "the display of partitioned data that is arranged to represent the physical geometry of plurality of tube segments of a furnace and enable visual detection of a problem area comprising one or more of the tube segments of the furnace." The focus of Winslow is not the "generation of a particular visual representation," but data manipulation to

approximate the location of defects. The applicant's arguments focus on the particular environment of Winslow, wherein the physical geometry of the water pipeline is not known. In contrast, the applicant points out that the claim at bar is directed to a specific environment (a furnace) with a certain physical geometry. The arguments in the prosecution history do not use the words "strip chart," nor are strip charts described.[21] Moreover, the strip charts of example 1 contain the markings made by the data analyst, effectively representing the location of the bends in the inspected furnace. The court disagrees with plaintiff's representation of the prosecution history and concludes that the applicant did not disclaim strip charts as described in example 1.

12. The court has provided a construction in quotes for the claim limitations at issue. The parties are expected to present the claim construction consistently with any explanation or clarification herein provided by the court, even if such language is not included within the quotes.

United States District Judge

[21] Plaintiff's citation to *North American Container, Inc. v. Plastipak Packaging, Inc.*, 415 F.3d 1335 (Fed. Cir. 2005) is unhelpful. In that case, the Federal Circuit found prosecution disclaimer when "the applicant distinguished his invention from the [prior art] on the basis of the latter disclosing inner walls that are 'slightly concave'" in order to overcome an obviousness rejection. "The inescapable consequence of such an argument is that the scope of applicant's claims cannot cover inner walls that are 'slightly concave'" thus, "the scope of applicant's claims is also limited to inner walls of the base portion with no concavity." *Id.* at 1345-46.