

**IN THE UNITED STATES DISTRICT COURT FOR THE
WESTERN DISTRICT OF PENNSYLVANIA**

WESTINGHOUSE ELECTRIC	)	
COMPANY LLC,	)	
	)	Civil Action No. 2:13-cv-1124 (NBF)
Plaintiff,	)	Filed Electronically
	)	
vs.	)	[JURY TRIAL DEMANDED]
	)	
ZETEC, INC.,	)	
	)	
Defendant	)	

AMENDED COMPLAINT

Plaintiff, Westinghouse Electric Company LLC (“WEC”), through its counsel, Pietragallo Gordon Alfano Bosick & Raspanti LLP, hereby alleges the following for its first amended complaint against Defendant, Zetec, Inc. (“Defendant” or “Zetec”):

THE PARTIES

1. Plaintiff, WEC, is a limited liability company organized and existing under the laws of the State of Delaware with headquarters located at 1000 Westinghouse Drive, Cranberry Township, Pennsylvania 16066.

2. Upon information and belief, Defendant, Zetec, is a corporation organized and existing under the laws of the State of Washington with offices located at 8226 Bracken Place SE, Suite 100, Snoqualmie, Washington 98065. Zetec is registered to do business in Pennsylvania, and upon information and belief, Zetec is doing business, has carried out substantial business, and has had substantial contacts with this judicial district.

JURISDICTION AND VENUE

3. This Complaint alleges patent infringement under the Patent Act, 35 U.S.C. § 271, *et seq.*

4. This Court has subject matter jurisdiction pursuant to 28 U.S.C. §§ 1331, 1338, and 2201.

5. Upon information and belief, Zetec is doing business, has carried out substantial business, and has had substantial contacts with Pennsylvania and this judicial district.

6. Venue is proper in this judicial district under 28 U.S.C. §§ 1391 and 1400(b).

SUMMARY OF FACTS

7. Plaintiff, WEC, is the owner by assignment of United States Patent No. 6,823,269 (“the ‘269 Patent”), issued November 23, 2004, and titled “Eddy Current Data Union”. A true and correct copy of the ‘269 Patent is attached hereto as Exhibit A.

8. The ‘269 Patent discloses and claims innovative and valuable inventions relating to synthesizing nondestructive examination data of a component by combining portions of specimen data and field data in a combined data stream, or data union. In particular, the inventions of the ‘269 Patent have valuable application in the field of performing automated analysis of eddy current data from steam generator tubing inspections to detect or identify potential flaws or defects in the steam generator tubing. Data union is a key tool to assist tube integrity engineers in justifying positions taken in degradation, condition monitoring and operational assessments.

9. Zetec's Eddynet/AN and RevospECT products are systems and processes that employ various techniques including signal injection to perform automated analysis of eddy current data from steam generator tubing inspections. For example, Zetec's RevospECT system is described on its Internet website as "a system and process that performs automated analysis of eddy current data from steam generator tubing inspections. RevospECT has met rigorous industry standards for flaw analysis from bobbin, rotating and array probe techniques and has demonstrated performance for a wide variety of non-flaw conditions as well. Additionally, RevospECT offers tube noise measurements to meet ongoing industry initiatives to monitor POD and performs a variety of data quality checks to alert inspection personnel to adverse conditions." See: <http://www.zetec.com/2010/07/revospect/>.

10. Zetec's RevospECT system is further described as being "fully capable of performing multiple path analysis using various detection and classification algorithms, applying any combination of probe technologies and analysis methodologies, to exceed the key performance indices of current dual analysis concepts, with additional capability to address history through loaded historical results and apply rule-based logic for final reporting of an indication. RevospECT can also be configured to output independently derived analysis results for conventional dual analysis resolution." See: <http://www.zetec.com/2010/07/revospect/>.

12. On or about August 17, 2012 counsel for WEC directly notified Zetec by letter of its belief that Zetec's systems may be covered by one or more claims of the '269 Patent, and requested an analysis of how Zetec's system was distinguished from the claims of the '269 Patent. Counsel for Zetec subsequently responded on September 6, 2012 with a letter expressing Zetec's belief that the '269 Patent was invalid. Counsel for WEC and Zetec exchanged two additional letters concerning infringement of the '269 Patent by Zetec. *See* Exhibit B, notice letters.

13. Upon information and belief, and notwithstanding WEC's notification of infringement, Zetec continues to manufacture, use, sell, and offer for sale its infringing systems, including Zetec's Eddynet/AN and RevospECT systems.

COUNT I
INFRINGEMENT OF THE '269 PATENT

14. WEC repeats and re-alleges each and every averment contained in paragraphs 1-13 of this Complaint as if fully set forth herein.

15. Zetec has infringed and is infringing the '269 Patent in the United States by at least making, using, offering to sell, selling, importing, causing to be made, causing to be used, causing to be offered for sale, causing to be sold and/or causing to be imported systems and/or methods, including Zetec's Eddynet/AN and RevospECT systems, that infringe one or more of the claims of the '269 Patent. Upon information and belief, Zetec has and is contributorily and/or actively inducing infringement of the '269 Patent by providing its customers with the infringing systems along with instructions for use and/or other operational materials.

16. On information and belief, Zetec's infringement, contributory infringement and/or active inducement of others' infringement of the '269 Patent have taken place with full knowledge of the '269 Patent and has been intentional, deliberate and willful, making this an exceptional case entitling Plaintiff to increased damages and reasonable attorneys' fees pursuant to 35 U.S.C. §§ 284 and 285.

17. By reason of the foregoing, Plaintiff has been damaged and will continue to be damaged, and has suffered and will continue to suffer irreparable loss and harm unless Zetec is enjoined by this Court.

PRAYER FOR RELIEF

WHEREFORE, Plaintiff, WEC, prays:

- A) that Zetec, its officers, agents, servants and employees be preliminarily and permanently enjoined from infringing Plaintiff's Patent pursuant to 35 U.S.C. § 283;
- B) that a judgment be entered that Zetec has infringed Plaintiff's Patent;
- C) that Zetec be found liable to Plaintiff for its acts of infringement and be ordered to pay damages pursuant to 35 U.S.C. § 284 as a result of infringement of Plaintiff's Patent, and all damages suffered by Plaintiff as a result of the infringement;
- D) that this case be adjudged and decreed exceptional under 35 U.S.C. § 285 and that Zetec be ordered to pay treble damages and the expense and costs incurred by Plaintiff, including reasonable attorneys' fees;
- E) that Plaintiff be awarded its costs and prejudgment interest on all damages pursuant to 35 U.S.C. § 284; and
- F) that Plaintiff be awarded such further relief as the court may deem appropriate.

DEMAND FOR JURY TRIAL

Pursuant to Rule 38 of the Federal Rules of Civil Procedure, Plaintiff, WEC, hereby demands a trial by jury of all issues triable by jury.

Respectfully submitted,

Dated: January 8, 2014

/s/ Douglas M. Hall
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Eric G. Soller, Esquire
Pa. I.D. No. 65560
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LLC

Exhibit A



US006823269B2

(12) **United States Patent**
Junker et al.

(10) Patent No.: **US 6,823,269 B2**
(45) Date of Patent: **Nov. 23, 2004**

(54) **EDDY CURRENT DATA UNION**

(56) **References Cited**

(75) Inventors: **Warren R. Junker**, Monroeville, PA (US); **Thomas W. Nenno**, Murrys ville, PA (US); **Hermann O. Lagally**, Greensburg, PA (US)

(73) Assignee: **Westinghouse Electric Company LLC**, Pittsburgh, PA (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 316 days.

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4,942,545 A	*	7/1990	Sapia	702/97
5,623,204 A	*	4/1997	Wilkerson	324/228

* cited by examiner

(21) Appl. No.: **10/121,749**

(22) Filed: **Apr. 12, 2002**

(65) **Prior Publication Data**

US 2003/0195710 A1 Oct. 16, 2003

(51) Int. Cl.⁷ **G06F 19/00; G01R 25/00; G01R 27/00**

(52) U.S. Cl. **702/38; 702/38; 702/97; 324/228; 324/220; 324/234; 324/238**

(58) Field of Search **702/35, 38, 64, 702/65, 85, 97; 324/220, 222, 228, 234, 238, 600, 601, 605, 611, 612, 613**

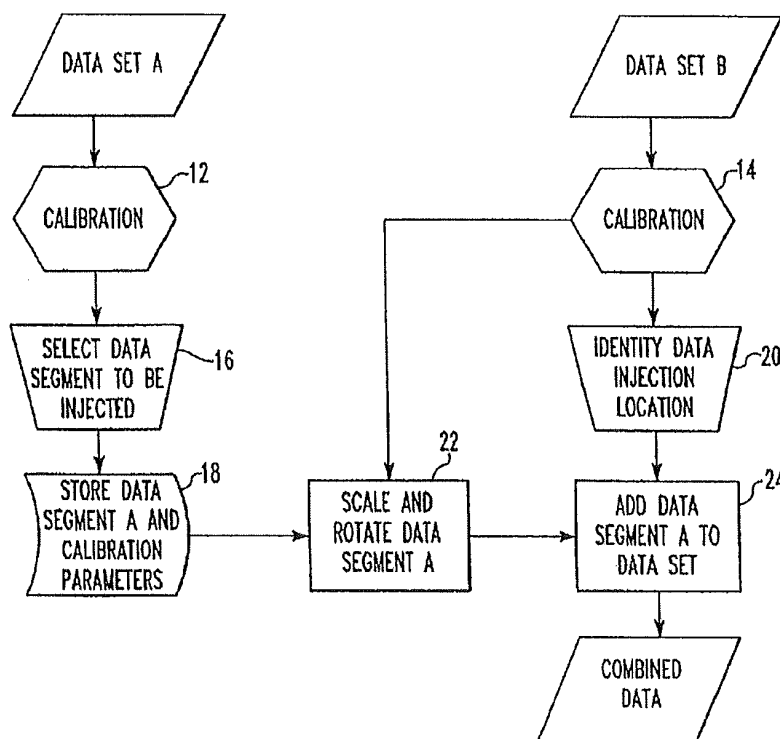
Primary Examiner—John Barlow

Assistant Examiner—John Le

(57) **ABSTRACT**

A method of synthesizing nondestructive examination data of a component including the steps of generating nondestructive examination data of the component in the field and separately generating nondestructive examination data of a specimen machined to simulate selected flaws in the component and combining portions of the specimen data with the field data in a combined data stream.

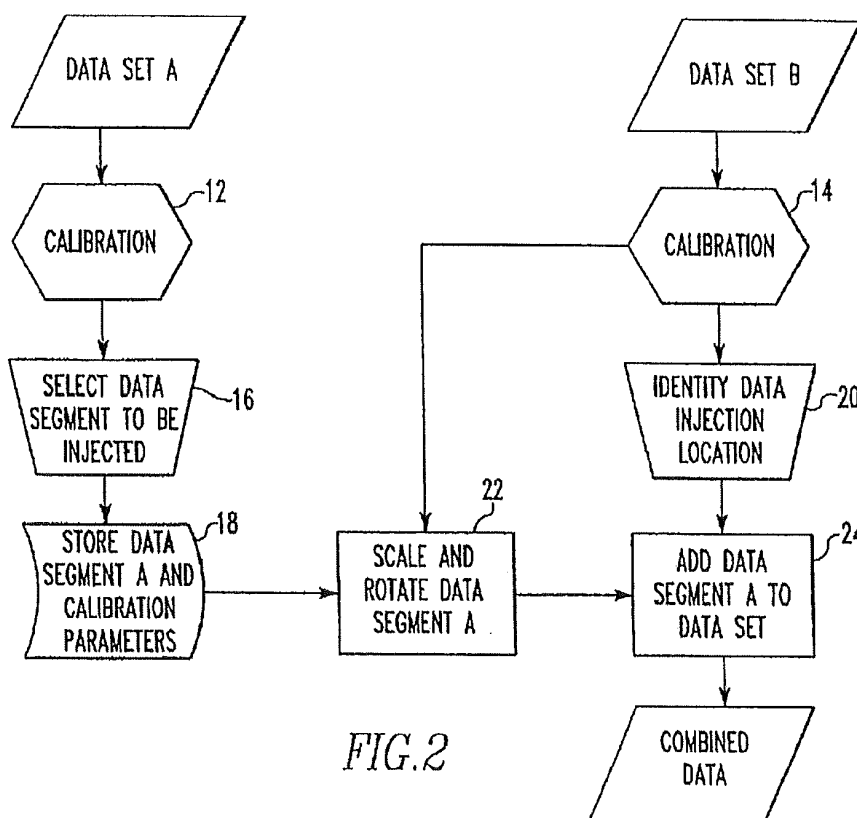
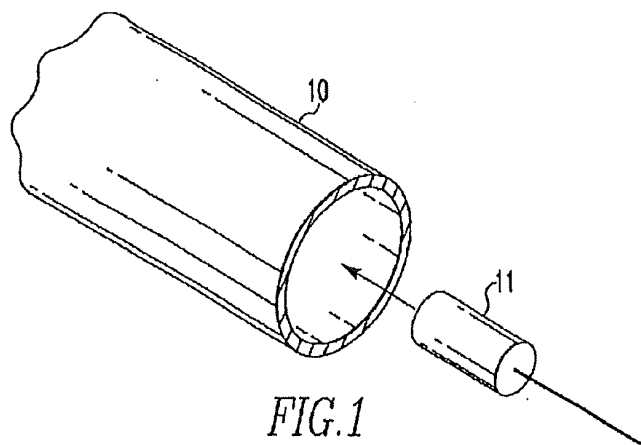
18 Claims, 1 Drawing Sheet



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EDDY CURRENT DATA UNION

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention pertains generally to eddy current data obtained from the nondestructive examination of a component and, more particularly, to a method of synthesizing eddy current data to be used for training data analysts and/or testing inspection techniques.

2. Related Art

Nondestructive examination of components is carried out in a number of fields and is particularly important in the periodic inspection of steam generator tubing that forms part of the primary circuit of a pressurized water reactor nuclear steam supply system. The integrity of the steam generator tubing in the primary circuit of a pressurized water nuclear reactor steam supply system is essential to assure that radioactive coolant from the reactor does not contaminate the secondary side circuit in which it is in heat transfer relationship to create steam to drive a turbine which in turn drives a generator to create electricity. The hot leg of the nuclear reactor coolant loop is connected to one side of a hemispherical plenum on the under side of the steam generator. The hemispherical plenum is divided into two substantially equal parts and bounded on its upper side by a tube sheet. The heat exchanger tubes extend from one side of the hemispherical plenum through the tube sheet into the secondary side in a U-shaped design that terminates through the tube sheet to the other side of the hemispherical plenum. The other side of the hemispherical plenum is connected to a cold leg of the nuclear reactor coolant loop. There are hundreds of tubes within the steam generator communicating between the hot side and the cold side of the plenum. To ensure the integrity of the tubes, periodically, during reactor outages, the plenum is accessed through manways and the tubes inspected. Eddy current probes are inserted into the tubes and the tube position and data read by the eddy current detectors are recorded to identify any flaws that may have developed in the tubes during the preceding service period between inspections. The eddy current data takes the form of signal patterns, which require a great deal of experience to interpret to identify the existence, type and extent of any flaws that may be present in the tubing. If flaws are detected that exceed a given criteria, the corresponding tubing is plugged and thus taken out of service to reduce the likelihood of failure during the forthcoming reactor operating cycle.

Obtaining eddy current data representative of the various kinds of flaws that are likely to be encountered under field conditions, among a background of scattering data and other noise encountered in the field, to train data analysts and test inspection techniques, is extremely difficult and expensive. However, such training is essential to being able to properly interpret eddy current data. Similarly, the testing of inspection techniques is necessary to understand the probability of detecting different types of flaws and the affect the sizing of a flaw has on the various discontinuity responses.

Accordingly, it is an object of this invention to provide eddy current data representative of the detection of a number of different flaws that is suitable for training and qualifying analysts and testing inspection techniques.

It is a further object of this invention to provide such eddy current data with substantially the same background, scatter and other noise as is encountered in the field.

Additionally, it is an object of this invention to provide such eddy current data in a relatively inexpensive manner.

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SUMMARY OF THE INVENTION

These and other objects are achieved by the method of this invention for synthesizing eddy current data to be used for training data analysts and/or testing inspection techniques. In the preferred embodiment, the steps of the method of this invention create a specimen that simulates the component undergoing nondestructive examination with preselected flaws of interest. The specimen is then monitored by an eddy current probe to create a set of eddy current data representative of the flaws detected in the specimen. At least some of the eddy current data collected at a field site is combined with at least some of the eddy current data collected from the specimen to establish a combined data train that reflects the eddy current response to the selected flaws in a background representative of data collected at the field site.

Preferably, the eddy current probes used to collect data at the field site and at the specimen are of the same type and are operated at the same inspection frequencies and data sampling rates. Additionally, in the preferred embodiment, both the field and specimen data sets are calibrated separately to substantially the same standard so that the signal level and orientation for a given flaw correspond. Prior to inserting the data obtained from the field into the specimen data or the specimen data into the data obtained from the field, the data to be inserted is arithmetically operated on to adjust the calibration, so when inserted, the inserted data has the same calibration factor as the data in which it is being inserted so that the combined set of data forms a new integrated data set that is separately stored. In another embodiment of this invention, the specimen could be replaced by a mathematical model and the data obtained from the specimen could be generated by the mathematical model.

BRIEF DESCRIPTION OF THE DRAWINGS

A further understanding of the invention can be gained from the following description of the preferred embodiments when read in conjunction with the accompanying drawings in which:

FIG. 1 is a perspective view of a portion of a steam generator tube in which an eddy current probe is about to be inserted; and

FIG. 2 is a flow chart of the steps of the method of this invention.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The invention provides for the injection of electronic nondestructive examination signals either from field data or data obtained from specimens, into a data stream to produce a data set that is the combination of the two data sets, i.e., the basic data stream plus the injected signal. In this example, the field data is obtained from the inspection of steam generator heat exchange tubing, figuratively shown in FIG. 1 by reference character 10, with an eddy current probe 11. For the purpose of the following description, the data obtained from the specimen will also be referred to as laboratory data, because it can be obtained at a site remote from the field. However, it should be appreciated that the location where the specimen data is collected is not pertinent to the broad aspects of this invention. Additionally, this invention can be applied to injecting one set of field data into another set of field data in the same manner as will be described hereafter. The focus, however, of the preferred embodiment described hereafter will be on inserting speci-

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men obtained data because of the ease of engineering the specimen to replicate a number of flaws of interest. By injecting the field data into the laboratory data or the laboratory data into the field data, data that is characteristic of the "noise" that might be encountered in a field inspection, from a specific nuclear power generating facility, can be combined with the data from the laboratory produced discontinuity responses. The net result is a data set that has the discontinuity response somewhat masked by the field noise. These data sets can then be used to train or test analysts on the impact of noise on the anticipated degradation responses. Further data sets produced by the combination process of this invention can be used to determine the impact of noise on the probability of detection of a flaw and on the uncertainties in detecting a given flaw of various sizes.

A flow chart of the overall data combination process of this invention is shown in FIG. 2. This process can be readily implemented by data management software such as the Westinghouse Advanced Network Sharing Eddy current Resources-ANSER™-software licensable from Westinghouse Electric Company, LLC, Monroeville, Pa. The ANSER™ software is an eddy current acquisition, analysis and database management tool that runs on a UNIX® based work station. Another alternative would be to use the EDDY-NET™ software licensable from Zetec Corp., Washington State. Preferably, both data sets involved in the combination process should be acquired using similar inspection conditions, i.e., probe type (coil diameter), inspection frequencies, data rates (samples/inch), etc. If there are differences in the inspection conditions, mathematical models can be used to interpolate one or the other of the responses if coil size or inspection frequencies are not identical.

The first steps 12 and 14 in the data injection process are to define the calibration or normalization parameters for each data set A & B. Preferably, at least one of the standard holes or notches in a calibration standard used for this purpose should be identical for both data sets. If they are not identical, mathematical models can be used as a basis for interpolation of one or the other of the data sets. The calibration standard is a specimen created in accordance with the ASME code. Each of the data sets is then calibrated so that the reference discontinuity response for the two data sets, A and B, is identical. For bobbin coil eddy current data, this can be accomplished by setting the voltage of the 20% holes, i.e., 20% through-wall flaw, to 4 volts and the phase of the through-wall hole to a 40° rotation. For rotating probe data, the through-notch in the calibration standard can be used to set the phase and amplitude. For most applications, it can be assumed that the accuracy of the standard is sufficient so that cross calibration of the standards is not required.

After the calibration parameters are established, the segment of data from data set A to be inserted into data set B is selected and stored in step 16, shown in FIG. 2. In the ANSER™ system, this is accomplished by using the cursor to window the segment of interest and selecting the Save Tube Segment option. The data segment A along with the calibration parameters for that segment determined in step 12 is then stored in a file. Multiple segments from the same tube or specimen can be stored and ANSER™ identifies each with a ROW/Col. and sequence number as represented by step 18 in FIG. 2.

After the segments of interest have been identified, the data set B in which the segment is to be inserted is read into the machine. The location where the segment is to be

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inserted is chosen in step 20. In the ANSER™ system, this is accomplished by using the cursor to show the area of interest in the display window. The Modified Data option is then selected. This allows the operator to select which of the stored data segments is to be combined with the displayed data. Once the segment A data is selected, the appropriate calculations are made in step 22, based upon the calibration parameters, to rotate and scale the segment A data so that it has the same calibration factors as data set B. The thus normalized segment A data is then added to the displayed data set in step 24 shown in FIG. 2. To display the results with the ANSER™ system, data set B must be reread into the machine.

In the foregoing embodiment, the segment A data is added into the displayed data. If desired, the segment A data could equally well replace some of the displayed data in set B. Furthermore, since the data set that is being displayed is the file that is modified, it is important that the combination process take place on a copy of the data and not the original file. Once the combination process is complete, the new data set can be manipulated in the same way as any other data set. No knowledge of the data combination process is retained in the combined file.

While specific embodiments of the invention have been described in detail, it will be appreciated by those skilled in the art that various modifications and alternatives to those details could be developed in light of the overall teachings of the disclosure. For example, data obtained from field monitoring signals of detected flaws could be mathematically modeled using conventional modeling techniques, and the specimens described above could be replaced by the mathematical models to generate the second set of data to be manipulated with the field data in accordance with this invention. A product for creating such a model is VIC-3D licensable from Victor Technologies, LLC, Bloomington, Ind. Accordingly, the particular embodiments disclosed are meant to be illustrative only and not limiting as to the scope of the invention, which is to be given the full breadth of the appended claims and any and all equivalents thereof.

What is claimed is:

1. A method of synthesizing nondestructive examination data to be used for training data analysts and/or testing inspection techniques comprising the steps of:

generating data collected at a field site of a component from non-destructive examination of the component, which data collected at the field site includes noise;

creating a specimen that simulates the component undergoing non-destructive examination with a selected flaw;

generating nondestructive examination data at a laboratory site, remote from the field site, from the specimen of the component undergoing non-destructive examination; and

combining at least some of the nondestructive examination data collected at the field site with at least some of the nondestructive examination data collected at the laboratory site to establish a combined data train that reflects the nondestructive examination response to the selected flaw in a background representative of data collected at the field site.

2. The method of claim 1 including the steps of separately calibrating the data collected at the field site and the data collected at the laboratory site so that the data collected at the field site and the data collected at the laboratory site have the same relative signal strengths corresponding to a first flaw.

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3. The method of claim 2 wherein the first flaw is provided by a calibration standard.

4. The method of claim 1 including the steps of separately calibrating the data collected at the field site and the data collected at the laboratory site so that the data collected at the field site and the data collected at the laboratory site have the same relative signal orientation.

5. The method of claim 1 wherein the data collected at the field site is collected from the step of operating a first eddy current detector and the data collected at the laboratory site is collected from the step of operating a second eddy current detector.

6. The method of claim 5 wherein the first and second detectors are the same type of detector.

7. The method of claim 6 wherein the first and second detectors are operated at substantially the same inspection frequencies.

8. The method of claim 6 wherein the first and second detectors are operated at substantially the same data collection rates.

9. The method of claim 1 wherein only a segment of data collected at one of either the field site or the laboratory site is combined with data collected at the other of either the field site or the laboratory site.

10. The method of claim 1 wherein the specimen is a mathematical model and the data generated from the specimen is generated by the mathematical model.

11. A method of synthesizing nondestructive examination data to be used for training data analysts and/or testing inspection techniques comprising the steps of:

generating data collected at a field site of a component from non-destructive examination of the component;

creating a specimen that simulates the component undergoing non-destructive examination with a selected flaw;

generating nondestructive examination data at a laboratory site from the specimen of the component undergoing non-destructive examination;

combining at least some of the nondestructive examination data collected at the field site with at least some of the nondestructive examination data collected at the laboratory site to establish a combined data train that reflects the nondestructive examination response to the selected flaw in a background representative of data collected at the field site; and

separately calibrating the data collected at the field site and the data collected at the laboratory site so that the data collected at the field site and the data collected at the laboratory site have the same relative signal strengths corresponding to a first flaw, wherein the calibration is achieved by the steps of operating a first detector used at the field site to non-destructively test a first flaw and provide a first output indicative thereof and adjusting the first output received from the first detector in response to the first flaw by a first calibration factor to modify the first output to exhibit a first characteristic;

and operating a second detector used at the laboratory site to non-destructively test a second flaw which is substantially identical to the first flaw and provide a second output indicative thereof and adjusting the second output by a second calibration factor to modify the second output to exhibit the first characteristic.

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12. The method of claim 11 wherein the first characteristic is a selected amplitude of the first and second outputs so that the first and second outputs have corresponding amplitudes for substantially identical flaws.

13. The method of claim 11 wherein the first characteristic is a selected phase or orientation of the first and second outputs so that the first and second outputs have corresponding orientations for substantially identical flaws.

14. A method of synthesizing nondestructive examination data to be used for training data analysts and/or testing inspection techniques comprising the steps of:

generating data collected at a field site of a component from non-destructive examination of the component;

creating a specimen that simulates the component undergoing non-destructive examination with a selected flaw;

generating nondestructive examination data at a laboratory site from the specimen of the component undergoing non-destructive examination;

combining at least some of the nondestructive examination data collected at the field site with at least some of the nondestructive examination data collected at the laboratory site to establish a combined data train that reflects the nondestructive examination response to the selected flaw in a background representative of data collected at the field site;

separately calibrating the data collected at the field site and the data collected at the laboratory site so that the data collected at the field site and the data collected at the laboratory site have the same relative signal strengths corresponding to a first flaw; and

storing the data collected at the field site along with a first calibration factor obtained from the step of calibrating the data collected at the field site and storing data collected at the laboratory site along with a second calibration factor obtained from the step of calibrating the data collected at the laboratory site.

15. The method of claim 14 including the step of identifying in the stored data collected at the field site a location at which the data collected at the laboratory site is to be inserted and inserting the data collected at the laboratory site at the location.

16. The method of claim 14 including the step of identifying in the stored data collected at the laboratory site a location at which the data collected at the field site is to be inserted and inserting the data collected at the field site at the location.

17. The method of claim 14 including the step of operating on one of either the data collected at the field site or the data collected at the laboratory site that is to be inserted into the other of the data collected at the field site or the data collected at the laboratory site so that the inserted data is normalized to the same calibration factor as the data the normalized data is inserted in.

18. The method of claim 17 including the step of storing at least some of the data collected at the laboratory site that is combined with at least some of the data collected at the field site as a file separate from the stored data collected at the field site and the stored data collected at the laboratory site.

* * * * *

Exhibit B



Westinghouse Electric Company
Legal & Contracts
1000 Westinghouse Drive
Cranberry Township, PA
16066
USA

Sent via U.S. Express Mail

August 17, 2012

Mr. Howard Houserman
Chief Executive Officer
Zetec, Inc.
8226 Bracken Place SE, Suite 100
Snoqualmie, WA 98065

Re: Westinghouse Electric Company LLC's U.S. Patent No. 6,823,269 Entitled "Eddy Current Data Union"

Dear Mr. Houserman:

I am Senior Counsel Intellectual Property for Westinghouse Electric Company LLC ("Westinghouse"). The purpose of this letter is to notify Zetec, Inc. ("Zetec") that Westinghouse is the owner of U.S. Patent No. 6,823,269 (the "Westinghouse Patent") which discloses and claims a method for synthesizing nondestructive examination data. I have enclosed a copy of the Westinghouse Patent for your convenience.

It has recently come to our attention that Zetec is using a software program that performs automated analysis of eddy current data which contains features very similar to that described and claimed in the Westinghouse Patent. More specifically, Westinghouse viewed a presentation entitled "Noise Visualization and Other Inspection Software Tools" given on or about July 9th – 11th by a Zetec representative at the 31st Steam Generator Nondestructive Evaluation Workshop hosted by EPRI in Bretton Woods, NH.

Based on the information in our possession, Westinghouse is concerned that the Zetec program may read on one or more claims of the Westinghouse Patent. Therefore, to eliminate any confusion or misunderstanding regarding this matter, we request that Zetec provide us with specific details as to how the Zetec program is distinguishable from Westinghouse's patented technology. This information will allow us to determine whether the Westinghouse Patent has been infringed.

Hopefully, this situation can be resolved in an amicable and expeditious manner. Please provide a written response to this letter on or before August 31, 2012. If you have any questions, please do not hesitate to contact me. Thank you in advance for your prompt attention to this matter.

Regards,

A handwritten signature in cursive script that reads 'Richard J. Coldren'.
Richard J. Coldren

Encl.

LD3054RJC

cc: Michael Sweeney
Joseph Spadacene

LD3054RJC



US006823269B2

(12) **United States Patent**
Junker et al.

(10) Patent No.: **US 6,823,269 B2**
(45) Date of Patent: **Nov. 23, 2004**

(54) **EDDY CURRENT DATA UNION**

(56)

References Cited

(75) Inventors: **Warren R. Junker**, Monroeville, PA (US); **Thomas W. Nenno**, Murrys ville, PA (US); **Hermann O. Lagally**, Greensburg, PA (US)

(73) Assignee: **Westinghouse Electric Company LLC**, Pittsburgh, PA (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 316 days.

U.S. PATENT DOCUMENTS

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* cited by examiner

(21) Appl. No.: **10/121,749**

(22) Filed: **Apr. 12, 2002**

(65) **Prior Publication Data**

US 2003/0195710 A1 Oct. 16, 2003

(51) Int. Cl.⁷ **G06F 19/00; G01R 25/00; G01R 27/00**

(52) U.S. Cl. **702/38; 702/38; 702/97; 324/228; 324/220; 324/234; 324/238**

(58) Field of Search **702/35, 38, 64, 702/65, 85, 97; 324/220, 222, 228, 234, 238, 600, 601, 605, 611, 612, 613**

Primary Examiner—John Barlow

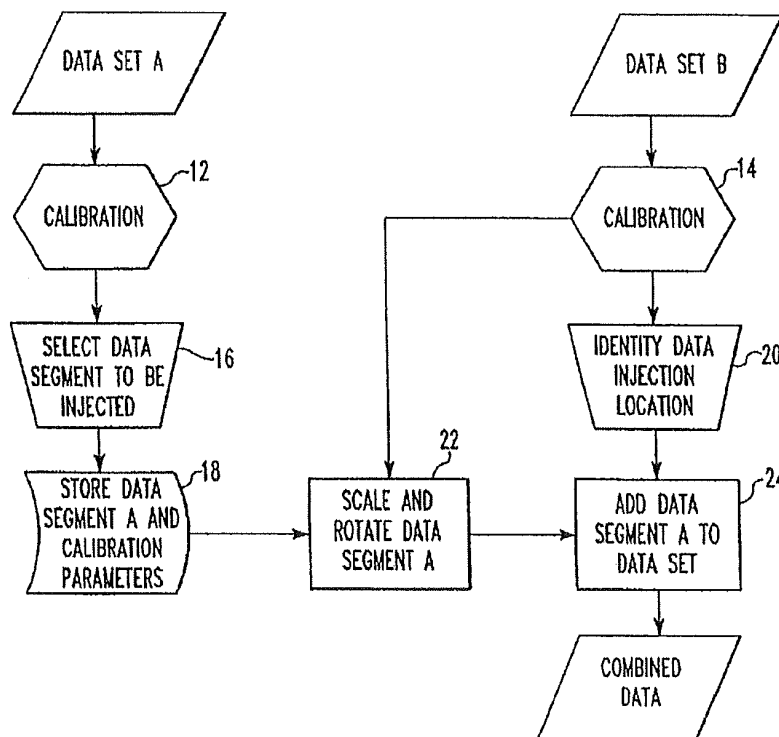
Assistant Examiner—John Le

(57)

ABSTRACT

A method of synthesizing nondestructive examination data of a component including the steps of generating nondestructive examination data of the component in the field and separately generating nondestructive examination data of a specimen machined to simulate selected flaws in the component and combining portions of the specimen data with the field data in a combined data stream.

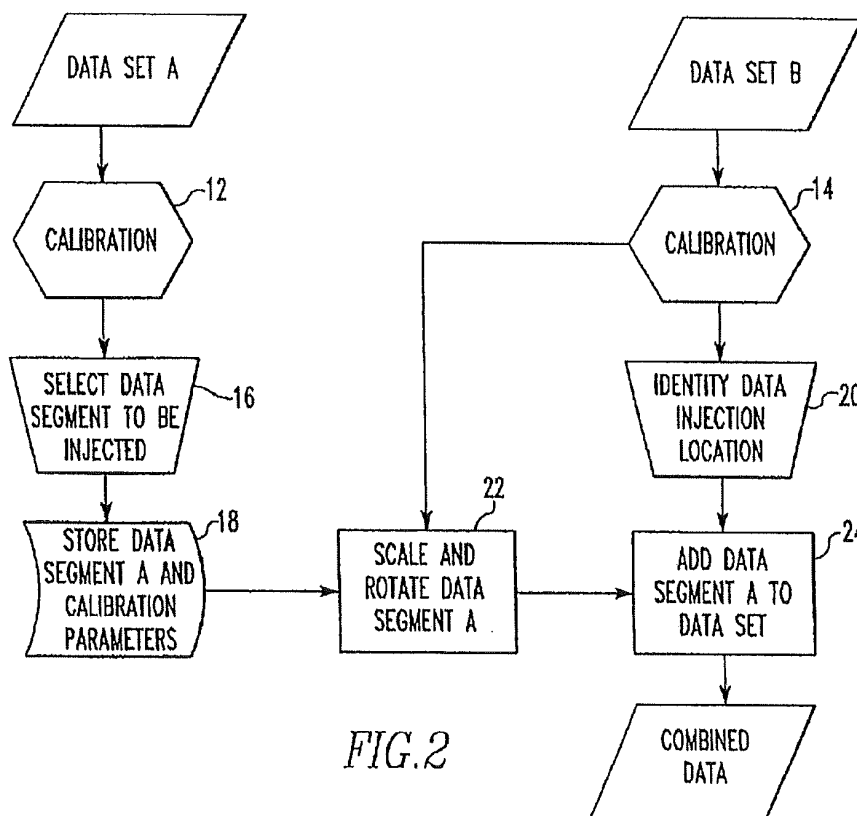
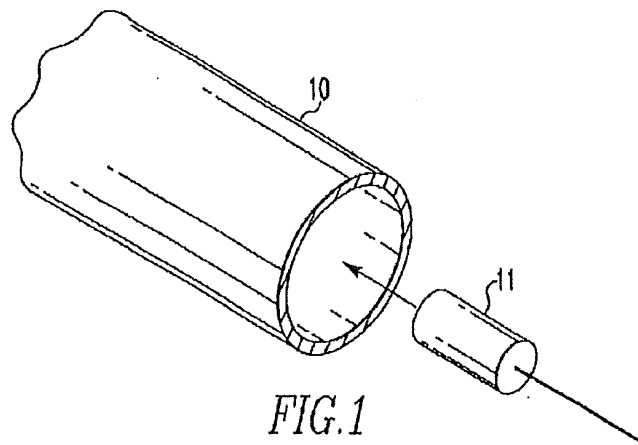
18 Claims, 1 Drawing Sheet



U.S. Patent

Nov. 23, 2004

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EDDY CURRENT DATA UNION

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention pertains generally to eddy current data obtained from the nondestructive examination of a component and, more particularly, to a method of synthesizing eddy current data to be used for training data analysts and/or testing inspection techniques.

2. Related Art

Nondestructive examination of components is carried out in a number of fields and is particularly important in the periodic inspection of steam generator tubing that forms part of the primary circuit of a pressurized water reactor nuclear steam supply system. The integrity of the steam generator tubing in the primary circuit of a pressurized water nuclear reactor steam supply system is essential to assure that radioactive coolant from the reactor does not contaminate the secondary side circuit in which it is in heat transfer relationship to create steam to drive a turbine which in turn drives a generator to create electricity. The hot leg of the nuclear reactor coolant loop is connected to one side of a hemispherical plenum on the under side of the steam generator. The hemispherical plenum is divided into two substantially equal parts and bounded on its upper side by a tube sheet. The heat exchanger tubes extend from one side of the hemispherical plenum through the tube sheet into the secondary side in a U-shaped design that terminates through the tube sheet to the other side of the hemispherical plenum. The other side of the hemispherical plenum is connected to a cold leg of the nuclear reactor coolant loop. There are hundreds of tubes within the steam generator communicating between the hot side and the cold side of the plenum. To ensure the integrity of the tubes, periodically, during reactor outages, the plenum is accessed through manways and the tubes inspected. Eddy current probes are inserted into the tubes and the tube position and data read by the eddy current detectors are recorded to identify any flaws that may have developed in the tubes during the preceding service period between inspections. The eddy current data takes the form of signal patterns, which require a great deal of experience to interpret to identify the existence, type and extent of any flaws that may be present in the tubing. If flaws are detected that exceed a given criteria, the corresponding tubing is plugged and thus taken out of service to reduce the likelihood of failure during the forthcoming reactor operating cycle.

Obtaining eddy current data representative of the various kinds of flaws that are likely to be encountered under field conditions, among a background of scattering data and other noise encountered in the field, to train data analysts and test inspection techniques, is extremely difficult and expensive. However, such training is essential to being able to properly interpret eddy current data. Similarly, the testing of inspection techniques is necessary to understand the probability of detecting different types of flaws and the affect the sizing of a flaw has on the various discontinuity responses.

Accordingly, it is an object of this invention to provide eddy current data representative of the detection of a number of different flaws that is suitable for training and qualifying analysts and testing inspection techniques.

It is a further object of this invention to provide such eddy current data with substantially the same background, scatter and other noise as is encountered in the field.

Additionally, it is an object of this invention to provide such eddy current data in a relatively inexpensive manner.

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SUMMARY OF THE INVENTION

These and other objects are achieved by the method of this invention for synthesizing eddy current data to be used for training data analysts and/or testing inspection techniques. In the preferred embodiment, the steps of the method of this invention create a specimen that simulates the component undergoing nondestructive examination with preselected flaws of interest. The specimen is then monitored by an eddy current probe to create a set of eddy current data representative of the flaws detected in the specimen. At least some of the eddy current data collected at a field site is combined with at least some of the eddy current data collected from the specimen to establish a combined data train that reflects the eddy current response to the selected flaws in a background representative of data collected at the field site.

Preferably, the eddy current probes used to collect data at the field site and at the specimen are of the same type and are operated at the same inspection frequencies and data sampling rates. Additionally, in the preferred embodiment, both the field and specimen data sets are calibrated separately to substantially the same standard so that the signal level and orientation for a given flaw correspond. Prior to inserting the data obtained from the field into the specimen data or the specimen data into the data obtained from the field, the data to be inserted is arithmetically operated on to adjust the calibration, so when inserted, the inserted data has the same calibration factor as the data in which it is being inserted so that the combined set of data forms a new integrated data set that is separately stored. In another embodiment of this invention, the specimen could be replaced by a mathematical model and the data obtained from the specimen could be generated by the mathematical model.

BRIEF DESCRIPTION OF THE DRAWINGS

A further understanding of the invention can be gained from the following description of the preferred embodiments when read in conjunction with the accompanying drawings in which:

FIG. 1 is a perspective view of a portion of a steam generator tube in which an eddy current probe is about to be inserted; and

FIG. 2 is a flow chart of the steps of the method of this invention.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The invention provides for the injection of electronic nondestructive examination signals either from field data or data obtained from specimens, into a data stream to produce a data set that is the combination of the two data sets, i.e., the basic data stream plus the injected signal. In this example, the field data is obtained from the inspection of steam generator heat exchange tubing, figuratively shown in FIG. 1 by reference character 10, with an eddy current probe 11. For the purpose of the following description, the data obtained from the specimen will also be referred to as laboratory data, because it can be obtained at a site remote from the field. However, it should be appreciated that the location where the specimen data is collected is not pertinent to the broad aspects of this invention. Additionally, this invention can be applied to injecting one set of field data into another set of field data in the same manner as will be described hereafter. The focus, however, of the preferred embodiment described hereafter will be on inserting speci-

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men obtained data because of the ease of engineering the specimen to replicate a number of flaws of interest. By injecting the field data into the laboratory data or the laboratory data into the field data, data that is characteristic of the "noise" that might be encountered in a field inspection, from a specific nuclear power generating facility, can be combined with the data from the laboratory produced discontinuity responses. The net result is a data set that has the discontinuity response somewhat masked by the field noise. These data sets can then be used to train or test analysts on the impact of noise on the anticipated degradation responses. Further data sets produced by the combination process of this invention can be used to determine the impact of noise on the probability of detection of a flaw and on the uncertainties in detecting a given flaw of various sizes.

A flow chart of the overall data combination process of this invention is shown in FIG. 2. This process can be readily implemented by data management software such as the Westinghouse Advanced Network Sharing Eddy current Resources-ANSER™-software licensable from Westinghouse Electric Company, LLC, Monroeville, Pa. The ANSER™ software is an eddy current acquisition, analysis and database management tool that runs on a UNIX® based work station. Another alternative would be to use the EDDY-NET™ software licensable from Zetec Corp., Washington State. Preferably, both data sets involved in the combination process should be acquired using similar inspection conditions, i.e., probe type (coil diameter), inspection frequencies, data rates (samples/inch), etc. If there are differences in the inspection conditions, mathematical models can be used to interpolate one or the other of the responses if coil size or inspection frequencies are not identical.

The first steps 12 and 14 in the data injection process are to define the calibration or normalization parameters for each data set A & B. Preferably, at least one of the standard holes or notches in a calibration standard used for this purpose should be identical for both data sets. If they are not identical, mathematical models can be used as a basis for interpolation of one or the other of the data sets. The calibration standard is a specimen created in accordance with the ASME code. Each of the data sets is then calibrated so that the reference discontinuity response for the two data sets, A and B, is identical. For bobbin coil eddy current data, this can be accomplished by setting the voltage of the 20% holes, i.e., 20% through-wall flaw, to 4 volts and the phase of the through-wall hole to a 40° rotation. For rotating probe data, the through-notch in the calibration standard can be used to set the phase and amplitude. For most applications, it can be assumed that the accuracy of the standard is sufficient so that cross calibration of the standards is not required.

After the calibration parameters are established, the segment of data from data set A to be inserted into data set B is selected and stored in step 16, shown in FIG. 2. In the ANSER™ system, this is accomplished by using the cursor to window the segment of interest and selecting the Save Tube Segment option. The data segment A along with the calibration parameters for that segment determined in step 12 is then stored in a file. Multiple segments from the same tube or specimen can be stored and ANSER™ identifies each with a ROW/Col. and sequence number as represented by step 18 in FIG. 2.

After the segments of interest have been identified, the data set B in which the segment is to be inserted is read into the machine. The location where the segment is to be

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inserted is chosen in step 20. In the ANSER™ system, this is accomplished by using the cursor to show the area of interest in the display window. The Modified Data option is then selected. This allows the operator to select which of the stored data segments is to be combined with the displayed data. Once the segment A data is selected, the appropriate calculations are made in step 22, based upon the calibration parameters, to rotate and scale the segment A data so that it has the same calibration factors as data set B. The thus normalized segment A data is then added to the displayed data set in step 24 shown in FIG. 2. To display the results with the ANSER™ system, data set B must be reread into the machine.

In the foregoing embodiment, the segment A data is added into the displayed data. If desired, the segment A data could equally well replace some of the displayed data in set B. Furthermore, since the data set that is being displayed is the file that is modified, it is important that the combination process take place on a copy of the data and not the original file. Once the combination process is complete, the new data set can be manipulated in the same way as any other data set. No knowledge of the data combination process is retained in the combined file.

While specific embodiments of the invention have been described in detail, it will be appreciated by those skilled in the art that various modifications and alternatives to those details could be developed in light of the overall teachings of the disclosure. For example, data obtained from field monitoring signals of detected flaws could be mathematically modeled using conventional modeling techniques, and the specimens described above could be replaced by the mathematical models to generate the second set of data to be manipulated with the field data in accordance with this invention. A product for creating such a model is VIC-3D licensable from Victor Technologies, LLC, Bloomington, Ind. Accordingly, the particular embodiments disclosed are meant to be illustrative only and not limiting as to the scope of the invention, which is to be given the full breadth of the appended claims and any and all equivalents thereof.

What is claimed is:

1. A method of synthesizing nondestructive examination data to be used for training data analysts and/or testing inspection techniques comprising the steps of:

generating data collected at a field site of a component from non-destructive examination of the component, which data collected at the field site includes noise;

creating a specimen that simulates the component undergoing non-destructive examination with a selected flaw;

generating nondestructive examination data at a laboratory site, remote from the field site, from the specimen of the component undergoing non-destructive examination; and

combining at least some of the nondestructive examination data collected at the field site with at least some of the nondestructive examination data collected at the laboratory site to establish a combined data train that reflects the nondestructive examination response to the selected flaw in a background representative of data collected at the field site.

2. The method of claim 1 including the steps of separately calibrating the data collected at the field site and the data collected at the laboratory site so that the data collected at the field site and the data collected at the laboratory site have the same relative signal strengths corresponding to a first flaw.

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3. The method of claim 2 wherein the first flaw is provided by a calibration standard.

4. The method of claim 1 including the steps of separately calibrating the data collected at the field site and the data collected at the laboratory site so that the data collected at the field site and the data collected at the laboratory site have the same relative signal orientation.

5. The method of claim 1 wherein the data collected at the field site is collected from the step of operating a first eddy current detector and the data collected at the laboratory site is collected from the step of operating a second eddy current detector.

6. The method of claim 5 wherein the first and second detectors are the same type of detector.

7. The method of claim 6 wherein the first and second detectors are operated at substantially the same inspection frequencies.

8. The method of claim 6 wherein the first and second detectors are operated at substantially the same data collection rates.

9. The method of claim 1 wherein only a segment of data collected at one of either the field site or the laboratory site is combined with data collected at the other of either the field site or the laboratory site.

10. The method of claim 1 wherein the specimen is a mathematical model and the data generated from the specimen is generated by the mathematical model.

11. A method of synthesizing nondestructive examination data to be used for training data analysts and/or testing inspection techniques comprising the steps of:

generating data collected at a field site of a component from non-destructive examination of the component;

creating a specimen that simulates the component undergoing non-destructive examination with a selected flaw;

generating nondestructive examination data at a laboratory site from the specimen of the component undergoing non-destructive examination;

combining at least some of the nondestructive examination data collected at the field site with at least some of the nondestructive examination data collected at the laboratory site to establish a combined data train that reflects the nondestructive examination response to the selected flaw in a background representative of data collected at the field site; and

separately calibrating the data collected at the field site and the data collected at the laboratory site so that the data collected at the field site and the data collected at the laboratory site have the same relative signal strengths corresponding to a first flaw, wherein the calibration is achieved by the steps of operating a first detector used at the field site to non-destructively test a first flaw and provide a first output indicative thereof and adjusting the first output received from the first detector in response to the first flaw by a first calibration factor to modify the first output to exhibit a first characteristic;

and operating a second detector used at the laboratory site to non-destructively test a second flaw which is substantially identical to the first flaw and provide a second output indicative thereof and adjusting the second output by a second calibration factor to modify the second output to exhibit the first characteristic.

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12. The method of claim 11 wherein the first characteristic is a selected amplitude of the first and second outputs so that the first and second outputs have corresponding amplitudes for substantially identical flaws.

13. The method of claim 11 wherein the first characteristic is a selected phase or orientation of the first and second outputs so that the first and second outputs have corresponding orientations for substantially identical flaws.

14. A method of synthesizing nondestructive examination data to be used for training data analysts and/or testing inspection techniques comprising the steps of:

generating data collected at a field site of a component from non-destructive examination of the component;

creating a specimen that simulates the component undergoing non-destructive examination with a selected flaw;

generating nondestructive examination data at a laboratory site from the specimen of the component undergoing non-destructive examination;

combining at least some of the nondestructive examination data collected at the field site with at least some of the nondestructive examination data collected at the laboratory site to establish a combined data train that reflects the nondestructive examination response to the selected flaw in a background representative of data collected at the field site;

separately calibrating the data collected at the field site and the data collected at the laboratory site so that the data collected at the field site and the data collected at the laboratory site have the same relative signal strengths corresponding to a first flaw; and

storing the data collected at the field site along with a first calibration factor obtained from the step of calibrating the data collected at the field site and storing data collected at the laboratory site along with a second calibration factor obtained from the step of calibrating the data collected at the laboratory site.

15. The method of claim 14 including the step of identifying in the stored data collected at the field site a location at which the data collected at the laboratory site is to be inserted and inserting the data collected at the laboratory site at the location.

16. The method of claim 14 including the step of identifying in the stored data collected at the laboratory site a location at which the data collected at the field site is to be inserted and inserting the data collected at the field site at the location.

17. The method of claim 14 including the step of operating on one of either the data collected at the field site or the data collected at the laboratory site that is to be inserted into the other of the data collected at the field site or the data collected at the laboratory site so that the inserted data is normalized to the same calibration factor as the data the normalized data is inserted in.

18. The method of claim 17 including the step of storing at least some of the data collected at the laboratory site that is combined with at least some of the data collected at the field site as a file separate from the stored data collected at the field site and the stored data collected at the laboratory site.

* * * * *

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September 6, 2012

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Re: U.S. Patent No. 6,823,269 entitled "Eddy Current Data Union" (the "'269 patent")

Dear Mr. Coldren:

I am the Corporate Intellectual Property Counsel for Roper Industries, the parent company to Zetec, Inc. ("Zetec"). This letter is in response to your letter to Howard Houserman of Zetec, dated August 17, 2012 regarding the above-referenced matter.

As an initial matter, although your letter referred information in your possession, there was no specific disclosure of what that information is, nor was there any substantive discussion of Westinghouse's basis for alleging infringement by Zetec of the '269 patent other than reference to a presentation, which covered many aspects of Zetec's software tools. Consequently, we are unable to address Westinghouse's infringement allegations at this time without a more detailed explanation of Westinghouse's position.

Notwithstanding our inability at this time to address Westinghouse's infringement allegations, we believe that if the '269 patent was challenged in a post-grant proceeding or if this matter was litigated, the patent would certainly be held invalid. We have several reasons for that unmistakable conclusion. One is based on prior art, and the other on the actions of Westinghouse during the prosecution of the application which matured into the '269 patent. Those actions we believe would very likely support a finding of inequitable conduct.

With respect to the prior art, one particularly pertinent reference is "Depth Based Structural Analysis Methods for SG Circumferential Indications" co-authored by one of the inventors of the '269 patent, i.e., Warren Junker. That reference (hereinafter the "Junker reference") is dated December 1997, nearly four and half years before the filing of the application which matured into the '269 patent. The Junker reference was prepared for the Electronic Power Research Institute by Westinghouse and Aptech Engineering Services, Inc. A copy of the Junker reference is enclosed herewith.

I direct your attention to pages 5-22 to 5-25 of the Junker reference. This material discusses the union of flawed tube segment data with samples of pulled tube segments to “simulate a typical field inspection.” p.5-22 §5.7.1.4. The procedure states “Samples of NDD sectors from pulled tubes were included along with the flaw segments. The reconstituted data were re-identified and subjected to axial Lissajous analysis to determine the presence or absence of flaw signal behavior.” Page 5-25 further states: “laboratory specimens were included in the data base.” A more detailed description of the data union of flaw data and non-flawed segment data is found on page 5-29 § 5.7.6.2. What is quite significant is that the program used to analyze the merged data files is Eddynet, a Zetec product.

Our basis for concluding that the ‘269 patent is invalid over the prior art is not based on the Junker reference alone. In this regard, I address your attention to a March 1999 publication entitled “Guidelines for Qualifying Eddy Current Technology for CANDU Steam Generator Tube Inspection” by S.P. Sullivan, published by Atomic Energy of Canada, Ltd., a copy of which is enclosed. Section 4.5 of that reference states:

The ‘signal injection’ method can superimpose flaw signals upon signals in data files from eddy current scans of in-service tubes. This is accomplished by selecting a certain portion of a data file with a flaw in it, subtracting a baseline value from all the data points [i.e., calibrating the data] . . . and adding the results to appropriate sections of a data file generated from a scan of an in-service tube. This method can be used to simulate the distortion of flaw signals by the background noise encountered in scans of the in-service SG tubes.

In addition to the foregoing, there is other pertinent prior art. For example, there is a set of presentation slides by V.S. Cecco and S.P. Sullivan which was distributed at the ISG-TIP-2 Task Coordinating Group Meeting at the Argonne National Laboratory Oct. 19-23, 1998. A copy of this presentation is also enclosed herewith. As can be seen, this prior art shows signal injection of a flaw (an inner diameter ferromagnetic anomaly) into sampled field data (tubesheet expansion transition).

We believe that the above references clearly demonstrate that the method called for in Claim 1 of the ‘279 patent, namely, merging two eddy current data files, at least one containing noise, was well known to the public prior to the ‘269 patent’s filing, thereby rendering that claim invalid. We further believe that the minor additions to that broad concept which are found in the remaining claims are at least disclosed or obvious to one skilled in the art in light of those references.

Moreover, because the claimed method was well known as early as 1997-99 we would expect that further prior art publications and documents will surface pursuant to a more in-depth search and study, which we will conduct if necessary.

I will now address the issue of inequitable conduct. It seems beyond dispute that Mr. Junker and a host of other Westinghouse employees knew of the Junker reference and the highly pertinent disclosure contained therein. The Junker reference lists nine Westinghouse employees as authors, including Mr. Junker. Yet this highly pertinent reference was not disclosed to the U.S.P.T.O. during the prosecution of the application that matured into the '269 patent, despite a duty to disclose it. Thus, it is very likely that if this matter was litigated, a court would conclude that the '269 patent was procured by inequitable conduct.

In conclusion, while we believe issue of potential infringement of the '279 patent is irrelevant in view of the invalidity of the '279 patent, if you have any substantive evidence that you believe should be brought to our attention to prove your allegations of infringement please provide the same to me for our consideration.

Very truly yours,

A handwritten signature in black ink, appearing to read 'T. Arnold', written in a cursive style.

Trevor Arnold

(3 Enclosures included)

cc: Tim Winfrey and Bob Vollmer of Zetec



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November 1, 2012

Mr. Trevor Arnold
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Re: Westinghouse Electric Company LLC's U.S. Patent No. 6,823,269 Entitled "Eddy Current Data Union"

Dear Mr. Arnold:

Thank you for letter dated 6 September 2012. As you recall, Westinghouse Electric Company LLC ("Westinghouse") is the owner of U.S. Patent No. 6,823,269 (the "Westinghouse Patent") which discloses and claims a method for synthesizing nondestructive examination data. Please note that, contrary to the statement made in the second paragraph of your letter, Westinghouse did not allege that Zetec, Inc. ("Zetec") is infringing the '269 patent. Westinghouse merely notified Zetec of the existence of the Westinghouse Patent and expressed our concern that Zetec's software program (as described in the presentation entitled "Noise Visualization and Other Inspection Software Tools") may read on one or more claims of the Westinghouse Patent. Westinghouse requested that Zetec provide us with specific details as to how the Zetec program is distinguishable from Westinghouse's patented technology. This information will allow us to determine whether the Westinghouse Patent is being infringed.

In your letter, you cited three documents you claim are prior art and questioned the actions of Westinghouse during prosecution of the Westinghouse Patent to reach the "unmistakable conclusion" that the Westinghouse Patent would be held invalid in a post-grant proceeding or litigation. Westinghouse will address each of these issues in the same order as presented in your letter.

First, you cite a document drafted by Westinghouse (co-authored by Warren Junker, a named inventor of the Westinghouse Patent) for the Electric Power Research Institute (EPRI) as being prior art to the Westinghouse Patent. The document is entitled "Depth Based Structural Analysis Methods for SG Circumferential Indications" (hereinafter the "EPRI Reference"). As you correctly noted, the EPRI Reference is dated December 1997, which predates the April 2002 filing date of the Westinghouse Patent. EPRI, however, has confirmed that the EPRI Reference was not made publically available until 21 March 2008, nearly six years after the filing date of the Westinghouse Patent. EPRI also confirmed that any disclosures of the EPRI Reference prior to 21 March 2008 were made only to a party under strict obligations to maintain the EPRI Reference as confidential. Because the EPRI Reference was not made publically available until after the filing date of the Westinghouse patent, the EPRI Reference does not qualify as prior art to the Westinghouse Patent.

Second, you cite as prior art a document authored by S.P. Sullivan for Atomic Energy of Canada, Ltd (AECL) entitled "Guidelines for Qualifying Eddy Current Technology for CANDU Steam Generator Tube Inspection" (hereinafter the "AECL Reference"). Again you correctly note that this document was dated March 1999, which predates the April 2002 filing date of the Westinghouse Patent. We found it somewhat puzzling that you provided to us only four (4) pages of the AECL Reference; especially considering that you provided the entire EPRI Reference which counts over 600 pages in length. Westinghouse completed an exhaustive search of publically available sources to locate a complete copy of the AECL Reference. This search was ultimately unsuccessful. We then made an inquiry about the document with AECL. AECL informed us that the AECL Reference is only available to certain members of the CANDU Owner's Group (COG) and to certain AECL licensees. AECL confirmed that both the members of COG and the licensees are under an obligation to maintain the AECL Reference as confidential. Because the AECL Reference is not publically available, the AECL Reference does not qualify as prior art to the Westinghouse Patent.

Furthermore, and of more immediate concern, AECL informed us that this document contains AECL's proprietary information. The protection of proprietary information is a matter which Westinghouse takes very seriously; regardless of whether the proprietary information belongs to Westinghouse or to a third party. As such, we ask that you please confirm that Zetec was authorized by AECL to disclose the AECL Reference to Westinghouse. If Zetec was so authorized, we ask that you kindly provide us with a copy of the entire AECL Reference so that we can better assess its relevance to the Westinghouse Patent.

Third, you cite as prior art a set of presentation slides authored by V.S. Cecco and S.P. Sullivan which was distributed in October 1998 (hereinafter the "Cecco Reference"). Specifically, you refer to a single slide containing the wording "Signal Injection of an ID ferromagnetic anomaly at the tubesheet expansion transition" therein as providing "pertinent prior art". It has been held that the disclosure in an assertedly anticipating reference must provide an enabling disclosure of the desired subject matter; mere naming or a description of the subject matter is insufficient, if it cannot be produced without undue experimentation. *Elan Pharm., Inc. v. Mayo Found. For Med. Educ. & Research*, 346 F.3d 1051, 1054, 68 USPQ2d 1373, 1376 (Fed. Cir. 2003). In other words, the single prior art reference must enable a person of ordinary skill in the art to practice the claimed invention. (See *Abbott Labs. v. Sandoz, Inc.*, 544 F.3d 1341, 1345 (Fed.Cir. 2008)). Clearly the singular statement contained within the Cecco Reference does not provide an enabling disclosure which would enable one skilled in the art to make the invention claimed in the Westinghouse Patent with or without undue experimentation. Thus, the Cecco Reference does not anticipate the Westinghouse Patent.

Finally, Westinghouse will address your most serious allegation related to the issue of inequitable conduct. Westinghouse disputes that the EPRI Reference is even material yet alone "highly pertinent". The EPRI Reference relates to an examination of depth-based structural analysis methods for steam generator tube integrity analysis of circumferential indications. The EPRI Reference teaches taking a single signal scan measuring the entire 360 degrees inner diameter of a tube and splitting that single signal into multiple signals, each representing 30 degrees of the inner diameter of the tube. Such a process is greatly different, even opposite of, the invention disclosed and claimed in the Westinghouse Patent in which a first signal is injected into a second signal to obtain a single combined signal. At the time the Westinghouse Patent was filed, Westinghouse had no reason to believe that the EPRI

Reference was material to the claimed invention. Furthermore, Westinghouse currently believes that the EPRI Reference is not material to the claimed invention. As such, Westinghouse was under no duty to disclose the EPRI Reference to the United States Patent and Trademark Office.

To eliminate any further confusion or misunderstanding regarding this matter, Westinghouse again requests that Zetec provide us with specific details as to how the Zetec program is distinguishable from Westinghouse's patented technology. This information will allow us to determine whether the Westinghouse Patent has been infringed.

Hopefully, this situation can be resolved in an amicable and expeditious manner. Please provide a written response to this letter on or before November 19th, 2012. If you have any questions, please do not hesitate to contact me. Thank you in advance for your prompt attention to this matter.

Regards,



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December 21, 2012

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Re: U.S. Patent No. 6,823,269 entitled "Eddy Current Data Union" (hereinafter the "'269 patent")

Dear Mr. Coldren:

This letter is in response to your letter dated November 1, 2012.

As I noted in my response dated September 6, 2012 to your letter to Howard Houserman of August 17, 2012, there was no specific disclosure in your letter of what information Westinghouse has, nor any substantive discussion of Westinghouse's basis for questioning Zetec about the operation of its proprietary software other than reference to a presentation, which covered many aspects of Zetec's software tools. As such, we remain unable to address Westinghouse's allegations that "Zetec's software program ... may read on one or more claims" of the '269 patent, without a more detailed explanation of Westinghouse's position.

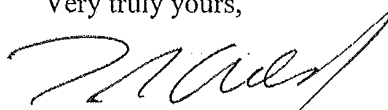
You have asserted that the article "Depth Based Structural Analysis Methods for SG Circumferential Indications" co-authored by Warren Junker, who is a named inventor on the '269 patent, was not publicly-available until March 2008, yet you have not provided any written evidence to support that allegation. Available public evidence shows just the opposite, i.e., that the document was not confidential. The report is not marked confidential. Further, it has a disclaimer of warranties and a copyright notice that suggest public distribution. Most critically, the report was referenced in Wang, X. & Reinhardt, W., "On the Assessment of Through-wall Circumferential Cracks in Steam Generator Tubes with Tube Support., in J. Pressure Vessel Tech. Feb. 2003 125, p. 85. (presented July 22-26, 2001). The report is also cited in an Entergy report dated February 3, 2000 that is available on-line. In addition, the report has 12 authors. While Mr. Junker is among the authors, there is no indication that he originated the information relevant to the '269 patent. For all of these reasons, we maintain our position regarding the applicability of this report as prior art to the Junker patent and the inventors' duty to disclose it.

Likewise, the March 1999 publication entitled "Guidelines for Qualifying Eddy Current Technology for CANDU Steam Generator Tube Inspection" by S.P. Sullivan, is not marked confidential and includes a copyright notice without any indication that the work is unpublished. Further, we understand that the publisher, Atomic Energy of Canada, Ltd. would have included the indication "Protected COG R&D" in the document header if distribution of the document was restricted. Therefore, we can only surmise that distribution of the document was not restricted.

Regarding the presentation slides by V.S. Cecco and S.P. Sullivan distributed at the ISG-TIP-2 Task Coordinating Group Meeting at the Argonne National Laboratory Oct. 19-23, 1998, we maintain that the document's disclosure of signal injection of a flaw into sampled field data is highly relevant to the '269 patent and is further evidence that the claimed technique of merging two eddy current data files, at least one containing noise, was well known in the art at prior to the filing of the '279 patent. Note as well, that Mr. Sullivan, who authored March 1999 publication that you assert to be confidential, co-authored this public presentation regarding the same Canadian steam generators six months earlier.

We maintain that the issue of infringement or whether Zetec's software "reads on" the '279 patent is irrelevant in view of the apparent invalidity of the '279 patent. Again, if you have any substantive evidence that you believe should be brought to our attention to prove your allegations of infringement please provide the same to me for our consideration.

Very truly yours,

A handwritten signature in black ink, appearing to read "Trevor Arnold", written in a cursive style.

Trevor Arnold

cc: Tim Winfrey and Bob Vollmer of Zetec