What can VisonArray™ 3-D Virtual Imaging technology do for you?

VisonArray™ technology can help you use pipe present technology does not allow you to use, and reach depth otherwise cannot be reached, and much more. Use of OCTG, drill pipe and landing strings at deeper depths is limited by current API strength formulas. We all know that there is "unused" strength remaining in these materials when using these formulas. Until now, no pipe inspection methods were able to show accurate remaining metal mass (cross-sectional-area) every 1/4 inch helix along the length of the pipe, to allow modified formulas and algorithms to accurately determine actual pipe strength.

Knowing exact cross sectional area now allows end users and drilling contractors to utilize their existing tubulars and drill pipe to deeper depths.
In order to achieve deep well drilling you may need to know the parameters of the following:

- WALL THICKNESS
- CROSS-SECTIONAL-AREA
- ECCENTRICITY
- FULL LENGTH OD MEASURING
- OVALITY DETERMINATION STRAIGHTNESS - -
- DETERMINATION
- THREAD MEASURING
- FLUID VOLUME DETERMINATION
- ID MEASUREMENTS

All of the above parameters can now be determined with the VisonArray™ 3-D FULL LENGTH ULTRASONIC PIPE INSPECTION SYSTEM available at Technical Industries, Inc. (www.technicalindustries.com) In addition to the above capabilities, pipe anomalies oriented transversely, longitudinally and at various oblique angles are also detected and evaluated for acceptance or rejection.

Automated ultrasonic inspection has always been a technology that has baffled people. Technical Industries, Inc. has designed a system that will allow you to visually see that each inspection is done properly. Neither the inspection operator nor the customer has ever been able to validate each inspection until now.

This technology gives the inspection operator and customer a means to insure every test is complete and thorough. By being able to view the wall data from the ultrasonic inspection, the inspection operator can determine if everything went well during the entire inspection process. This allows the inspector to be confident that the conditions are perfect for the flaw transducers to transmit their sound waves into the metal.

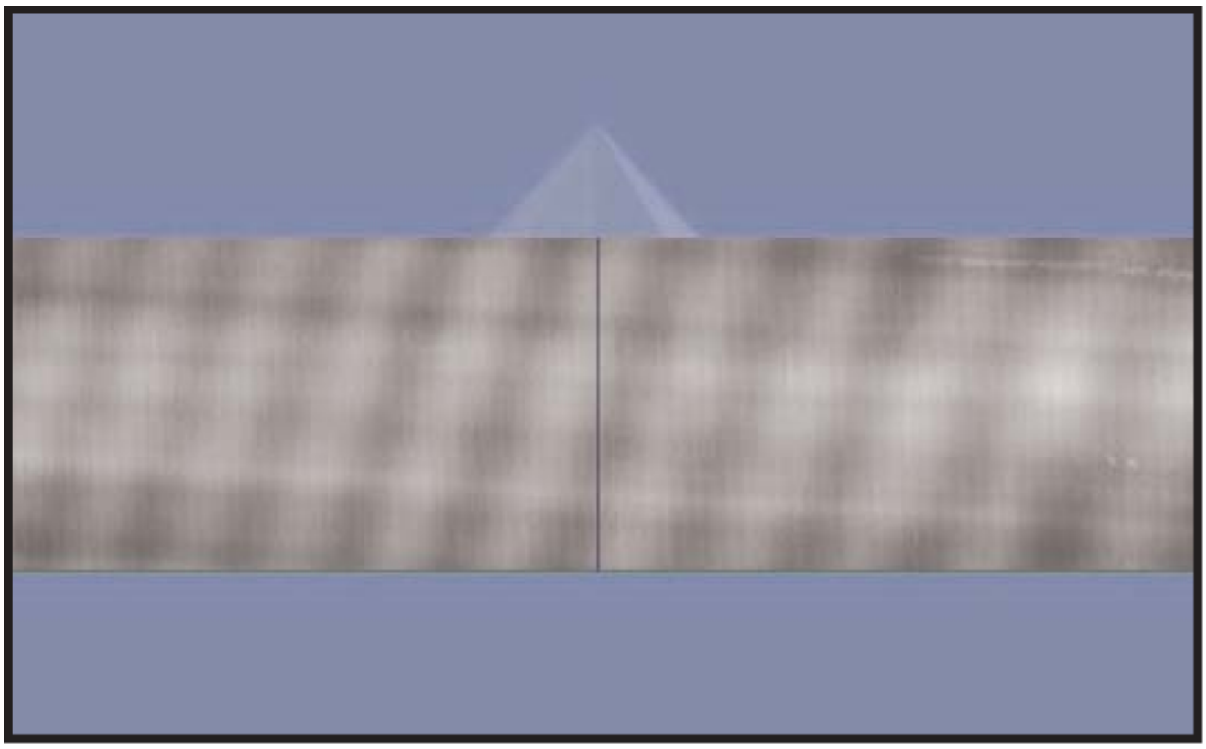
The Process is as follows:

Wall thickness data is saved in a matrix. This matrix is 360 units in width by the length of the pipe divided by 1/4". The 360 units in width represent every degree around the circumference of the pipe. As the pipe spins and the transducers traverse down the length of the pipe, the wall thickness data is recorded and stored. After the raw data is collected, the data is massaged and stored in a matrix. This matrix data is then used to validate the inspection and to calculate the cross-sectional, eccentricity and many other parameters.

Technical Industries has developed a technique that will measure the outside diameter (OD), full length of a joint of pipe. The OD measuring system will accurately measure the outside diameter every degree around the circumference and every ^{0}" down the length of the pipe. The OD measurement is exact to .010". The end result is an exact physical representation of the true OD down the length of the pipe. This information allows for the quick calculation of degree of ovality.

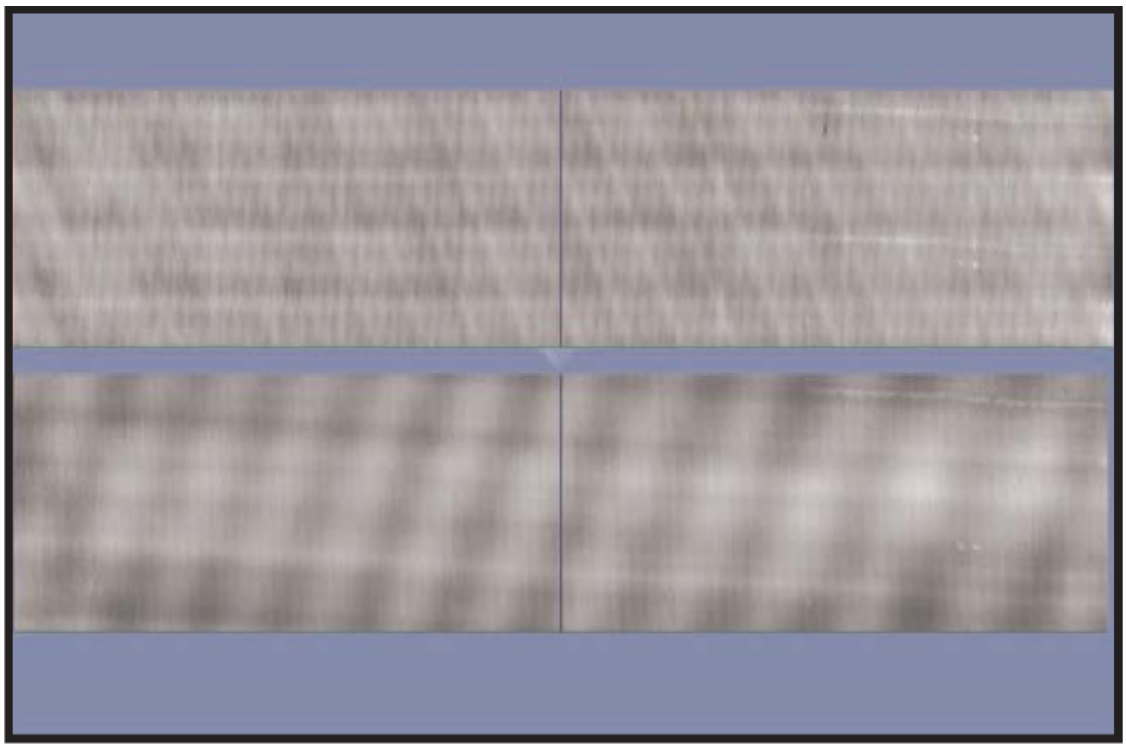
This same system is also capable of determining and measuring pipe straightness. In addition, if end connections are welded to the pipe, the system will determine if the connections are welded parallel to the axis of the pipe and whether or not the connections are parallel to each other. If not parallel, the system can measure the amount of out-of-tolerance. With the combined data of wall thickness, straightness and OD measurement, finite element analysis can also be performed.

With the combination of all of this technology, Technical Industries, Inc. is able to measure ID information as well. This technology allows a virtual drift to be passed down the inside of the pipe. By having ID information, we are able to determine volume. This can more accurately determine the amount of drilling mud or cement needed for your well.
Different images and more information can be obtained at www.technicalindustries.com. On the home page, click Customer Inventory, click on Texas and download the PowerPoint presentation. On this same page you can also download the viewer and a sample pipe.



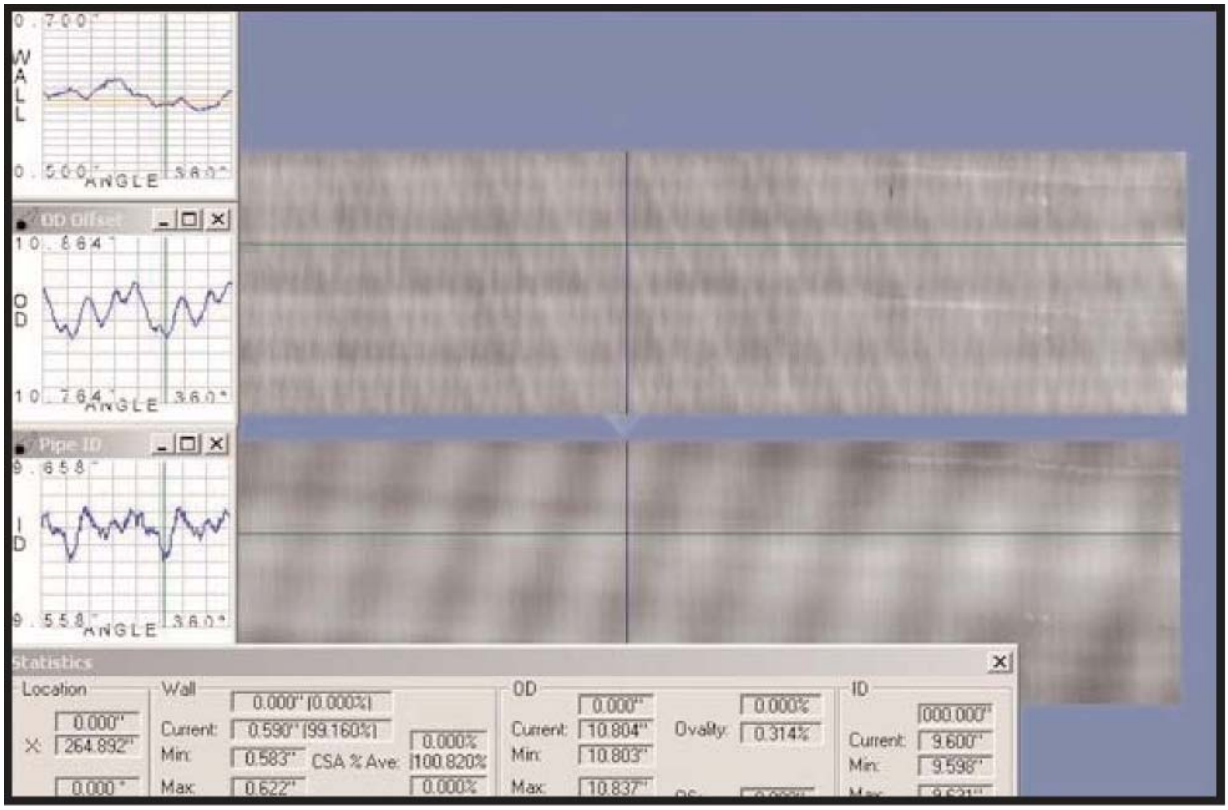
Wall Thickness Inspection

This is a grayscale image of a length of casing, 10 3/4” diameter and 40 feet long. The image shows the pipe, as it would look if cut lengthwise and opened up into flat plate. The darker the image the thicker the material. The lighter the image the thinner the material. This image shows the manufacturing process based on wall thickness down the length of the pipe. In this image one can see a grind mark (lighter area) about 8 ft long on the right side of the pipe.



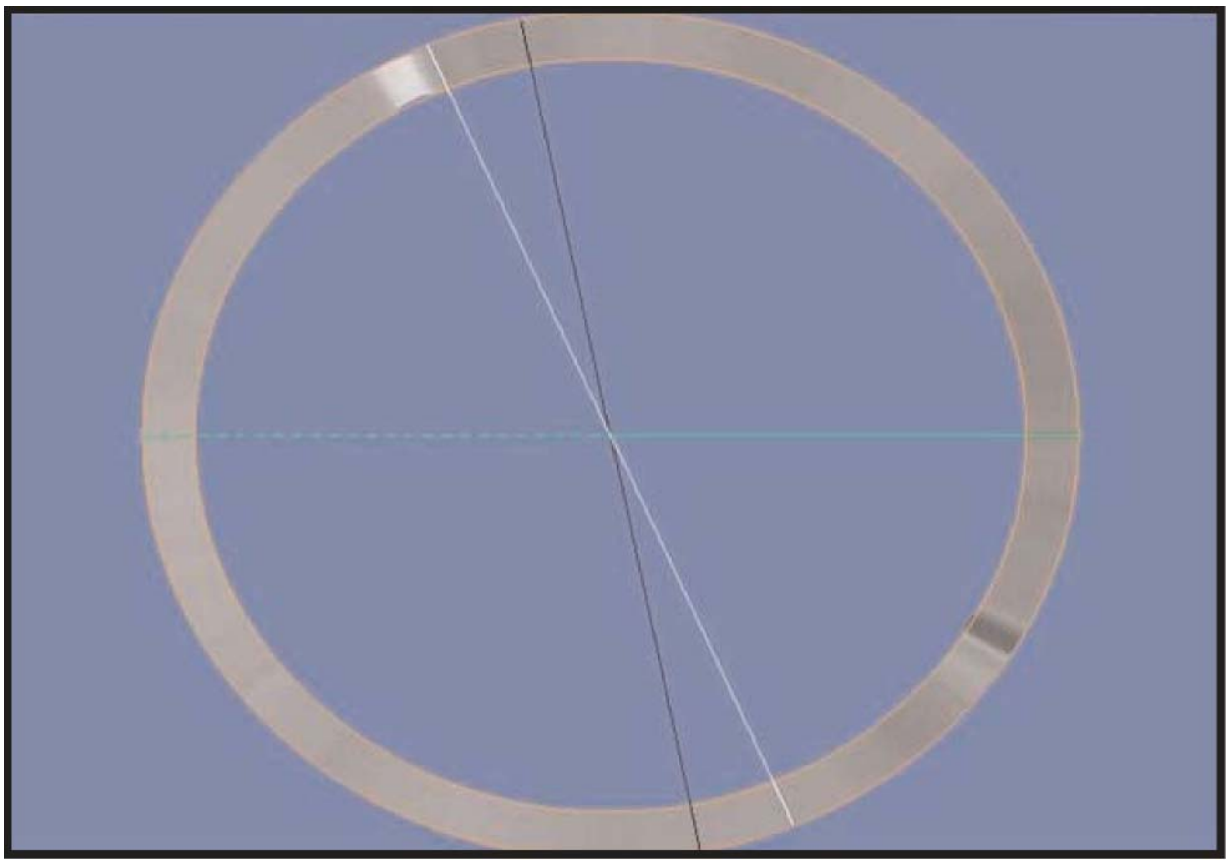
Full Length OD Measuring

This is a grayscale image of a length of casing, 10 3/4” diameter and 40 feet long. The image shows the pipe cut lengthwise and opened up into flat plate. The darker the image the larger the OD. The lighter the image the smaller the OD. This image shows the manufacturing process based on OD measurements down the length of the pipe. In this image one can see a grind mark (lighter area) about 8 ft long on the right side of the pipe.



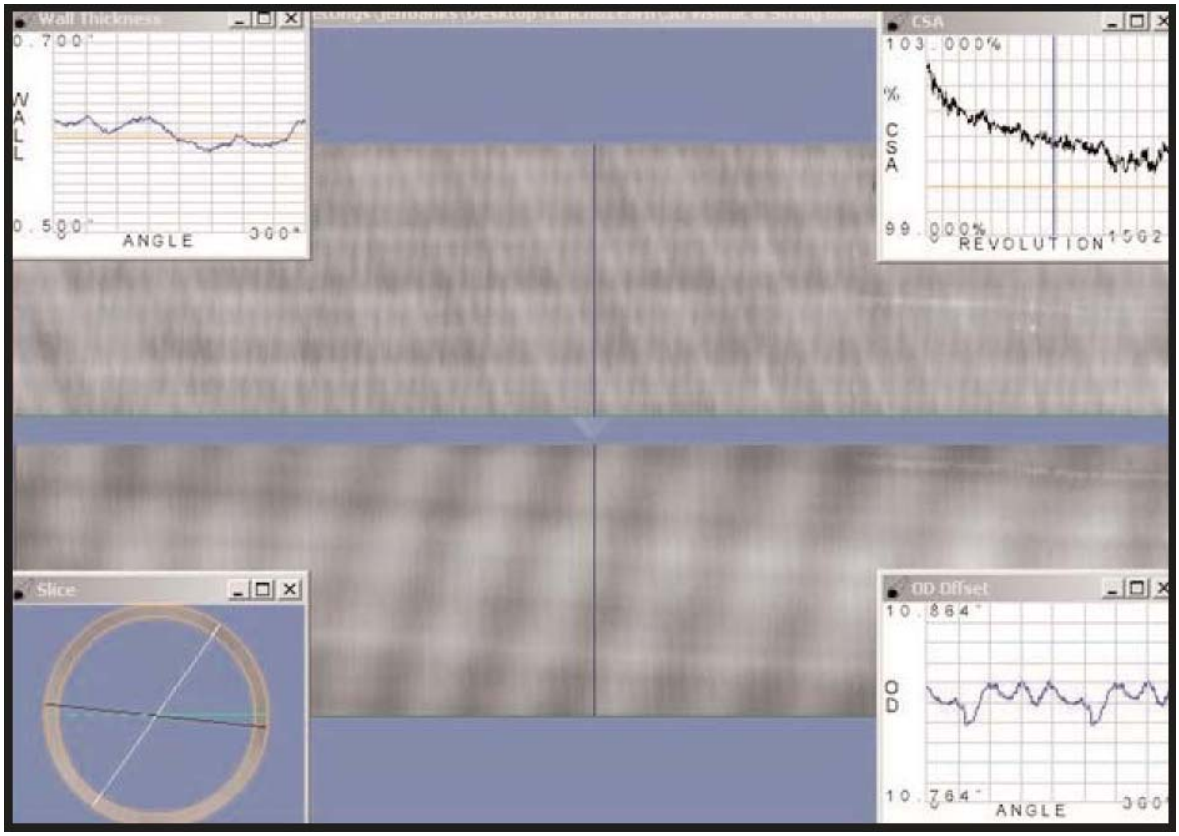
Combined OD Measuring and Wall Thickness

This image represents the combination of OD data (top image) and wall thickness (bottom image) in 2-D format and will accurately represent the physical properties of the pipe.
In the bottom image, the dark grayscale imaging represents the thickest part of the pipe wall and the lighter the color, the thinner the wall. In the top image, the dark grayscale imaging represents the largest OD and the lighter the color, the smaller the OD.



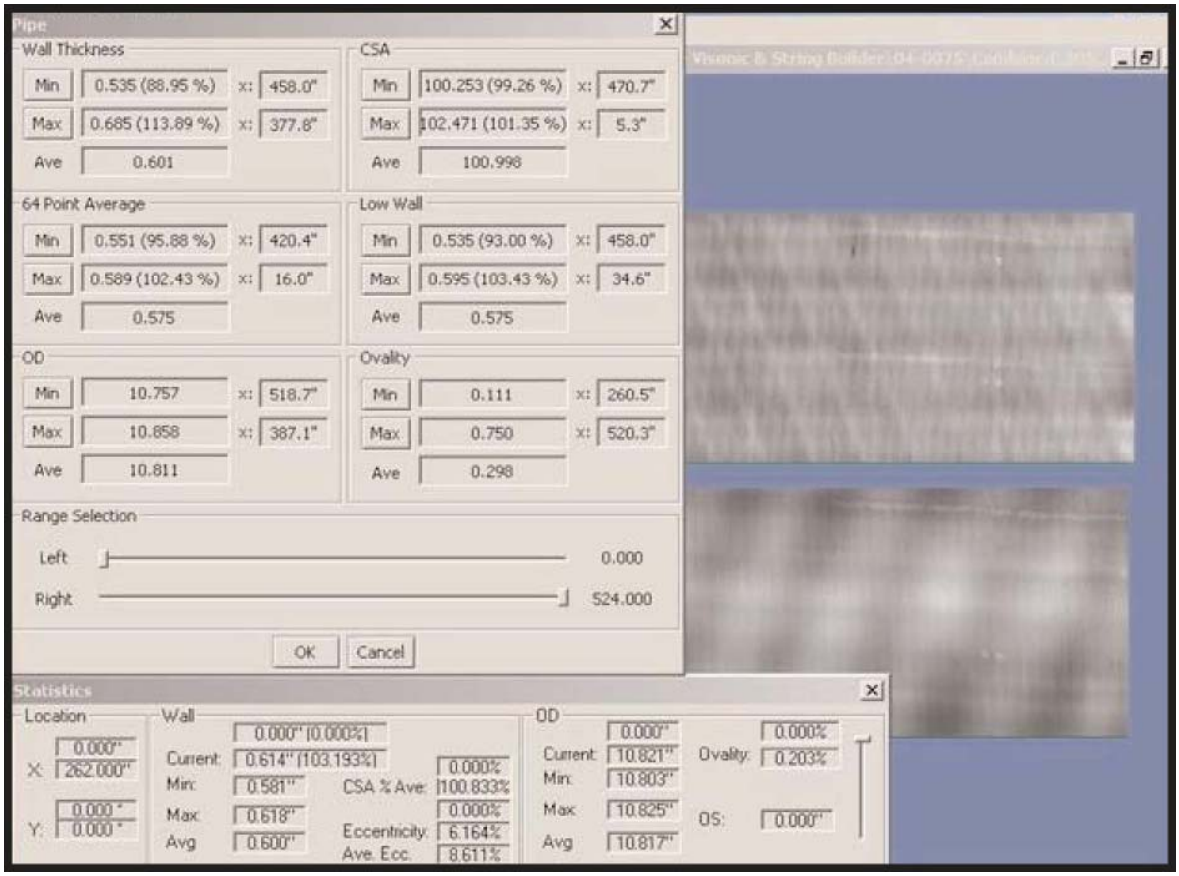
Slice View. (CSA)

This image represents the combined wall thickness and OD data in a slice view. The orange colored rings represent nominal ID and nominal OD. Deviation from nominal can be seen at 11:00 o'clock and 4:00 o'clock.



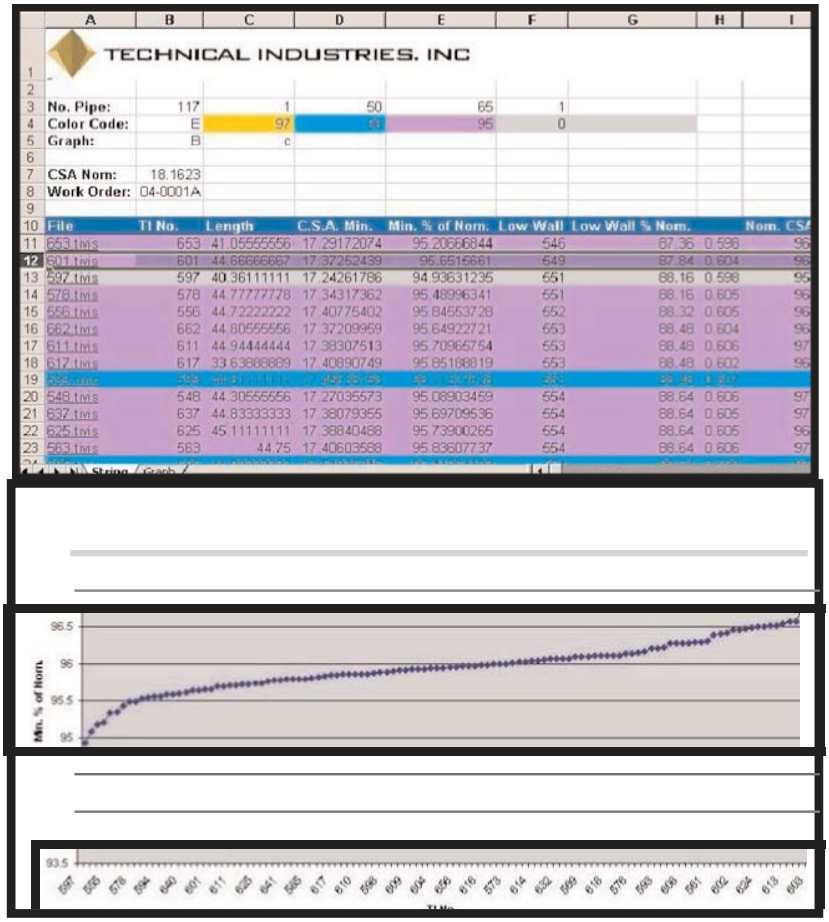
Combined OD and Wall plus slice data plots

This graphic shows OD data and wall thickness with plots of one revolution of the following: wall thickness (top left), cross sectional area (top right), slice (bottom left) and one revolution of OD data (bottom right). The versatile imaging system enables the client to view numerous plots simultaneously.



Statistical data display

Currently, results of inspection can be displayed as Min., Max. and Avg. Wall Thickness; Max. Min. and Avg. Cross-Sectional-Area; Max., Min. and Avg. 64-Point Average; Min., Max and Avg. Low Wall; Max., Min., and Avg. OD; Max., Min., and Avg. Percent of Ovality; Min. Collapse Pressure and Min. Tensional Strength.
Soon to be added is ID measurement and fluid volume.



TECHNICAL INDUSTRIES, INC

No. Pipe:	117
Color Code:	E
Graph:	B
CSA Nom:	18.1623
Work Order:	04-0001A

File	TI No.	Length	C.S.A. Min.	Min. % of Nom.	Low Wall	Low Wall % Nom.	Nom. CSA
653.tvis	653	41.05555556	17.29172074	95.20666844	546	87.36	0.598
601.tvis	601	44.66666667	17.37252439	95.6516661	649	87.84	0.604
597.tvis	597	40.36111111	17.24261786	94.93631235	651	88.16	0.598
578.tvis	578	44.77777778	17.34317362	95.48996341	651	88.16	0.605
556.tvis	556	44.72222222	17.40775402	95.84553728	652	88.32	0.605
662.tvis	662	44.80555556	17.37209959	95.64922721	653	88.48	0.604
611.tvis	611	44.94444444	17.38307513	95.70966754	653	88.48	0.606
617.tvis	617	33.63888889	17.40890749	95.85188819	653	88.48	0.602
548.tvis	548	44.30555556	17.27035573	95.08903459	654	88.64	0.606
637.tvis	637	44.83333333	17.38079355	95.69709536	654	88.64	0.605
625.tvis	625	45.11111111	17.38840488	95.73900265	654	88.64	0.605
563.tvis	563	44.75	17.40603588	95.83607737	654	88.64	0.606

String Builder and graph of sorted pipe.

The top image shows pertinent data determined during the VisonArray™ 3-D Ultrasonic inspection for each length of pipe. Using MS Excel format, columns can be setup for various data for each length of pipe, depending on client's interest. Normally, Minimum Cross-Sectional-Area; Low Wall; Nominal Cross-Sectional-Area; Minimum Percent of Nominal CSA and others are used. The client can select the column based on how they wish the pipe string to be sorted and ran in the well. Once the pipe string has been sorted, a graph of this string design can be displayed as seen in the bottom image.

Straightness of Riser pipe

This graphic shows an actual production riser and the OD and straightness image of the pipe. Technical Industries Inc. has developed technology to measure and record straightness. The inspections performed on this pipe were wall thickness, straightness and OD measurement. All of the data was combined to exactly represent the pipe and finite element analysis was also done. In addition to straightness, Technical Industries, Inc. can determine if the box and pin end were welded parallel to the pipe and if they are parallel to each other. This inspection can also measure how much the welded pin and box are out of tolerance.