Accurately measure the depth of defect (0.01mm Precision)

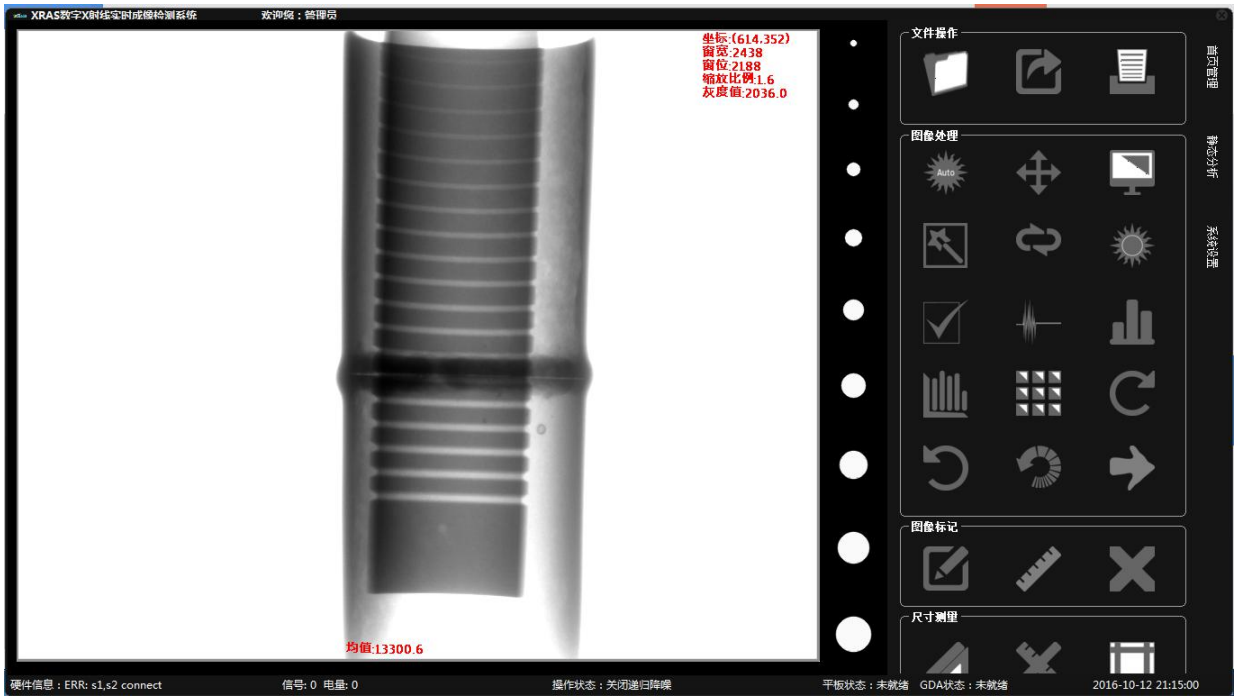
Current situation: During periodic inspection of industrial pipelines and equipment in service, great attention is paid to the development and corrosion of internal defects in welding positions, which is directly related to the safe use cycle and safety of equipment.Traditional film testing mostly uses blackness contrast method to roughly infer the depth of defects, such as the blackness of circular defects and the blackness of base material to judge whether it is a deep hole.The processing method adopted by digital radiography system is similar to film detection. The gray scale contrast method is used to infer the approximate depth of defect. It is difficult to accurately judge the depth of defect, especially crack defect, unless very serious opening defect, blackness or gray level is very star.It is very difficult for superficial and extensible cracks to judge the depth of fracture lines by gray or blackness, which results in great uncertainty for the safety evaluation period of pipelines and equipment for special equipment inspectors.Generally, rectification notice or suspension of use will be issued, but in the field of service equipment is sometimes flammable, explosive, high temperature places, maintenance is particularly inconvenient, thus causing huge property losses to production enterprises.

BACKGROUND: Timely and efficient digital radiography provides a technical basis for monitoring welding defects and corrosion.How to measure the depth of welding defects and corrosion? How to judge the development speed of welding defects and corrosion depth?How to combine the measurement of defect and corrosion depth and depth of defect and corrosion development with the assessment of equipment safety equivalence?Let the development of defects always be within our control and prediction, so that the equipment can operate safely and stably with defects, and save a lot of resources and energy for the country.

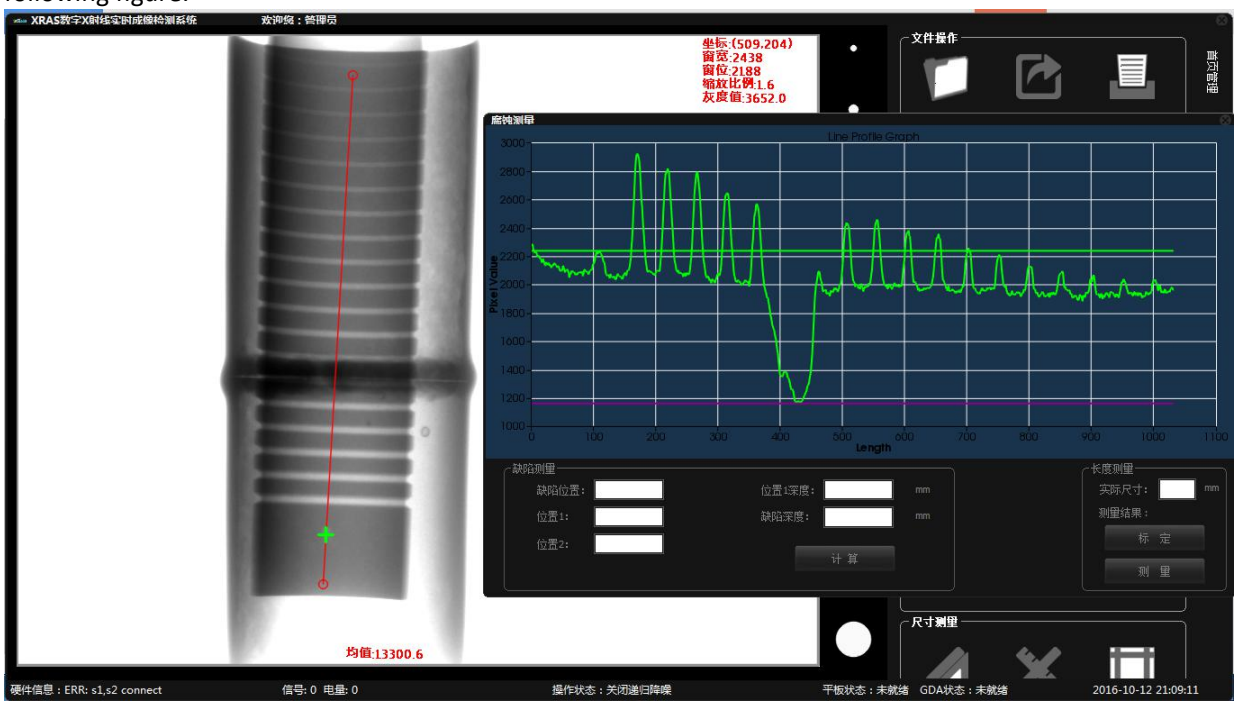
Characteristic: Digital radiography is based on two-dimensional plane imaging. The measurement of defect and corrosion depth is always the difficulty of radiographic detection. The defect depth can be measured accurately by precise calculation of grooved test blocks and imaging software, which provides evaluation basis for on-line evaluation of equipment.Precision of the test block is 0.05, step 0.1 mm from 0.1mm..... 10mm. Considering the cross-section shape of the workpiece, several groups of different test blocks of sheet and tube are prepared.The defect and corrosion depth can be calculated accurately by computer software. We can divide them into two methods.

Measuring methods: 1) Defect, corrosion depth and specimen depth under the same condition

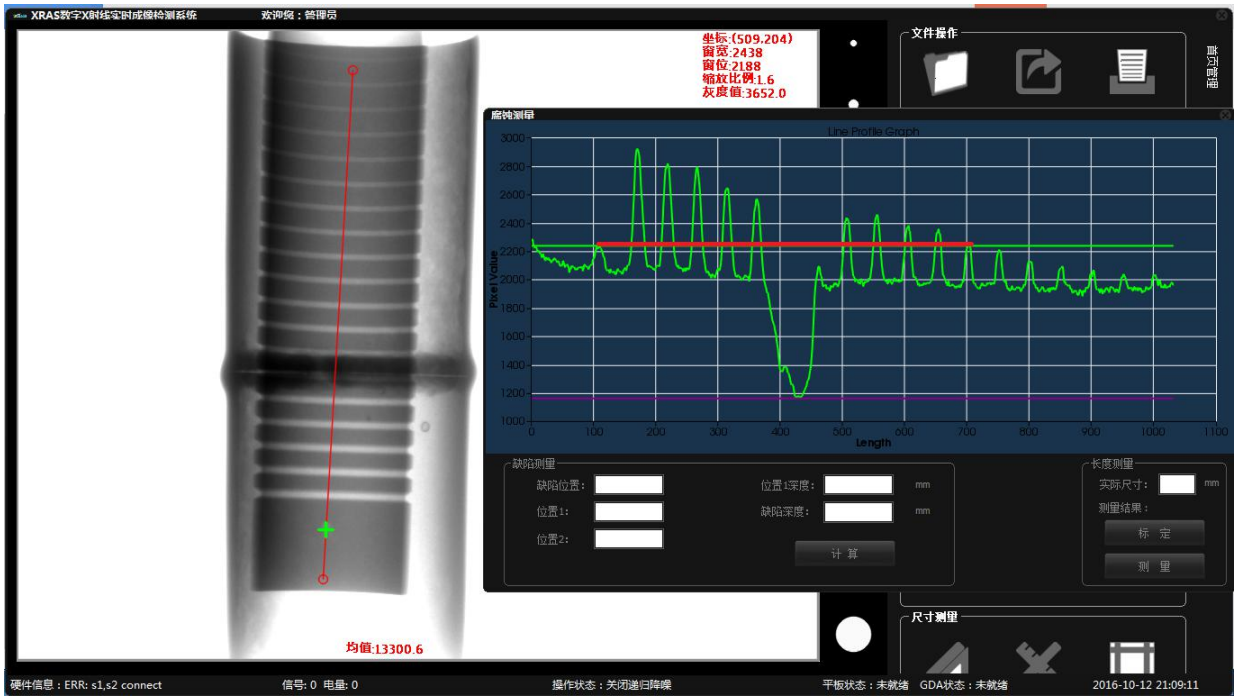
Firstly, the location of the pipeline defect is found, and then the blank area of the annular test block is covered with the location of the defect, as shown in the following figure:



(b)Draw a straight line from the location of the defect to the calibration line of the annular specimen as shown in the following figure:



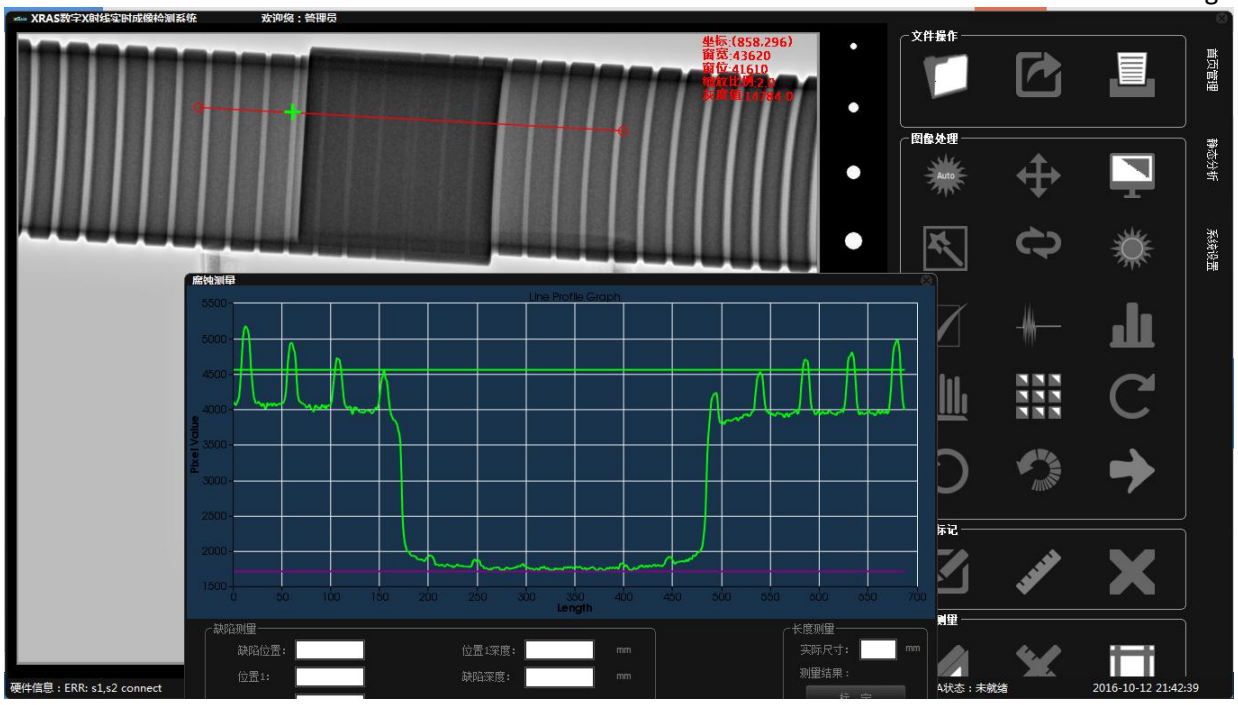
(C)Observe whether the defect point and the peak value of the calibration line of the annular specimen are on the same horizontal line, as shown in the figure below.



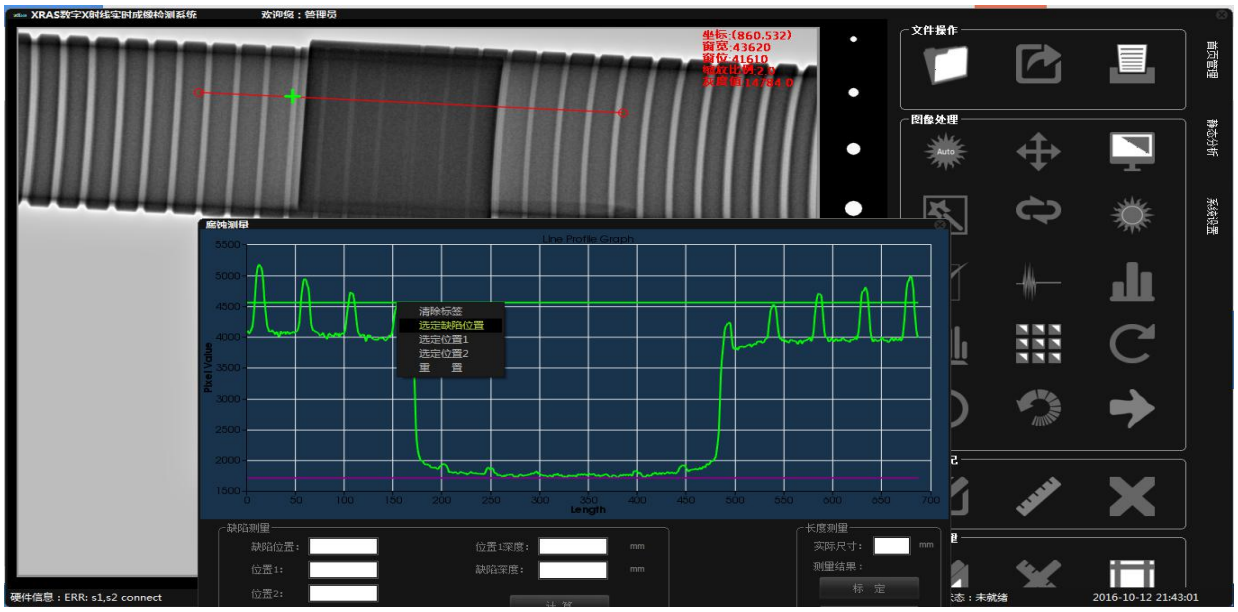
If the defect point shown in the figure is in the same position as the calibration line of 0.9mm depth of the annular specimen, the defect and corrosion depth can be determined to be 0.9mm.

2 Defect, corrosion depth and specimen depth under different conditions

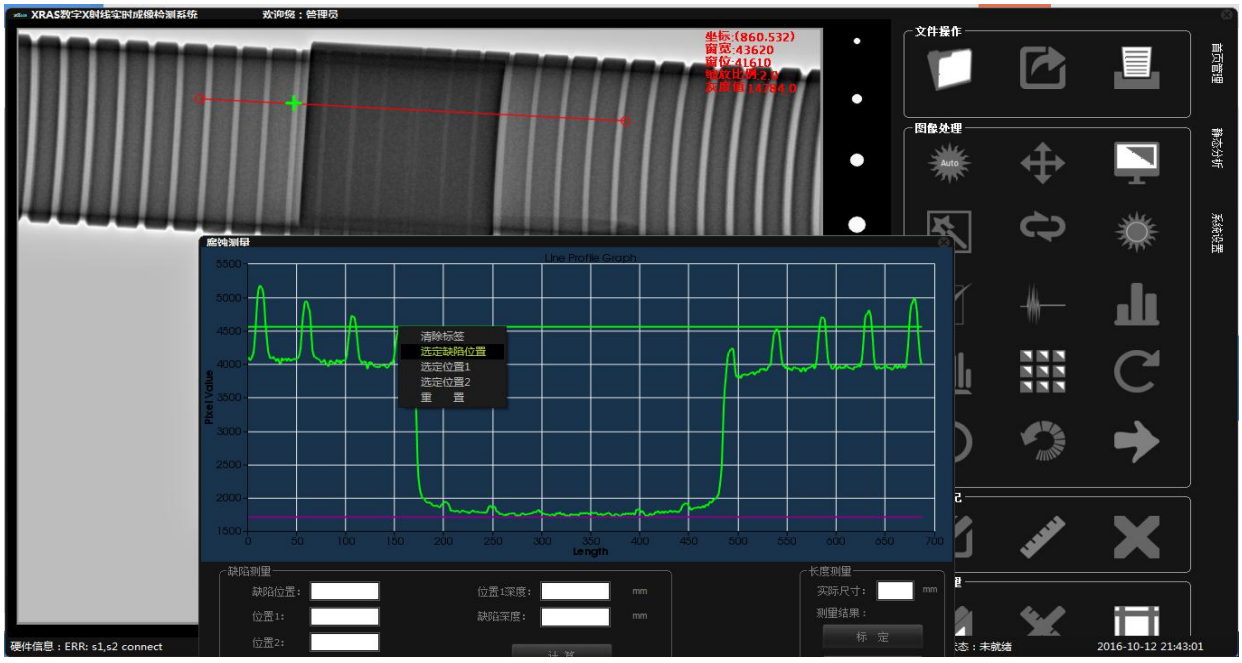
(a) In the middle of the two calibration lines, the measurement method is used to find the location of the pipeline defect. Then the blank area of the annular block is covered with the location of the defect. Similarly, a straight line is drawn from the defect location to the calibration line of the annular block as shown in the following figure:



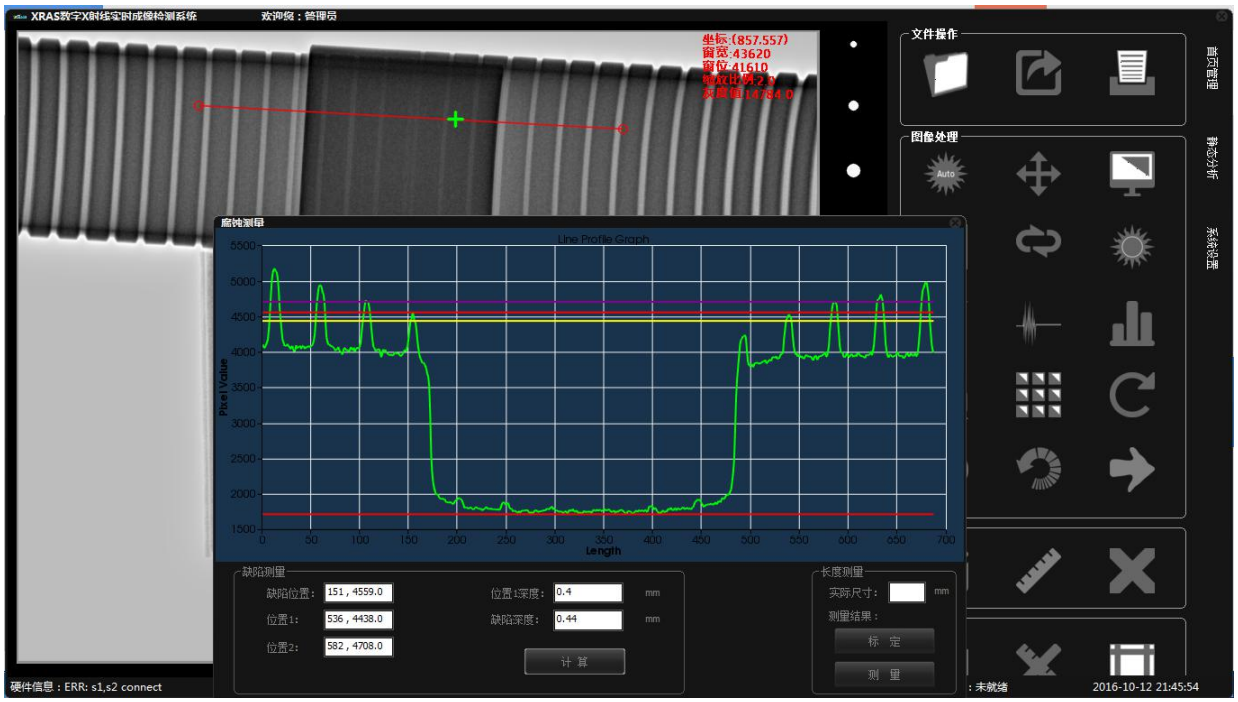
(b)Select the defect location as shown in the following figure:



(c) Select location 1 and enter the known depth of location 1 as shown in the following figure:



(d) Select Location 2 and click the Calculate button to get the depth of the defect, as shown in the figure below.



Concluding remarks: The emergence of precise measurement by digital radiography software solves the problem of defect depth measurement, provides technical basis for equipment safety assessment in national production, and provides safety guarantee for people's lives and property.