

Data Computing Disk of Line Convergent Detector

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Abstract

Emanative detectors ,at present ,are generally utilized to detect plates, pipes and welding seam over ultrasonic, but cracks in surface are easy to be missed .Line convergent detector can find clearly the cracks in workpiece , I have programmed for calculating line convergent detector ,so that we can manufacture detectors in order to test any materials .I have made data computing disk ,that is a database for making detectors .

Key Words :Line Convergent Detector, Welding Seam Convergent Detector, Data Computing Disk .

1. Background

Emanative detectors ,at present ,are generally utilized to detect

plates, pipes and welding seam over ultrasonic, but cracks in surface are easy to be missed .

Add a Emanative sonic lens between the lens and the wedge in the Emanative detector, that makes sonic waves come off the crystal plate focus on in forth and back directions, and do not in left and right directions, the sonic waves hit the workpiece in a line ,this detector is named line convergent detector , this detector detects pipes, plates and bars with the following advantages :

First It contacts the workpiece in a line ,so that immensely reduces the influence that result from surface waves , improve the rate of effective detecting .

Second All sonic waves hit the workpiece in the same time . It take longer time for waves to detect a heave than a hollowed surface , it is easier to find surface cracks ,heat affected zone cracks and surface cracks covered with stay plates .

2. Line convergent detector data computing disk

To check workpiece with line convergent detector .It ,at present, is very difficult to make this detector without references ,designation and data ,it is a new science ,I have worked out the programmed data system and made data disk1,2,and 3, No .1 is for calculating radiuses of the forth end and back end of the sonic lens of any materials , thickness detectors and other data , and No. 2 for middle position ,

No . 3 is for calculating all other data . All waves reach the workpiece surface in the same time,that is the waves focus on the workpiece surface,the formulas are accurate proved through practice .

I have completed the following aspects with the three discs:

- (1) Computing convergent detector data for detecting different materials and different thicks.
- (2) Disk 1 studied the shape of sonic lens ,and also the relation among lens's radius and relative parameters showed as schedule .

Shape of sonic lens

Sonic lens curve is the side contact curve between the lens and the wedge ,for an example ,r1 :the forth radius of the center of the lens , r2 : the back radius ,r : side length of the lens , t: thickness of the workpiece ,k: value of detector ,C1: sound velocity of sonic lens ,C2: sound velocity of wedge, C3: sound velocity of workpiece , parameters as folloings:C1:4700, C2: 2720 ,C3: 3230, t: 20, r: 10, k: 2, point 1 is the forthest one , others line in turn .

unit :mm

point	1	2	3	4	5	6	7	8	9	10	11
r1	44.2	45	45.9	46.9	47.9	49	50	51.1	52.3	53.5	54.4

unit :mm

point	1	2	3	4	5	6	7	8	9	10	11
r2	54.9	56.2	57.5	59	60.5	62	63.6	65.3	67	68.7	70.5

The radiuses in different points are different, the former is longer than the latter, the lens curve is like the back of a fish ,We name it “a fish back” ,the key to make detectors is to make surface of lens and wedge accurately.

(3) Relation among the radius and parameters

The radiuses vary with parameters , for choicing parameters correctly , we should know the relation among radiuses and parameters, use disk 1 to compute the relation , lock other parameters ,vary one parameter ,observe the changing trend .

A The relation among r1,r2 and t: lock c1:6260, c2:2720, c3:3230, k:1, r:10, vary t

t	30	40	50	60	100	200	300
r1	39.4	51.2	63.2	75.2	123.8	246	368.5
r2	48.5	60.5	72.2	84.8	133.6	246	378.7

R1 and r2 become longer with t does .

B The relation among r1,r2 and C3:

Lock c1:6260, C2:2720, T:50 k:1, r:10 vary C3

C3	2960	2990	3080	3120	3230
r1	55	55.9	58.7	59.9	63.2
r2	59.9	61.3	65.5	67.5	72.7

R1 and r2 become longer with C3 does .

C The relation among r1,r2 and C1:

Lock C2:4700, C3:3230, t:30, k:1, r:10, vary C1

C1	6260	4700	4350	4170
r1	39.4	29.5	26.3	24.4
r2	48.5	36.3	32.3	30

R1 and r2 become longer with C1 does

D The relation among r1,r2 and C2:

Lock C1:4700, C2:3230, T:30 k:1, r:10 vary C2

C2	2720	2780	2900
r1	29.5	27.9	24.9
r2	36.3	33.7	28.6

R1 and r2 become shorter with C1 does

E The relation among r1,r2 and k:

Lock c1:4700, c2:2720, t:30, r:10 vary k

k	1	1.5	2	2.5
r1	29.5	44.3	67.1	100.7
r2	36.3	59.1	94.4	150

R1 and r2 become longer with C1 does

F The relation among r_1, r_2 and R :

r_1, r_2 and R vary also with C_1 and K , for an example, C_1 is 4170, $k \geq 1.7$; C_1 is 4700, $k \geq 1.5$, C_1 is 6260, $k \geq 1.2$, r_1 is in inverse proportion to R , C_1 is 4170, $k < 1.7$, C_1 is 4700, $k < 1.5$, C_1 is 6260, $k < 1.2$, r_2 is in direct proportion to R .

G The relation among r_1, r_2 and H :

H is the height of the wedge foundation .

Disk 2 can reveal The relation among r_1, r_2 and H :

Lock $C_1:4700$, $C_2:2720$, $C_3:3230$, $t:30$, $k:1$, $R:10$, vary H

H	2	3	4	5
r_1	29.5	30	30.6	31.1
r_2	36.3	36.7	37.2	37.6

R_1, r_2 increase with H does.

Conclusion: r_1 and r_2 increase with t, k, C_1, C_3, H do, decrease with c_2 increasing, when C_1 is certain, k is above a fixed value, r_1 decrease with R increasing, k is less than this fixed value, r_1 increases with R increasing, then r_2 always increases with R increasing. Radiuses vary, from the above mentioned, with any parameter vary, the shape of the lens vary. the shape is enormous, it is hard to be controlled, know above changing principles, we can choice parameters rapidly and

accurately .

4. Computing multi series convergent data,and finishing the application for patent

Patent number:200520029456.7

Schedule 1 :value analysis report.