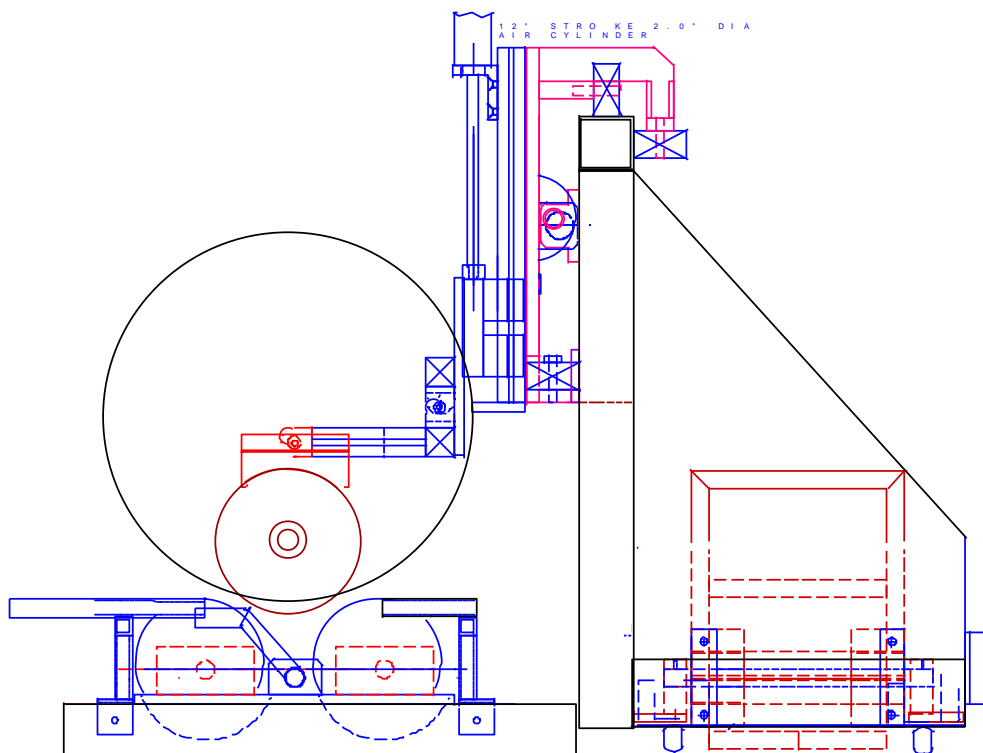




TECHNICAL SPECIFICATION

SDI-5283 25-10

Ultrasonic Bar/Cylinder Inspection System





Specification for an Ultrasonic Defect Detection System for Bar and Cylinders

1 INTRODUCTION

This specification is for a rugged single or multi channel, high-resolution ultrasonic test system for bar or cylinder inspection. The SDI-5283 rotator system with irrigated transducer test head can be installed at floor level in harsh industrial environments. The ultrasonic instrumentation and motion components are stored in a heavy duty housing for protection against dropped tubes etc during loading. It is designed to achieve the accuracy and resolution required at high throughput speeds in a harsh operating environment. The system will test product with diameters ranging from 10 in (250mm) to 25 in (600 mm). The standard system can be configured for lengths up to 20ft.

2 SYSTEM DESCRIPTION

The system consists of floor mounted sump supporting a 20ft (8m) long SDI-1334 heavy duty rotator. The transducer(s) are mounted in-line in a high flow irrigated housing which rides in contact with the bar. This type of housing is used extensively on the SDI compressed gas cylinder inspection systems which are used with very heavy duty cycles on a variety of rough surfaces. It provides coupling equivalent to an immersion system as a water filled chamber is maintained between the transducer and the part. The test head is mounted on a cantilever bridge equipped with a bar follower assembly. There are a number of different contoured shoes which can be rapidly changed by the operator to accommodate different bar diameters. Each shoe size will test several different bar diameters.

The bar to be tested is loaded onto the rollers while the transducer/follower assembly is parked in a housing at either end of the scanner. As the bar is rotated, the transducer assembly traverses the entire length of the bar. All test parameters, including rotator speed, helix pitch etc are controlled by the SDI-1830-UTB system controller. The time to test a bar is dependent on the test standard defect size and determined by the bar diameter. To reduce inspection time the testing is performed bi-directionally. The test bridge moves off the bar into a shielded housing at the end of each scan. It remains protected until the next bar is loaded onto the rotator then it emerges and travels the opposite direction down the length of the next bar and into housing the other end. The sequence is repeated for each bar.

The modular design allows rapid reconfiguration of the system to accommodate different lengths and diameters of bar. The detailed description of the modules is given below.



2.1 Test Station

The test station is the main operating station of the system and contains the sump, rotator, bridge and system controls. In the majority of systems, the instrumentation and system controls are housed at the end of the test station, as this is where the operator will usually be located.

The test station frame is fabricated from welded steel and finished with epoxy paint. The overall length is 30ft. and the depth 3ft. The SDI-1334 rotator will function in either direction with continuously variable speed. The maximum speed is 40 surface in per sec.

2.3 Auxiliary Modules

A number of auxiliary modules are available for improving the inspection efficiency.

2.3.1 Defect Markers

Automatic defect markers are available for indelibly marking the product downstream of the test station. Both paint jet and felt tip markers are available.

2.3.2 Defect Logging

A computer-based defect logging package is available for producing a tabular output of defect location and material length.

2.3.3 Water Conditioning Unit

A recirculation pump and filter system ensures water quality is maintained under normal working conditions. Optional temperature control and de-airation units can be provided.

3 INSTRUMENTATION

The instrumentation used is the Socomate 7100 PC based multi-channel flaw detector available with up to 8 channels. This high speed, high-resolution instrument is designed for industrial on-line applications where features such as the interface gate synchronization eliminate variations due to



surface conditions and bar flutter. The unit has up to eight sequenced channels each consisting of a pulser/receiver module. Each channel will accommodate four gate modules with rear panel outputs. All instrument parameters are displayed on the PC monitor including the A-scan and gate response. For each channel a flaw gate indicator will be illuminated if an echo appears in the gate above the preset thresholds. Thickness modules are available if required.

4 SYSTEM CONTROL

All system functions will be controlled and monitored by the SDI-1830-UTB system control module. This is an integrated suite of software modules running on a rack mount industrial P.C. with an optional touch screen display. There are four main functions:- 1) Instrument setup and display, 2) System control, 3) Operator input, and 4) Data logging. The screens can be custom designed for particular applications. Typical screens for each of these functions are shown below. These could be reconfigured as required.

4.1 Instrument Setup

This screen allows each instrument channel to be set up and directs the video and gate outputs from the selected channel to the display scope. At any time the operator can view the A-scan display of any channel by touching that channel number on the screen. All setups can be stored and recalled with a file name. Other functions controlled include:

- Instrument setup; gain, gate position and gate threshold.
- Instrument response monitoring - either the alarm condition, the signal amplitude or the time of flight.
- Multi-channel sequencing to prevent cross talk by sequencing pulsing, gate position and gate width on each pulse.
- Transducer manipulation where motorized transducer positioners are used the positions of each transducer for each material, type and size can be stored as part of the test parameter setup. (option)

4.2 System Control

This is the main screen for controlling system configuration. The inspection helix pitch is controlled as determined by the required defect detection level. The system controller controls the drive speed and helix angle of the system. This module receives input from various sensors on the system and instrumentation and determines a sequence of events based



on these inputs. The precise sensor input is determined by the type of test being performed and the options installed

4.3 Operator Input

This screen allows the operator to input the details of the product being tested.

4.4 Data Logging and Display

This screen shows the condition of the system alarms. All alarm outputs will be continually monitored using this SDI-1910 Posilog PC data logging package. When an alarm condition occurs the Posilog will record the channel number, alarm type and encoder counter reading. These values will be displayed on the screen and stored to disk. In addition, an optional paint marker will indicate the occurrence of a defect on the side of the bar. The defect log files will be accessible in read only mode from any other PC networked with the host. As an alternative, the system can be configured with full C-scan data recording, display and analysis.

5 TEST RESULTS

Digital defect logging modules are available for computerized archiving of test results. The SDI-1961 Posilog data acquisition package option will provide tabulated defect location in a report format.

6 SYSTEM INSTALLATION/ACCEPTANCE

The system will be available for acceptance trials prior to shipment. The details of the Acceptance Test Procedure (ATP), including the range and number of test samples, are to be agreed beforehand.

The system will then be installed and commissioned. Installation is expected to take two weeks. It is understood that the customer will provide suitable single-phase power. Water supply and drainage will be required for occasional use during system maintenance. Full installation drawings will be provided shortly after receipt of order.

7 TRAINING

This specification includes 3 days training of personnel in the operation and routine maintenance of this equipment. This training will take place at the customer site after installation.



8 SAMPLE SYSTEM CONTROL SCREENS

sdi Structural Diagnostics, Inc. X-Position **10.001** Test Setup

Data File **B1100037-Bloggs Mtl-001** Motion Control

Mode **Stop On Defect** 1 2 3 Report Header

Diameter **7.600 in** 4 5 6 Test Results

Length **88.000 in** 7 8 9 INC BAR # DEC Bar #

Pitch **0.040 in** 0 . Pause

Speed **18.0 in/s** **45.2rpm** Del Enter Start Test

Start Pos **88.000 in** << Teach Start Exit

88.000 in

System Control

sdi Clear All Clear Screen ↑

Record File -- 01

Pre Fix	Mill Order	Tag No.	No. of Tags	Charge to Order/Prod. Code	Alloy	Heat

Operator **Width** **Thickness**

Comments

Pre-Calibration **Post-Calibration**

A	B	C	D	E	F	G	H	I	J
K	L	M	N	O	P	Q	R	S	T
U	V	W	X	Y	Z	<=Delete	Clear Field		
0	1	2	3	4	5	6	7	8	9

Tracking Data UT Setup Main Alarm Monitor Exit to Win95

Operator Input