

**PACKAGE ID** - 001210IBMPC00 TCTBIS

**KWIC TITLE** - True Color Tube Borescope Inspection System

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**LIMITATION CODE** -COPY                   **AUDIENCE CODE** - LIM

**COMPLETION DATE** - 05/20/1997   **PUBLICATION DATE** - 05/20/1997

**DESCRIPTION** - The overall purpose of TCTBIS is to determine the quality of the inside surface of a tube. This is done by acquiring multiple images along the inside of a tube and converting these images into one unwrapped image of the inside of a tube. This resultant image is the same as if you had slit a tube length-wise, flattened it out, and then taken a picture of it. What is unique about this system is that the picture is acquired in a non-destructive manner. TCTBIS also analyzes the unwrapped images for oxidation, foreign particles, and surface imperfections, scratches.

**PACKAGE CONTENTS** - Media Directory; Software Abstract; Media Includes Source Code, User's Guide, Executable Module, Object Module;

**SOURCE CODE INCLUDED?** - Yes

**MEDIA QUANTITY** - 1 3.5 Diskette

**METHOD OF SOLUTION** - TCTBIS uses common trigonometric methods to calculate coordinates along a circle in order to extract image data to create an unwrapped image of the inside of a tube. Also, a data reduction routine is used so that the resultant unwrapped image is always 300x196 pixels.

**COMPUTER** - IBM PC

**OPERATING SYSTEMS** - Windows 95

**PROGRAMMING LANGUAGES** - Visual Basic 4.0, VB Script for Excel 7.0

**SOFTWARE LIMITATIONS** - TCTBIS is currently setup to inspect 1/4 inch increments of strait tubes. Both of these restrictions can be overcome. For instance, an endscope could be used for curved tubing, and a regular lens could be used to larger diameter tubing or piping. A minor change to the software would have to be made to allow for larger increments to be processed.

**SOURCE CODE AVAILABLE (Y/N)** - Y

**UNIQUE FEATURES** - An unwrapped image of the inside of the tube is created in a non-destructive manner. The resultant image is of

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**UNIQUE FEATURES - (CONT)** very high resolution. By default TCTBIS acquires 300 pictures in a 1/4 inch length of tube in 60 seconds. Each picture creates one vertical line in the resultant unwrapped image. The length of the vertical line is also variable. A real-time color image of the inside of the tube is displayed on the screen for the operator to view. The operator can view any point inside of the tube by moving the borescope via simple controls on the Graphical User Interface (GUI). Image analysis of the unwrapped image can be done immediately after the unwrapped image is created, or done later.

**RELATED SOFTWARE** - TCTBIS requires that the commercial software packages Image Pro Plus V2.0 and Excel V7.0 be installed under windows 95.

**HARDWARE REQS** - Matrox Millenium Graphics Card, Matrox Meter Frame Grabber, a fast PCI bus implementation (such as the Dell Dimension XPS M200s), monitor capable of displaying 1024x768 pixels at 24 bit color, and a Compumotor AT6400 stepper motor controller.

**TIME REQUIREMENTS** - TCTBIS takes 60 seconds to capture 300 640x480 pixel 24 bit color images, extract the correct pixels from each picture, reduce the data, and create the unwrapped image. Image analysis takes about 4 seconds per unwrapped image.

**ABSTRACT STATUS** - Released AS-IS 4/23/1998

**SUBJECT CLASS CODE** - I

**KEYWORDS** -  
COMPUTER PROGRAM DOCUMENTATION  
T CODES  
PIPES  
DATA ANALYSIS

**EDB SUBJECT CATEGORIES** -  
990200

**SPONSOR** - DOE/ER

**PACKAGE TYPE** - AS - IS