



Sentry 9000 Version 6

Feature Introduction

White Paper

January, 2007

Prepared by:

Wei Siong Tan, Ph.D.
AccuSentry®
605 Franklin Road
Marietta, GA 30067
E-mail tan@accusentry.com

Sentry 9000 Version 6 Feature Introduction

Introduction

Automated 100% Product Inspection provides a wealth of information for actionable intelligence that is key to manage quality and increase productivity. The inspection system is not only useful for rejecting defective products but also very useful for providing instant feedback to help improve product quality, reduce waste, and increase the machine up time. Since every part is inspected, continuous run-time data can be collected to provide instant key metrics to help guide the machine operators to spot problem areas and make any necessary adjustment.

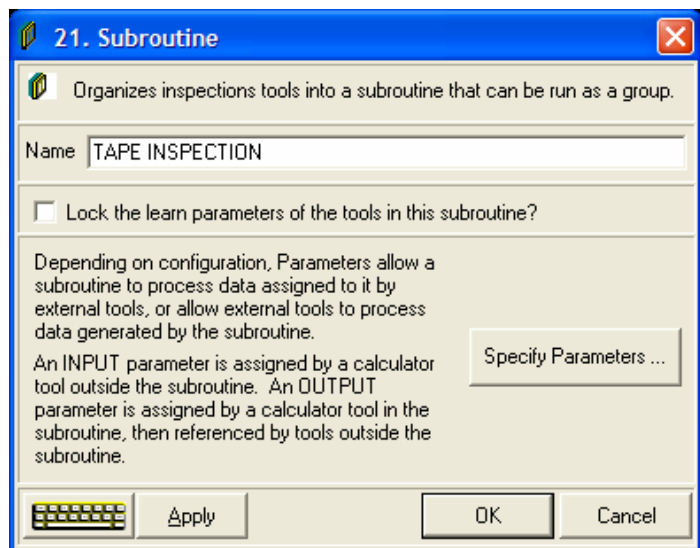
In a high-speed production environment, machine shutdown is extremely costly. The Sentry 9000 is a useful tool for minimizing machine down time. As such AccuSentry is continuing to improve the Sentry 9000 to maximize the efficient utilization of the system.

Version 6 Features

The following sections highlight some of the features that are available on version 6 of the software.

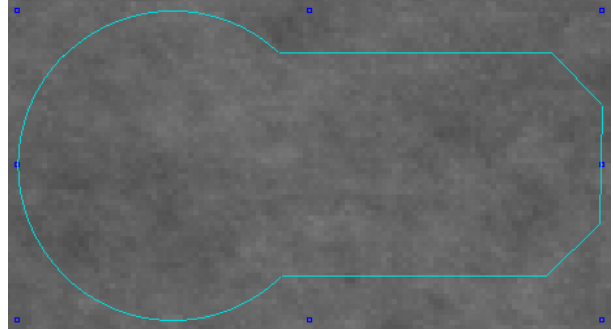
Inspection Standardization and Sharing Tool

Version 6 software introduces a library tool which enables application engineers to share and reuse previously created routines and subroutines. The library function allows the user to create subroutines that can be shared across applications. This function minimizes maintenance time and shortens the development cycle of new inspection features. It ensures that all common functions are consistent and that each product is inspected the same way. The library functions can be stored in a central repository. This essential tool can be used to drive standardization across multiple inspection platforms.



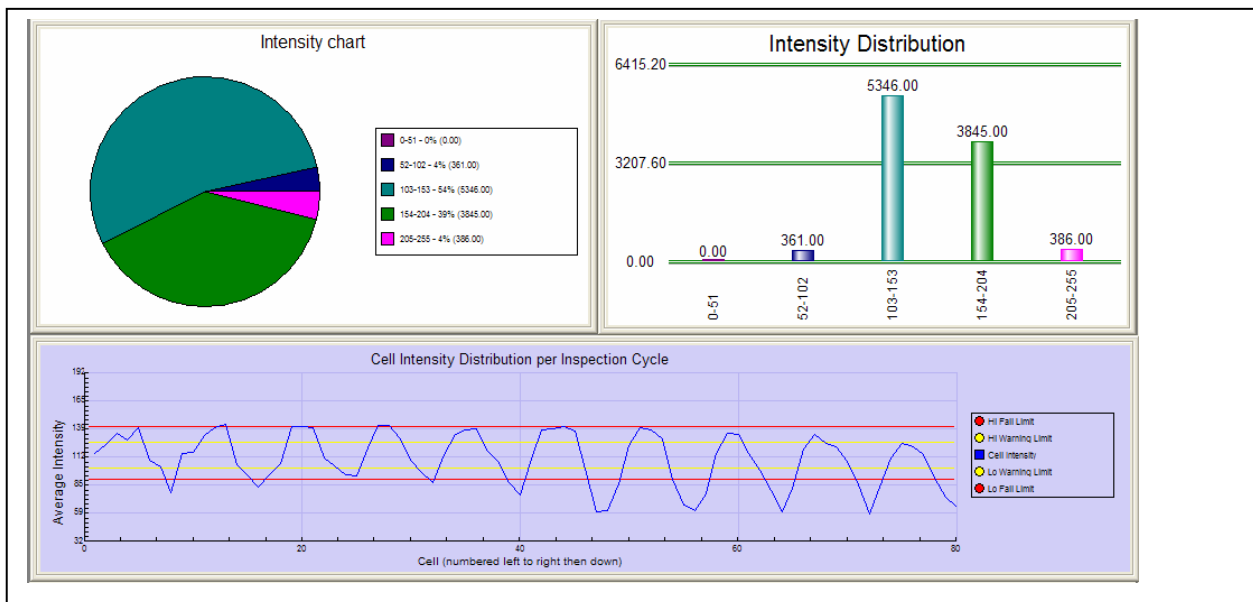
Custom Shaped Inspection Area

Version 6 provides the ability to draw custom area to match the specific shape of a product feature to be inspected. The advantage of the custom shaped area is to provide a more precise coverage of the intended region of inspection. In addition, the custom shaped area can be positioned and rotated at each inspection cycle for a dynamic placement over the feature of interest. The picture to the right shows a simple example of a custom shaped area.



Enhanced Production Data Display Tool

Version 6 provides advanced Graph and Chart to facilitate a variety of ways to visually present the inspection result in a manner that can be easily interpreted by the floor operators (see the example below). The advanced graph and chart tool provides a very convenient way to set color coded warning and fail limits. Warning limits are particularly useful for alerting the operators to potential problems before bad products are being produced. One of the key benefit of the Sentry 9000 system is to provide the key actionable intelligence to increase the productivity by reducing machine down time and reducing waste. Graph and charts could be used to effectively convey key performance indicators to the machine operators and

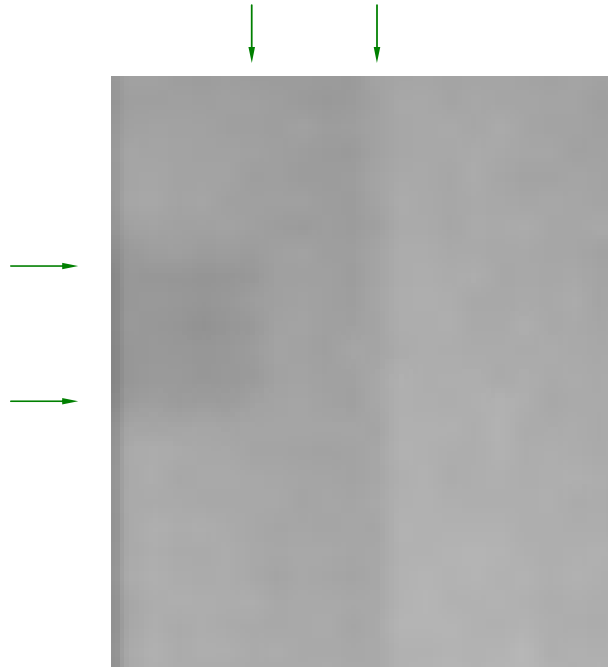


to allow the operator to interactively improve the machine performance over time.

Subtle Feature Detection

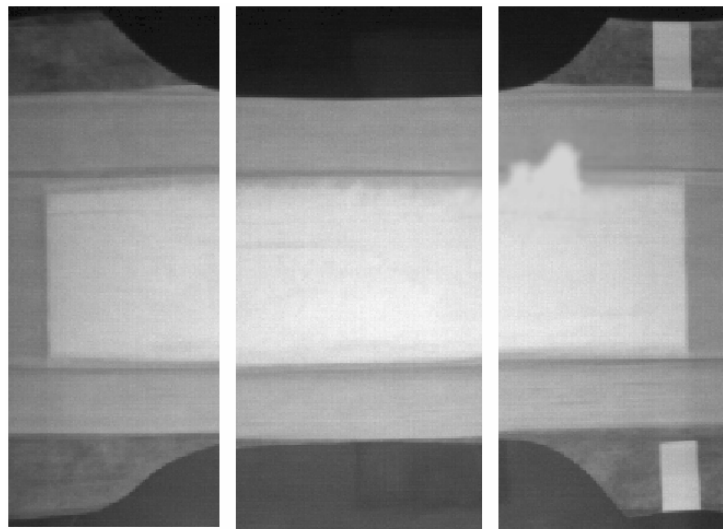
Version 6 Edge Detection tool contains advanced capability to detect faint edges which are crucial to inspect subtle transition layer. It also includes Graph to provide the user the ability to visualize the “strength” of an edge. The user can quickly analyze the various aspects of an edge and determine the proper edge parameters to achieve consistent edge detections.

The Edge Detection also has an improved ability to scan edges from different types of scan directions: along a specified direction, radial Inward, radial outward, circular clockwise, circular counter-clockwise, or along a custom defined route. These scan line types are useful for scanning edges on a surface that cannot be easily detected using regular straight line direction.



Full Product Viewing Through Narrow Opening

As illustrated by the pictures below, Version 6 software provide a “Virtual Camera” capability to capture different sections of the product at different time using the same camera. The benefits of this feature are two fold: increased inspection sensitivity and full product inspection through a small viewing window. The increased inspection sensitivity comes from the additional resolution because only a smaller section of the part is captured at a time. Furthermore, since only a smaller section of the part needs to be visible at a time, inspections that otherwise require expensive machine modification can be avoided because the part can be imaged through a smaller viewing window. Images from remote systems can also be transferred via TCP/IP for inspection.



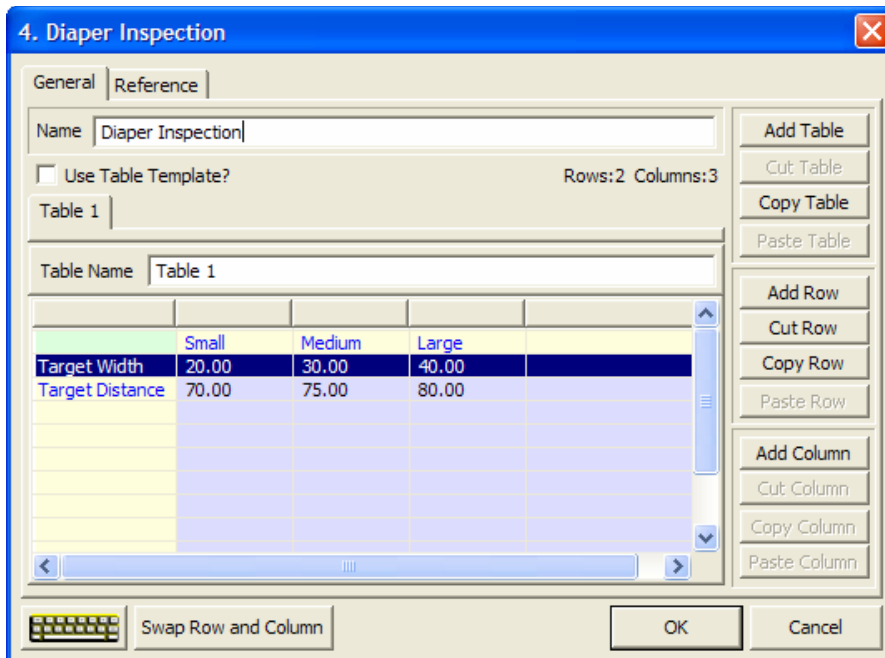
Cam 0

Cam 1

Cam 2

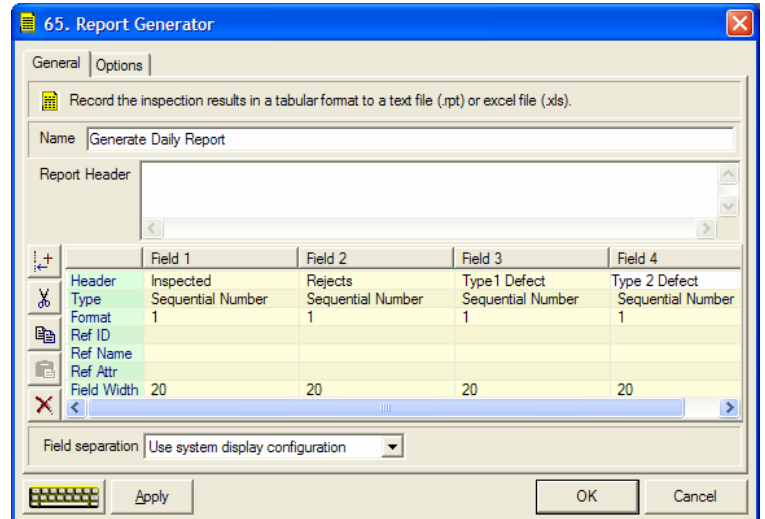
Product Management Tool

Version 6 provides the ability to manage multiple similar style products in a single inspection file. It provides a data table in a spreadsheet file format to contain the parameters, targets, tolerances, etc., for each product. It also provides an area table to store the specific inspection area of each product type. Instead a plethora of inspection files, specific inspection parameters and areas are consolidated in a few inspection files. Each inspection file contains the inspection parameters and areas for a class of product with multiple styles. This could significantly save the amount of time required to develop and maintain the application files.



Valuable Production Report

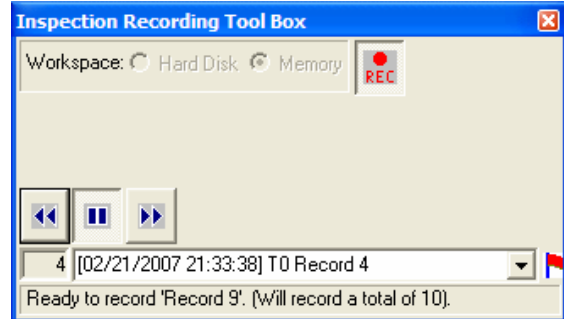
Version 6 provides an easy way to create reports for real-time or scheduled data collection of measurements, defect counts, or any data, written to local or remote file storage. This allows quality managers to access and analyze the data for making timely decision to initiate relevant improvements. The report generator provides a friendly spread sheet style data entry format to determine the type of information to be included in the report.



Data entry can be logged by inspection cycle, by time, and by certain pass/fail criteria.

Quick Test and Validate

Version 6 provides a tool to expedite the testing and validation of the Sentry 9000 system. It provides a simple toolbox interface to allow the recording of Pass/Fail images and the associated inspection result. The recorded inspections can be played back at a later time for review and analysis. Libraries of known reject types can be saved and later re-inspected whenever any parameter is changed. This ensures that the change would not affect the ability to detect previously known defects. This tool could be used to minimize the production down time for testing and validations. It improves the ability to determine the impact of certain parameter changes. It could be used to help making intelligent decisions to improve product quality and productivity.



Expanded Communication Protocols

Version 6 software supports the industry standard protocols to meet the expanding communication needs of modern production lines. Among the protocols supported by the software are TCP/IP, OPC, and RSLinx. In particular, OPC protocol is a widely supported standard for providing real-time feedback or input for process control and/or data collection. With Version 6 software, the Sentry 9000 can be connected to a factory floor data historian or data management software.

Easy Implementation of Complex Functions

The **Math** tool is an advanced tool designed to improve the ability to perform complicated mathematical calculations. It lets the users to define complex mathematical expressions with a large number of operations. This is a time saving feature to facilitate the implementation of mathematical expressions. It also simplifies the maintenance of the inspection file by consolidating the mathematical calculations in one place allowing the program to be more easily understood.

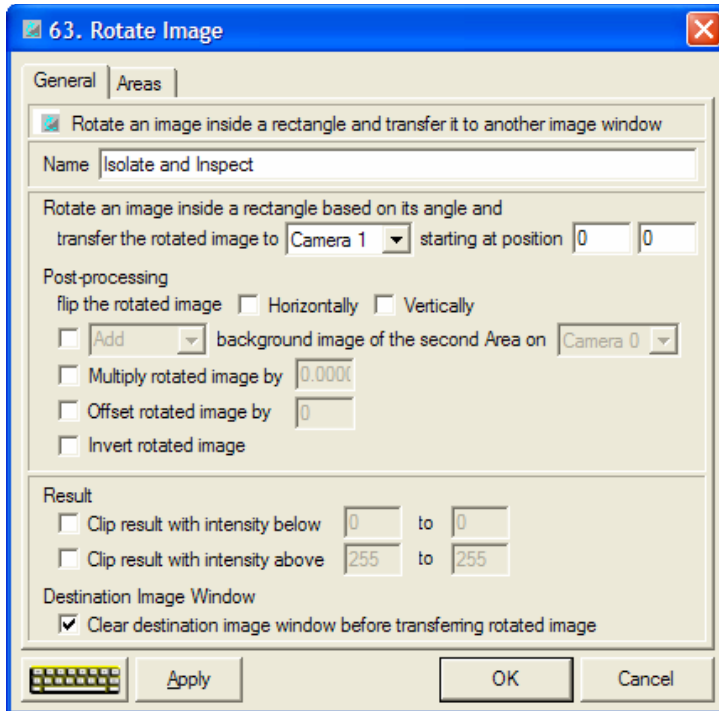
Flexible Image Trigger

In previous versions of Sentry 9000, cameras must be triggered from I/O inputs 17-20. With Version 6, any input position can be used to trigger the camera allowing greater flexibility in interfacing and cabling. Furthermore multiple input signals can be used to trigger a camera to create multiple virtual images.



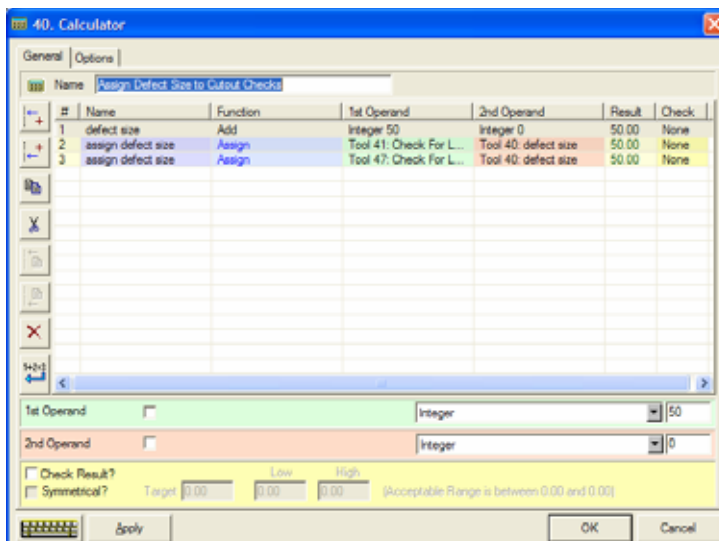
Isolate and Inspect

Version 6 software provides a comprehensive rotate image tool to allow the transfer of certain sections of an image to a different window. This would enable the system to isolate any particular section of the image to be individually processed to allow greater flexibility and reliability in the inspection process.



New Calculator Interface

Version 6 features a new calculator interface which provides a complete view of all operations in the calculator. The new interface is designed to expedite the programming



development and maintenance of the Sentry9k inspection files.

Detecting Hard-to-Find Objects

The clustering tool on Version 6 features a new algorithm to detect hard-to-find object against a background with varying intensity. It automatically adjust the threshold based on the intensity of the local background.

Custom Name of Camera and IO

Version 6 provides the ability for individual naming of an image windows. For example an image window under the previous window will be display with the heading Cam 0. Under the new software the image window can be named: Cam 0: Operator Side Tape.

In addition each IO signal can now be individually named, e.g. Cam0 Trigger. This improves the maintainability of the inspection program and prevent potential confusion in the process.

Improved Inspection Speed

Version 6 optimizes the process of image acquisition and inspection execution by performing both functions concurrently. The result is a significant improvement in the system ability to perform more complex inspection while still keeping up with the fastest production rate. Additional and more detailed inspections can be added to the work load without impacting the inspection performance.

