

Successful Implementation of the Agilent *Medalist* x6000 Automated X-Ray Inspection Solution – The Pyramid Concept

Application Note

Introduction

The primary goals of implementing the Agilent *Medalist* x6000 automated x-ray inspection (AXI) solution are optimization of SMT and solder wave processes via a highly capable feedback loop, along with the identification/removal of all defects created by those processes. A properly utilized x6000 reduces production costs, improves shipped quality, and lowers life cycle costs. This document details a holistic and structured guide to achieve those goals in the shortest time with the least risk. The concepts described are well proven through years of practical experience partnering with customers to maximize the benefits gained by deployment of Agilent AXI systems.

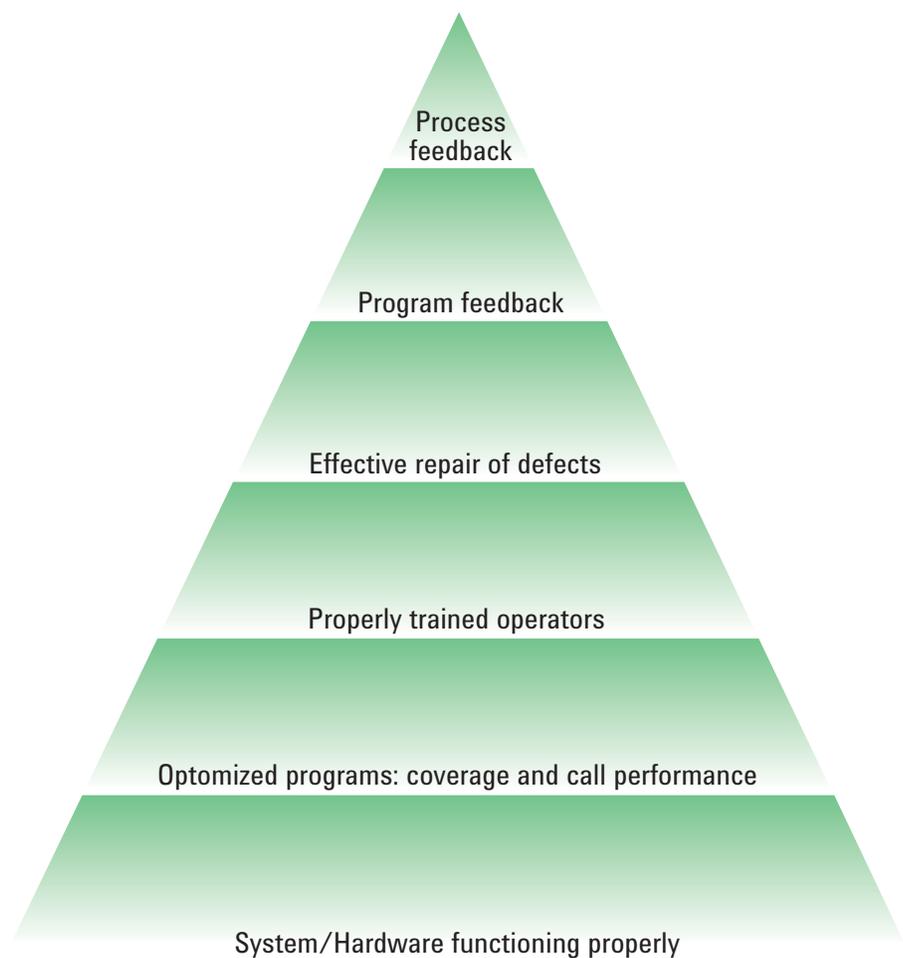


Figure 1. AXI Deployment Pyramid



The Pyramid Concept

The Pyramid Concept is a systematic approach to optimized x6000 implementation. There are several areas that must be addressed in order to realize the full benefit of deployment. The main areas of a successful deployment are shown in Figure 1.

The pyramid form is used to visually signify the key areas of focus and their basic interrelationships. Items lower in the pyramid form the foundation for the item higher in the pyramid. Higher level items are generally and often severely compromised if the lower level items are flawed. As each level is built on top of the level below, the user manages performance of each section of the pyramid from the bottom up.

Starting at the base of the pyramid, System/Hardware performance impacts all the other sections listed above it. If a system isn't functioning properly, the data output by the system may not be valid, therefore negating all other sections of deployment. Then programs must be written correctly to capture all of the real defects (within its functionality) with the minimum amount of false calls. Properly trained operators can then appropriately disposition defect calls. We progress up the pyramid to reach maximum effective real-time process feedback.

It should be noted that fundamental to success is management support. Namely of concern is management of the programmers, repair operators, and process group. Management of these groups must buy off on the importance of this model in order to achieve the highest level of successful implementation.

Each section below will discuss how to determine that each of the levels of the deployment pyramid are implemented optimally.

Hardware Performance

With the *Medalist* x6000 AXI system, all Confirmation and Adjustment procedures are run automatically, keeping the system functioning at peak performance at all times. Therefore, the customer need not have any actions within this critical section unless the automated tests report a problem.

Agilent Provides	Customer Suggestions
All C&A procedures are performed automatically, at varying intervals	No action needed unless procedure fails and requires action

Table 1. Hardware performance

Agilent Provides

- *Medalist* x6000 Programmer training class
- On-line documented programming guidelines
- On-site startup assistance
- Remote programming support capability
- Simplified programming model
- Automation of many programming steps

Optimized Programs

The next most important level of the pyramid is optimized programs. Are the programs finding the real defects with minimal false calls? If not, any real defects captured by the tester run the chance of not being recognized because the false call rate is too high.

The *Medalist* x6000 AXI programming environment is an entirely new, easier-to-use interface for a simplified programming model. Several programming steps have been eliminated or automated to simplify this model and to allow new programmers to obtain expert comparative results. An example is auto focus for all images – eliminating the need for setup and management of surface mapping. Another improvement is automatic threshold setup of all parts so the programmer needs only to fine tune these thresholds rather than start setting thresholds from scratch.

The primary customer responsibility in this section of the pyramid is to assign a dedicated Lead Programmer to the x6000, and send this person to the training class included with the system. This Lead can then help manage all levels of the implementation.

Customer Suggestions

- Assign dedicated Lead Programmer to manage all levels of the implementation pyramid
- Send Lead Programmer to Programmer training class

Table 2. Optimized programs

Properly Trained Operators

In this section we are concentrating on whether the *Medalist* Repair Tool (MRT) software operators are able to correctly disposition the defects as false or real as well as have a plan for operator monitoring and feedback. Effectiveness can be negated if operators do not know how to recognize a real defect and disposition it correctly.

To the right is a list of the tools that are provided by Agilent to help customers succeed. Also shown is a list of suggestions for customers to maximize success.

Agilent Provides

- *Medalist* Repair Tool (MRT)
- Image Interpretation training material
- Assistance and tools to perform operator certification
- System capability to lock out un-trained operators and track operator performance

Customer Suggestions

- Assign dedicated Repair Tool operators
- Trainer available to learn how to train operators with material provided
- Operators trained and certified for Image Interpretation

Table 3. Properly trained operators

Effective Repair of Defects

Typically, it is suggested that the MRT operator also be the repair operator, but this is not always the case with all repair actions. In this section we are focused on ensuring the repair operators (ROs) repair the boards correctly. It is imperative that operators that are assigned to repair boards have received the correct training and certification for the type of repair they are doing. As most implementations are “feed forward” repair loops, ineffective repairs can result in escapes and/or additional defect injection (for example creating a short).

To the right is a list of the tools provided by Agilent to help customers succeed. Also, shown is a list of suggestions for customers to maximize success.

Agilent Provides

- Repair Tool provides detailed diagnostic information for accurate and complete repair

Customer Suggestions

- Repair operators IPC solder certified
- Access to Repair Tool at repair station
- Operators trained and certified for Repair Tool use

Table 4. Effective repair of defects

Program Feedback

The *Medalist* Quality Tool (MQT) is used to feed back false call performance to the programmers. MQT provides the programmer with prioritized areas to reduce false calls while feedback from downstream test systems such as ICT provides escape information.

Agilent Provides

- *Medalist* Quality Tool (MQT) - **automated** false call pareto charts created to point to areas for improvement in program

Customer Suggestions

- Create and deploy procedure for feedback from downstream (i.e. ICT, FTC, etc)
- Lead Programmer use MQT and downstream feedback to improve programs

Table 5. Program feedback

Process Feedback

Medalist Quality Tool (MQT) provides process engineering with prioritized areas to reduce defect rates. Agilent AXI has many advantages resulting in an extremely powerful process feedback tool. It offers extremely high defect detection capability and immediately provides detail at the solder joint level in a format that is easily translated into process improvement action.

Agilent Provides

- *Medalist* Quality Tool (MQT) - **automated** MQT real defect pareto charts created to point to areas for improvement in manufacturing process

Customer Responsibility

- Process Engineer use MQT information to improve manufacturing process

Table 6. Process feedback

Summary

The Pyramid Concept provides a holistic and structured approach to optimized x6000 deployment. Agilent contends that following the implementation pyramid accelerates and optimizes the benefits of AXI deployment. A properly utilized x6000 reduces production costs, improves shipped quality, and lowers life cycle costs. It achieves these results by providing a highly capable feedback loop, along with the identification and removal of the defects created by those processes.

If you would like more information on how to use the Deployment Pyramid, or would like assistance implementing the pyramid, contact your local Sales or Technical representative.

For more information on the *Medalist* x6000 AXU, please visit www.agilent.com/find/x6000.



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