Lesson Introduction

Because it keeps us from repeating mistakes.

Do you know why history is so important?

Yes, and mistakes are not only a problem for DCMA. They are a problem for every organization. Root Cause Analysis is the process used to determine what caused a problem. But, before we get too deep into problem solving, let's gain an understanding of the objectives for this lesson.

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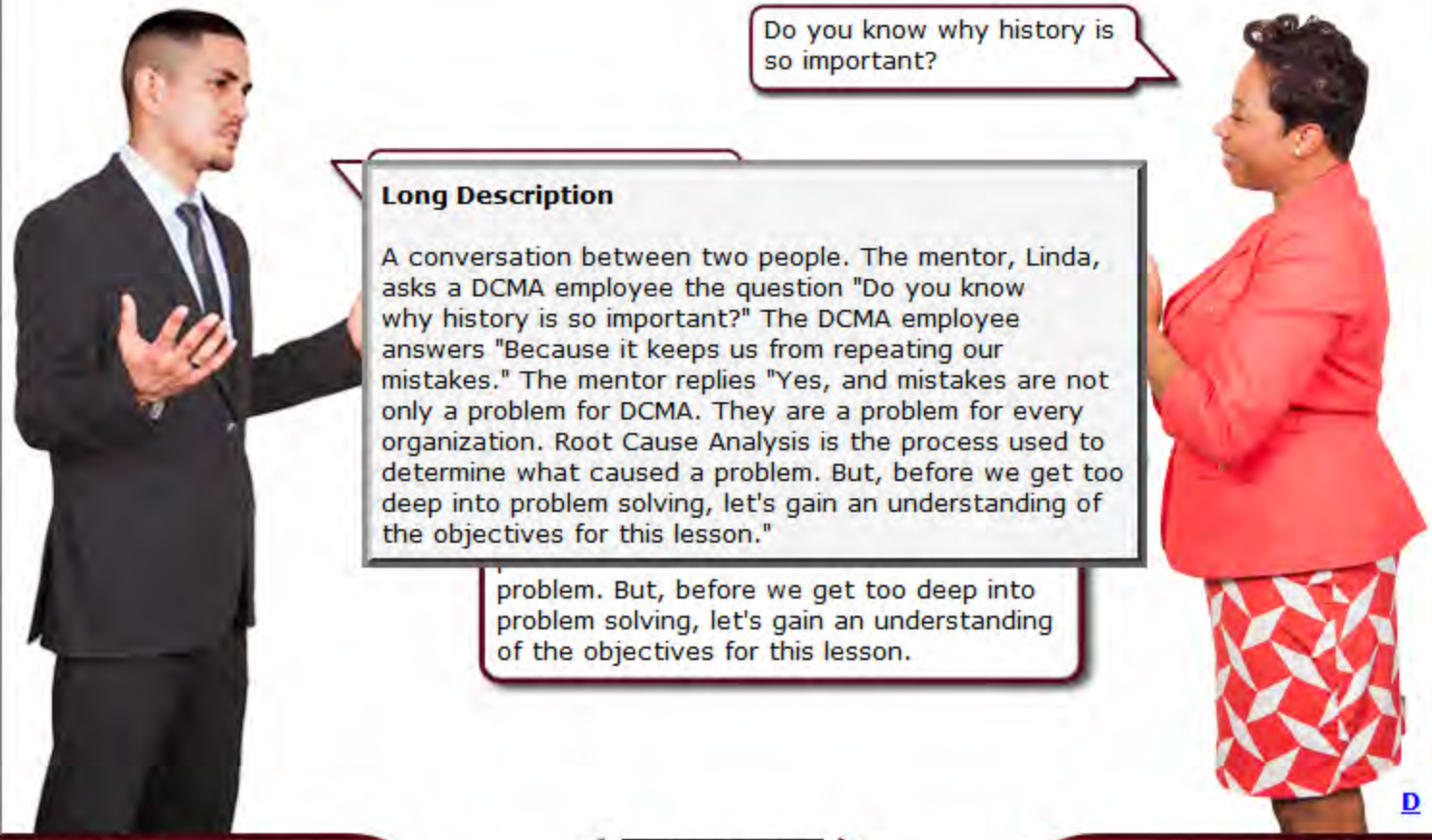
Lesson Introduction



Long Description

A conversation between two people. The mentor, Linda, asks a DCMA employee the question "Do you know why history is so important?" The DCMA employee answers "Because it keeps us from repeating our mistakes." The mentor replies "Yes, and mistakes are not only a problem for DCMA. They are a problem for every organization. Root Cause Analysis is the process used to determine what caused a problem. But, before we get too deep into problem solving, let's gain an understanding of the objectives for this lesson."

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Lesson Objectives

Terminal Learning Objective - Given descriptions of the uses of a root cause analysis, recognize the importance of a root cause analysis.

This lesson has three objectives. Upon completion, you should be able to:

- Identify the origins of root cause analysis.
- Recognize the importance of root cause analysis within the quality assurance process.
- Match the roles of parties involved in a root cause analysis with their responsibilities.

First, you will learn about the origins of Root Cause Analysis.

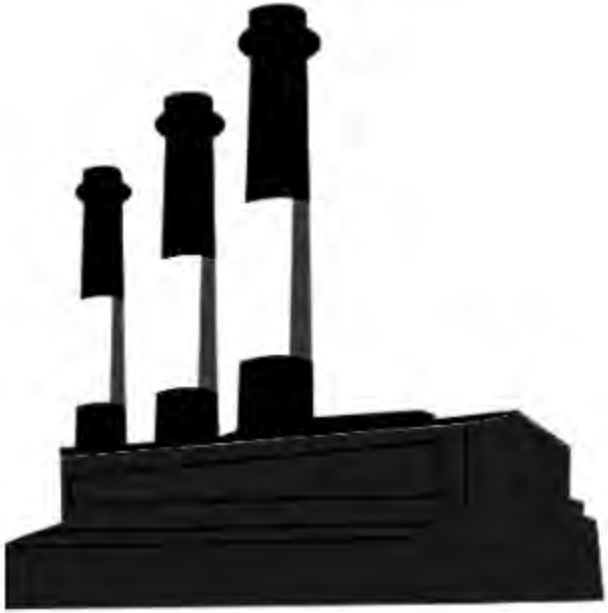
Root Cause Analysis Uses

Root Cause Analysis (RCA) provides the suppliers of the Defense Contract Management Agency (DCMA) two uses:

- Assess problems
- Find solutions

To fully appreciate the relevance of RCA, you must imagine a facility that only reacts to adverse events.

The textile industry provides great historical perspective. They will be our supplier.



Root Cause Analysis Origins

In the early 1900s, textile factories installed power looms to manufacture cloth. They were designed to automatically pull yarn from spools and weave it into cloth.

However, if a spool emptied, the loom continued to weave.

Employees reacted to the adverse event by shutting down the loom. But not before several feet of cloth were woven from the remaining spools.

This irregular cloth became waste.

Root Cause Analysis Origins, Cont.

A loom inventor, named Sakichi Toyoda, assessed the waste problem and found a solution. He applied a principle called Jidoka, which means a machine should stop itself when a problem occurs. Many consider this principle the origin of Root Cause Analysis because his looms no longer produced waste from an empty spool. Mr. Toyoda later became the pioneer of Toyota Production Systems.

Click on each item below to learn more about more modern applications of Root Cause Analysis.

- 1975 - FAA
- 1986 - Motorola
- 1999 - Healthcare

Root Cause Analysis Origins, Cont.

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Click on each item below to learn more about more modern applications of Root Cause Analysis.

1975 - FAA

1986 - Motorola

1999 - Healthcare

1975 - Federal Aviation Administration (FAA)

The aviation industry is actively involved in quality control, error reduction, and risk management. In 1975, the FAA established the Aviation Safety Reporting System (ASRS) to manage safety. Following its establishment, the FAA has reduced death rates from airline accidents by 80 percent.

Root Cause Analysis Origins, Cont.

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1986 - Motorola

Motorola developed Six Sigma as a new strategy for risk management. Six Sigma uses specific methods, including statistical information, to outline their RCA. It also puts its workers in a specific infrastructure based on their qualification.

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Root Cause Analysis Origins, Cont.

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Beginning in 1999, the healthcare industry took a special interest in RCA to address the high number of adverse results reported in patient safety and hospitalization records. They found that death from medical errors was the eighth leading cause of death in America – ahead of motor vehicle accidents.

Root Cause Analysis Origins Knowledge Review

Which inventor is credited with originating Root Cause Analysis by applying the principle of Jidoka when he engineered his machinery to stop itself when a problem occurs?

- [x] Sakichi Toyoda, pioneer of the Toyota Production System (1900s)
- [ ] Dr. Martin Cooper, inventor of the mobile phone at Motorola (1980s)
- [ ] John L. McLucas, FAA Administrator (1970s)
- [ ] C. Everett Koop, Surgeon General of the United States (1980s)

Check Answer

Sakichi Toyoda is credited with applying the principle of Jidoka and originating Root Cause Analysis.

Root Cause Analysis Origins Summary

As you can see, Root Cause Analysis has origins in Japan and is widely practiced today by prominent companies.

The suppliers of products to the DoD use RCA as one of the many tools in their Quality Assurance arsenal.

Next, you will learn about the importance of Root Cause Analysis.

Quality Assurance Definition

Quality Assurance (QA) is a way of preventing mistakes or defects in manufactured products and avoiding problems when delivering solutions or services to customers.

QA is applied to:

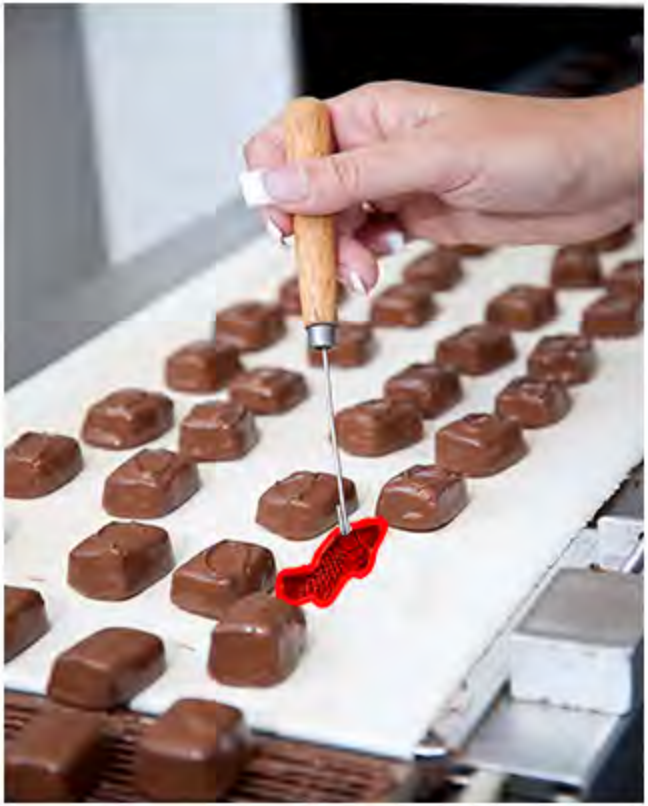
- Products
- Services
- Software
- Data Items

Quality Assurance - Physical Products and Services

QA is applied to products and services in pre-production to verify what will be made meets specifications and requirements.

QA is applied to physical products during manufacturing production runs by validating lot samples to ensure products meet specified quality control standards.

QA is applied to services provided by the supplier such as depot repairs and modifications, and installation services.



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QA is applied to services
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Long Description

The same assembly line is displayed, but with the fish chocolate highlighted in red.

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Quality Assurance - Software and Data Items

QA is also applied to software to verify that features and functionality meet business objectives, and that code is relatively bug free prior to shipping or releasing new software products and versions.

QA is applied to data items created and modified by the supplier such as technical manuals and engineering drawings.

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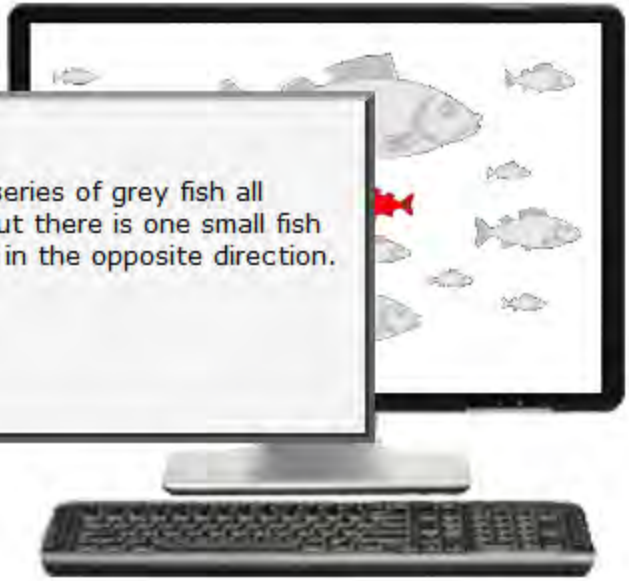

Long Description

A computer monitor displays a series of grey fish all swimming the same direction, but there is one small fish that is bright red and swimming in the opposite direction.

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Root Cause Analysis Relevance to Quality Assurance

Root Cause Analysis is important to the QA process because it provides the methods to achieve the following goals:

- Transform a mistake-prone reactive culture into a more efficient proactive culture
- Reduce the frequency of problems occurring over time

Both of these goals lead to the delivery of solutions and services that make a customer happy.

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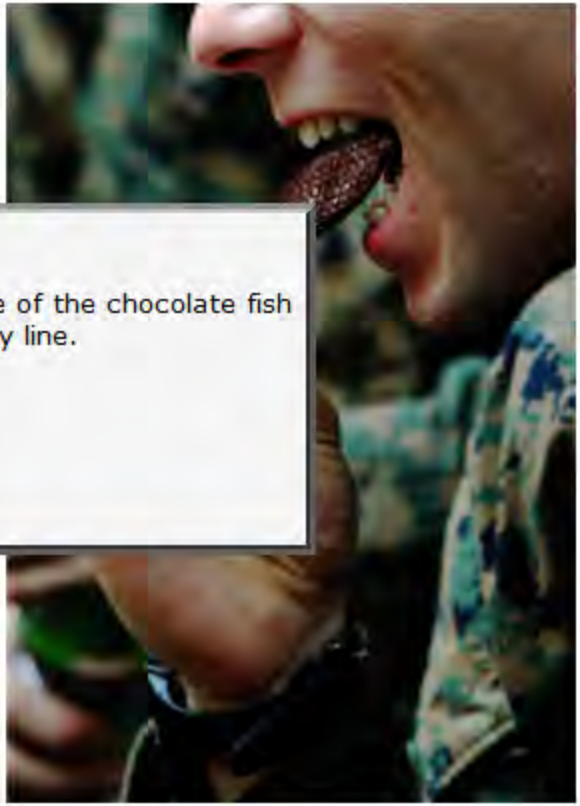

Long Description

A United States Marine is eating one of the chocolate fish that had been made on the assembly line.

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Root Cause Analysis Relevance to Quality Assurance Knowledge Review

Which of the following goals make Root Cause Analysis important to Quality Assurance?
(Select all that apply)

- [ ] Remove programmer notes from software code
- [ ] Test procedural steps for enhanced safety
- [ ] Measure product inventories for proper delivery counts
- [x] Transform a reactive culture into a proactive culture
- [ ] Verify computer code as human-readable
- [ ] Eliminate steps in production process to save time
- [x] Reduce the frequency of problems

Check Answer

Root Cause Analysis is important to the QA process, because it provides the methods to **transform a mistake-prone reactive culture into a more efficient proactive culture and to reduce the frequency of problems occurring over time**.

Root Cause Analysis Relevance to Quality Assurance Summary

You might be asking how a Quality Assurance Specialist at the DCMA can help transform a supplier culture from reactive to proactive.

The answer is that you are not alone. You will join a Quality Assurance team that monitors suppliers and evaluates their products for problems.

Next, you will learn about the roles and responsibilities of the RCA parties on a QA team.

Root Cause Analysis Supplier Roles

Root Cause Analysis involves several parties on the supplier team. Your suppliers may use a different title for each member of their RCA teams, but most follow a pattern. The name of the supplier party often describes the party role.

Click on each role in the bullet list to learn more about the roles and responsibilities of the parties in a typical supplier's RCA team.

- Quality Manager
- Project Lead
- Engineer
- Auditor

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Quality Manager

Project Lead

Engineer

Auditor

The Quality Manager role at a typical supplier has the following responsibilities:

- Communicate with Customer at a Corporate Level
- Manage Supplier Agreements with Customers
- Define Processes and Projects
- Manage Multiple Processes and Projects
- Provide Quality Training to Organization
- Monitor Organization Quality

Other titles used by suppliers for this role are Manager, Quality Department Head, or Company President (depending on supplier size).

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- Quality Manager
- **Project Lead**
- Engineer
- Auditor

The Project Lead role at a typical supplier has the following responsibilities:

- Communicate with Customers at a Project Level
- Monitor Assigned Projects
- Manage Risk on Assigned Projects
- Lead Root Cause Analysis Efforts
- Lead Project Engineers
- Lead Project Auditors

Other titles used by suppliers for this role are Team Leader, Quality Foreman, Task Supervisor, or Quality Supervisor.

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- Quality Manager
- Project Lead
- **Engineer**
- Auditor

The Engineer role at a typical supplier has the following responsibilities:

- Manage Project Requirements
- Solve Technical Problems
- Integrate Products
- Verify Products
- Validate Products
- Report as Necessary to Quality Manager

Other titles used by suppliers for this role are Software Engineer, Subject Matter Expert, or Quality Engineer.

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Click on each role in the bullet list to learn more about the roles and responsibilities of the parties in a typical supplier's RCA team.

- Quality Manager
- Project Lead
- Engineer
- Auditor

The Auditor role at a typical supplier has the following responsibilities:

- Manage Project Configurations
- Assure Process and Product Quality
- Analyze Process and Product Problems
- Measure Process and Product Problems
- Resolve Process and Product Problems
- Report as Necessary to Engineer, Lead and Manager

Other titles used by suppliers for this role are Investigator, Interviewer, or Quality Specialist.

Quality Management Initiatives

The parties on a supplier's Root Cause Analysis team may take on the titles from one of many quality management initiatives in the defense industry. You should be prepared to navigate your way through the following quality initiatives when preparing to evaluate your suppliers:

- Capability Maturity Model Integration (CMMI®)
- Total Quality Management (TQM)
- Taguchi Methods
- Six Sigma
- Quality Functional Deployment (QFD)
- Kansei Engineering
- ISO 9004 Performance Improvement

These are not just supplier initiatives. One or more of these management methods could be implemented at DCMA or your office.

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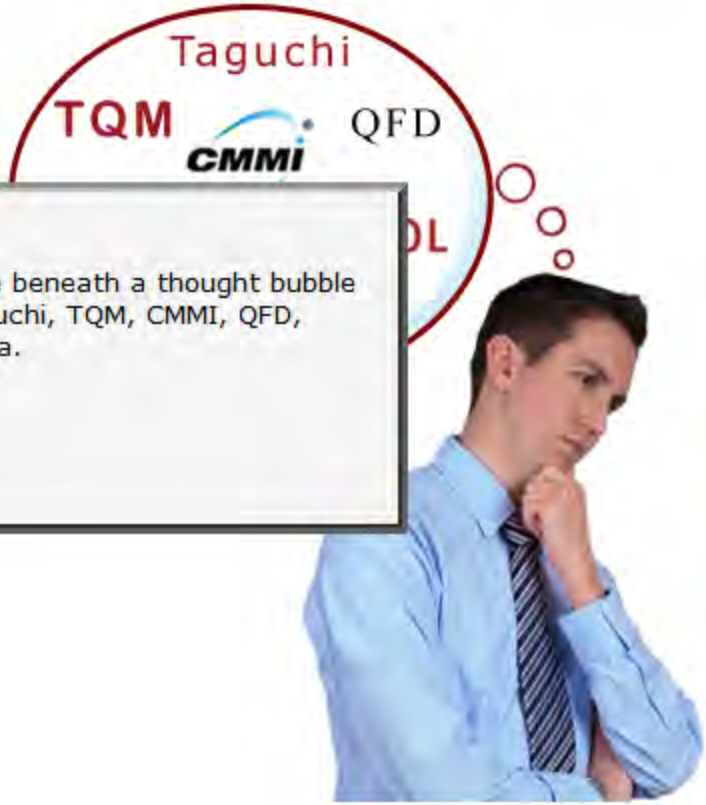

Long Description

A man stands looking pensive beneath a thought bubble that contains the words Taguchi, TQM, CMMI, QFD, Quality Control, and Six Sigma.

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Root Cause Analysis DCMA Roles

The parties involved in Root Cause Analysis at DCMA are dependent on the size of the project that is in focus. There are small-scale projects delivered by our suppliers whose corrective actions need only to be evaluated by an individual specialist. For the large-scale projects, you may find yourself assigned to be a member of a DCMA team with multiple parties. For the purposes of this training, three roles are used to describe DCMA roles and responsibilities. Click on each role below to learn more about its roles and responsibilities in Root Cause Analysis.

Manager

Engineer

Specialist

Root Cause Analysis DCMA Roles

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Manager

Engineer

Specialist

Manager

The DCMA Manager role has the following responsibilities:

- Communicate with Suppliers at a Corporate Level
- Manage Supplier Agreements
- Manage Multiple Suppliers and Projects
- Define Internal Quality Processes
- Provide Internal Quality Training to DCMA Staff
- Monitor Projects and Team Assignments
- Assign Product Quality Deficiency Reports

Root Cause Analysis DCMA Roles

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Manager

Engineer

Specialist

Engineer

The DCMA Engineer role has the following responsibilities:

- Assist in the Evaluation of Product Quality Deficiency Reports
- Review Project Requirements
- Research Technical Problems
- Compare Product Design to Production
- Evaluate Supplier Root Cause Analysis Reports
- Interpret RCA Supplier Results
- Report as Necessary to DCMA Manager and Specialist

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Manager

Engineer

Specialist

Specialist

The DCMA Specialist has the following responsibilities:

- Respond to assigned Product Quality Deficiency Reports
- Review Project Requirements
- Compare Project Requirements to Product
- Review Corrective Action Request (CAR) responses
- Verify implementation of corrective actions
- Verify effectiveness of implemented corrective actions.

Other titles used for this role are Quality Assurance Representative (QAR) and Quality Assurance Specialist (QAS). This role best represents the target population for this training.

Root Cause Analysis Roles Knowledge Review

Fill in the blank. Match each role to the technician title responsible for performing the role by typing the letter of the role in the field for the corresponding title.

a. Lead Root Cause Analysis Efforts
b. Resolve Process and Product Problems
c. Provide Quality Training to Organization
d. Review Corrective Action Responses
e. Research Technical Problems
f. Assign Product Quality Deficiency Reports
g. Solve Technical Problems

1. Quality Manager (Supplier) c
2. Project Lead (Supplier) a
3. Engineer (Supplier) g
4. Auditor (Supplier) b
5. DCMA Manager f
6. DCMA Engineer e
7. DCMA Specialist d

Check Answer

The Supplier Quality Manager provides quality training to the organization. The Supplier Project Lead leads Root Cause Analysis efforts. The Supplier Engineer solves technical problems. The Supplier Auditor resolves process and product problems. The DCMA manager assigns product quality deficiency reports. The DCMA Engineer researches technical problems. The DCMA Specialist reviews corrective action responses.

Lesson Summary

This lesson introduced you to three key concepts:

- Origins of RCA
- Importance of RCA
- RCA Roles and Responsibilities

It is important to note that DCMA operates under common quality goals. Yet, in the field, you may find locations where roles and responsibilities differ from those in this tutorial.

Lesson Completion

You have completed the content for this lesson.

To continue, select another lesson from the Table of Contents on the left.

If you have closed or hidden the Table of Contents, click the Show TOC button at the top in the Atlas navigation bar.