‘Copy Exact’ Awareness Training

GT Supplier Change Control

February 2018 Rev

‘Copy Exact’ Training Outline

- ‘Copy Exact’ Philosophy
  - What is ‘Copy Exact’?
  - What are the Benefits?
  - What is a ‘Change’?
  - Expectations and Responsibility
  - What is a Qualified Process?
  - Prevention of Violations
- Change Communication and Management
  - Supplier Change Notification Form and Process
- Evidence of Training Compliance

What is ‘Copy Exact’?

- History
  - Pioneered by Intel Corporation, the original purpose of the ‘Copy Exact’ methodology was for semiconductor manufacturers to be able to ramp up production quickly and with identical results.
  - Everything which might affect the process, or how it is run is to be documented and not changed, unless it is either physically impossible to do so, or there is an overwhelming competitive benefit to introducing a change.

What is 'Copy Exact'?

- Definition
  - "Copy Exact" is a policy that requires all manufacturing process steps that affect the form, fit, function, or appearance of a product remain fixed and not be changed without prior notification and approval from Greene, Tweed (GT) and/or the Customer. This is a semiconductor industry wide standard that ensures that our customers always receive consistent performance from our products.
    - Physical Interchangeability (Form, Fit and Appearance) – Equivalent parts capable of being installed, removed, or replaced without sustaining or causing damage, misalignment, or interference.
    - Functional Interchangeability – Parts equivalent in safety, characteristics of operation, performance, durability, serviceability, structural strength, material, and protective finish.

What are the Benefits?

- 'Copy Exact' enables the delivery of product from multiple production facilities with identical product performance.
- Faster production ramp up that improves product availability.
- Improves consistency in quality performance between different customer fabrication facilities.
- Reduces time and money invested in re-engineering what should be the same process.

What is considered a ‘Change’?

- A change in the process is defined as a deviation from the qualified product baseline. Process parameters, product specifications, facility location, raw material specifications, sub-tier suppliers, tools, etc., used for the first production order define the product baseline (system configuration).

Expectations and Responsibility

- No changes to Design, Process, Equipment, or Materials without prior notification and approval.
  - Once a process is approved through acceptance of the First Article it is then considered ‘Locked In’.
  - This is also known as a Process of Record (POR) or Process Qualification Program (PQP).
  - This applies to all parts whether or not a formal POR or PQP exists.
- The prime supplier is responsible for ensuring all sub-tier suppliers and processors are working to the same ‘Copy Exact’ requirements.

Expectations and Responsibility

- Change requires written customer (GT) notification and approval.
- In the case a change must be made:
  - Any change is to be implemented with prior approval, under control and compliant with the required amount of notification time - minimum of 9 months.
  - Minimum of 12 months notification for obsolescence.
  - Any change is to be justified with adequate benefits.
  - The change needs to be validated with appropriate test data.
- **Quality is the responsibility of Everyone!**

What is a Qualified Process?

- All process steps are identified with controls in-place to ensure repeatability.
- Critical features have been identified with a documented measurement method and inspection frequency established.
- Production data is collected and monitored, the appropriate response and escalation steps are identified in the event data begins to trend outside of control limits.

What is a Qualified Process?

- All calibration and maintenance requirements involved in the production, inspection, and testing are documented and compliant.
- First Article is completed to ensure part meets drawing tolerances and upon approval ‘locks in’ the Process.

Prevention of Violations

- What is a ‘Copy Exact’ Violation?
  - When a supplier or sub-tier supplier makes an unauthorized, uncontrolled, or undocumented deviation to the established system configuration or to the system component manufacturing procedures without notification and GT approval.
  - A violation may be discovered during a failure analysis or through audit even if no impact was detected.

Prevention of Violations

- What is the Result of a ‘Copy Exact’ Violation?
  - An unintended result could potentially effect:
    - Safety and Ergonomics
    - Process Controls
    - Tool Reliability
    - Manufacturing
    - Control and Automation
    - Obsolescence of Downstream Operations and Procedures.
    - Obsolescence of Spare Parts Inventory
    - Require New Tool Shipments and Qualification

Prevention of Violations

- What is the Cost of a Violation?
  - Seemingly insignificant changes in a component may have a serious adverse effect in the semiconductor manufacturing process with money lost in materials and equipment down time.
  - Violations discovered by our customers through audit or investigation may result in the GT supplier approval rating being lowered. Also, business and financial penalties could be applied.
  - **Loss of business for GT and it's supply base**!

Prevention of Violations

- Do not make any changes unless approved by GT and notify us when there is a plan to:
  - Change the manufacturing location.
  - Change in the production processes or procedures.
  - Change to a material or special process supplier.
  - Revision or part number change.
- Be proactive on obsolete material and communicate changes.
  - Plan for last time buys to bridge time required for requalification.
  - GT requires minimum 12 month notification prior to obsolescence.

Prevention of Violations

- Make ‘Copy Exact’ awareness part of your business culture.
- Ensure your suppliers and sub-tier suppliers are trained and compliant with ‘Copy Exact’ requirements.
- Communicate up front with your GT Supply Chain Specialists or SQE and use them as a resource in planning changes.
- When in doubt, contact GT before making any changes. Error on the side of caution!

Supplier Change Notification Process

- Request the current revision of the Supplier Request for Engineering Change form from a GT supply chain specialist. The form is also available on the *gtweed.com* website under Supplier Information.
- Return the completed form to GT supply chain specialist including:
  - Description of the change.
  - Justification for the change.
  - Part numbers affected.
  - On-hand balance of parts manufactured to the current qualified process.
  - Is a last time buy possible to the current qualified process & what would be the maximum quantity available for this?
  - If applicable, identification of proposed replacement material.
- DO NOT make the change until GT written approval has been received.

Supplier Change Notification Process

- The GT supply chain specialist will forward the request to the appropriate GT internal engineering, quality, and customer service functions for review and disposition.
- If approval is granted, then the GT supply chain will immediately contact the supplier to confirm the controlled plan for implementation and requalification.

Evidence of Training Compliance

- All suppliers involved in the Semiconductor business sector of GT must complete this annual training and accompanying ‘Copy Exact’ test with their employees and their sub-tier suppliers.
- ‘Copy Exact’ training should be part of any new hire orientation.
- The suppliers must send a copy of the training records with test scores to their GT Supply Chain Specialist and/or GT SQE as evidence of compliance.
- The training record must include signatures from the supplier’s Quality and Operations management.
- Contact your GT supply chain specialist or SQE if you have any questions regarding this requirement.