material handling logistics conference
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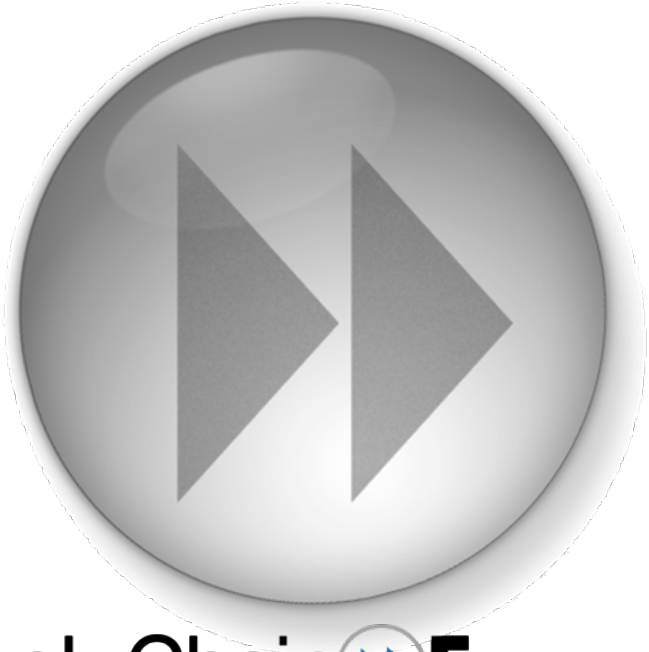
The Latest In Facility Reliability Tools And Tactics

Track 5 Session 9



Supply Chain Forward.

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Abstract

- **Beyond preventative maintenance is predictive maintenance. Beyond predictive maintenance is maintenance optimization. This class will review ISO 9001 quality management and Certified QA procedures and show how they can apply to your maintenance programs. We will demonstrate the preparation of in-house and vendor audit checklists to foster continuous improvement in your maintenance program. By session end, you will be able to incorporate proven QA Audit checklists to iteratively refine higher and higher standards of maintenance professionalism and reliability.**

Agenda

- **Discuss what Quality Assurance is**
- **Discuss how Quality Assurance can be adopted in a maintenance or operations program**
- **Teach how to audit ourselves and our vendors to ensure quality in our maintenance programs**
- **Discuss how Quality Assurance can improve reliability**
- **Key Takeaways**
- **Questions**

Quality Assurance

- **What is ISO 9001?**
  - **ISO is an organization that develops Standards for use worldwide to help companies plug into the world market**
  - **ISO 9001: 2008 Outlines criteria for a good Quality Management System (QMS)**

Source: The 9000 Store, Basics of ISO 9001

Quality Assurance

- **ISO 9001 – Quality management systems – requirements are based on eight quality management principles:**
  - **Customer focus**
  - **Leadership**
  - **Involvement of people**
  - **Process based approach**
  - **System approach to management**
  - **Continual improvement**
  - **Decisions based on facts**
  - **Mutually beneficial supplier relationship**

Source: Dolniak, CMRP, Mechanical Quality Assurance

Quality Assurance

- **Certified QA programs require six procedures in their programs:**
  - **Control of documents**
  - **Control of records**
  - **Internal audits**
  - **Control of nonconforming product**
  - **Corrective actions**
  - **Preventive actions**

Source: Dolniak, CMRP, Mechanical Quality Assurance

Mechanical Quality Assurance

- **A working mechanical quality assurance program takes these Quality Assurance procedures and applies them to the non-production aspect of your facility**

Mechanical Quality Assurance

- **MQA systems require upper management support, trained and dedicated MQA workers, and a professional atmosphere**

Mechanical Quality Assurance

- **Confidentiality is essential, especially in dealing with outside vendors**

Mechanical Quality Assurance

- **As with any Quality Assurance program, changes do not occur unless an audit program is instituted**
- **An effective MQA program should utilize a thorough audit checklist, containing sections of specific questions**
- **The questions should address the requirements of your industry and the scope of your program**
- **Auditing vendors is a must in an effective MQA program as their provided services need to meet the same scope of your program**

MQA Audits

- **For consistency reasons, you should only have one safety audit checklist that covers all requirements of your MQA scope**
- **It is good practice to conduct in-house beta audits to fine-tune your checklist before auditing your vendors**

MQA Audits

- **A typical industrial audit checklist includes requirements similar to the following:**
  - **Certification requirements**
  - **Quality Program**
  - **Document requirements**
  - **Inspection and Test Plan (ITP) requirements**
  - **Engineering Control requirements**
  - **Inventory Control requirements**
  - **Repair and Installation requirements**
  - **Work Order requirements**

Source: Dolniak, CMRP, Mechanical Quality Assurance

MQA Audit Checklists

- **Certification Requirements**
  - **If a vendor failed this section of the audit, it should immediately be eliminated from conducting work with your company. Vendors doing work must have their company's and workers' certifications, licenses and training requirements current if the type of work requires such.**

MQA Audit Checklist

- **Certification, Licenses, and Training:**
  - **These include welder's certifications, non-destructive examination requirements, welding procedures, code-required stamps and other federal, state, local and industry-related certification requirements**

MQA Audit Checklists

- **Quality Program Requirements**
  - **This section verifies that the six required procedures for a certified quality program are in place, are current and are followed in the vendor's quality program.**
    Non-conformance resolution in an important point that is reviewed.
    ISO 9001 requirements also are examined.
    - **Source: Dolniak, CMRP, Mechanical Quality Assurance**

MQA Audit Checklists

- **Document Requirements**
  - **This audit section assures that vendor standards, procedures, Piping and Instrument Diagrams (P&IDs), prints and other critical documents utilized by the vendor are controlled, current and accurate. There should also be a current procedure on how to update these documents.**
    - **Source: Dolniak, CMRP, Mechanical Quality Assurance**

MQA Audit Checklists

- **Inspection and Test Plan (ITP) Requirements**
  - **ITPs refer to stops in the process where tests and verifications are conducted to assure the product is meeting requirements. How these tests are conducted, along with the accuracy and calibration of the test equipment, are also assessed.**
    - **Source: Dolniak, CMRP, Mechanical Quality Assurance**

MD CALIBRATIONS

Machine Tool Calibration at the Speed of Light™

Certificate of Calibration

ISO-230 1997

Customer: ABC Company — Model No: Machine #51

Description: 5 Axis VMC — Serial No: 1111

This certifies that the above equipment was calibrated in compliance with ISO-230 Standard to the following limits:

Linear/Angular Displacement Range | Systematic Positional Deviation (E) | Linear/Angular Accuracy (A @ CF=2)

X	22.0000	Inches	X	± 0.000072	Inches	X	± 0.000078	Inches
Y	22.0000	Inches	Y	± 0.000059	Inches	Y	± 0.000072	Inches
Z	23.0000	Inches	Z	± 0.000066	Inches	Z	± 0.000101	Inches

Linear/Angular Periodic Error | Linear/Angular Max Reversal (B) | Linear/Angular Repeatability (R @ CF=2)

X	0.000030	Inches	X	0.000021	Inches	X	0.000040	Inches
Y	0.000047	Inches	Y	0.000040	Inches	Y	0.000060	Inches
Z	0.000045	Inches	Z	0.000037	Inches	Z	0.000143	Inches

Telescope Ball Bar Performance

Length = 5.0005 Inches — Plane = YZ — Direction = CCW — Deviation = 0.000609 Inches

Environment (Nominal):

Air Temperature: 74.60 °F — Humidity: 6.41 %

Material Temperature: 74.90 °F — Pressure: 30.24 In of Hg

At planned intervals, MD Calibrations' measurement standards are calibrated by comparison to, or measurement against national or international standards. Supporting documentation relative to traceability is on file and is available for examination upon request. MD Calibrations', calibration intervals are per manufacturer recommendations. The equipment serial numbers and calibration due dates are:

	Serial Number	Calibration Date	Cal Due Date
ML10 Laser	H15306	03 December 2002	03 December 2006
EC10 Environmental Unit	H14870	18 November 2004	18 November 2005
QC10 Ballbar	H20587	26 April 2004	26 April 2005
Zerodur Gage	G97157	21 April 2004	21 April 2005

Calibration Date:

Certificate No:

MD Calibrations

39 Clinton Ave PO Box 337 Hope, Rhode Island 02831

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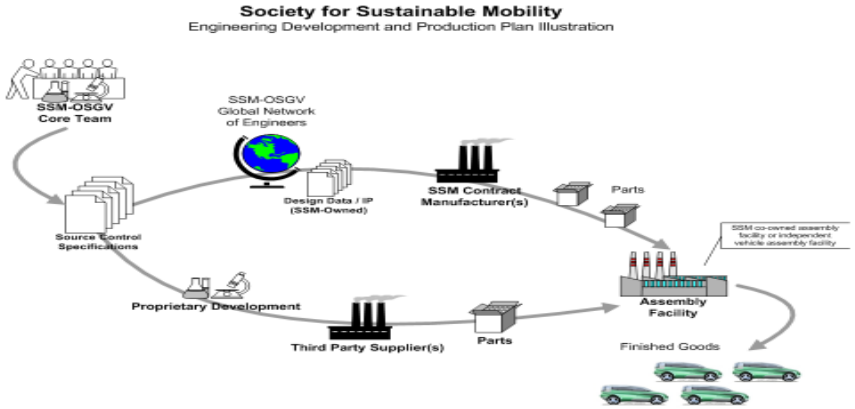
MQA Audit Checklists



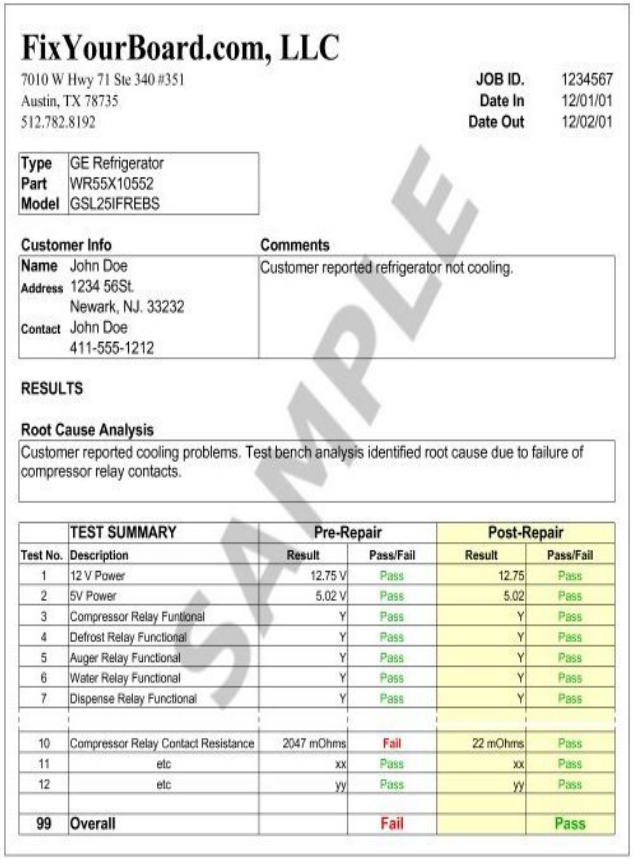
- **Engineering Control Requirements**
  - **The process implemented by the vendor to ensure proper engineering practices, management of change and other controls applied to the product from specification through delivery are reviewed in this section**
    - **Source: Dolniak, CMRP, Mechanical Quality Assurance**

MQA Audit Checklists

- **Inventory Control Requirements**
  - **How inventory is received, inspected, tagged, segregated, stored, delivered to the production area, quarantined when found to be out of specification and resolution of out-of-specification items are audited in this section**
    - **Source: Dolniak, CMRP, Mechanical Quality Assurance**

MQA Audit Checklists

- **Repair and Installation Requirements**
  - **This section audits the processes utilized to verify that proper checks and measurements are being done for the repair and installation of equipment. These may include “as found,” teardown, repair and “as left” reports**
    - **Source: Dolniak, CMRP, Mechanical Quality Assurance**



FixYourBoard.com, LLC

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Austin, TX 78735
512.782.8192

JOB ID.	1234567
Date In	12/01/01
Date Out	12/02/01

Type	GE Refrigerator
Part	WR55X10552
Model	GSL25IFREBS

Customer Info

Name John Doe
Address 1234 56St.
Newark, NJ. 33232
Contact John Doe
411-555-1212

Comments

Customer reported refrigerator not cooling.

RESULTS

Root Cause Analysis

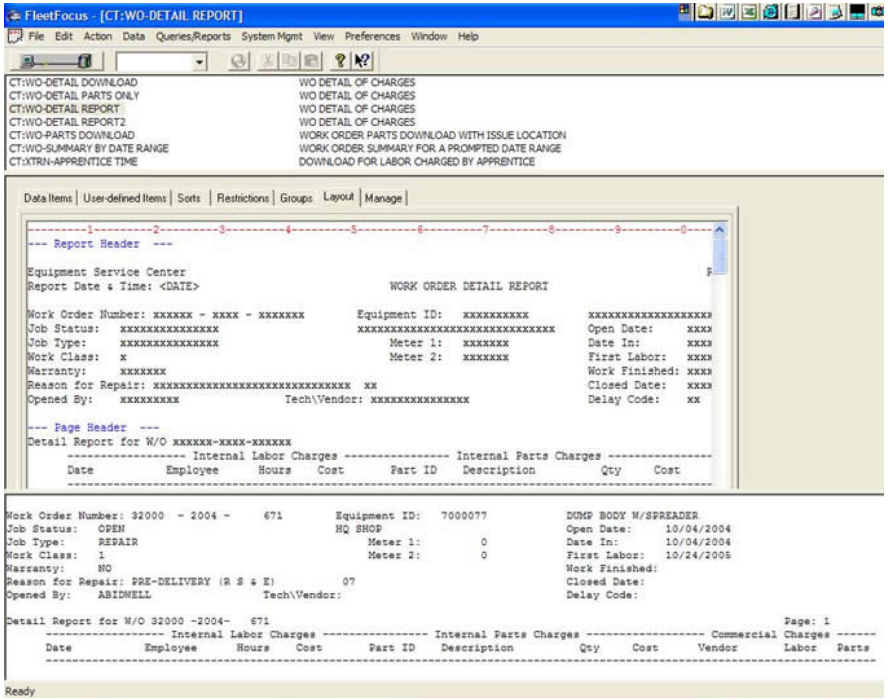
Customer reported cooling problems. Test bench analysis identified root cause due to failure of compressor relay contacts.

	TEST SUMMARY	Pre-Repair		Post-Repair	
Test No.	Description	Result	Pass/Fail	Result	Pass/Fail
1	12 V Power	12.75 V	Pass	12.75	Pass
2	5V Power	5.02 V	Pass	5.02	Pass
3	Compressor Relay Funtional	Y	Pass	Y	Pass
4	Defrost Relay Functional	Y	Pass	Y	Pass
5	Auger Relay Functional	Y	Pass	Y	Pass
6	Water Relay Functional	Y	Pass	Y	Pass
7	Dispense Relay Functional	Y	Pass	Y	Pass
10	Compressor Relay Contact Resistance	2047 mOhms	Fail	22 mOhms	Pass
11	etc	xx	Pass	xx	Pass
12	etc	yy	Pass	yy	Pass
99	Overall		Fail		Pass

SAMPLE

MQA Audit Checklists

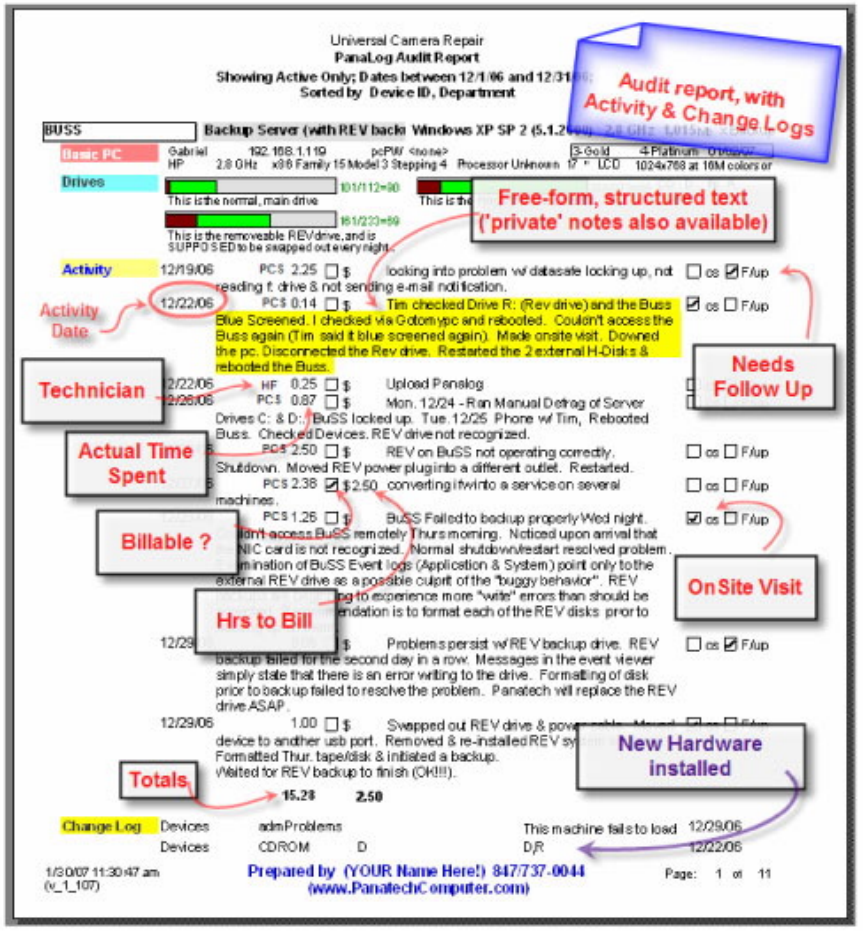
- **Work Order Requirements**
  - **Work order contents that ensure the requirements of the work order were documented and signed off properly are verified in this audit section. Note that this is not Quality Control verifying that the actual work itself was completed per the work order instructions or procedures.**



  - Source: Dolniak, CMRP, Mechanical Quality Assurance

MQA Audit Results & Findings

- **Details of the audit should be recorded on an Audit Report that include a summary, conclusion and recommendations**
- **A grading system needs to be developed that best suites your company's needs**
  - **A grading system that has historically worked well includes "Straight" Weighting and "Stoplight" Weighting on each section**
  - **Green, Yellow or Red grades allow quick recognition of the audit results**

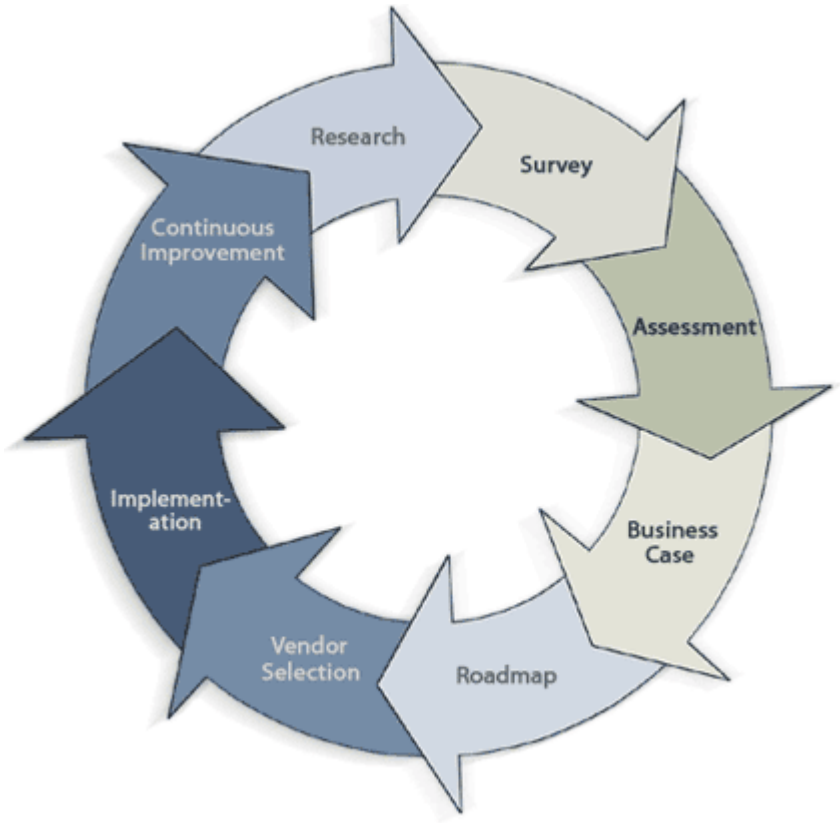


MQA Re-Audits

- **For “failed” audits, re-auditing is typically done within 30 to 90 days, depending on the severity of the findings**
- **Approved vendors that have passed an MQA Audit are typically added to an Approved Vendor list for 3 years before re-auditing is required**

Source: Dolniak, CMRP, Mechanical Quality Assurance

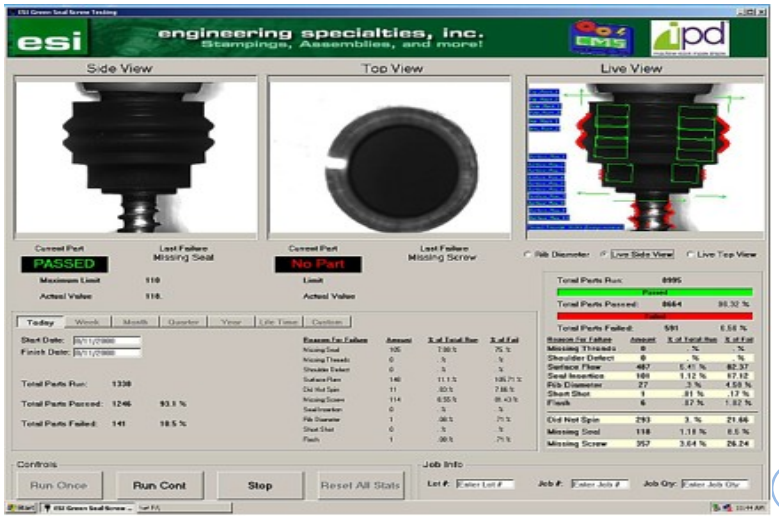
Improved Equipment Reliability



- **Most people think of vibration analysis, Infrared, and oil testing and how they can improve reliability, however QA techniques have their place in reliability as well**
- **QA programs and audits drive continuous improvement in all areas internally and externally and therefore increase reliability**

Improved Equipment Reliability

- **When you consistently audit vendors they realize how serious you are about mechanical quality and they know you will hold them accountable for their part in it**
- **You are essentially eliminating many reliability problems before they are even installed, because your vendors are most apt to produce quality products and operating as planned**



Improved Equipment Reliability

- ***Any time you discover areas for improvement through audits, you make processes more efficient and reduce risk of failure***
- **Vendors that don't "make the cut" are eliminated ensuring only the best quality products and services to your company**

Key Takeaways

- **You should have a good idea of how to implement a successful MQA audit checklist**
- **When these techniques and audits are implemented correctly, without a “got you” mentality, it will create a mutually beneficial relationship that reduces risk and takes your reliability to new levels.**

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Questions?