

DENSO's QA Network Tutorial

Designed To Support SQA Manual Section 25:

- This tutorial was developed to support our suppliers' understanding of DENSO's QA Network System.
- DENSO would like to encourage discussion with our QA representatives as needed to support completion of the QA Network worksheet.

DENSO's QA Network Challenge

Improve Product Processes to Detect Abnormal Conditions

1. Build up QA Network from supplier to customer.
2. Ensure Product Process Quality Assurance

[Prevent Problem Occurrence and Delivery]

Customer

Assembly Process

Sub-Assembly Process

Parts Production Process

Our Focus

Supplier Process

Sub-Supplier Process

Apply QA Network



The image shows a 'QA NETWORK EVALUATION' table with multiple columns and rows. The table is mostly yellow, with some white sections. It appears to be a complex data table used for evaluating quality assurance across a network.

Supplier to customer based on relation of cause and affect of critical QA items

About QA Network...

What is “QA Network Activity”?

QA Network Activity is to be able to implement rank evaluation to determine the assurance level of QA items from both aspects of defect prevention and containment. The system is utilized to locate weak spots considering all production processes and help improve overall quality assurance.

<Key Points of System>

1. Set up Assurance Net from all process points [from suppliers to shipping product]
2. Check assurance level at each step and kaizen where needed.
Examples of kaizen: adding equipment fail safe, improving operator work instruction, improve inspection method

QA Network Application Examples

The following are the situations where QA Network is utilized...

(1) When Assuring New Processes and Modifying Processes

When establishing a **new process (line)**, or **making a drastic change to the line**, define the items as to (while setting up the process) what items should be assured during production. Thus, QA network can be useful when you build or modify the process/line.

Through this activity, we will be able to contain possible defects even before the production stage and also to prevent recurring problems from the past.

(2) Improving the Level of Existing Processes

For the processes (line) that are **already established**, check the assurance level of those processes vs. production assurance items. The QA Network can be used to screen out some of the weak areas in the processes where assurance level is low.

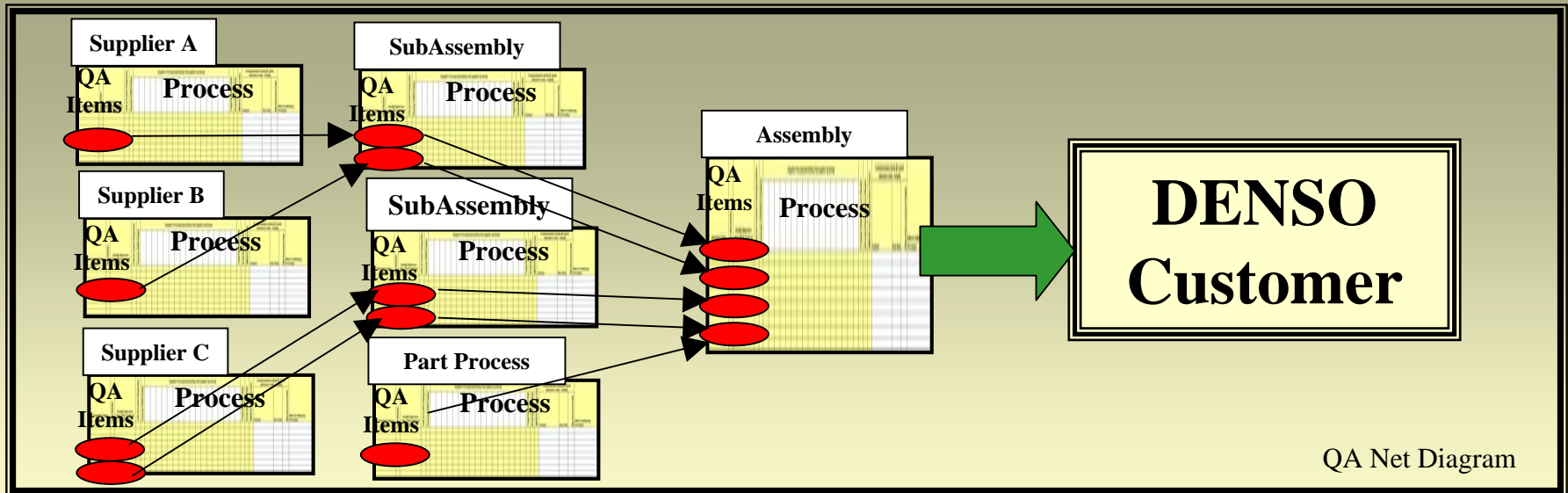
Through this activity, you will be able to perform process diagnosis on A-rank quality items and other production assurance items (quality items). This will prompt for Kaizen that improves the process level, which will prevent the same type of quality problems from recurring.

QA Network Merits

- (1) Defines critical control items, assurance level of each process, and subsequent assurance steps, to prevent defect escape.
- (2) Using the Assurance Rank Chart to evaluate the quality assurance level of the process objectively helps realize which items need *Kaizen* effort.
- (3) Presenting QA Network to the Production Department will allow all members to realize their roles, in terms of process quality. This also helps everyone realize what the key-points are, in the aspect of QA management and equipment maintenance.
- (4) To make the overall processes more visual by using the matrix chart. Previously, some are relying solely on the know-how of process engineers and experience of operators. The matrix will help reduce those incidents and allow members to conduct examination more easily.
- (5) Since “Escape Prevention Rank” (on each production assurance rank) is linked for all process steps, it eliminates redundancy on re-inspection. Thus, number of inspections may be reduced.

QA Network Concept

- The QA Network concept historically has been developed for individual process steps [PFMEA Format]. *There is little consideration for upstream and downstream process steps.*
- DENSO has expanded the areas to which the QA Network covers from supplier to customer. Furthermore, relation of Production Assurance Items among different processes (suppliers, upstream processes, targeted process, downstream processes) are defined.



Why is the QA Network Necessary

Comparison Summary

Procedure	PFMEA	QA Network
MERIT	<ul style="list-style-type: none">•Countermeasure taken from viewpoint of prevention and detection for the process under review•Finds all critical defect modes for the process under review	<ul style="list-style-type: none">•Easy to review Process Assurance Rank throughout all processes simultaneously•Clarifies point at which countermeasures are necessary
DEMERIT	<ul style="list-style-type: none">•Difficult to screen each process step for defects not related to the specific process•Not clear how much to improve RPN•Difficult to understand the relationship to previous or following processes	<ul style="list-style-type: none">•Difficult to review detail steps of all processes



• QA Network and PFMEA compliment each others weak points.

•Critical PFMEA items should be combined into QA Network Concept to gain merits above.

Who is Involved in QA Network Development

We suggest to utilize personnel from all aspects of the targeted part's process:

- Production Associates
- Inspection Groups [receiving, in-process, outgoing]
- Shipping Group
- QA Personnel
- Engineering Staff

***The Key Point* is to observe all aspects of the targeted part's process to provide the best rank evaluation possible.**

Making the QA Network - DENSO Inputs

Sheet Identification

QA NETWORK EVALUATION										
Supplier		ABC Stamping								
Part Name		Steel Washer								
Part Number(s)		TN02175-XXXX								
Primary Process Assurance Method	Production Associate	Visual								
	Standard Gauge									
Inspection Associate	Visual									
	Standard Gauge									
Potential Product Failure Mode	Item Number	Quality Assurance Item / Root Cause of Critical Failure	Previous DENSO Defect	Supplier Processes (Including Sub-supplier by Item)					Target Assurance Rank	Actual Assurance Rank
	1	Outer Diameter		Sheet Material (Supplied)	Receiving/Sheel	Stamping	Tumbling	Heat Treatment	Final Inspection	Packaging/Shipping
2	Inner Diameter									
3	Thickness									
4	Hardness									

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QA NETWORK EVALUATION	
Supplier	ABC Stamping
Part Name	Steel Washer
Part Number(s)	TN021750-XXXX

Categorized by Individual part basis or by part group if parts are very similar.

Making the QA Network - DENSO Inputs

Quality Assurance Items

QA NETWORK EVALUATION				DMTN			Supplier			RANK CALCULATION				RANK NOTATION METHOD:																									
Supplier	ABC Stamping			Approved	Check	Written	Approved	Check	Written	<table border="1"> <tr> <td>①</td> <td>②</td> <td>③</td> <td>④</td> </tr> <tr> <td>△</td> <td>A</td> <td>A</td> <td>A</td> <td>B</td> </tr> <tr> <td>△</td> <td>A</td> <td>B</td> <td>C</td> <td>D</td> </tr> <tr> <td>△</td> <td>A</td> <td>C</td> <td>D</td> <td>D</td> </tr> <tr> <td>△</td> <td>B</td> <td>D</td> <td>D</td> <td>D</td> </tr> </table>				①	②	③	④	△	A	A	A	B	△	A	B	C	D	△	A	C	D	D	△	B	D	D	D	Prevalence: 'Escape' Rank (e.g.) Example: '2/20' or '2' if process is detection only.	
①	②	③	④																																				
△	A	A	A	B																																			
△	A	B	C	D																																			
△	A	C	D	D																																			
△	B	D	D	D																																			
Part Name	Steel Washer																																						
Part Number(s)	TMO2118-XXXX																																						
Primary Process Assurance Method	Machine	Auto/Checker																																					
	Production Associate	Visual																																					
	Standard Gauge	Special Jig																																					
	Inspection Associate	Visual																																					
	Standard Gauge																																						
				Supplier Processes (Including Sub-supplier by Item)												Countermeasure Items (If actual assurance rank < target)																							
Potential Product Failure Mode	Item Number	Quality Assurance Item / Root Cause of Critical Failure	Critical Control Designation (Previous DENSO Defect)	Steel Material (Supplied)	Receiving/Steel	Stamping	Tumbling	Heat Treatment	Final Inspection	Packaging/Shipping	Target Assurance Rank	Actual Assurance Rank	DMTN QC Inspection Item	Content	Due Date	New Assurance Rank (Effect to following Processes)																							
				Starter Noise	1	Outer Diameter			3/20	-2								Final Failure																					
				Starter Noise	2	Inner Diameter			3/20	-2																													
				Starter Noise	3	Thickness	◇		3/30	-2	-2					SAFETY related occurrence reduction of final insp.	07/01	A																					
				Starter Noise	4	Hardness			3/30	-2																													

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Potential Product Failure Mode	Item Number	Quality Assurance Item / Root Cause of Critical Failure	Critical Control Designation	Previous DENSO Defect
Starter Noise	1	Outer Diameter		
Starter Noise	2	Inner Diameter		
Starter Noise	3	Thickness	◇ F	WR
Starter Noise	4	Hardness		

- Product Failure Mode: Affect to DMTN Product
- Item Number: For Reference
- QA Item / Root Cause of Critical Failure: Determined from DMTN Product FTA or previous problem history
- Critical Control Designation: Per DENSO FTCA criteria based on 'R' value [S=Safety, F=function, E=environment, C=critical, A=critical but less than C.
- Previous DENSO Failure: Some experience with this item failure [WR=warranty return, CR=customer return, FI=Final Inspection, NP=Next Process]

Making the QA Network - DENSO Inputs

Assurance Rank / DENSO Inspection / Next Process Affect

QA NETWORK EVALUATION									
Supplier		ABC Stamping							
Part Name		Steel Washer							
Part Number(s)		1M02119-XXXX							
Machine		Auto-Checker							
Production Associate		Visual							
Inspection Associate		Standard Gauge							
		Special Jig							
		Visual							
		Standard Gauge							
		Special Jig							
Potential Product Failure Mode		Supplier Processes (Including Sub-supplier by Item)							
Item Number		Quality Assurance Item / Root Cause of Critical Failure							
Critical Control Designation		Previous DENSO Defect							
		Sheet Material (Supplied)							
		Receiving Sheet							
		Stamping							
		Tumbling							
		Heat Treatment							
		Final Inspection							
		Packaging/Shipping							
Starter Name		1 Outer Diameter							
Starter Name		2 Inner Diameter							
Starter Name		3 Thickness							
Starter Name		4 Hardness							

DMTN				Supplier		
Approved	Check	Written	Approved	Check	Written	

RANK CALCULATION:				
Defect Frequency Rate	①	②	③	④
High	A	A	A	B
Medium	A	B	C	D
Low	A	C	D	D
Very Low	B	B	D	D

RANK NOTATION METHOD:																						
Prefer: "Escape" Rank letter	Example: "2.0E" or "2" if process is detection only.																					
Rank Item:	<table border="1"> <tr> <td>A</td> <td>⬠</td> <td>⬠</td> <td>⬠</td> <td>⬠</td> <td>⬠</td> <td>⬠</td> </tr> <tr> <td>B</td> <td>⬠</td> <td>⬠</td> <td>⬠</td> <td>⬠</td> <td>⬠</td> <td>⬠</td> </tr> <tr> <td>C</td> <td>A</td> <td>Other Item</td> <td></td> <td></td> <td></td> <td></td> </tr> </table>	A	⬠	⬠	⬠	⬠	⬠	⬠	B	⬠	⬠	⬠	⬠	⬠	⬠	C	A	Other Item				
A	⬠	⬠	⬠	⬠	⬠	⬠																
B	⬠	⬠	⬠	⬠	⬠	⬠																
C	A	Other Item																				

Countermeasure Items [If actual assurance rank < target]			
Target Assurance Rank	Actual Assurance Rank	DMTN QC Inspection Item	New Assurance Rank
C	C	●	
C	C	●	
A	C	●	A
C	C	●	

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Target Assurance Rank	Actual Assurance Rank	DMTN QC Inspection Item	Content	Due Date	New Assurance Rank	Effect to following Processes
C	C	●				Feed Failure
C	C	●				
A	C	●	Add 100% roller micrometer confirmation at final step.	8/15/01	A	
C	C	●				

• Target Assurance Rank

Rank	Items
A	⬠ S ⬠ E ⬠ F ⬠ S ⬠ E ⬠ F
B	⬠ C
C	A, Other Items

- **DMTN QC Inspection Item:** Sampling Inspection performed or not.
- **Effect to following process:** Indicated if item is critical to DMTN processing [fit or assembly]

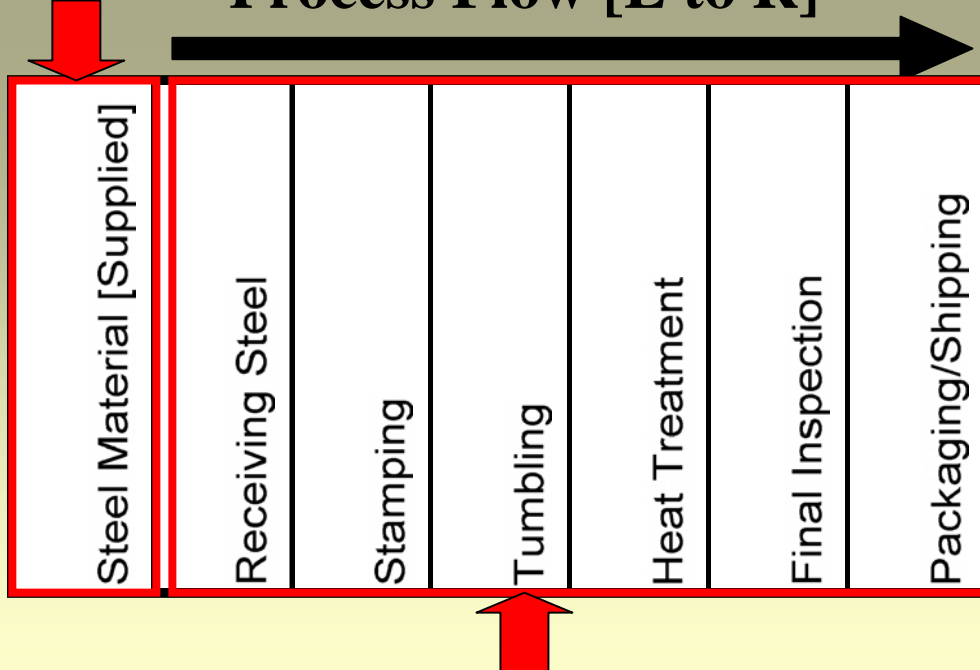
Making the QA Network - Supplier Inputs

Process Flow

QA NETWORK EVALUATION																		
Supplier		ABC Stamping		DMTN		Supplier		RANK CALCULATION:		RANK NOTATION METHOD:								
Part Name		Steel Washer		Approved	Check	Written	Approved	Check	Written	Detail Fraction: $\frac{Q}{Q}$ $\frac{Q}{Q}$ $\frac{Q}{Q}$ $\frac{Q}{Q}$ Example: 2/20 or 2 if process is detection only.								
Part Number(s)		TM02194-XXXX								TARGET RANK SELECTION: Rank: $\frac{Q}{Q}$ $\frac{Q}{Q}$ $\frac{Q}{Q}$ $\frac{Q}{Q}$ $\frac{Q}{Q}$ Rank: A, B, C, A, Other Item								
Primary Process Assurance Method	Machine	Auto/Checker																
	Production Associate	Visual																
	Standard Gauge	Special Jig																
	Visual	Special Jig																
Inspection Associate	Standard Gauge																	
	Special Jig																	
Supplier Processes (Including Sub-supplier by Item)																		
Potential Product Failure Mode	Item Number	Quality Assurance Item / Root Cause of Critical Failure	Critical Control Designation	Evolution/DKNSO Defect	Steel Material (Supplied)	Receiving Steel	Stamping	Tumbling	Heat Treatment	Final Inspection	Packaging/Shipping	Assurance Rank	Assurance Rank	QC Inspection Item	Countermeasure Items (if actual assurance rank < target)	Due Date	New Assurance Rank	Effect to following Processes
	1	Outer Diameter					3.2C					C	C					
	2	Inner Diameter					3.2C					C	C					
	3	Thickness					3.2C					C	C					
	4	Hardness					3.2C					C	C					

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Process Flow [L to R]



- List process inputs (sub-supplied materials) by Item
- List internal process steps separately including key inspection steps.

Making the QA Network - Supplier Inputs

Primary Process Assurance Method

QA NETWORK EVALUATION				DMTN			Supplier			RANK CALCULATION:				RANK NOTATION METHOD:	
Supplier	ABC Stamping			Approved	Check	Written	Approved	Check	Written	Detail Fraction: Pass				Prefer: "Escape" Rank later	
Part Name	Steel Washer									① ② ③ ④				Example: 2/20" or 1/2" if process is detection only.	
Part Number(s)	100124 XXXX									A A A B				TARGET RANK SELECTION:	
Machine	AutoChecker									A A B C D				Rank: 1000000000000000	
Production Associate	Visual									A B C D D				Rank: 1000000000000000	
Standard Gauge	Special Jig				●	●				A C D D D				Rank: 1000000000000000	
Special Jig	Visual									B D D D D				Rank: 1000000000000000	
Inspection Associate	Standard Gauge				●	●				C A Other Note				Rank: 1000000000000000	

Potential Product Failure Mode	Item Number	Quality Assurance Item / Root Cause of Critical Failure	Critical Control Designation	Supplier Processes (Including Sub-supplier by Item)						Target Assurance Rank	Actual Assurance Rank	Countermeasure Items (If actual assurance rank < target)		New Assurance Rank
				Previous DENSO Defect	Sheet Material (Supplied)	Receiving/Sheel	Stamping	Tumbling	Heat Treatment			Final Inspection	Packaging/Shipping	
Starter Noise	1	Outer Diameter				3/2C					●			Feed Failure
Starter Noise	2	Inner Diameter				3/2C					●			
Starter Noise	3	Thickness	WR	3/3D	-2	-2					●	●		AM101 valve assembly verification of final insp.
Starter Noise	4	Hardness				3/3D	-2				●			8/1/01 A

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Primary Process Assurance Method	Machine	AutoChecker							
	Production Associate	Visual							
	Standard Gauge					●			●
	Special Jig								
	Inspection Associate	Visual							
	Standard Gauge		●			●			●
	Special Jig								

- Indicate the primary process (quality) assurance method for each of the listed process steps.
- If there are no process assurance checks at the specified step, leave the space blank.

Making the QA Network - Supplier Inputs

Calculation of Assurance Rank

QA NETWORK EVALUATION																																																																																																											
Supplier		DMTN			Supplier			RANK CALCULATION:		RANK NOTATION METHOD:																																																																																																	
ABC Stamping Steel Washer		Approved	Check	Written	Approved	Check	Written	<table border="1"> <tr><td>①</td><td>②</td><td>③</td><td>④</td></tr> <tr><td>A</td><td>A</td><td>A</td><td>B</td></tr> <tr><td>A</td><td>B</td><td>C</td><td>D</td></tr> <tr><td>A</td><td>C</td><td>D</td><td>D</td></tr> <tr><td>B</td><td>D</td><td>D</td><td>D</td></tr> </table>		①	②	③	④	A	A	A	B	A	B	C	D	A	C	D	D	B	D	D	D	Prevent: "Escape" Rank later Example: "2-2" or "-2" if process is detection only.																																																																													
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Thickness		F		WR		3-3D		-2		-2		-2																																																																																															
Hardness								3-3D		-2																																																																																																	

Assurance Rank Calculation

Rank(s)		1	2	3	4
Basic Concept		Equipment alone can prevent defects and is also capable of detecting a equipment problem.	Quality still has to be assured (partially) by members. 4M is standardized and defects are 100% prevented in the ordinary work condition.	Quality still has to be assured (partially) by members. 4M is standardized and most defects are prevented in the ordinary work condition.	Difficult to adhere to the standards, Process capability is not sufficient from an equipment aspect, Team members may rely on experience
Assembly	Securing	Assure torque lower limit and prevention for missed step [impact wrench with torque gauge and interlock]	Assure torque lower limit without full prevention [Impact wrench with torque gauge but no interlock, or impact wrench with no torque gauge with interlock]	No assurance for torque, associate relies on his feeling and process capability is good.	No assurance for torque, associate relies on his feeling and process capability is not good.
	Wrong Part / Missing Part	Associate checks if he picks up the correct part [detection device for part identity and interlock]	Part is fed automatically to the associate and associate picks part by automatic signal.	Associate uses his memory and selects between 2 types of parts, the parts are clearly labeled from where the part is picked.	Associate uses his memory to select between 3 or more part types, no clear identification exists for part picking.
	Foreign Objects	Masking is used to cover all possible entry points for foreign objects	Device is used to eliminate foreign objects (part flipping or air blow). For assay, necessary quantity of parts is assured to be picked	Associate performs a visual check for all foreign material and can remove contaminants.	Associate remove particles if he notices, but likelihood of detection is small.
	Assembly	A reliable failsafe exists - e.g.. Notch that allows assy only one direction.	The is a failsafe but it is used as a auxiliary device [e.g.. Jig to help proper insertion]	Easy to recognize misassembly by appearance. Visual confirmation exists.	Possible to detect but easy to overlook, or not possible to detect visually.
Processing	Size or Shape	Automated foolproof failsafe exists [such as a 100% depth check for a drilled hole], and auto-compensation to keep accuracy	Failsafe exists but relies on human confirmation. Failsafe does not confirm 100%. Human adjustment based on measurement.	No failsafe exists; however, equipment has good process capability. Measurement by sampling.	Process capability of equipment is insufficient. No good inspection system available.
	Burr and Metal shaving	Primary processing does not allow burr or metal shaving based on design [coining]	Secondary process in place to eliminate burr [brushing or tumbling]	Operator monitors burr and adjusts to keep specification. Measurement method clear.	No clear method to monitor or control burr. Flow-out potential exists if a burr occurs.

How to Decide Defect Prevention Rank?

- Use table to determine ranking 1-4 for Defect Prevention.
- If additional clarification is needed due to a specialized process, utilize the “Basic Concept” to develop another process specific criteria.

Assurance Rank Calculation

How to Decide Escape Prevention Rank?

Rank	1	2	3	4
Basic Concept	Defect Prevention is thorough and can detect equipment problem.	Assurance is partially provided by members. During normal operation, 4-M is standardized and escape prevention is sufficiently assured.	Largely relying on associates. Equipment-wise escape prevention is not perfect. Standards are developed and are sufficient.	Lack of work standards or incomplete standards. Defects are likely to escape equipment detection.
Assembly	All defects are detected and an alarm will sound. Detection is 100%.	Manual measurement instrument is utilized for confirmation. Frequency can assure no defect to customer.	Visual checks are performed and easy to detect failures. Likely to detect before shipment to the customer.	Visual check and likely to overlook. Detection is not assured.
Processing	100% equipment check is performed. Equipment detection prompts the process to halt or automatically remove the defect.	Gauge is used to check defects using a sampling frequency that will contain defects before leaving the plant.	Gauge is used, but sampling frequency cannot 100% assure no shipment of defects.	Inspection by senses only (touch, feel, see, etc.)

- Use table to determine ranking 1-4 for Escape Prevention.
- If additional clarification is needed due to a specialized process, utilize the “Basic Concept” to develop another process specific criteria.

Assurance Rank Calculation

How to Decide Current Assurance Rank?

		Defect Prevention Rank			
		①	②	③	④
Escape Prevention Rank	△ 1	A	A	A	B
	△ 2	A	B	C	D
	△ 3	A	C	D	D
	△ 4	B	D	D	D

Use this table to determine the current assurance rank

- Maximum (lowest number) assurance rank is used for each category [consider all process steps] to determine part overall assurance ranking.
- If Current Assurance Rank $>$ Target, no action is necessary.
- If Current Assurance Rank $<$ Target, improvement is needed.

Assurance Rank Calculation

Example of Assurance Rank Calculation Method.

Potential Product Failure Mode	Item Number	Quality Assurance Item / Root Cause of Critical Failure	Critical Control Designation	Previous DENSO Defect	Supplier Processes [Including Sub-supplier by Items]							Target Assurance Rank	Actual Assurance Rank
					Steel Material [Supplied]	Receiving Steel	Stamping	Tumbling	Heat Treatment	Final Inspection	Packaging/Shipping		
Starter Noise	1	Outer Diameter					3-2C			-2		C	C
Starter Noise	2	Inner Diameter					3-2C			-2		C	C
Starter Noise	3	Thickness	F	WR	3-3D	-2	-2			-2		A	C
Starter Noise	4	Hardness						3-3D		-2		C	C

If only detection point, indicate as shown.

Use ranking for itemized supplier components based on knowledge of the process if the QA items are affected by the supplier.

Fully rank all process steps that have both defect prevention and escape prevention points.

Overall ranking determined by maximum rankings [defect prevention and escape prevention]. If a supplier makes the QA item, utilize the supplier's defect prevention ranking.

Assurance Rank Improvement

Previous Example Thickness is rank C and needs rank A due to Function criticality and previous Warranty Problem.

Potential Product Failure Mode	Item Number	Quality Assurance Item / Root Cause of Critical Failure	Critical Control Designation	Previous DENSOC Defect	Supplier Processes [Including Sub-supplier by Items]						Target Assurance Rank	Actual Assurance Rank	DWTN QC Inspection Item	Countermeasure Items [If actual assurance rank < target]			
					Steel Material [Supplied]	Receiving Sheet	Stamping	Tumbling	Heat Treatment	Final Inspection				Packaging/Shipping	Content	Due Date	New Assurance Rank
Starter Noise	1	Outer Diameter					3-2C			-2	C	C					
Starter Noise	2	Inner Diameter					3-2C			-2	C	C					
Starter Noise	3	Thickness	◇	WR	3-3D	-2	-2			-2	A	C				8/15/01	A
Starter Noise	4	Hardness						3-3D		-2	C	C					

Starter Noise	3	Thickness	◇	WR	3-3D	-2	-2			-2	A	C
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	Escape Prevention	Rank
Current Process	Thickness confirmed at 2 points after stamping by sampling. Interval can assure no defect flow-out.	2
↓		
New Process	Thickness confirmed 100% by roller micrometer at final inspection.	1

		Defect Prevention Rank			
		①	②	③	④
Escape Prevention Rank	①	A	A	A	B
	②	A	B	C	D
	③	A	C	D	D
	④	B	D	D	D

Indicate Action Plan:

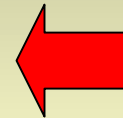
Countermeasure Items [If actual assurance rank < target]		
Content	Due Date	New Assurance Rank
Add 100% roller micrometer confirmation at final step.	8/15/01	A

Meets Target

Final Approval

QA NETWORK EVALUATION										DMTN			Supplier			RANK CALCULATION:				RANK NOTATION METHOD:			
Supplier		ABC Stamping								Approved	Check	Written	Approved	Check	Written	Defect Prevention Rank				Prevent# - 'Escape#' Rank letter Example: '2-2B' or '-2' if process is detection only.			
Part Name		Steel Washer														①	②	③	④	TARGET RANK SELECTION:			
Part Number(s)		TH021750-XXXX														△1	A	A	A	B	Rank Items		
Primary Process Assurance Method	Machine	AutoChecker														△2	A	B	C	D	A S E F S E F		
		Production Associate	Visual														△3	A	C	D	D	B C	
	Standard Gauge															△4	B	D	D	D	C A Other Items		
	Special Jig																						
	Inspection Associate	Visual																					
		Standard Gauge																					
Special Jig																							
Potential Product Failure Mode	Item Number	Quality Assurance Item / Root Cause of Critical Failure	Critical Control Designation	Previous DENSO Defect	Supplier Processes [Including Sub-supplier by Items]										Target Assurance Rank	Actual Assurance Rank	DMTN QC Inspection Item	Countermeasure Items [If actual assurance rank < target]			New Assurance Rank	Effect to following Processes	
					Steel Material [Supplied]	Receiving Steel	Stamping	Tumbling	Heat Treatment	Final Inspection	Packaging/Shipping												
Starter Noise	1	Outer Diameter					3-2C									C	C						Feed Failure
Starter Noise	2	Inner Diameter					3-2C									C	C						
Starter Noise	3	Thickness	F	WR	D	-2	3-2C									A	C		Add 100% roller micrometer confirmation at final step.	8/15/01	A		
Starter Noise	4	Hardness						3-3D								C	C						

Supplier		
Approved	Check	Written

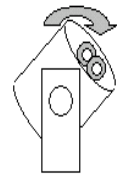
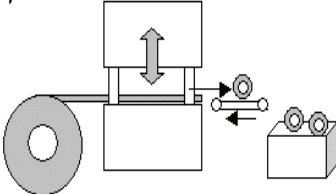
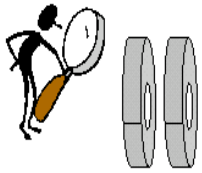
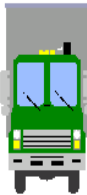


**Final Approval
by QA Manager
or above.**

Practice Exercise

**TIME FOR
PRACTICE**

SAMPLE PROCESS FLOW FOR XYZ STAMPING COMPANY



Defect Prevention (thickness)
 Inspection associate samples one coil per material lot by micrometer and process is capable for thickness.

Defect Detection (thickness)
 Inspector sampling each coil by micrometer, but thickness can abruptly change based on occurrence history.

Defect Prevention (OD, ID, Burr)
 Operator confirms by sampling and adjusts accordingly. Process has good capability. OD and ID confirmed by gauge, but burr by operator feeling.

Defect Prevention (Burr)
 Burr is eliminated by secondary tumbling. Process is 100% effective.

Defect Detection (Thickness, OD, ID, Burr)
 Inspection Associate monitors each dimension and collects data. All dimensions measured by gauge except burr by feel. Inspection audit alone cannot assure part 100%.

Defect Detection (thickness)
 Micrometer sampling cannot assure 100% - sometimes thickness problems are detected by ABC's customer.

Defect Detection (OD, ID, Burr)
 OD, ID measured by gauge but burr is measured by feeling. Small batches are controlled to assure no flowout. Burr control method is not documented.

QA NETWORK EVALUATION

Supplier	XYZ STAMPING	
Part Name	WASHER	
Part Number(s)	XXX-XXXX	
Primary Process Assurance Method	Machine	AutoChecker
	Production Associate	Visual
		Standard Gauge
		Special Jig
	Inspection Associate	Visual
		Standard Gauge
Special Jig		

DMTN		
Approved	Check	Written

Supplier		
Approved	Check	Written

RANK CALCULATION:

Escape Prevention Rank	Defect Prevention Rank			
	①	②	③	④
①	A	A	A	B
②	A	B	C	D
③	A	C	D	D
④	B	D	D	D

RANK NOTATION METHOD:

Prevent# - 'Escape#' 'Rank letter'
Example: 2-2B' or '2' if process is detection only.

TARGET RANK SELECTION:

Rank	Items
A	S, E, F, S, E, F
B	C
C	A, Other Items

Potential Product Failure Mode	Item Number	Quality Assurance Item / Root Cause of Critical Failure	Critical Control Designation	* Previous DENSO Defect	Supplier Processes [Including Sub-supplier by Items]										Target Assurance Rank	Actual Assurance Rank	DMTN QC Inspection Item	Countermeasure Items [If actual assurance rank < target]		New Assurance Rank	Effect to following Processes	
					Content	Due Date																
Starter Failure	1	Thickness														C	●					
Starter Failure	2	Outer Diameter														C	●					Assembly
Starter Failure	3	Inner Diameter														C	●					Assembly
Starter Failure	4	Burr	C													B	●	Any Suggestions?				

