QCL and DSS Training For Suppliers

July 22, 2016

Training Agenda

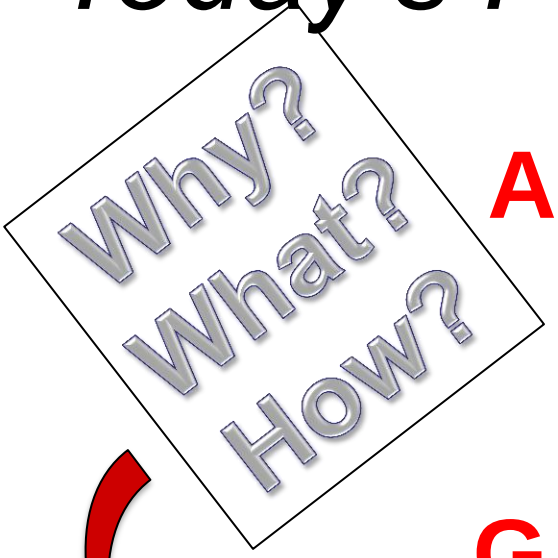
1. Introduction to Nexteer Engineering Procedure G1331
2. DSS Assessment & Control Level Charts
3. DFMEA / DSS / PFMEA / PCP

Poor communication in the workplace

Failure in the marketplace.

Frustration at the Tier-Two

Today's Purpose



ANSWER

GAIN

Understanding
Advocacy
Commitment to Improve

Vision for Quality

- We must have great execution at each step
- G1331 and DSS provide the framework and visibility to:

G1331

- G1331 is a product engineering procedure for defining product characteristics and quality control levels(QCLs)
- Developed cross functionally with Nexteer Product Engineering, Manufacturing Engineering, Quality & Global Supply Management
- Born out of necessity in today's environment
- Critical today due to Industry Quality Standards, and Field Actions

Purpose and Scope

- The purpose of G1331 is to support Nexteer's objective of zero recalls, field actions, and quality spills.
- Compliance required for:
  - All NEW parts associated with program launches in 2016 CY onward
  - Carryover parts will be evaluated separately with part family strategies
- There are two major components of G1331
  1. Process for defining QCL's and communicating DFMEA severities and sensitivities for each dimension on a product drawing or specification.
  2. Establish a set of standards for the following manufacturing requirements: (Control Level Chart)
     - Frequency of Inspection-Attachment B
     - Detection Controls-Attachment C
     - Process Controls-Attachment D
     - Defect Handling-Attachment E
     - Traceability-Attachment B

What is QCL?

- Quality Control Level
- A product drawing and specification symbol to communicate Safety/Compliance and Fit/Function characteristics
- A method to communicate different levels of manufacturing requirements

SAFETY AND/OR GOVERNMENT REGULATED PART					■ YES	□ NO	
DESIGNATED CHARACTERISTICS				DC SYMBOL	QCL TYPE	QCI TYPE	
NEXTEER PROCEDURE G1331			SAFETY/COMPLIANCE		CL1/CL2	QS-100V QS-DR	
8	LAST NO USED			NO SYMBOL SEE DSS	CL3	NOT APPLICABLE	
8	TOTAL ON DRAWING		FIT/FUNCTION		CL4/CL5	CI-100V CI-DR	
DC							
NO	TYPE	DESCRIPTION		RATIONALE		ZONE	SH
1	CL1	ITR TORQUE		MECHANICAL INTEGRITY		D19	
2	CL4	STUD SPACING		CUSTOMER ASSEMBLY		K11	
3	CL2	CRIMP LOAD		SEALING INTEGRITY		L16	
4	CL4	INPUT SHAFT ALIGNMENT		CUSTOMER ASSEMBLY		M14	
5	CL2	LEAK TEST		SEALING INTEGRITY		D25	
6	CL4	LABEL PRESENCE		CUSTOMER ASSEMBLY		C24	
7	CL4	MOUNTING STUD PITCH DIA		CUSTOMER ASSEMBLY		C25	
8	CL5	CORRECT SOFTWARE LEVEL		FUNCTIONAL		C26	
B070	SEE DSS3820XXXX FOR IDENTIFICATION OF CL3 CHARACTERSITICS						

- Identifying a QCL is an interactive process with the Design Severity & Sensitivity Assessment
- Note: CL3 is only shown in the DSS document and not on the drawing and is classified as a standard characteristic even though it has a severity of 9 or a 10

Special Product Characteristics

- The Nexteer Automotive special characteristic is called the **Quality Control Level** characteristic. A QCL is associated with product safety, government regulatory compliance, fit or function. QCLs are designated on engineering drawings/specifications, and **require control above standard care** in manufacturing. The primary purpose for a QCL is to **communicate** to our supply base our specific process requirements.

Quality Planning and Process Documentation

SAFETY AND/OR GOVERNMENT REGULATED PART				■ YES	□ NO	
DESIGNATED CHARACTERISTICS			DC SYMBOL	QCL TYPE	QCI TYPE	
NEXTEER PROCEDURE G1331		SAFETY/COMPLIANCE		CL1/CL2	QS-100V	
					QS-DR	
8	LAST NO USED		NO SYMBOL SEE DSS	CL3	NOT APPLICABLE	
8	TOTAL ON DRAWING	FIT/FUNCTION		CL4/CL5	CI-100V	
DC					CI-DR	
NO	TYPE	DESCRIPTION	RATIONALE		ZONE	SH

- **SAFETY AND/OR GOVERNMENT REGULATED PART –** Mark YES if a part functional failure could lead to vehicle safety effects and/or non-compliance with government regulations such as Federal Motor Vehicle Safety Standards (FMVSS), Canada Motor Vehicle Safety Standards (CMVSS) and European Commission Regulations with DFMEA or DSS Assessment Severity 9 or 10. Substances of Concern are excluded.

What is DSS?

- Design Severity & Sensitivity
- A structured tool to translate (flow down) DFMEA functional failure mode severities to a feature/dimension level.
- A tool to document the design sensitivity associated with variation of a feature with respect to the tolerance. (R/Y/G)
- A tool to identify Nexteer Special Characteristics (Quality Control Level product characteristics – QCL)
- Creating a DSS is an interactive process with the DFMEA
- See DSS example next page

What is DSS?

Status: COMPLETE			Customer Program: Program		Prepared by: Name Manager: Manager				Manager Review Date: NA					DSS Revision Date: 8-Feb-16				NOTE: Keep SEV/SEN pairs together. Do not mix.	DSS RESULT
Part Name: Widget			Drawing Rev Date:	29-Jan-16	Vehicle Safety No Warning to Driver (10) With Warning (9) and/or Regulatory Non-compliance (10C, 9C)		Primary vehicle function lost - vehicle inoperable (8)		Primary vehicle function degraded (7) Secondary vehicle function (non-essential) lost (6) or degraded (5)		Annoyance Audible Noise, Appearance (4,3,2)		No effect to vehicle function (1)	MANUFACTURING Major Disruption 8			SEV Result	SEN Result	GCL TO BE SHOWN ON RELEASED DRAWING
Drawing No.: XXXX			Drawing Rev Level:	001A	SEV	SEN	SEV	SEN	SEV	SEN	SEV	SEN	SEV	SEV Nexteer	SEV OEM	SEN	SEVERITY	SENSITIVITY	
ROADMAP NUMBER	ZONE	DIMENSION DESCRIPTION (Product Characteristic / Feature Name)	DRAWING DIMENSION	DIMENSION	Enter: Max or Min	9,10 9C	R,Y,G	8	R,Y,G	7,6,5	R,Y,G	4,3,2	R,Y,G	1	8	8	R,Y,G	1 - 10	R, Y, G	QCL TYP
A110	A11	Inner hub OD radius	1.0 Max	1	MAX									1						STD
B100	B10	Note	Radius as formed	Note	NA									1						STD
C100	C10	Minimum OD for 'A' Datum surface	32.0 Min	32	MIN									1						STD
C110	C11	Lead-in chamfer offset	1	1.5	MAX									1						STD
C110	C11	Lead-in chamfer offset	1	0.5	MIN					5	Green							5	Green	STD
C120	C12	Lead-in chamfer angle	47/43 Deg	47	MAX									1						STD
C120	C12	Lead-in chamfer angle	47/43 Deg	43	MIN					5	Green							5	Green	STD
D050	D5	Angle of mismatch from removal of internal carrier tabs	38/34 Deg	38	MAX									1						STD
D050	D5	Angle of mismatch from removal of internal carrier tabs	38/34 Deg	34	MIN									1						STD
D060	D6	Basic Dimension - Mold shutoff surface OD	[Dia 63.13]	Basic	NA									1						STD
D061	D6	Note	Mold shutoff between these diameters - this side only	Note	NA									1						STD
D140	D14	Traceability Callout	6X6 2D Bar Code Traceability Mark on this surface. Per 34000869 - Spec, Direct Part Marking, No Orientation Required.	Note	NA					5	Green							5	Green	STD
E040	E4	Angle of mismatch from removal of internal carrier tabs	56/52 Deg	56	MAX									1						STD
E040	E4	Angle of mismatch from removal of internal carrier tabs	56/52 Deg	52	MIN									1						STD
E070	E7	Basic Dimension - Mold shutoff surface ID	[Dia 54.88]	Basic	NA									1						STD
E090	E9	Note	Natural material flow allowable this area	Note	NA									1						
E120	E12	OD	Dia 81.50	81.8	MAX	10	Green	8	Green	7,6,5	Green	4	Green					10	Green	CL3
E120	E12	OD		81.2	MIN	10	Green	8	Gren	7,6,5	Green	4	Green					10	Green	CL3
E121	E12	True position of OD	[[TP]] [Dia 0.25] / [B]	0.2	MAX									1						STD
E150	E16	Basic Dimension - Press zone	[DIA 39]	Basic	NA									1						STD
F040	F4	Radial location of dimple	Dia 75.2	75.7	MAX									1						STD
F040	F4	Radial location of dimple	Dia 75.2	74.7	MIN									1						STD
F070	F7	Inner hub OD	Dia 34.95 Min.	34.95	MIN	10	Green	8	Green	7,6,5	Green	4	Green					10	Green	CL3
F080	F8	ID	Dia 25.965/25.905	25.965	MAX	10	Red	8	Yellow	7,6,5	Green	4	Green					10	Red	CL1
F080	F8	ID	Dia 25.965/25.905	25.905	MIN					5	Green							5	Green	STD
F081	F8	Defines perpendicularity of ID to Datum A	DIA [[PR]] [0.05] / [A]	0.05	MAX					7,5	Green							7	Green	STD

Nexteer Automotive

Product Characteristics Control Levels Chart

Revised: 10-Jun-2016

Design Criteria				Manufacturing Requirements[1]				
Design Severity & Sensitivity (DSS) Result				Detection Activity (Detect nonconforming parts)		Process Control (Monitor the process)	Nonconforming Material Handling	Traceability
FMEA Severity[2]	Sensitivity	Control Level	QCL Symbol	Frequency of Inspection	Allowed Detection Controls			
G1346, G1174	G1331	G1331	G1331	G1331	G1174	G1763	G1901, G1786	G1783
9 - 10	RED	CL1		100%[3]	1 - 4	1 - 4	A	Singular Preferred Lot Control Required
9 - 10	YELLOW	CL2		100%[3]	1 - 7a	1 - 4	A-B	Lot Control or Singular
9 - 10	GREEN	CL3	No drawing symbol	Per Control Plan[5]	1 - 7a	1 - 7	A-B	Per Control Plan
8	RED	CL4		100%[3]	1 - 7a	1 - 6	A-B	Per Control Plan
8	YELLOW	CL5[4]		Per Control Plan[5]	1 - 7a	1 - 7	A-C	Per Control Plan
8	GREEN	STD	No drawing symbol		1 - 8			Per Control Plan
4 - 7	RED	CL5[4]		Per Control Plan[5]	1 - 7a	1 - 7	A-C	Per Control Plan
4 - 7	YELLOW	STD	No drawing symbol	Per Control Plan[5]	1 - 8			Per Control Plan
4 - 7	GREEN							Per Control Plan
1 - 3	R-Y-G	STD	No drawing symbol	Per Control Plan[5]	1 - 10	1 - 7	A-C	Per Control Plan

Attachment B

How to use Attachment B

- As an example if a drawing has a CL1 on a feature of the Nexteer drawing then the following must be done in filling out the MAPP document:
- The frequency of inspection must be 100%
- In Attachment C the selection of the Detection Controls can be choices 1 through 4.
- In Attachment D the selection of Process Controls can be choices 1 through 4.
- The allowable method for handling non conforming parts must be Method A.
- Singular traceability must be used on the parts.

Use of Attachment B continued

- Another example is for a part feature with a CL5 designation.
- The frequency of inspection is what makes sense for the process being used (per control plan).
- The Detection Control per Attachment C can be choices 1 through 7a.
- The Process Control per Attachment D can be choices 1 through 7.
- The non conforming part handling method can be choices A, B or C.
- Traceability can be what is on the process control plan.

Use of DSS and the Control Level Chart

- The DSS is a primary input to the control plan and MAPP.
- The control level chart defines the minimum quality control requirements for all features
- Establish a set of standards for the following manufacturing requirements:
  - Frequency of Inspection
  - Detection Controls
  - Process Controls
  - Defect Handling
  - Traceability
- The control level chart serves as the “standard” to assess and audit the control plan.

Attachment B

Note 1: WHEN AN ALTERNATIVE CONTROL STRATEGY IS NECESSARY OR APPROPRIATE USE NEXTEER G1331 APPROVAL FORM X-1331.

Note 2: AS PRESCRIBED BY SAEJ1739 FMEA STANDARD AND AIAG FMEA 4th EDITION REFERENCE MANUAL, THE PFMEA SHALL INCLUDE EFFECTS ON THE PRODUCT AND PROCESS. THE PFMEA SEVERITY RANKING USED TO CALCULATE THE RISK PRIORITY NUMBER SHOULD BE EQUAL TO OR GREATER THAN THE SEVERITY RANKING IN THE DFMEA.

Note 3: a. IF 100% PART INSPECTION IS NOT THE MOST EFFECTIVE OR FEASIBLE SOLUTION, THEN PROCESS CONTROL PARAMETERS MUST BE 100% MONITORED AND IDENTIFIED AS A KCC IN THE CONTROL PLAN ALONG WITH AN APPROPRIATE VERIFICATION PLAN & DETECTION METHOD WITH DOCUMENTATION REQUIRED.

Examples: BATCH OR STEADY STATE PROCESSES (e.g.: BATCH OR BELT HEAT TREAT, PLATING), DIMENSIONS RESULTING FROM A MOLDING, STAMPING OPERATION OR FROM A MACHINING OPERATIONS WHERE 1 TOOL CUTS MULTIPLE DIMENSIONS, MATERIAL PROPERTIES AND DIMENSIONS FOR INCOMING INSPECTION, GEOMETRIC TOLERANCES VERIFIED BY COORDINATE MEASURING MACHINE AND WHEN DESTRUCTIVE TESTING IS REQUIRED.

b. PART INSPECTION OR PROCESS MONITORING FOR ALL COMPONENTS AND ASSEMBLIES MUST BE WITHIN THE MANUFACTURING FACILITY. EXCEPTIONS THAT RESULT IN 100% VERIFICATION DOWNSTREAM AT NEXTEER INSTEAD OF AT THE SUPPLIER MUST BE APPROVED BASED ON EFFECTIVENESS OF CONTROLS. ALL NEW PART NUMBERS WILL REQUIRE PART INSPECTION OR PROCESS MONITORING AT THE COMPONENT OR ASSEMBLY'S MANUFACTURING LOCATION INDEPENDENT OF PREVIOUS EXCEPTIONS.

Note 4: CUSTOMER DOCUMENTED REQUIREMENTS SUPERSEDE REQUIREMENTS SHOWN. WHERE POSSIBLE CUSTOMER DESIGNATED CHARACTERISTICS WILL BE A CL5 OR APPROPRIATE DESIGNATION BASED ON SEVERITY & SENSITIVITY.

Note 5: THE OPTIMUM CONTROL STRATEGY METHOD WILL BE DETERMINED DURING PFMEA (MAKE) AND SUPPLIER MAPP DEVELOPMENT AS INPUT TO THE CONTROL PLAN.

Chart Revised 10JN2016

Detection Controls (Reference SAEJ1739 FMEA Standard)		
Key Words	**PFMEA DET Ranking**	**PFMEA Criteria (Breakdown)**
Not applicable	**10**	No current process control
Random Inspection	**9**	Random audit performed
Manual Inspection	**8**	Visual/tactile/audible detection of defect (failure mode) later in process (downstream operation)
	7b	Visual/tactile/audible detection of defect (failure mode) at operation
Gauging	**7a**	Attribute gauge detects defect (failure mode) later in process (downstream operation) *(Includes machine enhanced solutions e.g. Xray, Magnaflux, Eddy current, etc.)* Visual/tactile/audible detection of defect (failure mode) at operation is acceptable when the product requirement is called out without specific measureable limits *e.g. fully engaged (tactile push/pull), clear of grease (visual), etc.*
	6b	Variable gauge detects defect (failure mode) later in process (downstream operation)
	6a	Attribute gauge detects defect (failure mode) at operation
	5b	Variable gauge detects error (cause) or defect (failure mode) at operation
Semi-Automated Cannot continue without operator response	**5a**	Automated controls in-station detect discrepant part (defect/failure mode) and notify operator to take action (light, buzzer, etc.)
Automated Cannot make, Cannot accept, Cannot pass discrepant part	**4**	Automated controls detect discrepant part (defect/failure mode) and lock part to prevent further processing later in process (downstream operation) *(Includes bar code or RFID defect pass/fail tracking)*
	3	Automated controls detect discrepant part (defect/failure mode) and lock part to prevent further processing at operation (Includes automatic movement of part from station to detection device)
	2	Automated controls detect error (cause) and prevent discrepant part from being made at operation (process monitoring)
Error Prevention	**1**	Error (cause) prevention as a result of fixture design, machine design or part design

Revised 10JN2016

Attachment C

PROCESS CONTROL*	Process Controls Description
7	Sampling using attribute gauging - to monitor and adjust process
6	Sampling using variable gauging - to monitor and adjust process
5	Sampling using stop light style(red, yellow, green) variable gauging
4	Variable gauging with SPC charting
3	Variable gauging with automatic feedback/compensation control
2	Machine monitoring/control
1	Error (Cause) prevention as a result of fixture design, machine design or part design.

* 100% Attribute gauging is considered a Detection Control.

Attachment D

Nonconforming Material Handling / Reconciliation / Response (Reference G1735, G1786, G1901)

	Nonconforming Material Handling			Reconciliation (Reject Count from Equipment or Process Must Match Actual Physical Rejects and/or Log Sheets)		Response		
	When Inspecting Part or Monitoring Process 100%	When sampling (< 100% inspection)	Nonconforming parts placed into approved container, properly identified, and segregated from in-process material	Reject reconciliation completed prior to shipment of parts	Standard Reject Containment process formalized	Re-use, repair or rework not allowed	If reject count versus actual rejects/log does not reconcile, there must be clearly defined standard reaction plan (containment procedure) that is utilized	Rework and repair allowed only with PPAP approved methods unless an engineering permit, and/or Supplier Suggestion/Change Request (SCR), is issued and approved to utilize (re-use/repair/rework) any material that deviates from the product drawing or specification requirements
A	Nonconforming parts prevented from being used in subsequent operations by means of disassembly, destruction or part tracking (RFID or Barcode). In case of small parts or parts without RFID/barcode, part is placed automatically into a lock box with a tamper proof reject chute.	Not applicable		✓		✓	✓	
B	Nonconforming parts prevented from being used in subsequent operations by means of disassembly, destruction or part tracking (RFID or Barcode). In case of small parts or parts without RFID/Barcode, operator required to place nonconforming part in lock box interlocked to prevent equipment from advancing until reject part is detected. Reject Chute and lock box must be tamper proof.	If nonconformity found must segregate all parts produced back to the last known good part/lot and place in a lock box.		✓			✓	✓
C			✓		✓			✓

Attachment E

How to use Attachment E

- First from Attachment B select the appropriate method of handling non conforming parts. The choices are A, B or C.
- For the method selected only the check marked columns apply to that method.
- For example if method A is selected part sampling is not allowed. The part must be inspected 100% and prevented from being used in subsequent operations by means of disassembly, destruction o part tracking using RFID or Barcode. In the case of small parts without part tracking the part is to be automatically placed in a lock box with a tamper proof reject chute.

Use of Attachment E Continued

- With method A if 100% part inspection is not used but 100% process monitoring is with a controller then the non conforming parts must be made unusable either by disassembly or destruction. All parts must be scrapped back to the last known good part.

MAPP Aid

- For convenience in doing a MAPP the previous Attachments B,C, D & E have been arranged on a 11”x17” chart so that it can be printed in color. This chart is available in the MAPP instructions tab on the Supplier Portal. In the instructions tab on line 42 on the far right it can be accessed. It looks like the chart on the following slide.

Procedure No: G1331
Issued: 24JA97
Revised: 01JL16

Nexteer Automotive **Product Characteristics Control Levels Chart** Revised: 10-Jun-2016

Design Criteria				Manufacturing Requirements[1]				
Design Severity & Sensitivity (DSS) Result				Detection Activity (Detect nonconforming parts)		Process Controls (Prevention)	Material Handling	Traceability
FMEA Severity[2]	Sensitivity	Control Level	QCL Symbol	Frequency of Inspection	Detection Controls			
G1346, G1174	G1331	G1331	G1331	G1331	G1174	G1763	G1901, G1786	G1783
9 - 10	RED	CL1	◀	100%[3]	1 - 4	1 - 4	A	Singular Preferred Lot Control Required
9 - 10	YELLOW	CL2	◀	100%[3]	1 - 7a	1 - 4	A-B	Lot Control or Singular
9 - 10	GREEN	CL3	No drawing symbol	Per Control Plan[5]	1 - 7a	1 - 7	A-B	Per Control Plan
8	RED	CL4	◁	100%[3]	1 - 7a	1 - 6	A-B	Per Control Plan
8	YELLOW	CL5[4]	◁	Per Control Plan[5]	1 - 7a	1 - 7	A-C	Per Control Plan
8	GREEN	STD	No drawing symbol		1 - 8			Per Control Plan
4 - 7	RED	CL5[4]	◁	Per Control Plan[5]	1 - 7a	1 - 7	A-C	Per Control Plan
4 - 7	YELLOW	STD	No drawing symbol	Per Control Plan[5]	1 - 8			Per Control Plan
4 - 7	GREEN							Per Control Plan
1 - 3	R-Y-G	STD	No drawing symbol	Per Control Plan[5]	1 - 10	1 - 7	A-C	Per Control Plan

NOTE 1: WHEN AN ALTERNATIVE CONTROL STRATEGY IS NECESSARY OR APPROPRIATE USE NEXTEER G1331 APPROVAL FORM X-1331.

NOTE 2: AS PRESCRIBED BY SAEJ1739 FMEA STANDARD AND AIAG FMEA 4th EDITION REFERENCE MANUAL, THE PFMEA SHALL INCLUDE EFFECTS ON THE PRODUCT AND PROCESS. THE PFMEA SEVERITY RANKING USED TO CALCULATE THE RISK PRIORITY NUMBER SHOULD BE EQUAL TO OR GREATER THAN THE SEVERITY RANKING IN THE DFMEA.

NOTE 3:

a. IF 100% PART INSPECTION IS NOT THE MOST EFFECTIVE OR FEASIBLE SOLUTION, THEN PROCESS CONTROL PARAMETERS MUST BE 100% MONITORED AND IDENTIFIED AS A KCC IN THE CONTROL PLAN ALONG WITH AN APPROPRIATE VERIFICATION PLAN & DETECTION METHOD WITH DOCUMENTATION REQUIRED.

Examples: BATCH OR STEADY STATE PROCESSES (e.g.: BATCH OR BELT HEAT TREAT, PLATING), DIMENSIONS RESULTING FROM A MOLDING, STAMPING OPERATION OR FROM A MACHINING OPERATIONS WHERE 1 TOOL CUTS MULTIPLE DIMENSIONS, MATERIAL PROPERTIES AND DIMENSIONS FOR INCOMING INSPECTION, GEOMETRIC TOLERANCES VERIFIED BY COORDINATE MEASURING MACHINE AND WHEN DESTRUCTIVE TESTING IS REQUIRED.

b. PART INSPECTION OR PROCESS MONITORING FOR ALL COMPONENTS AND ASSEMBLIES MUST BE WITHIN THE MANUFACTURING FACILITY. EXCEPTIONS THAT RESULT IN 100% VERIFICATION DOWNSTREAM AT NEXTEER INSTEAD OF AT THE SUPPLIER MUST BE APPROVED BASED ON EFFECTIVENESS OF CONTROLS. ALL NEW PART NUMBERS WILL REQUIRE PART INSPECTION OR PROCESS MONITORING AT THE COMPONENT OR ASSEMBLY'S MANUFACTURING LOCATION INDEPENDENT OF PREVIOUS EXCEPTIONS.

NOTE 4: CUSTOMER DOCUMENTED REQUIREMENTS SUPERSEDE REQUIREMENTS SHOWN. WHERE POSSIBLE CUSTOMER DESIGNATED CHARACTERISTICS WILL BE A CL5 OR APPROPRIATE DESIGNATION BASED ON SEVERITY & SENSITIVITY.

NOTE 5: THE OPTIMUM CONTROL STRATEGY METHOD WILL BE DETERMINED DURING PFMEA (MAKE) AND SUPPLIER MAPP DEVELOPMENT AS INPUT TO THE CONTROL PLAN.

ATTACHMENT C

Detection Controls
(Reference SAEJ1739 FMEA Standard)

Key Words	PFMEA Ranking	PFMEA Criteria (Breakdown)
Not applicable	10	No current process control
Random inspection	9	Random audit performed
Manual Inspection	8	Visual/tactile/audible detection of defect (failure mode) later in process (downstream operation)
	7b	Visual/tactile/audible detection of defect (failure mode) at operation
Gauging	7a	Attribute gauge detects defect (failure mode) later in process (downstream operation) *(Includes machine enhanced solutions e.g. Xray, Magnaflux, Eddy current, etc.)* Visual/tactile/audible detection of defect (failure mode) at operation is acceptable when the product requirement is called out without specific measureable limits e.g. *fully engaged (tactile push/pull), clear of grease (visual), etc.*
	6b	Variable gauge detects defect (failure mode) later in process (downstream operation)
	6a	Attribute gauge detects defect (failure mode) at operation
	5b	Variable gauge detects error (cause) or defect (failure mode) at operation
Semi-Automated Cannot continue without operator response	5a	Automated controls in-station detect discrepant part (defect/failure mode) and notify operator to take action (light, buzzer, etc.)
Automated Cannot make, Cannot accept, Cannot pass discrepant part	4	Automated controls detect discrepant part (defect/failure mode) and lock part to prevent further processing later in process (downstream operation) *(Includes bar code or RFID defect pass/fail tracking)*
	3	Automated controls detect discrepant part (defect/failure mode) and lock part to prevent further processing at operation (Includes automatic movement of part from station to detection device)
	2	Automated controls detect error (cause) and prevent discrepant part from being made at operation (process monitoring)
Error Prevention	1	Error (cause) prevention as a result of fixture design, machine design or part design

ATTACHMENT D

PROCESS CONTROL*	Process Controls Description
7	Sampling using attribute gauging - to monitor and adjust process
6	Sampling using variable gauging - to monitor and adjust process
5	Sampling using stop light style (red, yellow, green) variable gauging
4	Variable gauging with SPC charting
3	Variable gauging with automatic feedback/compensation control
2	Machine monitoring/control
1	Error (Cause) prevention as a result of fixture design, machine design or part design.

* 100% Attribute gauging is considered a Detection Control

ATTACHMENT E

Nonconforming Material Handling / Reconciliation / Response
(Reference G1735, G1786, G1901)

	Nonconforming Material Handling		Reconciliation			Response		
When Inspecting Part or Monitoring Process 100%	Nonconforming parts prevented from being used in subsequent operations by means of disassembly, destruction or part tracking (RFID or Barcode). In case of small parts or parts without RFID/barcode, part is placed automatically into a lock box with a tamper proof reject chute.	Nonconforming parts prevented from being used in subsequent operations by means of disassembly, destruction or part tracking (RFID or Barcode). In case of small parts or parts without RFID/Barcode, operator required to place nonconforming part in lock box interlocked to prevent equipment from advancing until reject part is detected. Reject Chute and lock box must be tamper proof.	Nonconforming parts placed into approved container, properly identified, and segregated from in-process material	Reject reconciliation completed prior to shipment of parts Reject Count from Equipment or Process Must Match Actual Physical Rejects and/or Log Sheets	Standard Reject Containment process formalized Reject Count from Equipment or Process Must Match Actual Physical Rejects and/or Log Sheets	Re-use, repair or rework not allowed	If reject count versus actual rejects/log does not reconcile, there must be clearly defined standard reaction plan (containment procedure) that is utilized	Rework and repair allowed only with PPAP approved methods unless an engineering permit, and/or Supplier Suggestion / Change Request (SCR), is issued and approved to utilize (re-use/repair/rework) any material that deviates from the product drawing or specification requirements
When sampling; < 100% inspection	Not applicable	If nonconformity found must segregate all parts produced back to the last known good part/lot and place in a lock box.						
A	✓			✓		✓	✓	
B		✓		✓			✓	✓
C			✓		✓			✓

Implementation Mechanics

- Dimensions on product drawings carry a symbol if they have a designation of CL1, CL2, CL4 and CL5 per the DSS. CL3 do not appear on the drawing but do on DSS.
- The DSS (PDF format) will be a released item in Nexteer's Product Lifecycle Management(PLM) System, associated with the drawing, and revised in synchronization with the drawing revision.
- Provides mechanism to control, release, and communicate changes to DFMEA severities.
- Drawing and DSS form will be provided to the Nexteer suppliers by the buyer to support creation of the MAPP and control plan.
- Capability studies required at time of PPAP
  - CL1, CL2, CL4 & CL5 Cpk & Ppk $\geq$ 1.67
  - Note: On CL3 (Cpk & Ppk $\geq$ 1.33) A capability study is not mandatory unless requested by the AQE/PE.

Designated Characteristics: QCL, ~~QCI~~, ~~KPC~~

DC Block with Safety Note Required on Product Drawings & Specifications Effective 15AP2015

Need for PPAP on Warrant

QCL:
S/C
F/F

SAFETY AND/OR GOVERNMENT REGULATED PART				■ YES	□ NO
DESIGNATED CHARACTERISTICS			DC SYMBOL	QCL TYPE	QCI TYPE
NEXTEER PROCEDURE G1331		SAFETY/COMPLIANCE		CL1/CL2	QS-100V QS-DR
8	LAST NO USED		NO SYMBOL SEE DSS	CL3	NOT APPLICABLE
8	TOTAL ON DRAWING	FIT/FUNCTION		CL4/CL5	CI-100V CI-DR
DC					

NO	TYPE	DESCRIPTION	RATIONALE	ZONE	SH
1	CL1	ITR TORQUE	MECHANICAL INTEGRITY	D19	
2	CL4	STUD SPACING	CUSTOMER ASSEMBLY	K11	
3	CL2	CRIMP LOAD	SEALING INTEGRITY	L16	
4	CL4	INPUT SHAFT ALIGNMENT	CUSTOMER ASSEMBLY	M14	
5	CL2	LEAK TEST	SEALING INTEGRITY	D25	
6	CL4	LABEL PRESENCE	CUSTOMER ASSEMBLY	C24	
7	CL4	MOUNTING STUD PITCH DIA	CUSTOMER ASSEMBLY	C25	
8	CL5	CORRECT SOFTWARE LEVEL	FUNCTIONAL	C26	
8070	SEE DSS3820XXXX FOR IDENTIFICATION OF CL3 CHARACTERSITICS				

Must be shown in DFMEA, PFMEA, Process Control Plan including CL3 shown in the DSS document*

* ISOTS16949 Requirement

IMPORTANT!

Note 3: IF 100% PART INSPECTION IS NOT FEASIBLE THEN PROCESS CONTROL PARAMETERS MUST BE 100% MONITORED ALONG WITH AN APPROPRIATE VERIFICATION PLAN & DETECTION METHOD WITH DOCUMENTATION REQUIRED.

Examples: BATCH OR STEADY STATE PROCESSES (eg: BATCH OR BELT HEAT TREAT, PLATING), DIMENSIONS RESULTING FROM A MOLDING, STAMPING OPERATION OR FROM A MACHINING OPERATIONS WHERE 1 TOOL CUTS MULTIPLE DIMENSIONS, MATERIAL PROPERTIES AND DIMENSIONS FOR INCOMING INSPECTION, AND WHEN DESTRUCTIVE TESTING IS REQUIRED.

PART INSPECTION OR PROCESS MONITORING FOR ALL COMPONENTS AND ASSEMBLIES MUST BE WITHIN THE MANUFACTURING FACILITY. EXCEPTIONS THAT RESULT IN 100% VERIFICATION DOWNSTREAM AT NEXTEER INSTEAD OF AT THE SUPPLIER MUST BE APPROVED BASED ON EFFECTIVENESS OF CONTROLS. ALL NEW PART NUMBERS WILL REQUIRE PART INSPECTION OR PROCESS MONITORING AT THE COMPONENT OR ASSEMBLY'S MANUFACTURING LOCATION INDEPENDENT OF PREVIOUS EXCEPTIONS.

Adherence to Note 3 means an approval form to use an alternate control method is not necessary as noted in PFMEA/MAPP.

Vision for Quality

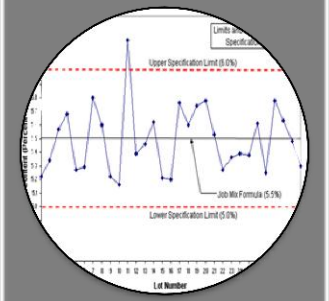
- We must have great execution at each step
- G1331 and DSS provide the framework and visibility to:

Engineering and Analysis

- Robustness Assessment

Communication Documentation

- Special Characteristics on Drawings
- DSS Assessment



Control Plans

- Minimum Requirements Defined
- High Level Approval Required for Exceptions

Operational Excellence

- Tool for Line Side Reviews and Audits
- DFMEA Change Control by Drawing Release

Quality

- Perfect Quality is the Desired Outcome