HAMILTON SUNDSTRAND SUPPLIER PRODUCT-RELEASE PROGRAMS

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TABLE OF CONTENTS

Section	Description	Page
1.0	**PURPOSE**	**4**
2.0	**SCOPE**	**4**
2.1	RANDON AUDIT PROCESS	**4**
2.2	AUTHORIZED TO RELEASE PROCESS	**4**
2.3	ALTERNATE TO ATR PROCESS	**4**
2.4	ORDER OF PRECEDENCE	**5**
3.0	**DEFINITIONS**	**5**
3.1	AUTHORIZATION TO RELEASE (ATR)	**5**
3.2	BULK PACKAGING	
3.3	CONTRACT QUALITY ASSURANCE REPRESENTATIVE (CQAR)	**5**
3.4	DEFECTIVE PART PER MILLION DEFECT (DPPM) RATE	**6**
3.5	DESIGNATED QUALITY REPRESENTATIVE (DQR)	**6**
3.6	ELECTRONIC SOURCE INSPECTION LAPTOP KIT (e-SILK)	**6**
3.7	ELECTRONIC SOURCE INSPECTION RECORD (ESIR)	**6**
3.8	FIRST ARTICLE INSPECTION REVIEW (FAIR)	**6**
3.9	MONTHLY ROLLING AVERAGE	**7**
3.10	NOTIFICATION OF POTENTIAL QUALITY ESCAPE (NOPQE)	**7**
3.11	PRODUCTION PART APPROVAL PROCESS (PPAP)	**7**
3.12	SUPPLIER QUALITY REPRESENTATIVE (SQR)	**7**
4.0	**RANDOM AUDIT PROCESS**	**7**
4.1	RANDOM AUDIT FREQUENCY FOR EXISTING SUPPLIERS	**7**
4.2	DPPM RATE	**8**
4.3	ADJUSTMENTS TO AUDIT FREQUENCY	**8**
4.4	SOURCE INSPECTION	**9**
5.0	**AUTHORIZATION TO RELEASE (ATR) PROCESS REQUIREMENTS**	**9**
5.1	e-SILK ACCESS	**9**
5.2	ATR REQUIREMENTS	**9**
5.3	DQR CANDIDATE SELECTION	**10**
5.4	DQR TRAINING	**11**
5.5	DQR APPROVAL	**12**
5.6	PROBATIONARY PROCESS FOR NEW DQRs	**12**
5.7	DQR AND ATR SUSPENSION	**12**

TABLE OF CONTENTS (continued)

Section	Description	Page
5.8	DQR REACTIVATION	**13**
5.9	DQR RESPONSIBILITIES	**13**
5.10	DQR PROCESS	**15**
5.11	DQR RECERTIFICATION PROCESS	**16**
5.12	P. O. TYPES	**17**
5.13	NONCONFORMING MATERIAL	**17**
5.14	DESIGN CONTROL	**19**
5.15	PART STAMPING/SPECIAL MARKING REQUIREMENTS	**19**
5.16	APPLICABLE DOCUMENT REVISIONS	**20**
6.0	**RAW MATERIAL/SPECIAL PROCESS CONTROLS**	**21**
6.1	VERIFICATION OF PURCHASED METALLIC RAW MATERIAL`	**21**
7.0	**HS APPROVED SPECIAL PROCESSES AND NDT REQUIREMENTS**	**22**
7.1	APPROVED SPECIAL PROCESSES	**22**
7.2	NADCAP ACCREDITATION REQUIREMENTS	**22**
7.3	MATERIALS TESTING LABORATORY REQUIREMENTS	**23**
7.4	NON DESTRUCTIVE TESTING (NDT) LEVEL 3 REQUIREMENTS	**25**
8.0	**PROCESS CERTIFICATION REQUIREMENTS**	**26**
8.1	PROCEDURE	**26**
9.0	**TEMPORARY KEY CHARACTERISTICS (TKC)**	**31**
9.1	PROCEDURE	**31**
10.0	**SURVEILLANCE CONTROL SWITCHING RULES**	**33**
10.1	SUPPLIER GOLD LEVELS	**33**
11.0	**PRODUCTION PART APPROVAL PROCESS**	**35**
11.1	SUPPLIER CONTRACT REVIEW	**35**
11.2	$PPAP_1$ REVIEW	**35**
11.3	$PPAP_2$ REVIEW	**35**
12.0	**SUPPLIER REQUEST FOR INFORMATION**	**36**
APPENDIX 1	**DISTRIBUTOR COMMODITY REQUIREMENTS**	**37**
APPENDIX 2	**SURVEILLANCE CONTROL SWITCHING RULES**	**38**
APPENDIX 3	**PROCESS CERTIFICATION: OPTION 2 SITE SPECIFIC CONTROL PLAN AND DATA REPORTING PROCESS**	**39**

1.0 PURPOSE

The purpose of this document is to provide additional Quality Systems requirements that are not contained in the United Technologies Corporations ASQR-01 'Aerospace Quality Requirements'. In addition, it defines the Supplier requirements for the Hamilton Sundstrand Designated Quality Representative Program.

Note: This specification does not apply to the Windsor Locks Space Systems business entities.

2.0 SCOPE

2.1 RANDOM AUDIT PROCESS

The Random Audit process applies to all HS suppliers using the e-SILK system to release product. Supplier product random audits are based on supplier's 3 months rolling average (DPPM) and range from total self-release to 100% over-inspection as referenced in section 4.0. These inspections shall be performed at the suppliers' facility by HS approved source inspectors, DQR's, or CQAR's. Random Audit Process Inspection requirements are in addition to sampling requirements flowed down to suppliers in the ASQR–20.1 "Supplier Sampling Requirements."

2.2 AUTHORIZED TO RELEASE PROCESS

The Authorized to Release (ATR) process is applicable to suppliers that provide product to HS facilities or drop ship product to HS suppliers or customers. ATR Suppliers must use the ATR process for all HS product shipments, including supplier-to-supplier, supplier–to-distributor, distributor-to-distributor, and supplier to Strategic Logistic Center (SLC). Previously HS approved DSQR Suppliers will be recognized as meeting DQR status. The procedures presented herein are general and may be tailored for individual program requirements or to fit unique Supplier/HS relations. ATR terms and conditions shall be documented in a Letter of Agreement (Form 8) between the supplier and HS. Direct ship authority will be granted by HS on a separate Letter of Agreement.

2.3 ALTERNATE TO ATR PROCESS

Suppliers not approved for the ATR Process are required to request source inspection services per instructions located on the HS Supplier Portal. This required over-inspection service will be at the supplier's expense. In addition to ASQR-01 Aerospace Supplier Quality Requirements noted on your purchase order, only the following sections of HSM17 apply:

2.3 ALTERNATE TO ATR PROCESS (continued)

2.3.1 Order of precedence per paragraph 2.4.1 through 2.4.5
2.3.2 Use of CQAR (third party source) or Receiving Inspection
2.3.3 Non conforming material per paragraph 5.12
2.3.4 Design Control per section 5.13
2.3.5 Special Marking Requirements per section 5.13.6
2.3.6 Applicable Document revisions per 5.15
2.3.7 Raw Material and Special Process Control per sections 6.0 and 7.0

2.4 ORDER OF PRECEDENCE

The order of precedence, in circumstances of conflicting requirements, shall be:

2.4.1 Contract (i.e. Purchase Order, Long Term Agreement)
2.4.2 Drawing Referenced
2.4.3 HS Specifications
2.4.4 Referenced Specifications
2.4.5 This procedure (HSM17)

3.0 DEFINITIONS

3.1 AUTHORIZATION TO RELEASE (ATR):

A process that authorizes a supplier's representative (DQR) to act as an agent of HS who may perform process audits, product inspection, acceptance, and release. Hamilton Sundstrand's ATR process is documented through eSilk.

3.2 BULK PACKAGING:

Parts too small to be individually stamped. Typically high volume, low cost, manufactured or specifically designated parts (i.e. bag of industry standard washers, nut, etc.).

3.3 CONTRACT QUALITY ASSURANCE REPRESENTATIVE (CQAR):

Contract Quality Assurance Representatives approved by HS (third party) to perform duties and responsibilities of HS Supplier Quality Assurance (SQA). CQAR's (formerly referred to as Unitek Representatives) are assigned HS acceptance stamps, and are delegated product acceptance or release authority.

3.4 DEFECTIVE PART PER MILLION DEFECT (DPPM) RATE:

DPPM is a metric used to determine a supplier's performance based on receipt and acceptance of product, and is calculated as follows.

$$\text{DPPM} = \frac{\text{Number of Pieces Rejected}}{\text{Number of Pieces Received}} \times 1{,}000{,}000$$

3.5 DESIGNATED QUALITY REPRESENTATIVE (DQR):

A supplier representative (employee) approved by HS to perform Source inspection, corrective action and related duties (formerly referred to as DSQR's).

3.6 ELECTRONIC SOURCE INSPECTION LAPTOP KIT (e-SILK):

e-SILK is an internet web-based method to communicate to Suppliers, SQRs and others current contractual requirements for Purchased Parts. It collects data necessary to release product (Lot Date Codes, Serial Number, Key Characteristics, Materials, etc.) and makes information readily available for use. It provides for direct shipment to point of use, bypassing RI and Material Lab, triggers payment, Supplier Ratings and other systems.

3.7 ELECTRONIC SOURCE INSPECTION RECORD (ESIR):

An ESIR is an Inspection Record generated by approved individual using the e-SILK application. The record applies to a specific quantity of parts inspected at a given time and provides the status of inspection approval based on provided requirements.

3.8 FIRST ARTICLE INSPECTION REVIEW (FAIR):

A First Article Inspection is to give objective evidence that all engineering, design, and specification requirements are correctly understood, accounted for, verified, and recorded. First Article Inspection Reviews shall be performed in accordance with SAE AS9102 and any additional requirements detailed in ASQR01.

3.9 MONTHLY ROLLING AVERAGE:

Monthly Rolling Average is calculated using the average of the PPMD value for each of the months specified. For example, a 3 Month Rolling Average would average the current and two preceding months DPPM value.

3.10 NOTIFICATION OF POTENTIAL QUALITY ESCAPE (NOPQE):

NOPQE is an escapes management process to report potential product non-conformances and document relentless root cause and corrective action.
UTC Form 6 is used to document supplier nonconformances found at a suppliers facility. Supplier to send in NOPQE via the Supplier Request for Information system.

3.11 PRODUCTION PART APPROVAL PROCESS (PPAP):

PPAP is simply a series of analyses of various aspects of a production manufacturing process. The purpose of this process is to provide evidence that UTC member engineering design, record and specifications requirements are properly understood and fulfilled. The goal is to demonstrate the established manufacturing process has the potential to produce product that consistently meets all requirements at the intended production rate**.**

3.12 SUPPLIER QUALITY REPRESENTATIVE (SQR):

An SQR is an individual performing functions as defined by this procedure as well as applicable HS procedures. There are three types of SQR's used by HS, they include:

- Supplier Quality Assurance Representatives (SQAR), HS or UTC employee
- Contract Quality Assurance Representatives (CQAR), Contract Employee
- Delegated Quality Representative (DQR), Supplier's Employee

4.0 RANDOM AUDIT PROCESS

4.1 RANDOM AUDIT FREQUENCY FOR EXISTING SUPPLIERS

Product acceptance audits conducted by the DQR are controlled by the random audit process through e-SILK. The frequency of random audits is based on the supplier's performance identified as a three (3) month rolling average. Each manufactured lot of shipped product is subject to the random audit logic (Table 1). Suppliers will be notified when an audit is required when using the e-SILK application. Refer to 5.10.1 for Over-Inspection Audits.

Table 1

HS Supplier Random-Audit Model		
Audit Level	**DPPM Range**	**Lot Inspection Probability**
A	<500	Supplier Self Release
B	501-1,500	1 in 30
C	1,501-3,000	1 in 25
D	3,001-4,000	1 in 20
E	4,001-7,500	1 in 15
F	7,501-10,000	1 in 12
G	10,001-15,000	1 in 10
H	15,001-25,000	1 in 7
I	25,001-50,000	1 in 5
J	>50,000	100%

Example: a supplier in audit level B will have a 1 in 30 chance of being audited for each lot to be delivered. Because this is a random process, it is possible to have no audits for several months or to have several audits sequentially. As the number of shipments increases, the frequency rate can be proven to be statistically sound.

4.2 DPPM RATE

The assigned random audit level is based on a three-month rolling average updated monthly. This data is available to users operating e-SILK. This is a self-adjusting system. As a supplier's quality improves, the audit frequency will decrease. If a supplier's quality deteriorates, the audit frequency will increase. Random audit frequency is assigned per TABLE 1 once a baseline DPPM rate is established. The ongoing DPPM rate is developed from data used in preparing the monthly HS supplier report card. Contributors to the Supplier DPPM rate are:

- SQAR, CQAR, and Receiving Inspection non-conformances
- Reverse flow (non-conforming parts) off the shop floor
- Customer returns
- Non-conformances validated as supplier responsibility
  Note: CAD's do not affect the Supplier's DPPM rate.

4.3 ADJUSTMENTS TO AUDIT FREQUENCY

Adjustments to the Audit Frequency can be attributed, but not limited to the following:

4.3.1 Rejection of one lot requires the DQR to inspect the nonconforming characteristic 100% for the next 3 manufactured lots of the same part number to ensure corrective action has been implemented, and is effective in elimination of non-conformances.
4.3.2 Delinquent corrective action response.
4.3.3 Detection of Quality System deficiency.
4.3.4 High Pain Escape to OEM customer

4.4 SOURCE INSPECTION

4.4.1 When a supplier must have HS perform source inspection (SQAR or CQAR), the supplier must request source inspection services per instructions located on the HS Supplier Portal under Help/Quality Training Materials.

4.4.2 First Article Releases for Flight Safety Product must be approved by a Hamilton Sundstrand Employee (SQAR). Subsequent releases of Flight Safety Product can be performed by the DQR.

5.0 AUTHORIZATION TO RELEASE (ATR) PROCESS REQUIREMENTS

5.1 e-SILK ACCESS

Supplier self-release requires Internet access and web site access to HS's Supplier Home Page. For all self-released product, the supplier shall complete an electronic source inspection record (ESIR) using e-SILK.

Note: The use of e-SILK supersedes the need to complete a Verification and Product Release Record (UTCQR Form 5)

Note: ESIR's are acceptable substitutes for Certificates of Conformance, ASQR-01 Form 4, and Format A Form.

5.2 ATR REQUIREMENTS

5.2.1 ATR Supplier Selection
To be considered for the ATR Program, a supplier must meet the following criteria:

5.2.1.1 Be listed on the current HS Quality Approved Supplier List

5.2.1.2 Be under the cognizance of the Supplier Quality Assurance organization.

5.2.1.3 Have a satisfactory or better rating for the last system audit or have an approved corrective action plan for the last system audit.

5.2.1.4 Hold a valid AS9100 certificate per the ASQR-01 requirements for manufacturers or AS9120 certificate per theASQR-01 requirements for distributors.

5.2.2 ATR Supplier Approval

To be approved for the ATR Program, the supplier shall:

5.2.2.1 Select qualified employees from the quality department considered competent to perform the required duties of a DQR.
The number of DQRs approved for a specific supplier shall be commensurate with the workload and appropriate contingency factors (vacation, holidays, illness, shift coverage, fluctuations in PPM, First Article audits, etc.) When the supplier cannot provide DQR coverage, the supplier is responsible for charges that may occur through the use of a third party agency (CQAR) under Hamilton Sundstrand's control.
It is highly recommended a minimum of two DQRs be available at all times for all HS Suppliers. One DQR will serve as the Primary, taking overall responsibility for the program, with all others serving as alternates.

5.2.3 ATR Supplier Requirement

5.2.3.1 Notify the HS Help Desk (860-654-2853) when a DQR is leaving their position.

5.3 DQR CANDIDATE SELECTION

Minimum qualifications for candidates are:

5.3.1 Employee of the supplier.

5.3.2 Needs to report organizationally through Quality.

5.3.3 Yearly eye exams by certified eye professional (e.g. optometrist, certified company nurse) per requirements of ASQR-01 with objective evidence to be kept on file at the supplier. The requirements detailed in ASQR-01 must be followed for each type of inspection performed.

5.3.4 A minimum of (6) six months experience with HS product, specification, and drawing requirements.

5.3.5 A minimum of (1) one year experience in the inspection field or Quality environment. This requirement may be shortened depending on the candidate's overall Quality Control background and prior experience with HS product.

5.3.6 The ability to read, write and understand English.

5.3.7 Complete, sign, and submit a Letter of Agreement (LOA), UTCQR Form 8, for each candidate, to HS SQA Management for approval.

5.3.8 Submit a completed DQR Candidate Form via fax to HS SQA Management for approval. Use the HS version of UTCQR Form3 dated 11/04.

Note: All forms / documents must be in English.

Note: These requirements can be tailored by HS SQA Management depending on the experience of the potential DQR candidate, and/or commodity being supplied.

5.4 DQR TRAINING

DQR Training will be completed on-line using the Supplier Home Page and e-SILK tutorial. As a minimum, the training will consist of acquiring a thorough knowledge of all applicable HS procedural requirements, purchase orders, engineering drawings (change levels), specifications, product specific quality plans, quality system requirements, approved special processes and e-SILK.
The DQR candidate will be tested and must achieve an 80% minimum test score prior to being approved by HS SQA Management.

Note: Three attempts are allowed to successfully pass the test. After failing three attempts candidate must request onsite training from the SQAR. SQA management reserves the right to deny applicant to move forward with DQR privileges.

5.5 DQR APPROVAL

Upon approval, HS will return signed copies of Form 3 and Form 8 with an electronic stamp (DQR number). The applicable HS SQAR will be the prime contact for any questions or issues that may arise during the performance of the DQR's duties.

Training will be provided to keep DQRs up to date with the latest document, procedure, and requirement changes as it affects the performance of the DQR's duties during the DQR Audit.

Note: Once all DQR documentation has been received and test completed SQAR reviews the candidate to give final approval to advance to probationary period.

5.6 PROBATIONARY PROCESS FOR NEW DQRs

5.6.1 New DQRs are authorized to only generate an (M) code e-SILK … This shall be in effect for an initial probationary period of approximately six months and will require a second person verification to release the (M) coded traveler.

Verification can be performed by one of the following:
- A non-probationary DQR at the site
- A HS Supplier Quality Assurance Representative (SQAR)
- A Third Party Source Inspector (CQAR)

5.6.2 The six month probation can be modified at the discretion of HS SQA Management.

5.6.3 A DQR review is required for a DQR to be released from probation. Contact your HS SQAR to schedule this review.

Note: SQAR gives approval for the DQR to be removed from probation.

5.7 DQR AND ATR SUSPENSION

At the discretion of HS SQA Management, a supplier may be suspended from the ATR program at any time. Suspension applies only for product procured by or for HS.

Suspension from the ATR Program will take place when any of the following occur:

5.7.1 HS determines SQR coverage is no longer required.

5.7.2 Actions taken by the supplier or DQR are detrimental to the best interest of HS.

5.7.3 If it is determined e-SILK identifications and passwords are shared with other employees.

5.7.4 No DQR activity occurring in a 12-month period.

5.7.5 Email failure – DQR email address and e-SILK user id must be the same.

5.7.6 High pain escape to OEM customer.

5.8 DQR REACTIVATION

5.8.1 A DQR who has not created an ESIR in over two years will have to retake the DQR test.

5.8.2 DQR could be placed on a conditional probation.

5.8.3 Submit proof of current eye exam. Follow requirements detailed in ASQR-01 and the DQR Candidate Selection section above.

5.8.4 Restore access to HS Supplier portal.

5.8.5 Onsite SQAR to ensure DQR is adequately trained.

5.9 DQR RESPONSIBILITIES

General DQR responsibilities include:

5.9.1 Perform all production product releases through e-SILK.

5.9.2 Release all material in accordance with HS procedures and specifications.

5.9.3 Clearly state the Engineering Change revision of the part. Entering NC for ‘no change’or ‘-‘as the EC Revision is not allowed. For example; if the revision is listed as ‘*’, enter ‘*’ in the EC revision field in e-SILK, if the revision is listed as ‘B’, then enter ‘B’ in the EC revision field in e-SILK.

5.9.4 Perform inspection on a minimum of 3 pieces and 5 characteristics (unless lot size or characteristics are less) for all Master Lots. The characteristics selected shall vary for each lot, and characteristics over-inspected must be recorded in eSILK. The DQR shall not be the same associate who performed the final Inspection for the P/N listed on the PO being released in eSILK (ASQR-20.1 inspection).

Note: In the event the supplier is performing SPC, do not choose a characteristic that has a CPK greater than 1.33.

5.9.5 Verify all applicable material related test requirements are met prior to initial release of any part. When required, subsequent testing will be imposed by purchase order or by specification.

5.9.6 Verify HS approved suppliers for Process/Material Specifications identified on on Report 80 and Report 85 are used.

(See Table 2 of this document for guidelines.)

Note: Listing of approved/restricted Process/Material Suppliers (Report 80 and 85) is available on the HS Supplier Portal.

5.9.7 Approve material for shipment by completing applicable forms and affixing stamps as required by specific purchase order and HS specification requirements.

5.9.8 Perform quality-related follow up activities that include, but are not limited to, corrective action resulting from audits, surveys, and nonconforming material escapes.

5.9.9 Review FAIR per ASQR-01 and document via e-SILK release the FAIR fully complies with requirements of ASQR-01. Attach all FAIR documents to the e-SILK release as applicable.

5.9.9.1 First Article Inspection (FAI) Reports as required by ASQR-01 shall have the AS9102 FAI Form 1 and HS First Article Inspection Report Review Checklist (ref. form QC-1700.00) completed by the required personnel as noted in the AS9102, FAI, Form 1, 'Review by' block. When a nonconformance is identified on the FAI Report it will be listed on Form 3 Field 11. The "Not Complete" box will be checked, and a delta FAI will be required on the next lot of parts to show the characteristic conforms.

- Block 21 requires completion by the DQR or authorized quality

representative, i.e., name of the person from the Organization who approved the FAIR.

- Block 22 requires completion in support of approval process noted in block 21, i.e., record the date when the FAIR is approved by the DQR or authorized quality representative.

Note: DQR's do not have customer signature authority. DQR's are not authorized to ship product prior to FAIR signature approval by HS, in accordance with para. 5.10.2, 5.10.3.

Note: If you have submitted your FAI to the email address noted on your PO AND you have a signed form1 from HS, you do not have to attach Your FAI paperwork, it is electronically on file with HS.

5.9.10 Maintain original and delta FAIR and associated documentation/certification on file for SQAR review/approval during scheduled DQR audits.

5.9.11 Attach to the ESIR full conformance to all documentation requirements established by the purchase order and Test Data Package. This shall include, as applicable:

- C of C's – Certifications of Conformance
- Certifications of materials, sub-tier processes, material testing, etc.
- Certifications of special processes, including processes provided by sub-tier process suppliers

5.9.12 Generation of 'P' (partial acceptance) coded travelers. A 'P' coded traveler should only be generated if additional processes need to be completed. Examples could be additional requirements requested by Hamilton Sundstrand Engineering, Quality or Manufacturing. When (P) coding a traveler, the notes section at the end of the traveler MUST be filled in detailing the reason for (P) coding. It should also include a contact name and number of the Hamilton Sundstrand individual who is responsible for the disposition of the (P) coded traveler.

Note: "P" code shall only be allowed with the authority of Supplier Quality Assurance. 'P' coded travelers will automatically stop in Receiving Inspection for
further evaluation.

5.10 DQR PROCESS

The DQR will prepare the shipment by completing the e-SILK report, assuring completion of all associated documentation, inspections, and tests.

5.10.1 Over-inspection Audits will be controlled through the online e-SILK application. Any subsequent audits must be performed by a different DQR. A second DQR is mandatory to release an "Audit" ESIR. If a second DQR is not available, contact a CQAR per instruction on the HS Supplier Portal. This shall be at the Supplier's expense.

5.10.1.1 Audits will be required when:

Management Override exists
Random Audit Process imposed by the system
During First Article Inspection Review
DQR on probation
High pain escape to the Customer

5.10.2 Flight Safety Hardware

Initial Release and subsequent First Article Inspection Reviews can only be performed by an SQAR.
Subsequent releases not involving First Article Inspection reviews may be performed by a DQR or CQAR.

5.10.3 Castings and Forgings

Procurement of all Hamilton Sundstrand designed castings and forgings shall be procured from a Hamilton Sundstrand approved supplier.
Supplier shall not ship production castings or forgings to Hamilton Sundstrand or another Hamilton Sundstrand supplier without having a written FAIR approval from Hamilton Sundstrand Procurement Quality Assurance (PQA). Suppliers shall notify the Hamilton Sundstrand buyer when a casting/forging FAIR is ready for Hamilton Sundstrand PQA review.
All castings requiring radiographic inspection shall be serialized and the x-ray film retained by the supplier per the requirements of ASQR-01.

5.11 DQR RECERTIFICATION PROCESS

Mandatory recertification every two years will be conducted in a formal training session for each DQR. Failure to comply will result in the loss of DQR status.
At the conclusion of each recertification class a formal test will be administered. The DQR must pass this test with an 80% or better score. The test can only be taken once. They do not take the test until they pass.

If the DQR does not pass the recertification test, their status will be inactive. This means they cannot create an ESIR within the eSILK application. They must wait 30

days before they can retake the recertification test. If the DQR does not pass on the second attempt, they must contact their SQAR for additional training. They will continue to have an inactive status and must wait an additional 30 days before attempting the test again. Failure to pass the test a third time will result in the loss of their inspection authorization for good. They cannot reapply at a later date.
Each new DQR is required to attend a formal training session within their 6 months probation period.

5.12 P.O. TYPE

Type of Part	ESIR
Production (non-repair) such as OP,O9, OD orders	Yes
Production (repair) OL,OS orders	Yes
Part getting shipped to another company besides Hamilton	Yes
Part on an "ON" purchase order (very rare, if ever)	No

NOTE: CALL HELP DESK WITH QUESTIONS

5.13 NONCONFORMING MATERIAL

The supplier shall establish and maintain documented procedures to ensure product not conforming to a specified requirement is prevented from unintended use or installation. This control shall provide for identification, documentation, evaluation, segregation (when practical), disposition of nonconforming product, and for notification to the functions concerned.

5.13.1 TYPE 1 Nonconformance

Nonconforming items of Hamilton Sundstrand design must be dispositioned by Hamilton Sundstrand Material Review Board (MRB) before goods or services are delivered. Type 1 disposition of supplier propriety items or components that could by themselves, or by relation to other components, affect system or end item specification, reliability, weight, safety, and appearance when it is a significant factor, requires approval by Hamilton Sundstrand MRB prior to release. Disposition by Hamilton Sundstrand MRB may be obtained by submitting 'Conditional Advance Disposition' per 5.12.3.

The supplier shall not proceed with a repair procedure unless authorized by Hamilton Sundstrand MRB.

5.13.2 TYPE II Nonconformance

Suppliers approved by Hamilton Sundstrand may perform Type II material review actions on proprietary products provided the subject product was completely designed, developed and funded by the supplier.

Type II is defined as any departure from requirements not falling into the category of Type I. These Type II dispositions, when authorized, shall be made available upon Hamilton Sundstrand request.

Requests for Type II MRB authority by specific product types (when required) are to be transmitted to Hamilton Sundstrand Procurement via Supplier Request for Information (SRI) available on the HS Supplier Portal. Additional information may be requested by Hamilton Sundstrand such as review and/or approval of the supplier's nonconformance and corrective action procedures, instructions and personnel.

Hamilton Sundstrand authorizes the supplier's Type II approval by issuing letter of delegation. The delegation will specify the approval level and any specific restriction or instructions.

Supplier's providing standard catalog items or commercial off the shelf (COTS) items are not required to request Type II MRB authority.

5.13.3 Conditional Advance Disposition (CAD) Requirements

If nonconforming material is detected during the manufacturing process that requires accept as is or repair disposition from HS, the Supplier is responsible for ensuring the following:

- CAD (including cause corrective action) has been generated and submitted to HS's Procurement group.
- CAD has been disposition and approved by HS.
- Requested repair activity is completed and conforming to requirements.
- Supplier has implemented corrective action to address root cause of the CAD.
- Supplier has implemented corrective action to address root cause of the CAD.
- ESIR's generated for affected product accurately document CAD activity.
- CAD material disposition as scrap has been properly mutilated (render unfit for use) at the supplier.

Note: CAD (form HSF 0857) is available on the HS Supplier Portal.

5.14 DESIGN CONTROL

Suppliers with design authority shall establish and maintain documented procedures to control and verify the design of the product in order to ensure the specified requirements in CEP100, Hamilton Sundstrand Supplier Configuration Management Requirements, are met.

5.15 PART STAMPING/SPECIAL MARKING REQUIREMENTS

5.15.1 For Cage Code of 73030 - Product Acceptance Stamp (Oval with last 3 digits of Supplier Code)

Product acceptance stamps are used for stamping all product in which the flow down is required by P.O. or all Heritage Hamilton drawings with a cage code of 73030. The supplier will need a set of oval stamps for stamping parts. The oval stamp must contain the last three digits of the company's HS primary supplier code. The primary supplier code is the code used on shipments within North America.

These stamps should be approximately the same size as the part marking and must be legible. Parts need to be stamped to be in conformance with HS part acceptance requirements. Place stamps using permanent ink in contrasting colors in front of the P/N. Stamp marking may be of the same type as the part marking specified on the drawing.

Note: A complete tutorial guide for marking parts can be found on the HS Supplier Portal under Part Marking Identification Aid.

For P coded ESIRs, the acceptance stamp shall be placed after the part marking. This indicates that all else is complete.

5.15.2 No stamps are allowed on General Electric part numbers

5.15.3 No stamps are needed on Dynamic Control parts

5.15.4 Heritage Sundstrand will flow marking requirements on the P.O

5.15.5 Required Stamp Locations

Place acceptance stamp to the left of the part number except as noted below:

Situation	Location of Stamp
Insufficient space	Above or below HS Part Number
No HS Part Number on part	Stamp container & associated paperwork
Part size too small	Stamp container & associated paperwork
Bulk Packaging	Prior HS approval required (Via SRI Process) in order container or associated paper work

5.15.6 Examples of Special Marking Requirements for HS Parts

Part Status	Required Acceptance Stamp
Parts which passed B/P Pressure Test	Mark with Letters "PT" in permanent ink Locate near part number but slightly separate from it
Parts manufactured to unreleased drawings (Identified with "X" in part number)	Mark "Diamond R" at left side of part number
Parts manufactured for Engineering use only Diamond (TS) parts are not upgradeable	Mark "Diamond TS" at left side of part number No ESIR required with "Diamond TS" products

NDT Stamping	Stamp to the right (above or below if space restrictions) lf applied part number or alternately next to any serial number or on a prominent surface		
Instructions call for identifying NDT acceptance by dye marking	Method	Pieces Inspected	Pieces Not Inspected In Sample
	Penetrant	Maroon	Yellow
	MPI	Blue	Orange
	Radiography	Blue	Orange

5.16 APPLICABLE DOCUMENT REVISIONS

Where the Drawing refers to a material, process or inspection specification, drawing or standard that has been revised, cancelled or superseded, the following shall apply:

5.16.1 If the Drawing refers to a specific issue or revision of the document, that issue or revision shall be used.

5.16.2 If the Drawing does not refer to a specific issue or revision of a document, the following shall apply:

5.16.2.1 Standard Parts. For standard parts (such as AN, NAS, MS, M, etc.) the part to be used may be any revision in effect prior to cancellation or supersession.

5.16.2.1.1 When utilizing Mil-Std parts a change from MIL-X to MIL-DTL or MIL-PRF is considered a change in the revision letter of the document not a new specification.

5.16.2.2 Material, Inspection, Process and Acceptance Specifications

5.16.2.2.1 If the document has not been cancelled, then only the current revision may be used.

5.16.2.2.2 Where the document is cancelled, with or without supersession, the last issue prior to cancellation or supersession shall continue to be applicable.

6.0 RAW MATERIAL CONTROLS

Note: Applies to all suppliers that distribute raw material or manufactures part numbers that contain a material specification on the drawing (except source control, specification control, COTS and standard parts).

6.1 VERIFICATION OF PURCHASED METALLIC RAW MATERIAL

6.1.1 Original mill certification or photocopy of original mill certification is required and shall be traceable to raw material lot or batch numbers. When the material specification has been cancelled with or without supersession, the latest issue prior to the cancellation or supersession shall continue to be used. The material must be certified to the material specification specified on the engineering drawing.

6.1.2 Material procured to a military, federal or industrial specification revision prior to that imposed by the Hamilton Sundstrand purchase order shall be considered acceptable provided the supplier validates the material certification meets all requirements of the latest specification revision.

6.1.3 If a specified material cannot be obtained; an acceptable alternate material can be identified from the HS engineering drawing 69100, "*Alternate Parts*." If an acceptable alternate material is not listed, the supplier shall submit a written SRI, "*Supplier Request for Information*" (ASQR-01 Form 3) to the cognizant HS contact.

7.0 HS APPROVED SPECIAL PROCESSES AND NDT REQUIREMENTS

7.1 APPROVED SPECIAL PROCESSES

All process and material specifications that appear on any HS engineering drawing, and are also listed on Reports 80 & 85, require a HS approved source. Suppliers must use an HS approved supplier (except as noted in Table 2) when a specific material or manufacturing special process is listed in HS Report #80. "*HS Approved Process/ Material Supplier Report*," or be listed as a HS approved supplier in HS Report #85, "*Supplier Internal Processes Report*."

7.1.1 Report #80: Identifies HS approved suppliers who are capable of providing a special manufacturing process or material in accordance with applicable process/material specifications (e.g., HS, PN, CP, AMS, MIL STDs, etc.), typically as a service provider. Approved sources are listed in ascending order based on the HS supplier code number.

7.1.2 Report #85**:** Identifies HS approved suppliers/fabricators who utilize their own captive internal special manufacturing process or material in accordance with applicable process/material specifications (e.g., HS, PN, CP, AMS, MIL STDs, etc.), typically in the production of HS product.

7.2 NADCAP ACCREDITATION REQUIREMENTS

Nadcap (National Aerospace and Defense Contractor's Accreditation Program) accreditation is required by United Technologies and Hamilton Sundstrand for all Special Process and NDT processes performed on Hamilton Sundstrand hardware, including processes performed by suppliers or their sub tier suppliers that design and/or manufacture parts for Hamilton Sundstrand. Suppliers shall submit an electronic Supplier Request for Information (SRI) from the HS Supplier Portal to request that a waiver from Hamilton Sundstrand Supplier Quality management when Nadcap accreditation has not been achieved. Special processes include but are not limited to the following: Nondestructive Testing, Heat Treatment, Chemical Processing (electroplating, anodizing, etc), Welding / Brazing, Non-conventional Machining and Surface Enhancement (Shot Peen), and Metal Coatings (Thermal Spray, Vapor Deposition).

Suppliers of source control, (except as noted in appendix) shall use Nadcap accredited suppliers for special processes and NDT.

Reports #80 and #85 can be viewed on the HS Supplier Portal.

Note: If a specification is listed in either HS Report #80 or #85, and no HS approved process supplier is listed, then the supplier shall submit an electronic SRI (ASQR-01 Form 3) from the HS Supplier Portal to request an approved process supplier be identified.

7.3 MATERIALS TESTING LABORATORY REQUIREMENTS

When specified on the Hamilton Sundstrand Purchase order, any product produced for Hamilton Sundstrand (Aerospace Division) requiring product and/or materials testing shall be performed by a Materials Testing Laboratory listed in Hamilton Sundstrand Report #80, "Approved Process/Material Supplier Report".

To access the Report #80:

- Access the HS Supplier Portal
- Select Supplier Reports tab and then 80/85 tab
- Select Report #80 from 'Click here to review'
- Radio button should be set to Specs beginning with…
- Input "*Laboratories, Independent Approved*" to specification number field for "Metallics" or
- Input "*Labs, Approved NonMetallic Testing*" to specification number field for "NonMetallics".

Other testing required by an engineering drawing and associated technical specification(s) necessary to complete a part shall be performed by supplier's internal lab or any testing source holding a current A2LA, Nadcap, or HS approval.

See Approved Special Process Supplier Requirements (Table 2) for specific drawing types.

10/6/2011	Approved Special Process Supplier Requirements (Note 1, 2)			
Drawing Designation	**Examples**	**Site**	**HS Special Process Specs**	**MIL/Fed/Ind Special Process**
	Released Production Drawings			
HS Design	17044534, 903D421, 4506783, C1006748, etc	All	Yes	Yes
Source Control	5018794, 5900100, 5913596	All	Yes	No (Note 5)
Specification Control	17044534, 903D421, 4506783, C1006748, etc	All	Yes	No
Altered Item Drwg	Same as Production Drawings	All	Yes	Yes
COTS-HS Std Parts Drwg	AN,MS,NAS,JN,JANTX,JANHC,3415	All	Yes	No (notes 3, 4)
	Advanced Released Production Drawings			
Advance Release Drwg	170XXXX Rel 01 ARC 11	RFD	Yes	Yes
Adv. Release X Drwg	579X2-821577-1 (Diamond R material)	WLOX	Yes	Yes
Advance Release HSPS	450XXXX IAR 8	HSPS	Yes	Yes
	Non Production			
EP - Non Production	EP 1705968	RFD	No	No
Diamond TS - Non-Production	579X2-821577-1 W/Diamond TS Purchase Order Note	WLOX	No	No
	Product Forms			
Rubber/Elastomer Seals (excluding industry std 0-rings) AMS7259, AMS7276, etc. For Industry Standard 0-rings follow the requirements of appendix 1	All Production drawings (not industrial standards, i.e. MIL/AN/etc.)	All	Yes	Yes

Note 1: Except as modified above, all processes listed in Report 80/85 are considered restricted Special Processes and HS approved sources shall be used.

Note 2: "Yes" indicates that a HS approved Special Process supplier (Report 80/85) shall be used. Unless otherwise noted, "No" indicates a non- HS approved supplier may be used if the HS PO supplier controls the special process supplier per AS9100 or ISO9000 and the related processing specification.

Note 3: FSCM 73030 drawings with a Standard Part title shall be treated as HS design, source control or specification control as dictated by the drawing type.

Note 4: Exceptions to COTS and Standard catalog hardware are those noted in Appendix 1. Exceptions are external threaded high strength fasteners which requires procurement from a HS approved Report 80/85 supplier. High strength is defined as greater than 150 KSI ultimate tensile strength (32 HRC). All special processes and NDT testing associated with the manufacture of high strength fasteners shall be performed by a HS report 80/85 supplier.

Note 5: Effective 11/1/2011 all Special Processes performed to a military, federal or industrial specification shall be performed by a Nadcap accredited supplier, unless a written waiver has been issued by Hamilton Sundstrand SQA-Special Process Department.

7.4 NON DESTRUCTIVE TESTING (NDT) LEVEL 3 REQUIREMENTS

Suppliers performing NDT processing shall have an on-site NDT level 3 or a corporate/contract Level 3 visit plant site at least every six (6) months unless a written deviation is granted by Hamilton Sundstrand Special Process and NDT management. The corporate/contact NDT L3 responsibility shall be documented in a company procedure and require the corporate/contract NDT Level 3 to perform the following functions as necessary during their plant visit:

- Perform internal audits of each NDT system and document results.
- Review Customer contract requirements for NDT.
- Implement customer requirements into company procedures, instructions and standard work.
- Review and approve NDT techniques.
- Assure all NDT certified personnel are trained and certified to the requirements of NAS410 latest revision.
- Assess Level 2 compliance to company procedures work instructions, & NDT techniques.
- Train and guide NDT personnel with processing and interpretation.
- Assure NDT systems and equipment are calibrated and operating properly.
- Assure all NDT techniques are approved by the company Level 3 and customer approved as required.
- Assure sample frequencies are correct.

All companies are responsible for assuring their verify the NDT Level 3 meets the requirements of NAS 410 latest revision, has taken a general, specific and practical exam in the methods they are overseeing and have a document (signed by upper management) identifying the primary company Level 3. General exams may be waived if the level 3 is ASNT, certified or has objective evidence they have passed a National Aerospace NDT Board (NANDTB) examination. Specific exams shall contain questions pertaining to applicable Industry and Hamilton Sundstrand specifications. NDT Level 3 practical exams shall consist of procedural elements as well as hands on practical equivalent to that of a NDT Level 2. NDT Level 3 re-certifications shall be by examination.

8.0 PROCESS CERTIFICATION REQUIREMENTS

Hamilton Sundstrand reserves the right to flow down on the engineering specification and/or drawing, characteristics defined as CTQC, CTSC, KPC1 and/or KPC2 that require Statistical Process Control implementation per HSC16199 and ASQR-09.1. Outlined in the following procedure are the specific actions expected to take place by any Supplier producing HS product that contains one of the aforementioned symbols defined in HSC16199.

1) Support Required Manufacturing Process Reviews
2) Define Lower level Key Product Characteristics to Supplier HS Defined CTQCs/CTSCs
3) Identify KPC features on applicable Work Instructions
4) Provide Operator Training
5) Prepare Control Plans
6) Perform Gage Capability Studies
7) Collect and Analyze SPC Data
8) Report Summary Results Prior to Shipping
9) Achieve Certification and Subsequent KPC Sampling

Note: Refer to HSC16199 for definitions and detail requirements of CTQC, CTSC and KPC features.

8.1 PROCEDURE

8.1.1 MANUFACTURING PROCESS REVIEWS: Supplier will support specific Manufacturing Process Reviews that ensure successful Process Certification implementation for HS defined CTQC, CTSC and KPC features. These reviews include the Key Characteristic Review (KCR) and Process Control Review (PCR). The intent of the KCR is to prepare the supplier for the formal PCR. Its focus is directed at reviewing and training the supplier in all the detail requirements of Process Certification such as: completing a process control plan, performing gage capability studies and data entry requirements via the HS portal. Supplier, as part of the KCR, will submit a Process Certification System Assessment to HS Supplier Quality Assurance used to assess Suppliers ability to implement KPC features adequately. Supplier will support requests by HS SQA to conduct onsite review/training. The PCR is a follow-up to the KCR and is conducted onsite at a Supplier to validate the supplier's Quality System implementation of Process Certification requirements as discussed during the KCR. Supplier will support requests to conduct the PCR at their facility, or, if requested by HS SQA, provide a self-assessment.

8.1.2 LOWER-LEVEL KPC SELECTION TO SUPPORT CTQCs/CTSCs: In the event HS defines CTQC/CTSC features per HSC16199, Supplier will self-assess and identify lower-level Key Product Characteristics to support the CTQCs/CTSCs which are upper-level in nature. Supplier will perform all the implementation requirements per the following paragraphs for their own self-selected KPCs. While this requirement is specific for suppliers who perform both the design and manufacturing functions, manufacturing only type suppliers are strongly encouraged to self-select KPCs and implement SPC for them per UTCQR-09.1 as a practice highly valued by United Technologies Corporation.

8.1.3 WORK INSTRUCTION IDENTIFICATION: Supplier will identify HS defined KPC features and/or self-selected KPCs on their work instructions/route sheets/travelers. It shall be obvious to the Operator that KPC features will require SPC activities such as reviewing Control Plans, ensuring Gage Capability Studies are completed, and performing the required SPC data collection using Control Charts.

8.1.4 OPERATOR TRAINING: Supplier will ensure Operators performing KPC operations will be trained properly in basic SPC techniques such as data collection, use of control plans, reacting to out-of-control points, and where to access SPC data collection tools. DQRs will be additionally trained to know how to enter KPC compliance data into the HS Process Certification Database available on www.hssupplierportal.com for reporting purposes.

8.1.5 PREPARATION OF CONTROL PLANS: DQR will ensure the Electronic Control Plan "Site Specific Information" tab, which is part of the HS Process Certification System available on www.hssupplierportal.com, will be filled out completely for each and every HS defined KPC flowed down to the Supplier. Suppliers are not required to fill out an Electronic Control Plan for self-selected KPCs but must maintain a control plan for them per UTCQR-09.1. Suppliers are encouraged to use Form QC-0985.4 spreadsheet, available on the hssupplierportal.com "Help" tab. This form contains a Control Plan format the Supplier may use if needed.

8.1.6 GAGE CAPABILITY STUDY: The DQR will ensure that a gage Capability Study was completed for any gage used to measure a KPC feature. The DQR will ensure the results are stored on the "Site Specific Control Plan", available in the Process Certification Database which is located at www.hssupplierportal.com. The requirement is to achieve a Gage Capability Study result of 20% or less of the total engineering tolerance and a gage resolution of no more than 10% of the total feature tolerance. An Action

Plan is required when either of the above requirements is not met. If these requirements cannot be practically achieved, a waiver document (KPC Management Form) must be submitted to HS via the HS process Certification System available on www.hssupplierportal.com. Supplier is encouraged to use Form QC-0985.4 spreadsheet that contains the Gage Capability Study "Short Form" and "Long Form" methods. Suppliers are encouraged to first use the Short Form as it is quite efficient. If a result greater than 20% occurs, Supplier should conduct a Long Form Study to determine if measurement system error is composed primarily of the instrumentation used or the Operator-to-Operator methodical differences.

8.1.7 SPC DATA COLLECTION AND ANALYSIS: DQR will ensure that the Supplier has collected SPC data for each KPC on the HS drawing and/or specification, plotted points on a Control Chart, and calculated Control Limits after 25 data points (subgroups) are recorded from the process. DQR will ensure that the statistical control limits, once determined, are applied to the control chart and set permanently until such a point is arrived that recalculation is warranted (i.e., major process change such as new machine, tooling, measurement system, transition to another plant site or area, etc.). DQR will finally ensure Process Capability indexes Cp & Cpk are computed for each KPC from a process determined to be "in-control". Supplier is encouraged to use form QC-0985.4 spreadsheet that contains an Individuals and Moving Range (IX-MR) Control Chart, very commonly used in small lot size environments that can be used to collect the data, plot the points, and compute the process control limits and process capability indexes Cp & Cpk.

8.1.8 DQR REPORTING PRIOR TO SHIPPING: The supplier is required to upload SPC summary data for each KPC feature via the Process Certification Upload Tool available at www.hssupplierportal.com for every manufactured lot (as designated by a Master ESIR). Upload snapshot data to the KPC database. If the Cpk for the snapshot data is less than 1.33, an Action Plan will be required. The Action Plan must be launched from the KPC database. DQR must ensure these reporting requirements are completed for the Master ESIR referenced on the ESIR generated for each shipment prior to providing an "Accept" response to the E-SILK question, "Process certification is being performed as required for this lot".

8.1.9 ACHIEVING CERTIFICATION AND SUBSEQUENT KPC SAMPLING: A KPC feature is considered "Certified" when the CPK is equal to 1.33 or greater, a Process Control Plan (e.g., Electronic Site Specific Plan for HS defined KPCs) is completed, a Control Chart identified with statistical

control limits that shows a minimum of 25 consecutive data points (subgroups) of data are in a state of control and a self-audit plan is in place.

There is no relief in sampling frequency for any feature designated KPC1. These features must maintain a 100% sampling frequency per HSC16199. In the event a KPC2 feature achieves a certified status, sampling frequency may be reduced to .65 AQL per HSC16199.

8.1.10 REQUIREMENTS FOR DISTRIBUTORS, OFFLOAD SUPPLIERS AND SUPPLIER PROCURED CASTINGS/FORGINGS: The following situations arise when the KPC feature requiring Process Certification per HSC16199/UTCQR-09.1 for a CTQ Part and that feature is not produced by the 1st-tier supplier who has the purchase order with HS:

A) Distributors who buy the complete part from a manufacturer and subsequently sell that part to HS.

B) 1st-tier supplier who contracts with a 2nd-tier supplier to provide a specific process step that produces the KPC feature of the CTQ Part the 1st-tier has the purchase order for with HS.

C) 1st-tier supplier is mandated by HS part drawing to buy a casting and/or forging from a specific 2nd-tier supplier. The casting/forging supplier manufactures the casting/forging to a HS drawing that contains one or more CTQ Features (i.e., KPC2).

In any of the defined events above, the 1st-tier-supplier has the responsibility to flow-down the HSC16199/UTCQR-09.1 Process Certification requirement to the 2nd-tier supplier. This responsibility is in direct alignment with the requirements specified in ASQR-01 relative to the flow-down of UTC requirements by a 1st-tier supplier to a 2nd-tier supplier.

8.1.10.1 Option 1: Direct Flowdown of HSC16199 Requirements

8.1.10.1.1 1st-tier supplier required to ensure 2nd-tier supplier has a system capable of meeting HSC16199/UTCQR-09.1 requirements. Recommend 1st-tier supplier use "Supplier Process Certification System Assessment" (Form QC-0990.9) available on www.hssupplierportal.com, "Help" tab, then "Quality-MPR".

8.1.10.1.2 1st-tier supplier will need to ensure the

requirements of HSC16199/UTCQR-09.1 are documented on the purchase order they issue to the 2nd-tier.

8.1.10.1.3 1st-tier supplier will need from the 2nd-tier, for each KPC feature identified on the HS CTQ Part, all the information required from Steps 8.1.5 through 8.1.7 above. This can be done by flowing down to the 2nd-tier supplier the "Process Certification Spreadsheet", Form QC-0985.4 available on www.hssupplierportal.com, "Help" tab, then "Quality-Process Certification".

8.1.10.1.4 1st-tier supplier is required to complete Step 8.1.8, "Data Reporting Prior to Shipping" outlined above for the KPC Feature(s) that were produced by the 2nd-tier supplier. 1st-tier supplier is responsible to coordinate how the pertinent information will be received from the 2nd-tier supplier prior to data entry.

8.1.10.2 Option 2: 100% Over-inspection by 1st-Tier Supplier

8.1.10.2.1 1st-tier supplier over-inspects 100% the CTQ feature (i.e., KPC1, KPC2) produced by the 2nd-tier supplier. Data is recorded using "Process Certification Spreadsheet" (Form QC-0985.4) available on www.hssupplierportal.com, "Help" tab, then "Quality-Process Certification".

8.1.10.2.2 1st-tier supplier will perform a Gage Capability Study per Step 7.1.6 above for the measurement instrument used in the over-inspection.

8.1.10.2.3 Prior to completing Section 7.1.10.2.4 below, the 1st-tier supplier will need to complete the "Site Specific Control Plan" for each CTQ Feature per Section 8.1.5. Since this option is based on "over-inspection", the 1st-tier supplier will complete the "Site Specific Control Plan" per Appendix 3.

8.1.10.2.4 1st-tier supplier is required to complete Step 8.1.8, "Data Reporting Prior to Shipping" outlined above for

the KPC Feature(s) that were over-inspected by the 1st-tier supplier but produced by the 2nd-tier supplier.

9.0 TEMPORARY KEY CHARACTERISTICS (TKC)

Hamilton Sundstrand reserves the right to flow down on the engineering specification and/or drawing, characteristics defined as CTQC, CTSC, KPC1 and/or KPC2 that require Statistical Process Control implementation per HSC16199 and UTCQR-09.1. Outlined in the procedure are the specific actions expected to take place by any Supplier producing HS product that contains one of the aforementioned symbols defined in HSC16199.

1) Support Required Manufacturing Process Reviews
2) Define Lower-level Key Product Characteristics to Support HS Defined CTQCs/CTSCs
3) Identify KPC features on applicable Work Instructions
4) Provide Operator Training
5) Prepare Control Plans
6) Perform Gage Capability Studies
7) Collect and analyze SPC Data
8) Report Summary Results Prior to Shipping
9) Achieve Certification and Subsequent KPC Sampling

Hamilton Sundstrand reserves the right to flow down to a Supplier a Temporary Key Characteristic (TKC) used to:

1) Validate the effectiveness of the corrective action plan submitted by an HS Supplier in the event of a dimensional escape.
2) Validate the effectiveness of the corrective action plan submitted by an HS Supplier in the event of a dimensionally related Conditional Advanced Disposition (CAD).
3) HS Engineering/Quality/Procurement may want to understand the capability for a given process/feature for design and/or root cause analysis purposes.

Any TKC resulting from a dimensional escape will be tied directly to a specific Quality Notification emanating from the System for Tracking Action Requests (STAR).

Supplier will be notified of TKC assignment via Email (including QC-0985.4 “Process Certification Spreadsheet”) to the supplier contact.

9.1 PROCEDURE

9.1.1 Supplier to HS receives input from HS to perform a temporary capability study on a feature that may have recently been subject of a dimensional escape, CAD, or based on a request from an internal HS function.

9.1.2 Supplier will create a Process Control Plan per UTCQR-09.1 for the subject feature now considered a TKC using the Electronic Control Plan "Site

Specific Information" tab, which is part of the HS process Certification System available on www.hssupplierportal.com. This will be filled out completely for each and every HS defined TKC flowed down to the Supplier.

9.1.3 Supplier to perform a Gage Capability Study on the subject TKC per paragraph 8.1.6.

9.1.4 Supplier shall collect 25 consecutive measurements from the process that recently was subject of a corrective action plan submitted to HS Supplier Quality Assurance and document in Form QC-0985.4 or equivalent.

9.1.5 Supplier will analyze the 25 measurements for statistical control for the TKC. This can be done using Form QC-0985.4 or equivalent. Any special causes of variation due to an out-of-control process will be addressed per UTCQR-09.1.

9.1.6 Supplier will calculate the Cpk of the process for a minimum of 25 consecutive measurements from a process determined to be in-control. If Cpk equals at least 1.33, the corrective action plan has been validated to be effective. If Cpk is less than 1.33, Supplier must continue with 100% inspection for the subject feature and identify & implement necessary process improvements to achieve a minimum Cpk = 1.33.

Calculations of Cp & Cpk can be done using Form QC-0985.4. If Supplier feels Cpk = 1.33 or better is unobtainable, Supplier will contact the Assignee on the Star/QN for resolution.

9.1.7 The supplier is required to upload SPC summary data for each TKC feature per paragraph 8.1.8. Upload snapshot data to the KPC database. If the Cpk for the snapshot data is less than 1.33, an Action Plan will be required and the supplier must continue with 100% inspection. The Action Plan must be launched from the KPC database. If the Cpk is equal to at least 1.33, but the total number of readings is less than 25, Supplier must continue with 100% inspection until 25 readings are reached consisting of at least 3 ~~2~~ consecutive lots.

9.1.8 Supplier may return to normal inspection on subject TKC feature once Gage Study is completed and results in 20% or less, Cpk = 1.33 is achieved for a minimum 25 consecutive readings over a minimum of two production lots and statistical control is demonstrated. All fields must be completed in the

Electronic Control Plan record for subject TKC in the Process Certification Database available on the HS Supplier Portal. HS Supplier Quality will

relieve the Supplier of the need to continue with the TKC Sampling Plan by deactivating it in the Process Certification Database.

9.1.9 Supplier DQR will ensure all TKC requirements listed in 9.1.1 to 9.1.8 are completed for any HS part number identified with a TKC prior to shipping.

10.0 SURVEILLANCE CONTROL SWITCHING RULES

Note: Hamilton Sundstrand reserves the right to execute any of the control plans defined in the "Surveillance Control Switching Rules" diagram as seen in Appendix 2. The individual control plans are based on a Suppliers quality performance as measured by Parts Per Million (PPM). The levels specified are consistent with the four levels of the UTC Supplier Gold process per UTCQR-06.4. All suppliers to UTC should take the steps necessary to be, at a minimum, at the Performing Level with a stretch goal of achieving the Gold Level.

10.1 SUPPLIER GOLD LEVELS

10.1.1 **Underperforming**

This level is characterized by a supplier who has a PPM level greater than 1500 for the last 6 month period. These are suppliers who are consistently generating part escapes, on-time delivery misses (OTD metric less than 85%), and need to enact on a supplier development plan to address their quality & delivery systems. The HS commodity team that oversees suppliers in this category has the right to institute any one or more of specific corrective actions including, but not limited to, higher frequency of audits than is normally required, executing Manufacturing Process Reviews that look in-depth into particular areas identified as potential causes, institution of oversight controls such as double-DQR leading up to 3rd Party Over-Inspection, and up to supplier disqualification for any future business.

10.1.2 **Progressing**

This level is characterized by a supplier who has a PPM level between 500 and 1500 for the last 6 month period. These are suppliers who have less

frequent escapes than an Underperformer, occasional delivery misses (OTD metric between 85% - 90%), and have some form of continuous improvement system. The HS commodity team that oversees suppliers in this category has the right to institute a high frequency of audits, Manufacturing Process Reviews that look in-depth into particular areas identified as potential causes, and drive the necessary Supplier Development Plan that will help the Supplier reach the Performing level.

10.1.3 **Performing**

This level is characterized by a supplier who has a *PPM level between 250 and 500 for the last 6 month period. These are suppliers who have a very reliable track record of delivering quality product on time. Performing level suppliers typically have a strong, documented system of continuous improvement in place. This includes the use of the tools of 5S, TPM, Quality Clinics, Process Certification, employee training, and good responsiveness to Customer requests. The Performing Level is considered the starting point or "normal" level of surveillance. The HS commodity team that oversees suppliers in this category may invite a Performing Supplier to implement a Supplier development Plan that, when completed, can allow the supplier to be nominated for the UTC Supplier Gold Award.

10.1.4 **Gold**

This level is characterized by a supplier who has achieved over the last 12 months a *PPM level that is 250 or less with no major escapes, a 95% or better OTD performance, a Customer Market Feedback overall score of at least 6.0 on a scale of 1-7, and a Lean Assessment Score for a Manufacturing supplier equal to 350 or more or 260 or more for Distributors or Service Providers. The HS commodity team may reduce the level of oversight for Gold suppliers per Appendix 2. Gold suppliers must be recertified to the UTCQR-06.4 criteria annually. HS reserves the right to conduct a Supplier Gold Sustainability Review with the Gold supplier in order to meet this requirement.

* PPM levels specified for Performing & Gold levels are for high volume suppliers (>10,000 pieces shipped over 12 month period). For Low Volume Suppliers, those shipping 10,000 pieces or less in a 12 month period, the Quality metric used to help determine the Supplier Gold Level is number of escapes as illustrated below:

- Zero major escapes allowed over 12 month period
- 3 minor escapes or less meets Gold PPM level of 250 or less

- 5 minor escapes or less meets Performing PPM level of 500 or less

11.0 PRODUCTION PART APPROVAL PROCESS

Note: Hamilton Sundstrand reserves the right to execute the requirements of ASQR-09.2, "UTC Production Part Approval Process", based on new part program risk assessments, source transitions, or Class I engineering changes.

11.1 SUPPLIER CONTRACT REVIEW

11.1.1 Supplier contract review process shall validate whether or not HS purchase order calls out PPAP per ASQR-09.2.

11.2 $PPAP_1$ REVIEW

11.2.1 Supplier will work with HS SQA to schedule $PPAP_1$ Review, an event used to instruct supplier how to meet the requirements of ASQR-09.2. This can be conducted at the supplier's site or telephonically.

11.2.2 Following the $PPAP_1$ Review, the Supplier shall prepare the PPAP Objective Evidence Package (Form number QC-0990.28, available on the HS Supplier Portal "Help" tab) for any HS part number as called out on the purchase order. The package shall include evidence for all applicable PPAP elements. This is in preparation for the $PPAP_2$ Review as described below.

11.3 $PPAP_2$ REVIEW

11.3.1 For PPAP Submission Level 1, the supplier shall complete UTC Submission Form 1, ensure signature by supplier management, and submit to HS SQA.

11.3.2 For PPAP Submission Levels 2, 3 and 4, the Supplier will submit the completed PPAP Objective Evidence Package to HS SQA along with the completed UTC Submission Form 1.

11.3.3 For part numbers with a PPAP Submission Level 4, the supplier will work with HS SQA to ensure the scheduled on-site PPAP2 Review occurs when the supplier is producing the PPAP part number so the HS SQA team may witness the production run as well as validate critical aspects of the supplier's PPAP

Objective Evidence Package.

11.3.4 The Supplier DQR shall review the HS PPAP Objective Evidence Package (Form number QC-0990.28, available on the HS Supplier Portal "Help" tab) for the following:

11.3.4.1 Overall Objective Evidence Package completeness.
11.3.4.2 Documented action items for any PPAP element not fully completed.
11.3.4.3 UTC PPAP Submission Form 1 is signed by supplier management.

11.3.5 PPAP Approval by Hamilton Sundstrand

11.3.5.1 DQR will not ship PPAP product only until receiving back from HS the original UTC PPAP Form 1 with a documented Interim Class that allows the product to be shipped. Reference ASQR-09.2 for more detail.

11.3.5.2 DQR shall ensure completed PPAP Objective Evidence Package and UTC Form 1 is kept on file at the supplier's site.

12.0 SUPPLIER REQUEST FOR INFORMATION

Hamilton Sundstrand has developed a supplier portal system to improve communications with suppliers using the Supplier Request for Information process. The system includes a central database for tracking progress and ownership of SRI's as well as maintaining a permanent record. Supplier and HS personnel will mutually have this visibility. An SRI shall be submitted to the contractual owner (Buyer) and may be used for items such as (reference ASQR-01 7.2.3(a)-(b)):

- An anomaly noted in a drawing or specification that could result in a nonconformance.
- Lack of clarity or definition in a drawing or specification.
- A request for an alternate method to a quality system requirement.
- Any change that may affect quality which must be documented and communicated to the applicable Hamilton Sundstrand SQAR prior to affectivity of the change including but not necessarily limited to:
  - Ownership
  - Manufacturing location
  - Process or inspection techniques

Note: The SRI form can be found in the Quality Management tab from the HS Supplier Portal. A complete tutorial is also available in the Help? Tab.

Appendix 1
Commodity Requirements

Fasteners:

Fastener Manufacturers producing externally threaded fasteners with a minimum ultimate tensile strength of 150,000 pounds per square inch or greater shall be AS9100 registered and Hamilton Sundstrand approved. This includes high strength fasteners produced to Hamilton Sundstrand drawings, military, federal and industrial specifications. Approved suppliers are listed in Hamilton Sundstrand's Report #80 under *"Fastener Manufacturers, High Strength"*.

All special processes and non-destructive testing of Hamilton Sundstrand, military, federal and industrial specifications (externally threaded fasteners) with a minimum ultimate tensile strength of 150,000 pounds per square inch or greater shall be performed by a Hamilton Sundstrand approved supplier (HS Report 80/85).

O-Rings:

All o-rings supplied to Hamilton Sundstrand must be individually packaged with the appropriate part marking on each bag. Bulk packaging is not allowed. The following individual bag type must be used: AMS2817 Type 3 Black Polybag

Industry Standard O-Rings:

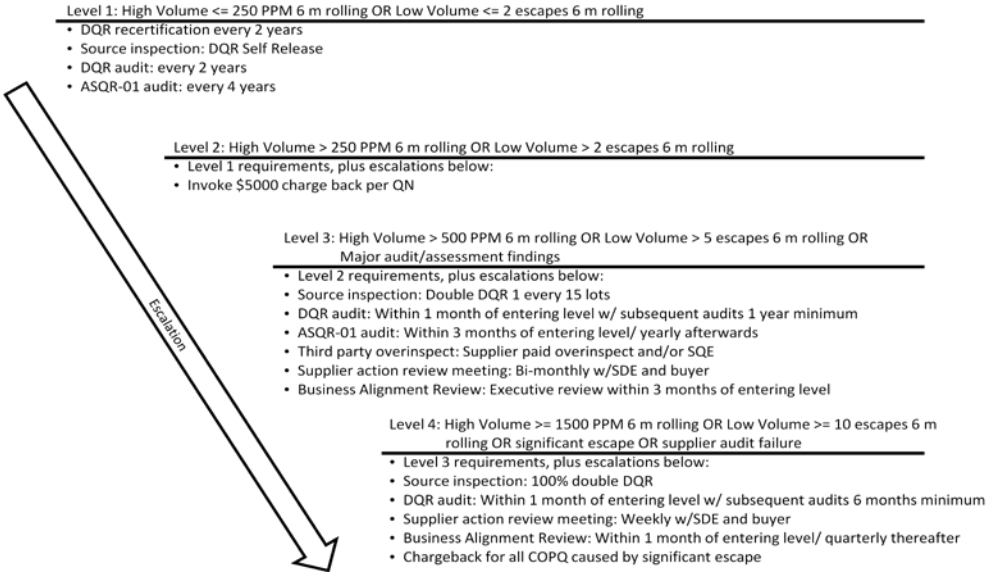
Industry Standard o-rings must be made by a Hamilton Sundstrand approved manufacturing site for the material formulation of the o-ring. The approved manufacturing sites are listed in Hamilton Sundstrand's Report #80 under the material formulation. Hamilton Sundstrand drawings listing Industry Standard o-rings with approved sources are excluded from this requirement.

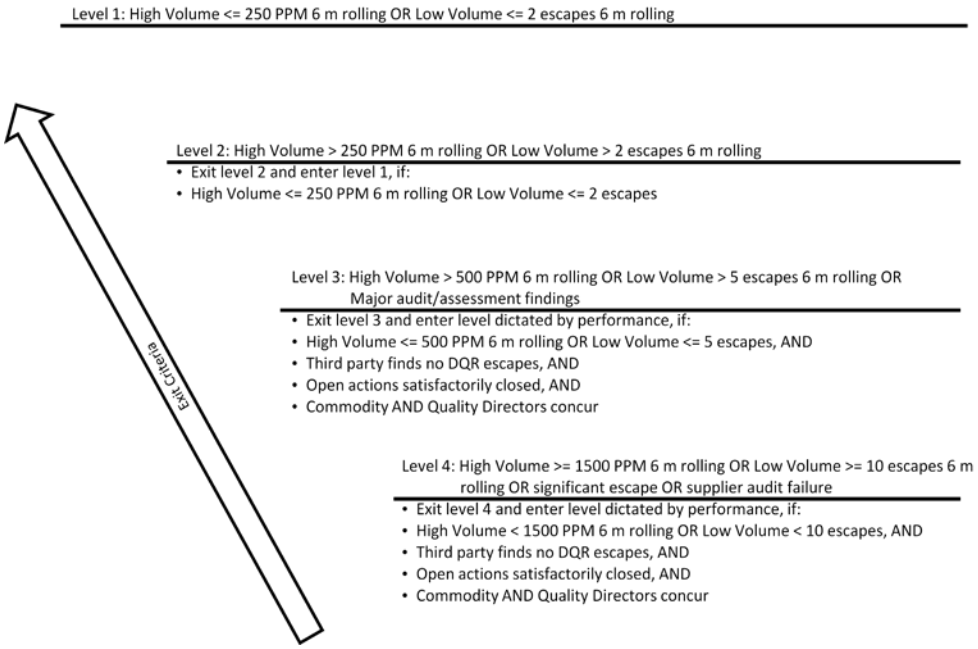
Teflon Wire:

M22759/5, M22759/7, M22759/9 and M22759/11 PTFE Teflon Wire must be produced by a Hamilton Sundstrand approved manufacturer. Approved manufacturers are listed in MS41.14, "*Qualification of PTFE Teflon Wire Manufacturers"*, and in Hamilton Sundstrand's Report #80 under, *"Teflon Wire Manufacturers, M22759/5, /7, /9, and /11"*.

These requirements apply to all direct and indirect Hamilton Sundstrand suppliers.

Appendix 2
Surveillance Control Switching Rules





Appendix 3

Process Certification: Option 2 Site Specific Control Plan and Data Reporting Process

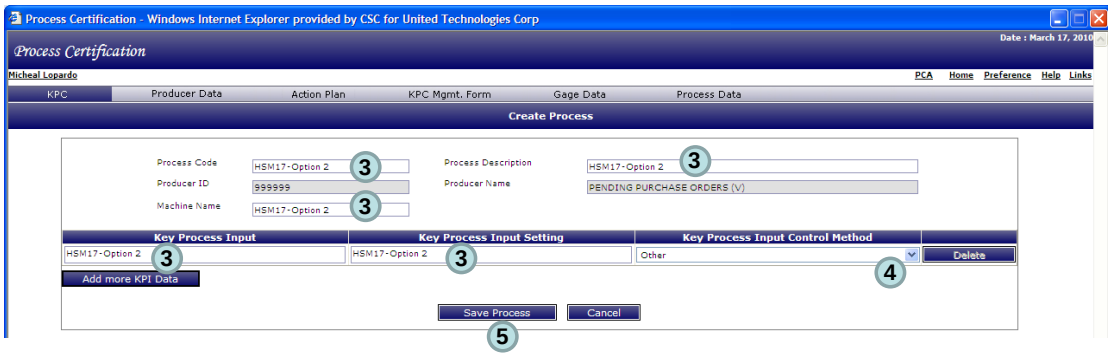
The purpose of this appendix is to assist the supplier with the creation of a "Site Specific Control Plan" (Section A below) and "Data Reporting" (Section B below) for those CTQ Feature, manufactured by a sub-tier, for which 100% over-inspection has been performed by the 1st-tier supplier per Section 8.1.10.2. Both sections below require the supplier to access the HS Process Certification Database from the HS Supplier Portal.

SECTION A – Creating the Site Specific Control Plan

1. From the Process Certification Database KPC Grid, '**Click**' on the View/Edit button to create a Site Specific Control Plan for the CTQ feature to be 100% over-inspected

Appendix 3 (Continued)
SECTION A – Creating the Site Specific Control Plan (continued)

2 **'Click'** on the "Add New Process" button to begin creating the Over-Inspection process control plan.



3 Enter the text "HSM17-Option 2" in the "process Code" box, the "Process Description" box, the "Machine Name" box, the "Key Process Input" box and the "Key Process Input Setting" box.

4 From the pull down menu for the "Key Process Input Control Method", **'select'** "Other".

5 **'Click'** on the "Save Process" button before exiting this screen.

Appendix 3 (Continued)
SECTION A – Creating the Site Specific Control Plan (continued)

6 From the "Chart Type" pull down menu, **'select'** the "IX-MR" control chart option. The Microsoft Excel version of this control chart is in Form QC-0985.4, available from the HS Supplier Portal (Help/Quality Process Certification).

7 Enter a subgroup size of one (1) into the "Sub Group Size" block.

8 **'Click'** on the "Add New Gage" button to enter the results of the Gage R&R Study that you have performed, using the same measurement instrument that will be used to evaluate the sub-tier's CTQ Feature. The Microsoft Excel version of the Gage R&R Short & Long Form are contained in Form QC-0985.4, available from the HS Supplier Portal (Help/Quality Process Certification).

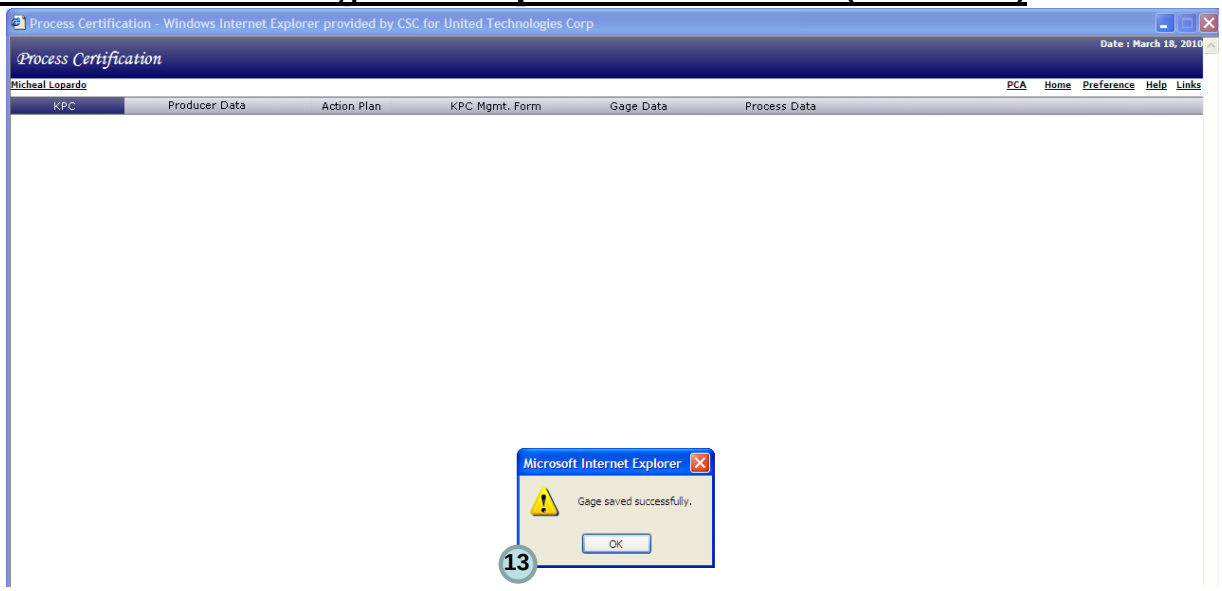
9 From your Gage R&R Short or Long Form Study (reference Form QC-0985.4), enter the "Gage Code" (this is the Gage Number from your recall/calibration system), "Date of the Last RR", select "Gage Type" (note that "Variable" is preferred; to use "attribute" type gaging (go/no-go, etc.), a KPC Management Form must be submitted to HS for approval), finally, enter the "Gage Description", "Gage Resolution" (should be maximum of 10% of total tolerance), and "Gage RR Standard Deviation".

10 **'Click'** on the "Save Gage" button. Now the "Minimum Total Tolerance" will be automatically calculated and displayed. See 11 below for explanation.

11 The "Minimum Total Tolerance" displayed equals the minimum total tolerance that this gage may be used for to accept product and that also results in a Gage R&R Study of 20% or less. If calculated "Minimum Total Tolerance" is greater than the feature total tolerance, another gage must be used or a KPC Management Form must be submitted to HS for approval.

12 This pop-up message will appear after clicking on the "Save Gage" button in Step 10. **'Click'** the "OK" button to save the gage data and automatically populate the Site Specific Control Plan.

Appendix 3 (Continued)
SECTION A – Creating the Site Specific Control Plan (continued)



13 This pop-up message will appear after clicking on the "OK" button from Step 12 to inform you that the gage data has been successfully saved to the Process Certification Database. '**Click'** "OK" to proceed to the Site Specific Control Plan.

14 **'Click'** on "Save" button once the "Process Data" and "Gage Study Data" sections have been completed. CAUTION: If you exit this screen without hitting the "Save" button, you will lose any data entered from the previous steps. You are now ready to enter data from the measurements entered on the IX-MR chart created from form QC-0985.4.

Appendix 3 (Continued)

SECTION B – Data Reporting

15 From the Process Certification Database KPC Grid, '**Click**' on the "Char" button in the "Select By" box.

16 **'Click'** on the *miniature* box in the "Select by" column adjacent to the "KPC Document #" and "KPC Description" for which you want to enter summary data calculations from the IX-MR chart created from form QC-0985.4.

17 **'Click'** on the "Online SPC Data Entry" button to activate Process Certification Data Entry Screen.

18 Enter your manufacturing lot traceability number.

19 Enter the part number for which you are reporting the SPC data.

20 Enter the lot size that was 100% over-inspected.

21 Enter the calculated "Mean" from the IX-MR chart used to record the 100% over-inspection readings (QC-0985.4).

22 Enter the calculated "Standard Deviation" from the IX-MR chart used to record the 100% over-inspection readings (QC-0985.4).

23 **'Click'** on the "Submit Data" button to upload data to the HS SPC Database. Note that the Cp, Cpk, Cpl and Cpu will automatically be calculated and displayed once you click on the "Submit Data" button.