



INTRODUCTION TO CRITICAL TO QUALITY CHARACTERISTICS

Non-Safety (KPC2, CTQP, CTQC)

February 2024

PURPOSE

The purpose of this training is to establish:

- Standard definitions & acronyms
- Understanding of CTQ non-safety as defined by HSC16199
- Drawing examples
- Process flow
 - CTQP
 - KPC2
 - CTQC
- COPS Summary
- KPC management request

****Please note this presentation is intended to act as supplemental material to HSC16199 and should not be used as a replacement for this governing specification**

ACRONYMS

COPS: Control of Process and Safety

CTQ: Critical to Quality

CTQC: Critical to Quality Characteristic

CTQP: Critical to Quality Process

FAIR: First Article Inspection Report

PCRB: Process Certification Review Board

KPC: Key Product Characteristic

SQAR: Supplier Quality Assurance Representatives

PCA: Process Certification Admin GPUTASCOPS@collins.com

DEFINITIONS

- HSC16199 defines a CTQ Part and Characteristics as
 - **Critical-to-Quality Parts**- Parts that can directly affect safety, mission essential or critical performance parameters. Critical To Quality parts may also be identified for customer satisfaction and contain one or more Critical to Quality Characteristics.
 - **Critical-to-Quality (CTQ) Characteristics**- Any feature or Process of Critical to Quality Parts that have the greatest impact to safety and/or customer satisfaction.
 - This presentation will cover the following CTQ characteristics which are NOT designated as Safety;
 - CTQC
 - CTQP
 - KPC2
 - For the Safety characteristic (CTSC, FSC, KPC1) training please see [“Safety Part Training \(Flight Safety\)”](#)

DEFINITIONS

CTQP



- Frozen Process Management meeting the requirements of HS14612 (submitted through COPS)
- Processes that are not directly measurable and have the greatest impact on the quality or operation, not related to safety
- May be located on the engineering drawing or within a Procurement Spec/DRD

KPC



- Statistically Managed Characteristic
- If varied from the prescribed acceptance limits may impact performance, form, fit, function, reliability, service life, possible mission abort, failure to launch, or prevent readiness for use resulting in extreme customer dissatisfaction not related to safety.
- Sampling is permitted if the requirements of HSC16199 section 4.1 and 4.2 are met and maintained

CTQC



- Supplier design product; used for items procured via Source Control or Vendor Item drawings or specifications
- Supplier must define characteristics to control elements or functions with the greatest non-safety impact to the quality or operation of the product
- May be located on the engineering drawing or within a Procurement Spec/DRD

DRAWING/SPECIFICATION NOTE EXAMPLES

31 CRITICAL TO QUALITY
CHARACTERISTICS PER HSC16199
(CAGE CODE 73030)

SEE NOTES			X	X
		X	X	X
PART NUMBER	KPC1	KPC2	★	CTQP

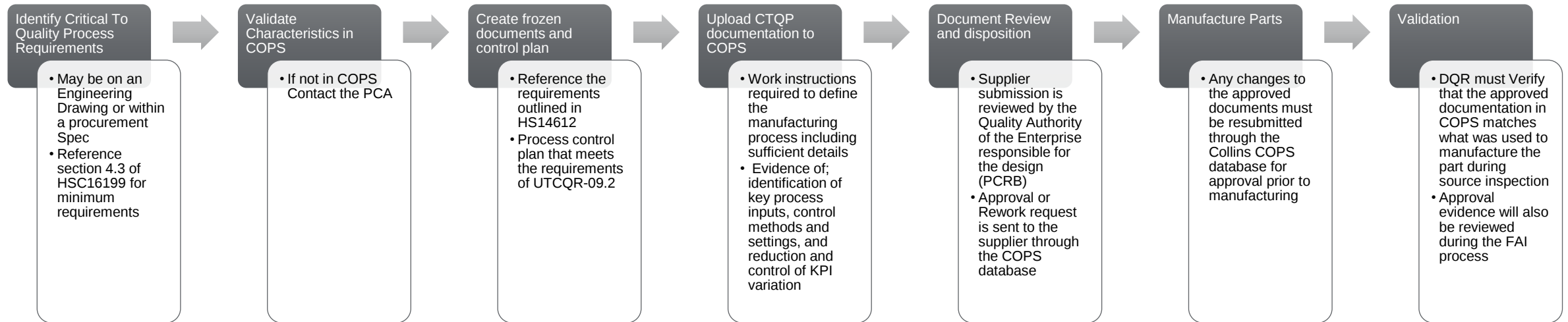
- KPC2 and CTQP will have corresponding drawing callouts either listed in the notes or in relation to a drawing dimension
- CTQC's are often defined in a procurement specification or DRD

4.5 Critical-to-Quality Characteristics

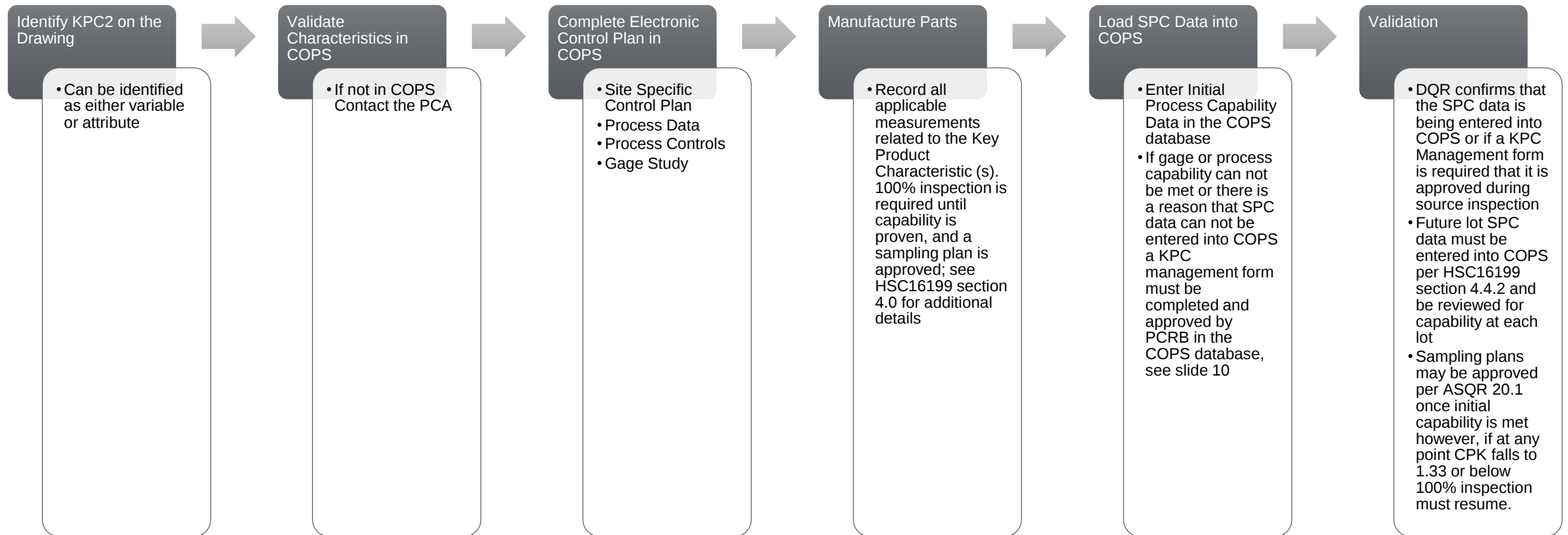
Critical-to-Quality (CTQ) Characteristics and Critical-to-Safety (CTS) Characteristics shall be defined and controlled in order to ensure that the requirements of this specification, and those of the drawing that it supports, are consistently met. Definition, classification and management of CTQ & CTS characteristics shall be per HSC16199. Key product characteristics (KPCs) shall be defined in coordination with the responsible UTAS Engineering and Quality representatives. Some CTQ characteristics are defined on the applicable drawing and this specification. Key product characteristics are to be defined for supplier detail parts or subassemblies. The supplier shall prepare a Control Plan in accordance with the requirements of HSC16199 for all KPCs identified.

CTQ Characteristic	Ref. Paragraph	Category*
Structural Strength	3.2.6	CTQC
Flow Characteristics	3.4.2	CTSC
External Leakage	3.4.4	CTQC
Hysteresis	3.4.5	CTQC
Threshold	3.4.6	CTSC
Null Bias	3.4.8	CTSC
Null Shift	3.4.9	CTSC
Actuation Step Response	3.4.10	CTSC
Vibration Resistance	3.5.8	CTQC
Service Life	3.6.1	CTQC
Cleanliness	3.10.3	CTQC
Preservation and Packing	5.1	CTQC
Identification Marking	5.2	CTQC

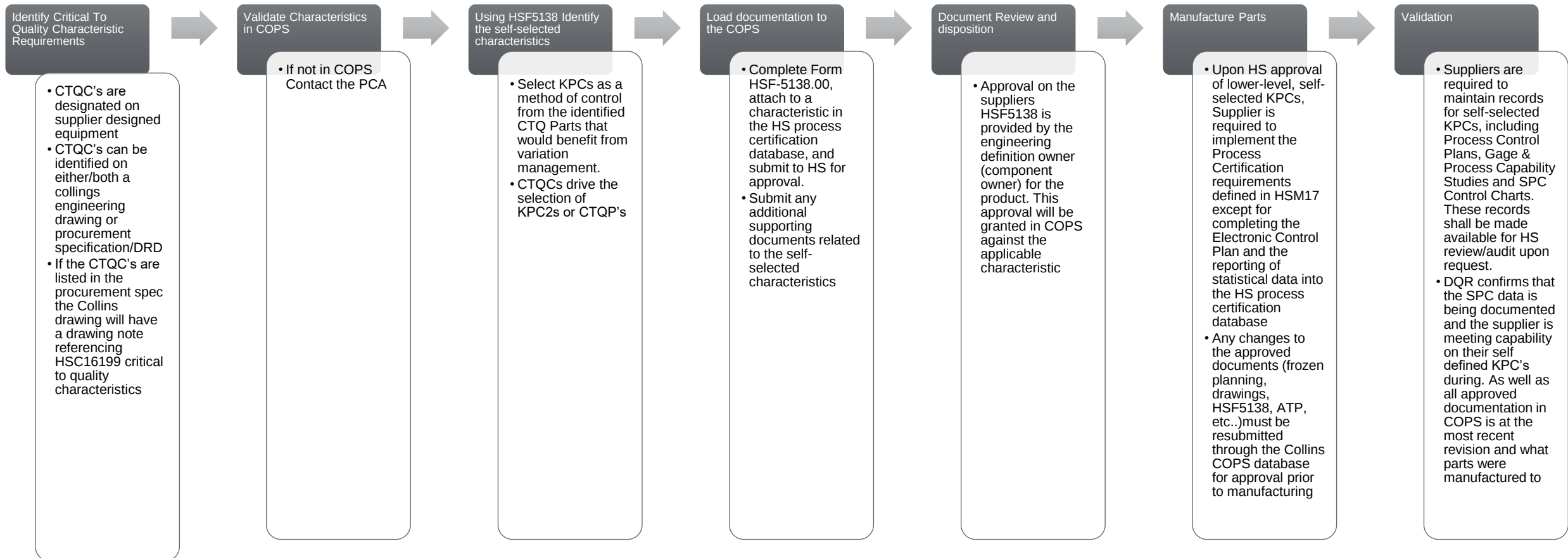
PROCESS FLOW-CTQP



PROCESS FLOW- KPC2



PROCESS FLOW- CTQC

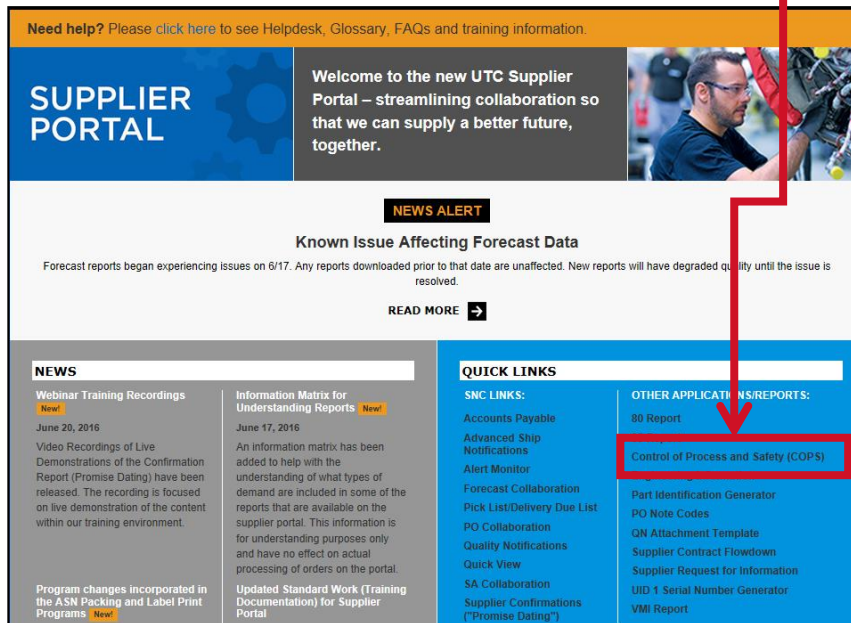


COPS SUMMARY

ACCESSING THE DATABASE



For suppliers: To access COPS, logon to the Collins Aerospace Supplier Portal:
<https://suppliers.utc.com/Pages/Home>
Click on the “Control of Process and Safety (COPS)” link



For the link to be visible the user must first request access from their designated Supplier Portal Admin.

Once the supplier admin verifies the users citizenship, they can request access for COPS under-manage users > restricted access

The access request will go to the COPS administrator to disposition, for issues or questions contact gputascops@hs.utc.com

**** See Supplier Circular 208 on the Supplier Portal for instructions on launching COPS in Compatibility Mode**

COPS SUMMARY SCREEN FIELDS

This is the COPS home screen or characteristic grid. It provides a listing of all the CTQ/CTS features (FSC, KPC1, KPC2, CTQC, CTSC, CTQP & TKC) assigned to the producer. All the features of this COPS screen will be explained in the following chapters.

Characteristic		Producer Data		KPC Mgmt Form		Gage Data		Process Data							
										Online SPC Data Entry		Offline SPC Data Entry		SPC Data History	
Select By Doc Char	Document #	Char #	Location		Description	Char Type	Control Plan/Frozen Proce	Control Plan/Frozen Process Status	Milestone Status	Last SPC/Approval Date	Producer	9201 Number	Sort		
	1	2	Sheet	3 Location	4	5		6	7	8	9	10			
							--Sele	--Sele	--Select-						
	852014	13626	1	A1	1 +/- .02 dia	KPC1	View/Edit				696969 - Mikey's Machine Shop				
	852014	13627	2	B2	16 microfinish	KPC2	View/Edit				696969 - Mikey's Machine Shop				
	852014	13628	1	Note 1	240 Torque	FSC	View/Edit				696969 - Mikey's Machine Shop				
	852014	13629	1	Note 10	Heat treat	CTQP	View/Edit				696969 - Mikey's Machine Shop				
	852014	13630	1	Note 2	Flow rate	CTSC	View/Edit				696969 - Mikey's Machine Shop				
	852014	13631	1	Note 20	Cleanliness	CTQC	View/Edit				696969 - Mikey's Machine Shop				
	852014	13632	1	C3	2 + .02 / - .00	TKC	View/Edit				696969 - Mikey's Machine Shop				

- Document #** – the document (drawing or specification) where the CTQ/CTS symbol is displayed.
- Char #** – a computer generated number which uniquely identifies the CTQ/CTS feature.
- Location**
 - Sheet** – the sheet of the drawing or the page in the specification where the CTQ/CTS symbol is located.
 - Location** – the zone/paragraph within the sheet where the CTQ/CTS symbol is located.
- Description** – a brief description of the CTQ feature.
- Char Type** – a code which specifies the type of CTQ/CTS feature (FSC, KPC1, KPC2, CTQC, CTSC, CTQP or TKC).
- Control Plan/Frozen Process Status** - indicates status of Control Plan/Frozen Process for a CTQ/CTS feature.
- Milestone Status** – the highest milestone requirements the CTQ/CTS feature has satisfied.
- Last SPC/Frozen Process Approval Date** – indicates the last SPC data submittal/Frozen Process Approval date.
- Producer** – identifies the producer or internal manufacturing site that is producing the relevant CTQ/CTS feature.
- 9201 Number** – allows foreign nationals to view the characteristic
- Sort** – allows the user to sort data by using one or more columns.
- Remove Filter** – allows all previously set filters to be removed in order to display all data.
- Filter** – filters data with all previously set filters.

COPS SUMMARY

SCREEN NAVIGATION BUTTONS

1

Characteristic

Producer Data

KPC Mgmt Form

Gage Data

Process Data

2

1

2

3

Next>

Last>>

Online SPC Data Entry

Offline SPC Data Entry

SPC Data History

Select By	Document #	Char #	Location		Description	Char Type	Control Plan/Frozen Process	Control Plan/Frozen Process Status	Milestone Status	Last SPC/Approval Date	Producer	9201 Num	Sort
			Sheet	Location									Remove Filter
Doc						--Select--	--Select--	--Select--					Filter
	852014	13632	1	C3	2 + .02 / - .00	TKC	View/Edit				696969 - Mikey's Machine Shop		
	852014	13631	1	Note 20	Cleanliness	CTQC	View/Edit				696969 - Mikey's Machine Shop		
	852014	13630	1	Note 2	Flow rate	CTSC	View/Edit				696969 - Mikey's Machine Shop		
	852014	13629	1	Note 10	Heat treat	CTQP	View/Edit				696969 - Mikey's Machine Shop		
	852014	13628	1	Note 1	240 Torque	FSC	View/Edit				696969 - Mikey's Machine Shop		
	852014	13627	2	B2	16 microfinish	KPC2	View/Edit				696969 - Mikey's Machine Shop		
	852014	13626	1	A1	1 +/- .02 dia	KPC1	View/Edit				696969 - Mikey's Machine Shop		
	4445559	12794	1	G6	Test attachment	CTSC	View/Edit		1		696969 - Mikey's Machine Shop		
	4445559	12792	1	Note 1	Test for report	FSC	View/Edit				696969 - Mikey's Machine Shop		
☐	4445559	12578	1	A1	10 +/- .5 QC-098 5.4 Example	KPC2	View/Edit	COMPLETE	3	06/12/2014	696969 - Mikey's Machine Shop		

7

1. **Screen Navigation Tabs** – click on any of these TABS from any screen and you will be returned to the selected screen.
2. **Page Navigator** – numbers indicate more characteristics for a producer reside on other pages.
3. **Online SPC Data Entry** – this link opens a screen for real time SPC data input.
4. **Offline SPC Data Entry** – this link opens a screen that creates an MS Excel spreadsheet template for off-line data entry.
5. **SPC Data History** – view and edit SPC data previously entered.
6. **View/Edit** – allows updates to the Site Specific Control Plan/Frozen Process/supplier-designed characteristics and viewing of the Primary Control plan and Milestone Status screen.
7. **Check Box** – indicates the Site Specific plan is complete and SPC data may be input for that CTQ characteristic.

COPS SUMMARY

SORT AND FILTER

- The “**Sort**” button sorts the visible cases by user-defined parameters.
- This efficiently organizes the visible cases

The screenshot displays the COPS interface with a 'Sort Key Characteristics' dialog box open. The dialog box has three sections for 'Sort By', 'Then By', and 'Then By', each with a dropdown menu and radio buttons for 'Ascending' and 'Descending'. The 'Sort' button in the table is highlighted with a red box, and a red arrow points from the 'Sort Key Characteristics' dialog to it. The 'Filter' button in the table is also highlighted with a red box, and a red arrow points from it to the table. The table has columns for 'Document #', 'Char #', 'Location', 'Description', 'Char Type', 'Control Plan/Frozen Proces', 'Control Plan/Frozen Process Status', 'Milestone Status', 'Last SPC/Approval Date', 'Producer', '9201 Number', and 'Sort'. The 'Sort' column has a dropdown menu with 'Asc' selected. The 'Filter' button is located next to the 'Sort' column.

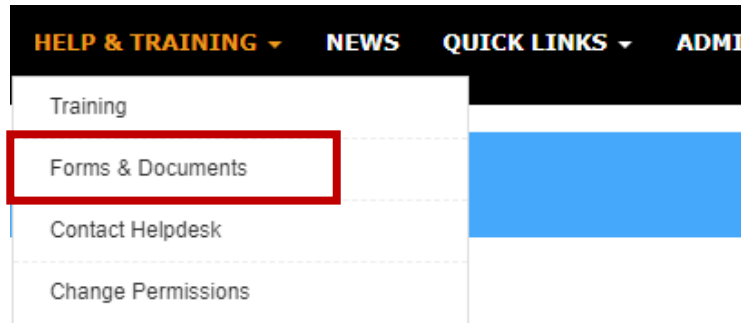
Select By	Document #	Char #	Location	Description	Char Type	Control Plan/Frozen Proces	Control Plan/Frozen Process Status	Milestone Status	Last SPC/Approval Date	Producer	9201 Number	Sort
☒ Doc												
☒ Char	444				--Sele		COMPLETE	--Select				
☐	4445559	12578	1	A1	10 +/- 5 QC-098 5.4 Example	KPC2	View/Edit	COMPLETE	3	06/12/2014	696969 - Mikey's Machine Shop	
☐	4445559	7846	2	D4	Test KPC #9	KPC2	View/Edit	COMPLETE	1		696969 - Mikey's Machine Shop	
☐	4445559	7427	3	M3	Max Feature	KPC2	View/Edit	COMPLETE	3	07/09/2012	696969 - Mikey's Machine Shop	

- The “**Filter**” button execute the filters the user-defined parameters.
- This narrows down the amount of files visible based on the parameters.
- Use “**Remove Filter**” to disable.

COPS SUMMARY

ADDITIONAL TRAINING MATERIAL

- For additional training materials and references to the COPS process please see the instructions located on the supplier portal



Supplier Quality

- [DQR Certification](#)
- [QNs: Quality Notifications](#)
- [SRI: Supplier Request for Information](#)
- [COPS: Control of Process and Safety](#) (highlighted with a red box)
- [Quality Specifications & Forms \(COL-ASQR-PRO-0003, HSM17, FORM 34, ect.\)](#)
- [Supplier Circulars](#)
- [MISH List](#)
- [ASQR Documents \(RTX\)](#)
- [Power Transmission Systems \(Rome NY\)](#)
 - [QC869 - PTS Vendor Request for Material Review Action \(VRMRA\)](#)
- [Power and Transmission Systems \(Poland, Wroclaw\)](#)
 - [INSTRUKCJA NR 11-15](#)

Control Of Process and Safety (COPS) Database

Control of Process and Safety

The Control Of Process & Safety (COPS) database is the result of merging the Process Certification and Flight Safety databases. COPS is one of the many tools that our company employs to assure that our products meet or exceed our customer's expectations. COPS involves the selection of critical to quality features on the Engineering drawing. There are three types of critical to quality features; those controlled by variation management techniques, those managed by frozen process techniques and those that require the producer to define their own sub-level features. These techniques have been proven to have a positive effect on form, fit, function, performance and service life.

Questions/concerns regarding the COPS process can be directed to GPUTASCOPS@Collins.com.

The instructions below will provide assistance for users to be able to navigate and enter data into the Control of Process & Safety database.

- [Step by Step Instructions](#)
 - [COPS Instructions](#)
 - [FSC + CTQP Instructions](#)
 - [CTSC + CTQC Instructions](#)
 - [KPC1 + KPC2 Instructions](#)

KPC MANAGEMENT FORM

- A KPC Management Form is an electronic document that is initiated by a producer to request an exemption of their KPC requirements:
 1. When gage capability requirements cannot be economically met
 2. When process capability requirements cannot be economically met
 3. When the use of variable gaging is impractical for the type of characteristic being measured
 4. To request waiver of all HSC16199 requirements for a specific KPC due to an alternate method of control
- KPC Management Forms apply only to characteristics controlled by variation management (KPC1s & KPC2s)
- The KPC Management Form is documented and stored in the COPS database
 - A completed [KPC Management Form 0996](#) must be included with the request submitted in COPS
 - Forms and Documents> Supplier Quality> DQR> HSC16199>KPC Management Form 0996
- For Instructions on submitting a Management Request through COPS reference the “COPS Overview”; Chapter 3E on the supplier portal

FOR ANY ADDITIONAL QUESTIONS OR
CLARIFICATION PLEASE CONTACT;

Process Certification Admin GPUTASCOPS@collins.com or your assigned SQAR