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I. Procedure Statement and Purpose

This document contains the procedure for Supplier Tooling Requirements for the Sentinel program and is applicable as indicated in the Site Applicability section of this document. Supplier Development Engineering is responsible for and has the authority to make changes to this procedure.

The purpose of this document is to outline the Special Tooling (ST) and Special Test Equipment (STE) requirements as flown down by Purchase Order (PO) codes or through PO notes. This instruction applies to all Special Tooling and Special Test Equipment on the Sentinel program as defined in Section III, "Definitions".

This instruction applies to parts/assemblies on the Sentinel program in which this document has been flowed down on the PO. This instruction applies to ST/STE funded with Purchase Order funds used to manufacture or inspect any components or assemblies that are delivered to Textron. This instruction does not apply to material directly delivered to Textron as a Purchase Order line item, rather the ST/STE used to manufacture or inspect that material.

This instruction is not applicable to the following items:

- Shop aids which are not used for inspection purposes
- General/special machine tools
- Consumables/expendable items
- Items purchased with IRAD funds for IRAD efforts
- ST/STE created as capital items with supplier funds and not captured under the Sentinel contract are not required to meet the requirements within this document

ST/STE shall be designed, manufactured, and inspected IAW this instruction (called out via PO Code D114). When source inspection is invoked, PO Code I301 (Legacy: 2Q) will be present and notification must be provided to Supplier Development Engineering through the use of the Source Inspection Request Form.

Suppliers shall notify Textron if any ST/STE is utilized in the manufacturing process. When Textron is notified of required ST/STE, Textron will request a copy of the drawing to release a part number against. This part number will then be added as a new PO or PO line item. Supplier drawings shall meet the requirements within this procedure.

II. External and Internal References

External References:	M234M, Supplier Tooling Manual FAR 52.245-1, Government Property
Internal References:	R79023-00703, SENTINEL SPECIAL TOOLING & SPECIAL TEST EQUIPMENT REQUIREMENTS SD-FORM-018, "Supplier Tooling Checklist"

III. Definitions

The terms "Special Tooling", "Special Test Equipment", and generic terms: "Tools" and "Tooling" are used throughout this process document. The use of the terms: "Tools" and "Tooling" consist of both Special Tooling and Special Test Equipment. Requirements that call out specific terms: "Special Tooling" and "Special Test Equipment" apply uniquely and not to both categories.

Special Tooling (ST)
Consists of custom jigs, dies, fixtures, molds, patterns, gages, or other equipment and other non-expendable manufacturing aids. ST does not include material, facilities, general or special machine tools, or similar capital items.

Special Test Equipment (STE)
Consists of an integrated test station assembly manufactured for special purpose testing. STE consists of custom items or assemblies of equipment that become a new assembly for special testing purposes. STE does not include material, facilities, and plant equipment items used for general plant testing purposes.

Shop Aid
Simple time and labor-saving devices made by the manufacturing shops. Shop Aids are not charged as a direct item of cost and are not accountable. Shop aids are not used for direct manufacturing or inspection purposes or considered ST and STE.

Expendable Items
Any commercial or non-designed, temporary tool. Generally, tools of low value that may be consumed within the manufacturing process. Examples include catalog items readily available on the open market, which, because of their size and/or nature are considered expendable. Drills, reamers, taps, snap gages, and all types of cutting tools are considered expendable tools, even though they are altered for production purposes and may be special in nature.

IV. Deliverable Data (From Sentinel SDRL SA025 Requirements)

Suppliers shall provide design information necessary to allow for the re-manufacture of ST based on the intended use. This documentation shall be provided with delivery

of material and be identified with the supplier's cage code and document numbers. This shall include, when applicable, the following items:

- Details of the process which are not published or generally available when required to achieve the engineering requirements of the tooling
- Performance ratings and tolerances
- Drawing dimensions, notes, and tolerances
- Critical manufacturing processes and assembly characteristics
- Tolerances input and output characteristics
- Diagrams
- Mechanical and electrical connections
- Details of material identification including heat treating and protective coatings
- Calibration information
- Environmental, Reliability, and Maintainability requirements

V. Numerical Controlled Data

Numerical controlled data applies to the software within CNC and CMM machines that is relied upon for production or verification of characteristics of the affected outputs. All CNC and CMM equipment shall be controlled IAW site-specific Calibration and/or Preventative Maintenance processes. CMM prove-out shall be performed IAW site-specific prove-out processes. CMM programs shall be proven out to ensure the following:

1. The programs properly identify the criteria required to produce or verify drawing characteristics
2. Identification of any specific methods/procedures required for implementation or monitoring of the process

Numerical controlled data will be required to be provided as evidence of tool proof during tool source inspections (when applicable).

VI. Customer Requests, Notifications, and Approvals

Throughout the design and manufacturing process for ST/STE, suppliers are required to obtain customer approval for various events.

Special Tooling Rework: Any modifications to ST made following final design approval that affect form, fit, or function require Textron approval. ST rework requests will require tool identification, a complete description, estimated cost, hours required, the reason for rework, tool rework schedule, and any potential impact on the part delivery schedule.

Special Tooling Adaptation: ST adaptation is defined as customer furnished tooling that may be used on equipment or in support of processes and manufacturing methods different from their initial intent which need to be adapted to perform properly. ST adaptation shall not occur without Textron approval.

STE Acquisition: Suppliers shall prepare a "Notice of Intent to Acquire" or equivalent for the acquisition of STE. This notice shall include certification that the STE or components thereof are not available in the supplier's inventory. This would apply when a system is acquired by the supplier and does not apply to the material/design required to develop the STE. This notice shall be on supplier letterhead.

Alternate Marking: If preferred or alternate methods of identification, as described in Section XII, "Methods of Identification", cannot be affixed due to size or functionality, Suppliers may request approval to utilize barcode tags and part number markings. If any additional marking type is required, this approval may also be granted upon request.

Provision of Tools: Suppliers are responsible for sub-tier use of program tools. Suppliers shall obtain Textron approval prior to providing any program tooling to sub-tiers. (Note: Program tooling consists of any ST/STE produced from contract/program funds).

Rejected Tools: ST/STE that are rejected during inspection shall be quarantined and controlled IAW supplier non-conforming material processes. Suppliers shall obtain approval prior to proceeding with tooling rework. The approval request shall include the estimated hours required for repair. Suppliers shall additionally apply a Supplier Tooling Limited Use and Hold Tag Form or similar.

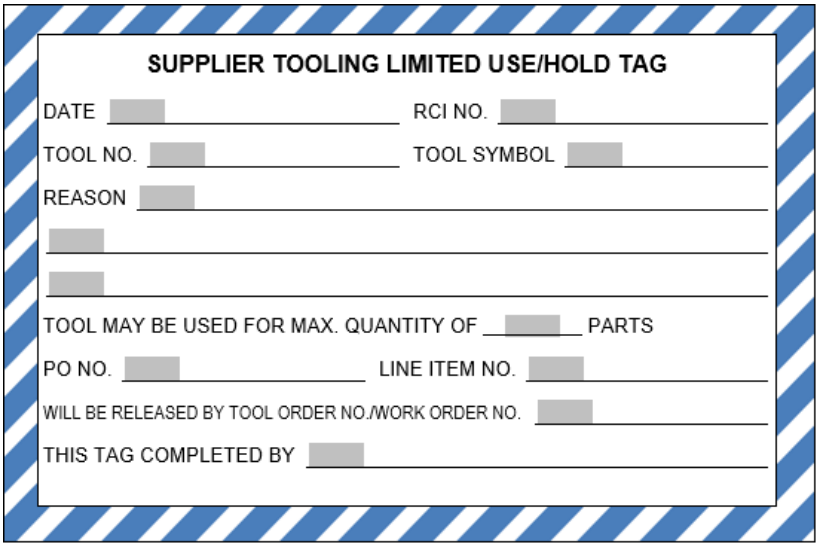


Figure 1 - Supplier Tooling Limited Use and Hold Tag Example

Seismic Events: When a seismic event occurs that impacts ST/STE as indicated in Section VII, "Maintaining and Handling of Tools", suppliers shall provide notification describing the seismic event and preliminary indication of damage incurred or risks involved with continued production including any in-process assemblies that are attached to ST/STE. Suppliers shall not continue until approval is granted by Textron.

Lost or damaged tools: Suppliers shall submit notification of any lost or damaged tools. Note: This includes degraded tools that the supplier deems can no longer be used.

VII. Supplier Requirements for Maintaining and Handling of Tools

Government Property: ST/STE shall be marked, handled, stored, and preserved IAW FAR 52.245-1 "Government Property". Be advised that you are liable for any loss of, or damage to, the property while it is in your possession. Seller shall provide the M-100 and/or ISC-021 form(s) via email to TS_PROPERTYADMIN01@TEXTRONSYSTEMS.COM, demonstrating compliance to this FAR clause. All equipment used to verify the acceptability of tooling shall be calibrated IAW supplier calibration processes.

Periodic Inspection: Periodic inspection, including proof loading (if applicable) and visual inspection, of ST/STE shall be performed on a 12-month cycle or prior to use if tools have been in storage longer than a 6-month cycle. ST/STE shall be adequately maintained through preventative maintenance and/or calibration systems as applicable. These records shall be retained and easily accessible.

Adhesive labels and/or identification plates shall be applied to tools that show the last periodic inspection and the next due date. When items are not suitable for adhesive or identification plates, a request shall be submitted to obtain a path forward. Items requiring proof loading shall additionally include a permanent tag with the next proof load due date present. The Periodic inspection system shall include the following:

1. Database containing tooling nomenclature, date of last inspection recall, name of person who performed the inspection, next inspection recall date
2. Written procedure specifically for conducting Recall and Periodic Inspection of tooling
3. Records (inspection logs) documenting periodic inspection results

Periodic tool inspections shall be documented along with any findings and be readily available for review upon request.

Periodic Tool Inspection Requirements: Supplier shall perform periodic inspection prior to use IAW general inspection items below. Visual inspection and/or measures shall validate the following (as applicable):

1. Tool is complete; inspection placard has (2) stamps applied (Prove-out stamp, acceptance stamp); all components are included and attached, as required
2. All lifting devices are attached and damage free. Safety wire is intact
3. Tool does not appear damaged or warped
4. Working surfaces are clean, corrosion free and maintain specified surface roughness requirements
5. Tool identification, tool setbacks, instructions, are all comprehensible and legible
6. Edges are not damaged, rounded, or irregular
7. Pins are straight and un-loosened
8. Bushings are not excessively worn or loose
9. All clamping devices are firmly attached. Ensure force or torque devices are properly adjusted and function properly.
10. Indexing and location devices do not appear worn, e.g. torque paint is intact, as applicable

11. Bolted and dowelled components do not appear to be damaged or moved. Torque paint appears intact.
12. All ancillary tooling devices work properly and (if applicable) are within calibration cycle dates
13. Laminated surfaces are free of cracks or detrimental surface blemishes
14. Verify measurable dimensions shown on the tool design or engineering drawing which affect accuracy of production parts.

Major Cycle Inspections: Major cycle inspections shall occur on a three-year basis for tools in continuous production. Tools not in continuous production will require major cycle inspections when moved or after 50 units are produced. Major cycle inspections shall consist of visual validation of key/critical tooling features to the tooling drawing to determine that the tool is acceptable for continued production use.

Seismic Events: When a seismic event with a magnitude greater than 4.5 occurs within a 50-mile radius of the assembly location take the following actions:

1. Immediately halt production and submit notification per Section VI, "Customer Requests, Notifications, and Approvals"
2. Validate key tooling features IAW Periodic inspection requirements above
3. Perform tool level check of 20% of the tools beginning with the largest and most complex tool
4. If any out of level conditions are discovered, inspect another 20% of tools
5. Continue to inspect in 20% increments until no out-of-level conditions are found
6. Re-level tool(s) found to be out of tolerance
7. Tools with product loaded will be leveled following completion of the in-process assembly, provided Textron approval is granted
8. Restrict further use of tool(s) until leveling can be completed
9. Await direction to proceed based on Textron review of notification/event

VIII. Acceptance of Tools

All ST/STE shall be inspected to verify that design, prove-out, and marking requirements are compliant. Records of inspection acceptance shall be retained for the duration of the program.

Prior to First Article Inspections (FAIs) on the program, individual ST/STE shall be proven out and may be required to be source inspected by Textron based on criticality of the ST/STE. When source inspection is required, PO Code I301 (Legacy: 2Q) will be present and will need to be performed.

Once the program transitions to production and is performing FAIs, successful FAIs on the final parts/assemblies created by ST/STE will equate to approval for any ST/STE used in the manufacture of the part.

Source Inspection Requirements: Textron source inspection will not typically be performed on ST/STE unless a concern arises based on the supplier's scorecard or the part is of a critical

nature to Textron. If source inspection is required per PO Code/Note, final tool acceptance will be contingent on demonstration of functionality and may require next higher assembly fit checks. Source inspection may include visual inspection, work order review, drawing review, review of inspection data, and documentation review (CofCs, approved NCs, etc.). Textron approval will include applying an acceptance stamp to the packing slip for each tool fabrication or rework accepted. Textron source inspections and audits of special tooling shall be performed IAW SD-FORM-018, "Supplier Tooling Checklist".

IX. Engineering Drawings

All ST/STE shall have electronic drawings uploaded and revision controlled with configuration management. ST shall be uploaded in a 3D graphic system format. The use of 2D files for STE is acceptable. ST/STE drawings shall include:

1. Tool Function: A statement identifying the tool's function
2. Tool Coordination: Identify all reference data, electronic models, or master tooling used in the fabrication of the tool
3. Tool Number: Part Number shall be IAW Section X, "Tool Nomenclature"
4. Standard Specification: Identify any applicable specification numbers (as required)
5. Tool Usage: Instructions shall be provided as supplemental information.

X. Tool Nomenclature

Drawings shall include the part number, tool symbol, and series number as defined below. Series numbers are only required if they fall into the criteria identified below. Drawings are permitted to use supplier-specific part numbers but shall provide a decoder on the drawing with a connection to a K0308 Part Number as provided by Textron. Material with supplier-specific part numbers shall be physically marked with the K0308 Part Number as noted in Section XI, "Tool Marking".

Permanent piece-parts within ST and STE assemblies do not require part marking IAW this manual. Any removable parts are defined as removable tools and shall be marked IAW the removable tools section of Section XII, "Methods of Identification".

Tool symbols: Tool Symbols shall be added after the base part number and shall be IAW the Tooling Symbols List (i.e. TK0311NN100000-1001 CFB) provided in Appendix

Tool Series: When tools are considered to be part of a series in which more than one tool contains the same part number and tool symbol identity but used to perform different operations, numerical series values can be assigned (i.e. TK0311NN100000-1001 CFB 0001, TK0311NN100000-1001 CFB 0002, etc.).

XI. Tool Marking

Removable Tools: when tools have removable components, other than standard parts, the components shall be identified with the following:

1. Complete tool identification number (tool number, symbol, series, multi)

2. Aggregate Detail Number (i.e. part 1 of 6, part 2 of 6, etc.). The only exception are tools that have multiple components that cannot be identified due to their usage (i.e. casting pattern components). This notation would instead say "Tool consists of XX total parts"
3. Weight (if over 25lbs)

Multiple Tools: When tools are duplicated for rate or multiple source requirements, an additional 4-digit Multi Number is added to the physical part marking (i.e. TK0311NN100000-1001 CFB 0001 0001, TK0311NN100000-1001 CFB 0001 0002 > both duplicates of TK0311NN100000-1001 CFB 0001). Note: This section would also apply in the case where two test stations perform the same operation but one is used as an interim test and the other is used as a production test).

All ST/STE shall be identified with the information below. This information may be positioned anywhere on the tool provided it does not interfere with the operation of the tool, will not be damaged through normal tool usage, and is readily visible when stored or in working positions. Drawings with supplier-specific part numbers with K0308 decoders present on drawings shall be marked with the K0308 part number preceded with a T (i.e. TK0308).

1. Supplier-specific drawing number (if applicable)
2. Part Marking IAW Section X, "Tool Nomenclature"
3. Program Designation - "Sentinel"
4. Engineering Drawing Revision Letter
5. Serial Number of the tool
6. Textron Contract PO Number - "5300017302"
7. Ownership Designation - "PROP OF USAF""
8. Date of Tool Acceptance
9. Date of Tool Prove Acceptance (as required)
10. Weight (as required – tools greater than 25lbs)
11. Engineering Drawing Revision Letter
12. Aggregate Detail # (if applicable per Section XII, "Methods of Identification")

Supplier-specific Drawing Number (If Applicable)	79023-41610-10
Tool Number, Symbol, Series, Multi	TK0308NP000000-1001 CFB 0001 0001
Program| Drawing Revision	Sentinel | Rev A
Serial Number | Sentinel PO #	SN 123456 | 5300017302
Ownership	PROP OF USAF
Inspection Date and Stamp	INSP 1/28/2025 (STAMP)
Tool Prove Date and Stamp	PROVE 2/13/2025 (STAMP)
Weight (if over 25lbs)	WT – 1800 LBS
Aggregate Detail # (if applicable)	Part 1 of 3

*Figure 2 - Tool Identification Tag Example **(Items in Red should not change)***

XII. Methods of Identification

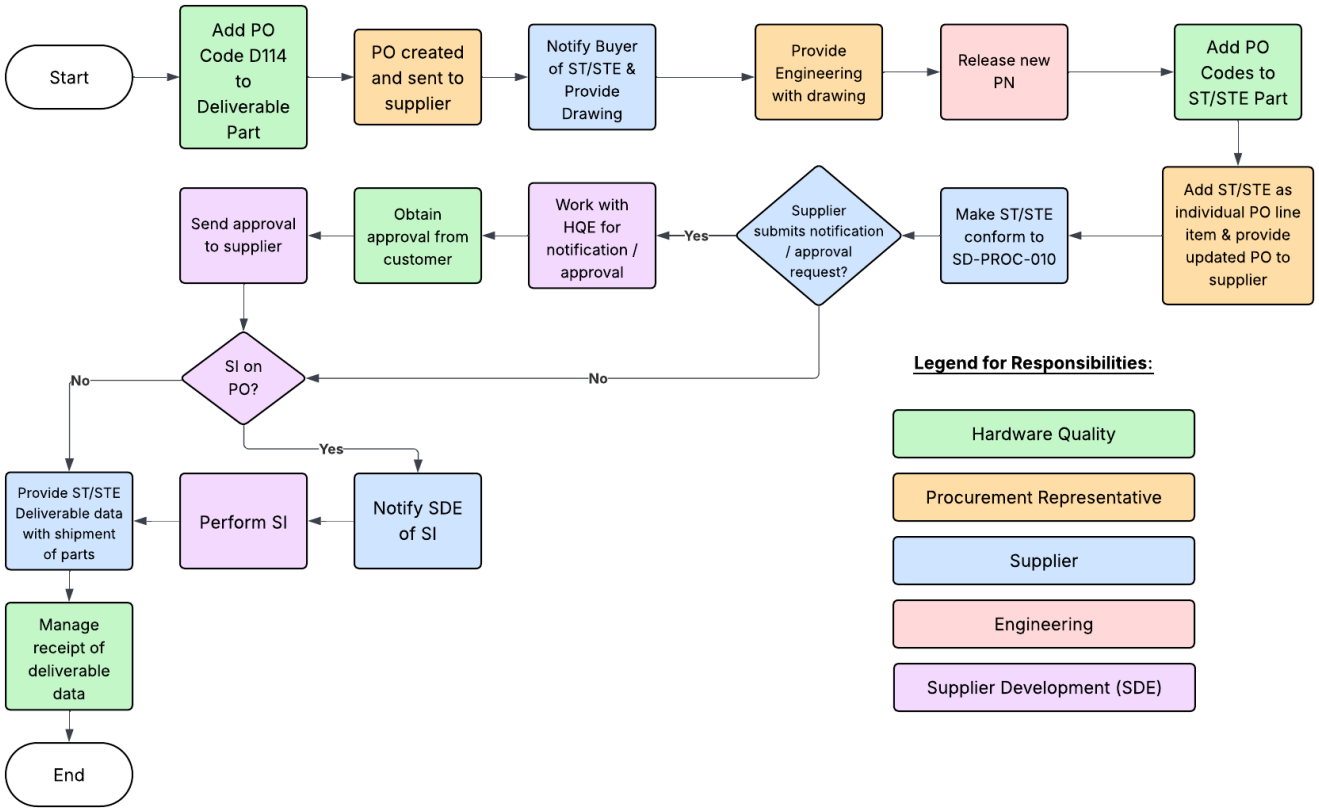
Preferred: Steel stamping is the preferred method of tool identification and shall be used at all times unless the use of stamps would damage, impair the use of the tool, or an alternate method is required by specification or approved tool design. When possible, identification should be steel stamped directly on hard tooling with 1/8" steel letter and number stamps.

Alternate: When alternate methods are required per the above, the following other methods may be utilized in order of preference:

1. Electric or air pencil on aluminum template via a tool tag affixed to the tool
2. Electro-etching
3. Scribing
4. Painting (containers only)

When the preferred and alternate methods of identification above cannot be met, approval may be granted per Section VI, "Customer Requests, Notifications, and Approvals".
When a tool is reworked to support a new configuration, the identification on the tool shall be changed as required.

Appendix A: Flow Chart



Appendix B: Tooling Symbols

Tool Symbols and Descriptions		
Symbol	**Tool Name**	**Description**
ABF	Attached Boring Fixture	Tool that indexes to an aircraft component to bore critical holes that are inaccessible to conventional machine operations.
ACT	Alignment and Check Tool	Tool providing means of determining positional location and used in resolving problems of rigging or verifying structural relationship.
ADJM	Auto Drill Jig Major	Major component tool used to locate, hold major components in place for drilling, assembly, and auto-drilling. This tool is the same as a Floor Assembly Jig (FAJ) but has added features for line transfer and re-index to another component station.
ADRM	Auto Drill Restraint Minor	A sub-tier fixture used to locate, hold parts and subassemblies in place for drilling, assembly, including auto-drill. Has added features for line transfer then re-index to another component station.
ADT	Apply Drill Template	Template made to nest against formed parts. Locates and defines hole locations for drilling operations.
AJ	Assembly Jig	Special tool built to support several parts or small assemblies in properly related positions so drilling and fastening can be easily accomplished.
AJA	Assembly Jig Accessory	Tool that is used in conjunction with another tool such as a primary major assembly tool such as an Assembly Jig (AJ).
ALM	Assembly Line Manifold	A designed manifold used on the assembly line that the product structure resides within during the cure of composite material. Uses a containment and distribution system that covers large portions of the structure to cure multiple areas simultaneously or used for large broad acreage cures, using convection heating. Does not include capital equipment that would be required to support the ALM, such as the heating source or controller.
ALO	Assembly Line Oven	A designed oven used on the assembly line for curing of composite material. Uses a containment and distribution system that covers large portions of the structure to cure multiple areas simultaneously or used for large broad acreage cures, using convection heating. Does not include the heating system or controller.
APST	Apply Paint Spot Template	Flat or slightly contoured template that carries holes which correspond to fastener locations.
APT	Apply Trim Tool	Made to nest against formed parts. Guides router for trimming operations.
ASMT	Assembly Template	Tool used in bench assembly, subassembly, and major assembly for locating, drilling holes, for transferring points, or for locating uses.
ATC	Assembly Transportation Cart	Used in a lean production environment to move large parts such as skins. Eliminates the need for overhead handling. Normally a wheel-based dolly which is designed to allow part transfer to major components or fixtures.
ATDT	Apply Trim and Drill Template	Template made to nest against formed parts. Used by locating to products to define trim lines and hole locations.
ATS	Assembly Transfer Station	Docking station which supports assembly or tool transfer from one tool to another.
ATT	Apply Trim Template	Template made to nest against formed parts. Used to locate and define trim lines for trim operations.
BD	Blanking Die	A male and female die, by which shearing action cuts or blanks the outline of a part in a flat pattern.

BF	Boring Fixture	Fixture with clamps and supports mounted on a base used for positioning part in line with center of spindle for boring operation. Tools may have indicating holes for positive alignment of bore and set blocks for depth of bore.
BI	Bending Iron	Tool used to bend flat glass to proper contour.
BMF	Boring Mill Fixture	A tool assembly consisting of a machine setup (holding fixture, tracing cam or model, cutter, and other accessories) used on the tracer boring mill for machining two- or three-dimensional contours of a part.
BOF	Bonding Fixture	Tool used to hold relationship of matched sets of parts which will be bonded together by application of adhesives, heat, and pressure. Tool may be externally or internally heated depending on part configuration and adaptability to standard autoclave, oven, or portable heating methods.
BPB	Blank & Pierce Die	A male and female die used to stamp out blank pieces from sheet metal and pierce holes in the blanks. Depending on the contour and number of holes, the die may be compound or progressive.
BST	Block Size Template	Template used to assist with verifying the size of a piece of glass (Pressing Plate Template).
BT	Bladder Tool	A pressure intensifier using a bladder to force parts to a desired location.
BTH	Bladder Tool with Heat	A pressure intensifier using a bladder that forces parts to a desired location with a heat element to provide curing.
BXD	Blank Pierce & Form Die	A combination tool for forming, along with piercing and blanking. A drawing ring and/or stripper plates are usually included. It may be a single operation die where the part is produced in one hit, or a progressive die where the blanking, piercing, and forming are done in separate but simultaneous operations while the material is moved through the die.
CBD	Cutting Board	Tool used to assist with the initial cutting of glass after it has been bent to contour (B-Lite or Pressing Plate).
CBT	Core Bond Tool	Tool of composite or metallic configured to support and bond core together.
CCF	Contour Check Fixture	Checking fixtures to verify the contour of a glass part (B-Lite Cutting Cradle or Pressing Plate Cutting Cradle).
CCT	Composites Cutting Template	A flat template is used for cutting composite materials to the required size.
CCX	Composites Cutting program	Numeric Controlled data used for cutting composite materials to a required size.
CFA	Curing Fixture Aluminum	Fixture that holds or positions details of pre-impregnated composite plies for subsequent curing operations using adhesives, heat, and pressure. May be heated internally or externally by oven, hot platens, or autoclave, depending on part configuration and process required. Pressure may be applied by mechanical methods, pressure plates or vacuum bags but not restricted to this media. Made of aluminum, either billet, or welded of multiple pieces.
CFB	Curing Fixture BMI	Fixture that holds or positions details of pre-impregnated composite plies for subsequent curing operations using adhesives, heat, and pressure. May be heated internally or externally by oven, hot platens, or autoclave, depending on part configuration and process required. Pressure may be applied by mechanical methods, pressure plates or vacuum bags but not restricted to this media. Face sheet is Bis-Maleimides (BMI) laminate.

CFCF	Curing Fixture Carbon Foam	Fixture that holds or positions details of pre-impregnated composite plies for subsequent curing operations using adhesives, heat, and pressure. May be heated internally or externally by oven, hot platens, or autoclave, depending on part configuration and process required. Pressure may be applied by mechanical methods, pressure plates or vacuum bags but not restricted to this media. Structure made of machined carbon foam and covered with Bis-Maleimides (BMI) prepreg.
CFFP	Curing Fixture Fiber Placement	Tool attaches Cure Fixtures of varied material types to mount Cure Fixture to mandrel rotators for fiber placement. Tool defines contour of a part in support of fiber placement machine with a reference system for laser ply imager of a material to support the desired cure temperature.
CFI	Curing Fixture Invar	Fixture that holds or positions details of pre-impregnated composite plies for subsequent curing operations using adhesives, heat, and pressure. May be heated internally or externally by oven, hot platens, or autoclave, depending on part configuration and process required. Pressure may be applied by mechanical methods, pressure plates or vacuum bags but not restricted to this media. Made of Invar, either billet, or welded of multiple pieces.
CFM	Cure Fixture Mandrel	Used to fabricate composite detail parts (spars, ribs, channels.) by concurring or two stage process.
CFMM	Curing Fixture Matched Metal	Fixture that holds or positions details of pre-impregnated composite plies for subsequent curing operations using adhesives, heat, and pressure. May be heated internally or externally by oven, hot platens, or autoclave, depending on part configuration and process required. Pressure may be applied by mechanical methods, pressure plates or vacuum bags but not restricted to this media. Matched metal mold made of Invar, either billet, or welded of multiple pieces.
CFPP	Composite Fiber Placement Program	Verified and controlled digital programs used for fiber placement by multi-axis Tow Placement machinery.
CFS	Curing Fixture Steel	Fixture that holds or positions details of pre-impregnated composite plies for subsequent curing operations using adhesives, heat, and pressure. May be heated internally or externally by oven, hot platens, or autoclave, depending on part configuration and process required. Pressure may be applied by mechanical methods, pressure plates or vacuum bags but not restricted to this media. Made of steel, either billet, or welded of multiple pieces.
CHF	Core Handling Fixture	Structure made for sole purpose of supporting and transporting large, contoured honeycomb core details.
CKF	Checking Fixture	Tool used to simplify inspection of parts too complex to efficiently inspect by conventional measuring methods. Usually consists of structures which will hold part in a fixed position by means of datum control, enabling users to easily inspect through use of gauges or inspection probe.
CKT	Checking Template	A flat pattern layout template made of metal or mylar used for reference in fabrication and inspection of detail parts or assemblies in various stages of fabrication. Provides engineering configuration with dimensional data, when the complexity of a Checking Fixture (CKF) is not required.
CLF	Clamping Fixture	Tool used in locating and clamping components during operations.
CM	Control Master	Master Gauge used for the purpose of coordinating multiple Master Gauges.

CMCD	Coating Machine Control Data	Computer program used by Numeric Control to drive a Computer Numeric Controlled coating machine.
CMD	Compression Molding Die	A die that conforms to the surface configuration of a part made of plastics, pre-impregnated molding compounds, or raw materials such as polyethylene and acrylic.
CMF	Core Mill Fixture	Tool used to locate and hold honeycomb core during shaping operations. This tool may include multiple positions for different stages of the process.
CMT	Chem Mill Template	Template which establishes scribe lines to which masking material is trimmed before actual chem mill operation.
COF	Combination Fixture	A tool to hold parts in proper relationship to each other for more than one type of operation, such as drilling, milling, boring, and milling. (not to be used for single operation tools).
CS	Caul Sheet	A plate covering all or part of a detail or assembly, used to reduce surface wrinkles and or to intensify pressure in a specific area during the cure cycle. It is also used on metal bonded details and/or assemblies for the same purpose. Also known as RCCS which is a rubberized Caul Sheet. CS should be used when a hard Caul Sheet is necessary.
CSP	Caul Sheet Pattern	Fixture used for holding a soft (rubberized) caul sheet material in position while being machined or trimmed. Fixtures will be contoured to match the caul sheet profile.
CT	Contour Template	A flat template made to a mold line for the purpose of mastering the contour of another tool or workpiece.
CTF	Cure Trim Fixture	This tool serves the purpose for lamination, cure, and trim. May be a mandrel, flat, contoured tool, defining one or multiple parts. May contain trim lines, tooling holes, and a cutter groove for trimming on assembly. Used to provide dimensional authority for fabrication of related composite tools.
CTM	Composite Tool Mandrel	Contoured source tool defining one or multiple parts. May contain trim lines and tooling holes. Used to provide dimensional authority for fabrication of related composite tools. Made of Bulk Graphite.
DD	Draw Die	A form die that controls the flow of sheet materials while forming into deep cuplike shapes. It is used in conjunction with power press equipment capable of deep-draw operations. Material is restrained under pressure by means of a blank holder (draw-ring) while being drawn into the die by action of the punch.
DF	Drill Fixture	Fixture for locating and holding part(s) while performing processes as drilling, reaming, and spot facing operations are being performed. Specific to hand operations.
DHD	Drop Hammer Die	Matched male and female dies used to form parts with intricate contours by impact on a Drop Hammer press.
DJ	Drill Jig	Assembly tool which holds a part or assembly for drilling. The tool can be clamped to the product for operations to be performed with drilling equipment to definite specifications.
DPF	Drill Plate Fixture	Apply-type tool containing bushed holes for the purpose of adding special holes. Often used on an assembly where pre-drilled holes would not be acceptable.
DT	Developed Template (Layout)	A flat pattern layout of a detailed part, projected into one plane, showing all data essential to cutting, trimming, drilling, forming, scarfing, and joggling. A Development Template serves as the primary tool for sheet metal fabrication and inspection operations. Provides engineering configuration with dimensional data in lieu of drawing references.

FAJ	Floor Assembly Jig	Primarily a floor-based tool used to facilitate locating, clamping parts and subassemblies in place for processes in assembly, hand drilling, and auto drilling. Typically used for major components.
FD	Form Die	A forming tool composed of a punch and die used with power press equipment for various types of metal-forming operations, such as bending, joggling, crimping, dimpling, curling, drawing, squeezing, and coining, by bending or flowing the material.
FOD	Forging Die	A cavity type dies in which a hot billet is hammered by a ram or forging press.
FTTO	Functional Test Tool	A tool capable of functionally checking a part, assembly, or system by simulating its actual operation. This may involve mechanical, electronic, electrical, hydraulic, or pneumatic principles. Unique calibration requirements are based on tool function.
GG	Go Gauge	Fixture used to check the final overall size of bent glass (B-Lite).
GT	General Tool	Can be used as a base tool for indexing into Numeric Controlled machines.
HCUF	Honeycomb Curing Fixture	Tool that holds or positions honeycomb core with hex ply in subsequent curing operations using heat along with pressure. Heat may be applied internally, externally by oven, hot platens, or autoclave.
HFD	Hydro-Form Die	A die consisting of a punch and draw ring only. Hydroforming is a simplified method of producing deep drawn shapes from sheet materials. This method differs from conventional deep drawing in that a special press is employed having a hydraulic actuated flexible diaphragm in place of the conventional “hard” female.
HFLA	Holding Fixture Line Accessory	Used in a lean production environment to move tools through the production line. Eliminates the need for overhead handling. Normally a wheel-based dolly.
HFT	Hot Form Tool	An externally or integrally heated form die used to hot form a work piece with some mechanical means of operating the die halves and applying forming pressure. This die is suitable for severe contours and may contain draw beads for stretching to overcome wrinkles in shrink areas.
HJ	Handling Jig	Structure is made for the sole purpose of supporting or transporting a heavy assembly.
HJA	Handling Jig Accessory	Tool that is used in conjunction with another tool such as a primary major assembly tool such as a Handling Jig.
HOE	Hoisting Equipment	Equipment such as slings and rigs, used in hoisting work pieces, assemblies.
HOFX	Holding Fixture	A floor-based tool that supports an aircraft component during final component assembly. This tool may provide part- or subassembly locators.
HOMF	Honeycomb Milling Fixture	Holding fixture with a base plate that indexes to desired machine and locators for supporting honeycomb core while being machined to desired configuration.
HSD	Hot Sizing Die	Forming tool consisting of match punch and die which normally completely encloses part. Parts placed on Hot Size Die are usually partially pre-formed and are hot sized to finished dimension.
HTD	Heat Transfer Device	Designed heating blankets used for localized cure of composite materials.
HTF	Heat Treat Fixture	A fixture with clamps and supports mounted on a firm base used to hold a part or assembly sufficiently rigid to maintain dimensional stability during the heat-treat operations.
ICM	Investment Cast Mold	A metal mold into which wax is poured to create a pattern. This pattern is covered with a ceramic mixture that forms the actual mold into which molten metal is poured to create a casting of a very intricate design. This process is sometimes referred to as the "Lost Wax" process.

ICT	Interchangeability Control Tool	A non-designed master that is the dimensional authority for the construction and control of production tools. It establishes the relationship between holes, surfaces, contour of a specific part, mating part or a portion thereof. Its purpose is to ensure the interchangeability of parts and to coordinate related tools.
IJ	Installation Jig	Positioning tool consisting of structure with locating and clamping details used for supporting parts or an assembly in its proper location.
IM	Injection Mold	A mold used to make thermoplastic parts in an injection molding machine – can involve multiple cavities.
IMF	Inspection Machine Fixture	Tool used to simplify inspection of parts too complex to efficiently inspect by conventional measuring methods. Usually consists of structures which will hold part in a fixed position by means of datum control, enabling users to easily inspect through use of gauges or inspection probe.
INFX	Inspection Fixture	A check fixture for castings and forgings.
JM	Jig Master	Control tool used to establish basic contours, trim, trim lines, hole patterns, and hinge axis. Used for dimensional control during construction of mating production tools.
JMA	Jig Master Accessory	Used with one or more master's and add to the function of a master. Facilitates use of a master or to aid in fabrication of individual masters but are not part of a master.
JMRF	Jig Master Rigging Fixture	Used to rig a master to a particular tool for the purpose of mastering.
LP	Laser Projection	Digital program for the use of the laser projection system to project engineering geometry onto the workpiece for the positioning of pre-cut materials.
LT	Locating Template	A flat or formed template used for orientation of holes and parts. May be used for assembly operations that do not require the rigidity of an Assembly Jig (AJ).
LUM	Lay-Up Mandrel	Used to fabricate composite detail parts (spars, ribs, channels.) by concurring or two stage process.
MCD	Machine Control Data	A controlled digital program used for machining.
MCDG	Machine Control Data Gerber	A controlled digital program used for numeric controlled Gerber ply cutting machine.
MECM	Manufacturing Engineering Control Model	Model or digital programs that are used in the verification of component/s, feature location, and on occasion the projection of work instructions.
MF	Milling Fixture	Fixture with clamps and supports mounted on a base used for holding a part during milling operations. In many cases, numeric controlled set and clock points will be included.
MIF	Machine Index Fixture	Tool used to locate, hold major tools or subassemblies in place for drilling, precision milling, along with auto drill. Typically, a large superstructure which also mates or completes major airframe parts.
MLO	Master Layout	Accurate full scale developed layout of a sheet metal part or group of parts forming an assembly. Made of mylar or equivalent.
MM	Master Model	Three-dimensional mock-up of a contoured Outer Mold line surface section of the aircraft. May contain trim lines and hole patterns for the purpose of mastering contoured parts. Made of plaster, plastic, foam or metallic.

MOF	Mold Form	Fixture that holds or positions details of pre-impregnated composite plies for subsequent curing operations using adhesives, heat, and pressure. May be heated internally or externally by oven, hot platens, or autoclave. Depending on part configuration and processes required. Pressure may be applied by mechanical methods, pressure plates or vacuum bags but not restricted to this media.
MST	Miscellaneous Service Tool	Expandable tool required for assembly of flightline operations, which includes items such as wheel chocks, pitot tube covers and control surface locks.
OAF	Optical Alignment Fixture	A support structure for optical equipment such as a telescope and target. Used when components of a tool or product are to be aligned optically prior to assembly.
PA	Pallet Assembly	A flat support representing a mobile machine bed which can be preloaded with multiple tools and parts, which is then loaded onto machine bed to perform machining on multiple parts.
PALS	Position and Alignment System	Vehicle section mating and alignment system which facilitates the usage of jacks, laser trackers, computers, and software.
PB	Press Block	A male die half forming tool that conforms to the surface configuration of the part and is used as the basic tool for forming when pressure or impact is externally applied. Allowance for spring back is usually built into the block.
PCF	Paint Cell Fixture	Used to position components in relation to the robotic paint delivery system, or for hand spray applications.
PCFF	Post Curing Form Fixture	Fixture with base form, press cover and clamps. Used to maintain dimensional integrity of "B" stage part while being post-cured.
PCM	Permanent Casting Mold	A metal mold capable of withstanding high temperatures and corrosive action of the molten metal poured into it to create a shape. Inserts may be used to make different parts in the same mold. These castings must be machined and have holes drilled to complete parts to blueprint requirements.
PFD	Precision Forging Die	Die used to produce precision forgings. Made from high strength materials to near net shapes, requiring minimal, if any, post machining operations. Minimal draft angle (< 1 degree) is utilized in the die construction.
PHF	Process Holding Fixture	Structures that are made for supporting, rotating, and transporting through nondestructive test operations.
PLM	Plastic Laminating Mold	A single-surface mold that is used to form certain production parts composed of sheet plastic, glass cloth laminates, reinforced resin, and other equivalent type materials involving simple application of heat and pressure for drape forming techniques.
PMF	Profile Mill Fixture	Fixture with vacuum clamping and or mechanical clamping used for holding a part in position while being machined. Fixture will have index features for the part and Numeric Control set and clock points for machine indexing.
PMU	Plaster Mock-Up	Full-size three-dimensional model of a section of the aircraft with smoothly faired plaster surfaces.
PPA	Project Plate Autoclave	A large metallic plate that may be internally plumbed for vacuum. Various small cure tools such as stiffener or rib tools are placed on the project plate for curing in the autoclave. One vacuum bag encloses all of the small cure tools positioned on a PPA.
PS	Production Sample	Accurately constructed facsimile of a production part, assembly or portion of either one. Used by production as a tool in support of fabrication and assembly operations. Made of plastic or metallic.
PSD	Protection Service Device	Accountable tool to provide protection to some portion of the aircraft or safeguard service personnel from hazardous operating conditions.

PST	Paint Spot Template	Flat or slightly contoured template that carries holes which correspond to a fastener pattern.
PTDJ	Portable Trim and Drill Jig	Drill plates using drill bushings made to nest against formed parts. Locates and defines hole locations for drilling and trimming operations.
PUJ	Pick-up Jig	Assembly tool used to hold structural assemblies for installation of fasteners or details not installed in the Assembly Jig (AJ, FAJ). Also used for systems installation, test and Quality Assurance (QA) inspection.
QMCD	Quality Machine Control Data	Computer program used by QA to inspect Numeric Control (N/C) machined parts or tooling.
RCCS	Rubber Cast Caul Sheet	A plate covering all or part of a detail or assembly, used to reduce surface wrinkles and provide intensify pressure in a specific area during the cure cycle. It is also used on metal bonded details and assemblies for the same purpose. Also known as CS which is a hard Caul Sheet. RCCS should be used when a rubberized Caul Sheet is necessary.
RF	Riveting Fixture	A tool that supports assemblies for convenience in riveting operations.
RGFX	Rigging Fixture	Used when large assemblies or systems must be lifted, then installed underneath the aircraft. Such as doors, APU's, or engine mounts.
RSF	Rail Support Fixture	Assembly rail used to support assemblies in a continuous flow assembly line. The RSF system will be capable of supporting and transporting the Engineering Assembly along with Tooling. During the assembly process providing forward and reverse motion, as well as up and down motion.
RTM	Resin Transfer Mold	A lay-up mold used for production of resin infused parts. Generally made of Invar.
RVB	Re-Usable Vacuum Bag	A reusable vacuum bag utilized on the interior of parts or ducts during composite cures.
RVM	Reduced Volume Manifold	Using a contained volume or a containment system with a supply of circulating heated air used on the assembly line for curing composite material. Using containment and/or distribution system that rests within the product structure. Easily portable does not include the equipment that would be required to support the RVM, such as the heating source or controller.
SAF	Saw Fixture	A tool with clamps, supports, and saw guides mounted on a base to support a part during saw operations.
SC	Scaffolding	Work stands, platforms, or portable stairways that are used to support workers in their activities around the airplane and tooling.
SD	Stretch Die	A male die against which sheet metal is formed by stretch wrapping on a stretch press.
SE	Support Equipment	Includes all equipment required to perform a support function, except that which is an integral part of mission equipment. SE includes tools, test equipment, Automated Test Equipment (ATE), organizational, field, depot support equipment, related computer programs, and software.
SFT	Spin Form Tool	A form pattern used on a spinning machine or lathe over which sheet metal, or tubular parts are spun to the desired shape by means of pressure applied with a collar ball tool. Allowance is made for spring back.
SHFD	Super-Plastic Hot Form Die	Tool used in mechanical or hydraulic press, having electrically heated platens and capable of providing loads required for completing peripheral seal around edges of part. Also counteracts argon gas pressure during forming.
SHR	Shipping Rig	A type of holding fixture mounted on an over-the-road trailer for transporting a work piece or assembly.

SJ	Secondary Jig	Holds a part or an assembly to prevent movement or distortion during secondary operations that do not require locating features like an Assembly Jig (AJ).
SK	Sketch	Small information drawings that are used to furnish information to tooling shops or manufacturing organizations.
SLF	Skin Locating Fixture	A precision machined metal tool with provisions for laser tracker targets which is used for the close tolerance location of fixed skins.
SLG	Sling	Lifting devices made of cables, chains, or nylon straps used as connection between hoist and assembly for the purpose of transferring that assembly to another location.
SMD	Slush Mold Die	Split mold open at one end whose inner surface duplicates outer surfaces of plaster mockup. May be used to produce Salt Mandrels.
STE	Special Test Equipment	Single-purpose or multi-purpose integrated test unit that is engineered, designed, fabricated, or modified to accomplish a special purpose testing in development and production phases.
STR	Storage Rack	A configured rack used to hold or store tools, parts, and assemblies.
SWD	Swaging Die	A forming tool, typically used on rotary and ram type equipment, specifically for changing the diameter in localized areas of tubular or solid rod materials. It involves considerable plastic flow of the metal to obtain cross-sectional reduction or increase. An SWD can also be used in a swaging machine for securing terminals to cables.
TAF	Trunnion Assembly Fixture	Tool that supports access to the assembly process from each side to facilitate access.
TFD	Thermoform Die	A forming tool consisting either of a male or female die. Used to form thermo-plastic sheet material by restraining the sheet, heating to plasticity, and draping over the form die
TFT	Tube Forming Tool	Tools used for tube forming operations, including beading dies, flaring dies, and special shape upsetting dies.
TSF	Transportation Shipping Fixture	Fixture to hold major assemblies in position for shipment between sites. Compatible with shipping container design or mate station design (PALS). Used for assemblies that need to be held to shape while moving from site to site.
VBST	Vacuum Bag Source Tool	Source tool for vacuum bags.
VMD	Vacuum Mold Die	A tool used in a hot process to fabricate parts by applying a vacuum to a forming block shaped to the appropriate contour of the designed part. Typically used to form sheet plastic, glass cloth laminates, reinforced resin, and other equivalent type materials.
VMF	Vacuum Mill Fixture	Fixture that will clamp part or assembly using vacuum. May also have mechanical clamps and part index features. Cradle's part with a high presence of mold line contact, mounted on a base used for holding a part during the milling operations. In many cases N/C set and clock points will be included.
WA	Welding Accessory	Any accessory required in welding operations that does not require the complexity of a Welding Jig (WJ).
WJ	Welding Jig	Supporting structure with provisions for holding two or more details of a welded assembly in proper relationship and in a position to facilitate welding operation.
XCLF	Experimental Clamping Fixture	Tool used in locating and clamping parts, and assemblies during cure operations. Used mainly for strain gauge installation.

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