

Design Delegation Seminar 2019

Conformity Process



Greg Baum - CAA

Why conform?



“The aircraft is the design that passed the tests”



When is conformity required?



Rule Part 21 Subpart B

21.35 Inspections and tests

(a) Each applicant...(TC,STC)..shall inspect and test a product of the type to ensure that—

- (1) the product complies with the applicable airworthiness requirements; and
- (2) the materials and product **conform** to the specifications in the type design; and
- (3) all parts of the product **conform** to the drawings in the type design; and
- (4) the manufacturing processes, construction and assembly **conform** to those specified in the type design.

Rule Part 148 Subpart A

148.11 Privileges

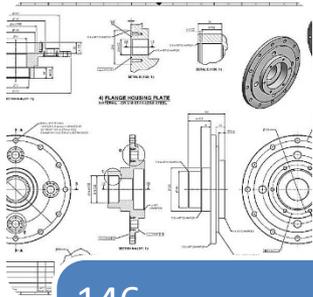
(c) A holder of a manufacturing organisation certificate may issue a CAA Form One ... for a manufactured item indicating that the item **conforms** to the type design for the item and is in a condition for safe operation.

Rule Part 43 Subpart E

43.205 Certifying requirements

Each person certifying conformity of an aircraft or aircraft component following a major modification or a major repair shall, before certifying to that effect, ensure that the modification or repair **conforms** to the applicable technical data acceptable to, or approved by, the Director.

Conformity steps



146

- Prototype data (drgs, specs)
- Checking

148/145/LAME

- Prototype manufacture
- Conformity

146/CAA

- Validate conformity
- Witness compliance test
- Approve final data

148

- Manufacture production parts/product
- CAA Form One conformity

Test article conformity process



Prior to Testing

- Prototype data released for manufacture
- Prototype parts manufactured (and installed)
- If CAA involved: applicant will notify CAA 10 working days prior to inspection per PSCP (longer required for overseas inspections).

During Inspection

- Applicant will have completed Statement of Conformity (8130-9, CAA Form One)
- Part 146 or CAA will sample and complete Conformity Inspection record (8100-1)
- Decision: do deviations prevent testing

Responsibilities



Applicant is responsible for conforming all parts & processes, but...

AC146-1

The design organisation should ensure that the manufacturer/assembler has—

- the necessary drawings and documents
- a quality control system that ensures the prototype reflects the designer's concept

**CAA/146 is responsible for testing the validity of the applicant's
Statement of Conformity**

CAA/146 role



Amount and focus of sampling determined by:

- The complexity of the product/parts
- The effect on aircraft safety (criticality) of the product/parts
- The use of new and novel materials, methods of construction and manufacturing technologies
- The Applicant's experience in the manufacture of the products/parts
- The number and extent of inspections used throughout the Applicant's manufacturing process e.g. destructive, NDT etc.

Give a level of confidence in the applicant's conformity.

1. Approving Country CAA/New Zealand		2. AUTHORISED RELEASE CERTIFICATE CAA Form One			3. Form Tracking Number	
4. Organisation Name and Address:					5. Work order/Contract/Invoice	
6. Items	7. Description	8. Part Number	9. Qty	10. Serial Number	11. Status/Work	
12. Remarks						
13a. Certifies that the items identified above were manufactured in conformity to: <input type="checkbox"/> approved design data and are in a condition for safe operation <input type="checkbox"/> non-approved design data specified in block 12				14a. <input type="checkbox"/> CAR 43.105(b) Release to Service <input type="checkbox"/> other regulation specified in block 12 Certifies that unless specified in block 12, the work identified in block 11 and described in block 12, was accomplished in accordance with Civil Aviation Rules Part 43 and in respect to that work the items are considered ready for release to service.		
13b. Authorised Signature & Number		13c. Certificate/Approval Number		14b. Authorised Signature & Number		14c. Certificate/Approval Number
13d. Name		13e. Date (dd/mmm/yyyy)		14d. Name		14e. Date (dd/mmm/yyyy)

Statement of Conformity



	Form Tracking No:
Project:	Work Request:

Section I – Aircraft (or component thereof)

Make/Description:	Model/Part No:
Serial No:	Registration No:

Section II – Engine

Make:	Description:
Part Number:	Serial Number:

Section III – Propeller

Make:	Description:
Part Number:	Serial Number:

Section IV – Certification

I hereby certify that:

- A. I have complied with rule 21.35(b).
- B. The engine or propeller described above, presented herewith, conforms to the type design.

Deviations:

Deviations

- Has applicant captured these for action later?
- Has applicant considered impact of deviation on test?

Signature of Certifier:	Title:
Organisation:	Date:

Statement of Conformity 8130-9 is Applicant's responsibility.

Signed by an authorised person:

- Part 148 Form One / Statement of Conformity holder;
- IA for STC or major design change;
- LAME for Minor design change;
- Other person specified in PSCP

Conformity Inspection Record

1. Work Request Number: 16/218/44	2. Sheet of Sheets 1 1	
3. Request for Conformity tracking No: FBNC0044	4. Statement of Conformity tracking No: FBNSC0044	
5. Applicant/Manufacturer: FLY. BY NIGHT LTD	6. Beginning Date: 20/6/2016	
8. Model: AS350 B4 (PARTIAL TEST ASSY)	9. Inspected By: G. BAUM	10. Signed: GJB

11. Item No:	12. Nomenclature of Item Inspected	13. Drawing, Document, Specification etc.	14. Revision and date	15. No. of Items		16. Comments
				Satis.	Unsatis.	
1.	BIKE RACK ASSY	FBN.001.D01	P1 20-5-16	✓		BOLT ITEM 21 DIFFERENT IN ONE PLACE (FRONT) AND BOLT PATTERN DIFFERENT • ROD USED INSTEAD OF PIP PIN IN CLAMP
2.	CLAMP ASSY PARTS	FBN.001.D02	P2 21-5-16	✓		SAMPLE DIMS OK.
3.	BIKERACK STUD CLAMPS	FBN.001.D04	P2 20-5-16	✓		SAMPLE DIM'S OK. MATEL 6061-T6 CERT'S OK.
4.	GUSSET PLATE	FBN.001.D10	P3 22-5-16	✓		SAMPLE DIMS OK. ANODISE FINISH DOC'S IAW. DRG SPEC.
5.	RH BASE ASSY	FBN.001.D12	P1 20-5-16	✓		PRODUCTION FINAL INSPECTION RECORD UNSIGNED.
ALL	TOO641	TOOL:VERNIER CALIPER	CAL.DUE 1-1-2017	✓		MEASUREMENT TOOL USED FOR INSP

Sample 8100-1



Conformity Inspection Record		1. Work Request Number: 16/218/44		2. Sheet of Sheets 1 1		
		3. Request for Conformity tracking No: FBNCO044		4. Statement of Conformity tracking No: FBNSCO044		
5. Applicant/Manufacturer: FLY. BY NIGHT LTD		6. Beginning Date: 20/6/2016		7. Ending Date: 20/6/2016		
8. Model: AS350 B4 (PARTIAL TEST ASSY)		9. Inspected By: G. BAUM		10. Signed: GJB		
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				Satis.	Unsatis.	
1.	BIKE RACK ASSY	FBN.001.D01	P1 20-5-16		✓	BOLT ITEM 21 DIFFERENT IN ONE PLACE (FRONT) AND BOLT PATTERN DIFFERENT • ROD USED INSTEAD OF PIP PIN IN CLAMP DRG CORRECTED ISS 1 26/6/2016. NO OTHER TESTS AFFECTED
2.	CLAMP ASSY PARTS	FBN.001.D02	P2 21-5-16	✓		SAMPLE DIMS OK.
3.	BIKERACK STUD CLAMPS	FBN.001.D04	P2 20-5-16	✓		SAMPLE DIM'S OK. MATH 6061-T6 CERT'S OK.
4.	GUSSET PLATE	FBN.001.D10	P3 22-5-16	✓		SAMPLE DIMS OK. ANODISE FINISH DOC'S IAW. DRG SPEC.
5.	RH BASE ASSY	FBN.001.D12	P1 20-5-16	✓	✓	PRODUCTION FINAL INSPECTION RECORD UNSIGNED. FINAL INSPECTION PERFORMED BY AUTHORISED INDIVIDUAL PRIOR TO TEST. SIGNED RECORD RECEIVED.
ALL	TOO641	TOOL: VERNIER CALIPER	CAL. DUE 1-1-2017	✓		MEASUREMENT TOOL USED FOR INSP

Sample 8100-1

Dealing with Unsat's



How are Non-conformities dealt with?

Can be pre-empted in Test Plan

- e.g. paint finish not applied on test article

Part 148 should have a procedure for non-conformities:

- 148.59 (b)(4) “establish procedures for— dealing with a material, part, or assembly not conforming to the type design or specification, including the recording of a decision and the disposing of a rejected material, part, and assembly”
- This must include liaison with the appropriate DO

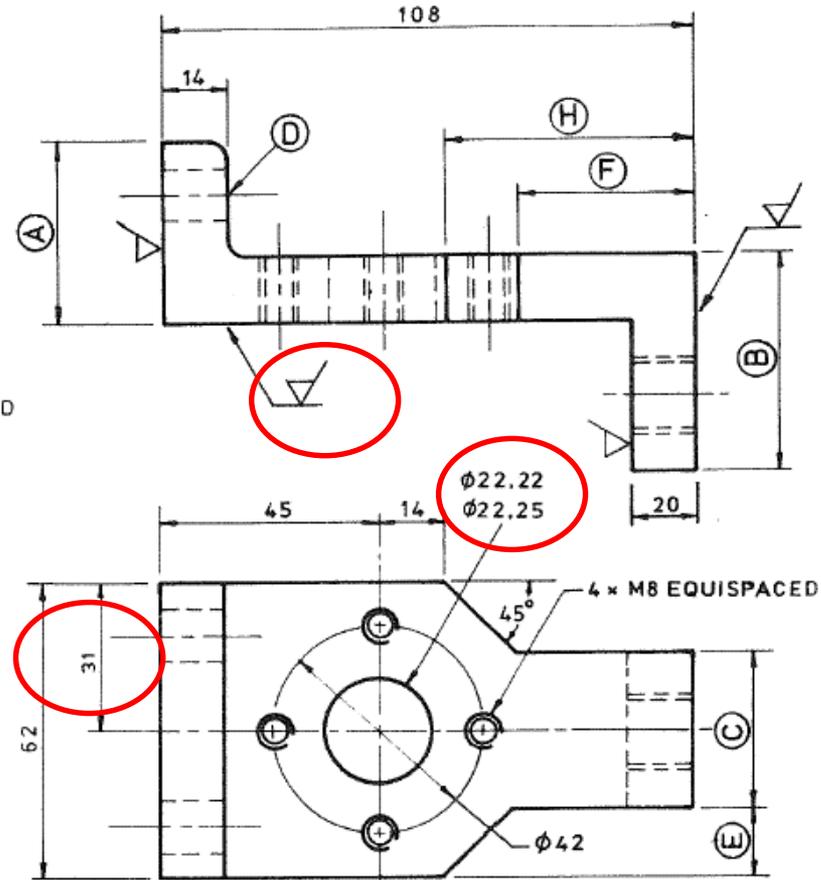
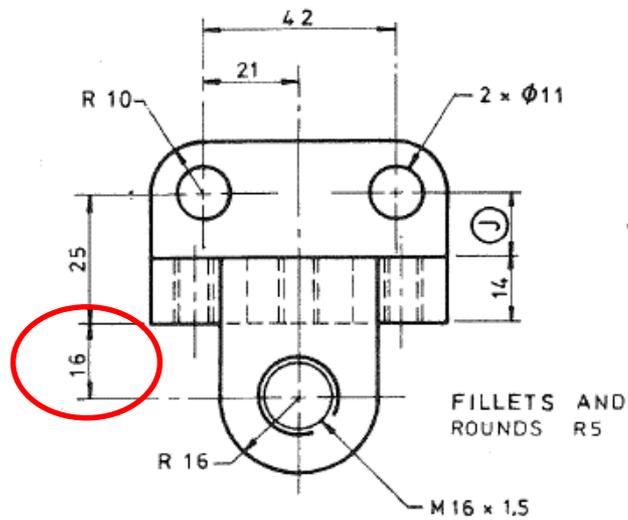
Part 146 DO action is required to:

- Approve a concession or correction (it must be shown that the applicable airworthiness design standards are complied with);
OR
- Modify design data in accordance with the parts made (design change)

Typical sample checks



- What deviations did the applicant identify? Note on 8100-1.
- Do drawing revisions match the production records?
- Raw materials – material certs match drawing
- Sample check of dimensions (use calibrated tools)
- Processes – Is there evidence to show the process was followed e.g. weld spec, surface finish, composite process spec?



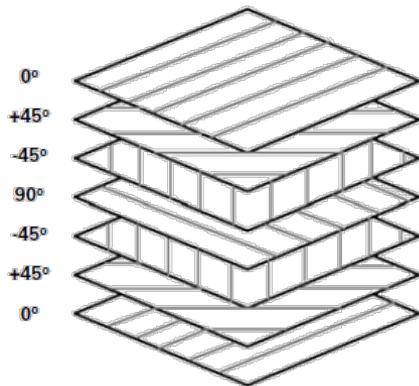
						TOLERANCES ± 0.5 EXCEPT AS STATED	MATERIAL C I	DRN	A SHAMBLES PTY LTD		
							FINISH	CKD	MOUNTING BRACKET		
2	THREAD	WAS M16	<i>awb</i>	7:01:01			PAINT - RED	APPD	SCALE	DRAWING NO	
1	THREAD	WAS M8 x 1	<i>awb</i>	7:01:01			HEAT TREAT	ISSUED	1 : 2	A-161	A1
CHANGE NO	ITEM	CHANGE	CKD OK	DATE	DATE	12.03.00					

Composite Challenges

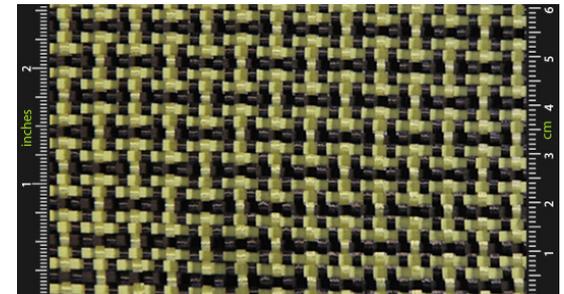
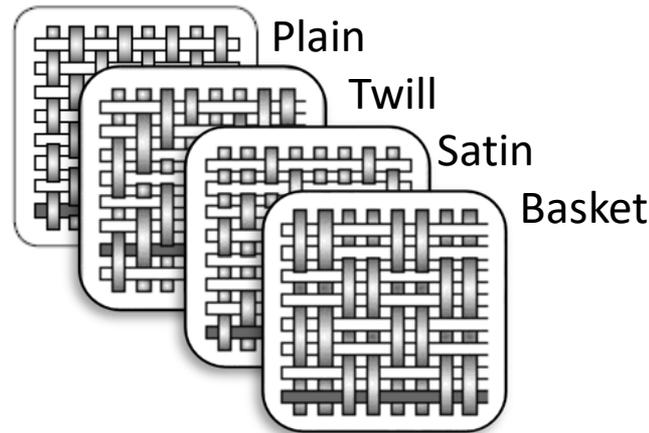


Making the material as well as the part....

- Material Specifications – The raw ingredients & finished performance
- Process Specifications – The recipe
- Drawings – The shape and size



Starting at the top surface (0/+45/-45/90/-45/+45/0)



Composite Challenges



During type certification, the inspector can be challenged with:

- Conforming test articles that use materials that are not yet approved (that is, the Material Specifications may not yet be finalized so that there are no pass/fail criteria to accept the material)
- Ensuring that approved material suppliers are used
- Ensuring materials are handled & processed correctly (transport, storage, contamination, temp, pressure, time)
 - e.g. Prepreg & bonding tapes in cold storage need to be contained in sealed bags and should be warmed to a temperature above the dew point of air before opening to prevent condensation
- Traveller coupons & test results are traceable to the part they were made with.
- Consumables have a big effect on part quality and must be defined and controlled (e.g. vacuum bag or breather cloth can affect porosity of part)