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# **Industry Working Group on STCs**

## **Recommendations for improving the level of safety of aeronautical products modified by Supplemental Type Certificates (STCs)**

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# STC Industry WG Context

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- ◆ While STCs are useful, experience in service has shown that, in some cases, they are responsible for safety occurrences.
- ◆ In October 2013, during the COB/Industry, the following action was taken: “Industry to launch the Industry ‘Complex STCs’ Working Group” (Action 2013-5.2 allocated to ASD, Airbus Helicopters). The objective assigned to the group was to review the current STC process in order to see whether it ensures a satisfactory safety level and to propose, if needed, the necessary adjustments.

# STC Industry WG Composition

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- ◆ The WG, created in January 2014, includes representation of the different types and geographical locations of the affected organizations as follows:
  - TC holders - Helicopters - Europe (AgustaWestland, Airbus Helicopters)
  - TC holders - Helicopters - North America (Bell Helicopter Textron)
  - TC holders - Large airplanes - Europe (Airbus)
  - TC holders - Airplanes - South America (Embraer)
  - STC holders - Airplanes - Europe (Cessna Düsseldorf, Sabena Technics)
  - STC holders - Airplanes - North America (Blackhawk Modifications)
  - Maintenance organizations performing STC installations - Airplanes - Europe (Cessna Düsseldorf, Sabena Technics)
  - Maintenance organizations performing STC installations - Airplanes - North America (Blackhawk Modifications)

# **STC Industry WG objectives**

## **(according to the Terms of Reference)**

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- ◆ To draw a factual picture of the present situation: safety figures, safety risks, difficulties faced by the various stakeholders... while not forgetting positive points!
- ◆ To review the existing applicable EASA, FAA, TCCA and ANAC regulations and advisory/guidance material, as well as the related work in progress. To discuss their adequacy.
- ◆ To propose changes in the above mentioned documents where beneficial.

# STC Industry WG Activities in 2014

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- ◆ Working groups activities:
  - Preparatory Work: (January-February 2014)
  - Four WG Meetings: (March – September 2014)
    - Review of the Preparatory Work and the STC Design and Certification Phase (4-6 March)
    - Review of the STC Installation Phase (14-16 May)
    - Review of the STC Continued Airworthiness Phase (8-10 July)
    - Finalization of the conclusions and of the WG Report (2-4 September)

# Definition of a STC (reminder)

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“A supplemental type certificate (STC) is a type certificate (TC) issued when an applicant has received FAA approval to modify an aircraft from its original design. The STC, which incorporates by reference the related TC, approves not only the modification but also how that modification affects the original design” (1)

- ◆ (1) FAA website ([http://www.faa.gov/aircraft/air\\_cert/design\\_approvals/stc/](http://www.faa.gov/aircraft/air_cert/design_approvals/stc/))

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# Results of analysis and recommendations (from the STC Industry WG Report)

# Main Issues Relating to STCs

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- ◆ During the design and certification phase:
  - Areas affected by the modification (the so called 'affected areas') need to be precisely and exhaustively identified, taking into account that the modification is not limited to the physical change.
- ◆ During the installation phase:
  - STC installers need to have enough data from the STC holder and adequate regulatory guidance to ensure the compatibility of the STC with the other modifications, repairs and airworthiness directives implemented or applicable to the aircraft.
  - Installers must install the STC in accordance with the installation instructions provided by the STC holder, avoiding non-approved deviations.
- ◆ During the continued airworthiness phase:
  - STC holders must ensure the continued airworthiness of the STC, including its 'affected areas'.
  - STC installers, CAMOs and air operators must report defects and occurrences caused by STCs to the STC holders (and inform the TC holders).



# Regulatory Improvement Recommendations

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- ◆ Based on the main issues identified, the WG has developed a set of 16 Regulatory Improvement recommendations addressed to FAA, ANAC, TCCA, EASA (most of them being proposals of development of new Guidance Material), which are summarized in the following slides (full text of each recommendation is in Appendix).
  
- ◆ The WG has also included in a Report to be published early 2015:
  - One example of a method, used by Airbus, for the identification of the STC 'affected areas' (Report, Appendix G)
  - One example of a procedure, used by Airbus, for issuance of a NTO (No Technical Objection) when an arrangement has been established between the STC applicant and the TC holder as per EU Part 21 §21.A.115 (Report, Appendix H)
  - Proposed guidance: Modification of an aircraft in reference to an approved STC (STC installation) (Report, Appendix I)

# Design and Certification Phase

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- ◆ Eight recommendations for improvement (D1 to D8):
  1. Require STC applicants to have (or have access to) the technical capability to demonstrate compliance with the certification basis (D1)
  2. To revise guidance material to include a recommendation that the STC applicant acquire the information necessary to adequately identify affected areas (D2)
  3. Airworthiness authorities to ensure that authority personnel have relevant technical background and have sufficient knowledge of the aircraft type being modified with emphasis on the affected areas (D3)
  4. Airworthiness authorities to formally approve STC Certification Plans (D4)

# Design and Certification Phase

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- ◆ Eight recommendations for improvement (cont....):
  5. Regulations to be revised to ensure that 'affected areas' are included in the compliance determination (D5)
  6. Regulations to be revised to add a definition of the areas affected by STCs (a new definition is provided) (D6)
  7. To revise guidance material to include method for identification of 'affected areas' (D7)
  8. To revise EASA guidance to provide a process allowing the TC-H to give a NTO (No Technical Objection) to the STC applicant when there is an arrangement as per EU Part 21 Subpart E (D8)

# Installation Phase

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- ◆ Two recommendations for improvement (I1 & I2):
  1. To revise FAA, ANAC and TCCA regulations to include a requirement for the maintenance organization to ensure that STC modifications are eligible to be fitted in combination with other modifications and/or airworthiness directives (I1)
  2. To develop STC installation guidance material, including responsibilities of STC holders, STC installers and air operators (I2)

# Continued Airworthiness Phase

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- ◆ Six recommendations for improvement (C1 to C6):
  1. To revise guidance to clarify that the STC-H is responsible for the continued airworthiness of the STC 'affected areas' and not just the physical modification (C1)
  2. Airworthiness authorities to harmonize occurrence reporting requirements for STC/TC Holders to establish a system for collecting failures, malfunctions and defects (C2)
  3. Airworthiness authorities to clarify regulatory material such that STC installers, CAMOs and air-operators report STC occurrences and its affected areas to the STC holder (and inform the TC holder) (C3)

# Continued Airworthiness Phase

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- ◆ Six recommendations for improvement (cont....):
  4. EASA to amend ORO.GEN.160(b) concerning the operator's reporting duties, in line with the wording of EU Part 21 §21.A.3, to clarify that reporting of occurrences for the STC and its 'affected areas' must be made to the STC holder (C4)
  5. FAA and ANAC to harmonize §21.3(a) with the EU Part 21 §21.A.3 so that the STC holder reports and investigates design defects, even if they are not the manufacturer (C5)
  6. To revise guidance materials to clarify the STC-H monitor ADs in order to identify if they could impact his STC and, in case of impact, that the STC-H performs any needed adaptations of the STC so that it is compatible with the AD. (C6)

# Conclusions (summary)

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- ◆ The WG recommends the four Authorities collaborate in order to make STC regulations:
  - More harmonized, with gaps filled when necessary (D1, D4, C2, C5)
  - More precise regarding the actions to be taken by each type of organization in each phase (D2, D5, D6, I1, C1, C3, C4, C6)
  - More complete regarding guidance material (D7, D8, I2)
- ◆ Moreover the WG recommends Authorities ensure authority personnel involved in STC activities have the relevant technical background and sufficient knowledge of the aircraft to be modified (D3)
- ◆ The WG recommendations will help:
  - Reaching better consistency in the certification approach
  - Reducing STC compatibility issues
  - Improving the Continued Airworthiness reporting
  - Improving the overall level of safety of aeronautical products modified by STCs

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Thank you for your attention!



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# Appendix

(Regulatory Improvement proposals, full text as written in the  
STC WG Report)

# Design and certification Phase: RI n° D1

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- ◆ It is recommended that the FAA and ANAC require the STC-Applicant (STC-A) to have (or have access to) the **technical capability to demonstrate the compliance of the modified product** with its certification basis without necessarily mandating the need to have a DOA/ODA/DAO type of organization. (Corresponding requirements: EU Part 21 §21.A.112B and TCCA CAR 521.202)

## Design and certification Phase: RI n° D2

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- ◆ It is recommended that FAA, ANAC, EU Part 21 and TCCA CAR 521 guidance material include a recommendation, **in cases where the authority is not fully confident that the STC-A has the access to all of the data necessary to properly identify the ‘affected areas’ and conduct the necessary re-investigations, that the STC-A obtain relevant information.** This information can be obtained through an arrangement with the TC-H or through alternative equivalent means if an arrangement with the TC-H is not possible.
- ◆ The WG has identified the following regulatory paragraphs as being relevant to this recommendation: FAA §21.97 (a)(2) & 21.115 (a), ANAC §21.97(a) & 21.115(a), TCCA CAR 521.202 & 521.203, EU Part 21 §21.A.113(b).

## Design and certification Phase: RI n° D3

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- ◆ It is recommended that **Airworthiness Authorities ensure that authority personnel involved in STC activities (PCM or Airworthiness Authority Project Leader, associated experts, etc.) have the relevant technical background and sufficient knowledge of the aircraft type being modified** for ensuring the adequacy and comprehensiveness of the STC applicant's proposed certification plan, with a special emphasis on the way the areas affected by the STC have been identified.

## Design and certification Phase: RI n° D4

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- ◆ It is recommended that **ANAC, TCCA and EASA formally approve the STC Certification Plan** (as currently done by the FAA) in a timely manner. This should minimize late, additional requests to the STC-A from the Authority, taking into account that many STC-As are smaller companies with limited resources.

## Design and certification Phase: RI n° D5

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- ◆ It is recommended that Airworthiness Authorities modify the wording of FAA §21.115, ANAC §21.115, TCCA CAR 521.160 and EU Part 21 §21.A.115 so that the **words ‘*the changed product*’ or ‘*the altered product*’ or ‘*the product*’** are replaced by **‘*the related change to the type design and areas affected by the change*’** .

# Design and certification Phase: RI n° D6

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- ◆ It is recommended, in conjunction with recommendation D5, **to add a definition of the areas affected by the change (i.e. ‘affected areas’) as follows:**
  - *“Affected areas are any items for which the change applicant shall show compliance with the applicable requirements because these items are affected by the modification.*
  - **Affected areas are:**
    - *New items or items physically modified by the change,*
    - *Items not functioning in accordance with the basic (pre-modification) design approval holder certification (new function, modification to performance features, modified loading) due to the effect of the change,*
    - *Items subjected to a different environment than the one certified by the design approval holder, due to the effect of the change,*
    - *Items having degraded safety margins (function and reliability), due to the effect of the change.”*
- ◆ The WG has identified the following regulatory paragraphs as being relevant to this recommendation: EU Part 21 §21.A.115 & 21.A.93, TCCA CAR 521.160; FAA §21.115; ANAC §21.115.

## Design and certification Phase: RI n° D7

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- ◆ It is recommended that FAA/ANAC/TCCA/EU guidance material be modified to include **guidance for the identification of areas affected by STCs. Appendix G of this report includes proposed guidance.**
- ◆ The WG has identified the following regulatory paragraphs as being relevant to this recommendation: EU Part 21 §21.A.115 & 21.A.93, TCCA CAR 521.160; FAA §21.115; ANAC §21.115.



## Design and certification Phase: RI n° D8

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- ◆ For STCs developed through an arrangement between the STC-A and the TC-H as defined in EU Part 21, it is recommended **to establish guidance material defining a process allowing the TC-H to give an NTO (No Technical Objection) to the STC applicant.** This guidance could be based on the method provided by the WG in Appendix H.
- ◆ The WG has identified the following regulatory paragraphs as being relevant to this recommendation: EU Part 21 §21.A.113(b) & 21.A.115(d)(1).

## Installation Phase: RI n° I1

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- ◆ It is recommended that FAA, ANAC and TCCA revise the applicable installation regulations (FAR Part 43, RBAC Part 43, and TCCA CAR 571) to include a requirement similar to EU Part M.A.501 requesting **the maintenance organization to ensure that the modification is eligible to be fitted when different modification and/or airworthiness directive configurations may be applicable.** It is further recommended that EASA ensure that **AMC to Part M clarifies that components also applies to modifications.**

# Installation Phase: RI n° I2

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- ◆ It is recommended that **guidance material concerning STC installation be developed**, including the definition of responsibilities of STC holders, STC installers and air operators. This guidance could be based on the following:
  - ICAO Airworthiness Manual, Appendix B to Chapter 5
  - EASA\_S21\_GP001 Good Practices – Coordination between Design and Maintenance – First installation of a change to a Product
  - new guidance developed in Appendix I of this Report
- ◆ The WG has identified the following regulatory paragraphs as being relevant to this recommendation:
  - EU Part M §M.501, FAA Part 43, ANAC RBAC 43, TCCA CAR 571 for STC installers
  - EU Part 21, FAA Part 21, ANAC RBAC 21, and TCCA CAR 521 for STC holders
  - EU Part ORO/NCO, FAA Parts 91/135 and TCCA CAR Part IV for air operators

## Continued Airworthiness Phase: RI n° C1

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- ◆ It is recommended that regulatory guidance clarify that **the STC-H is also responsible for the continued airworthiness of the STC 'affected areas' and not just for the physical modification.**

## Continued Airworthiness Phase: RI n° C2

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- ◆ It is recommended that the FAA and ANAC harmonize Part 21 §21.3 with the EU Part 21 §21.A.3A and TCCA CAR 521.354 in order **to request the TC-H to establish a system for collecting failures, malfunctions and defects.**

## Continued Airworthiness Phase: RI n° C3

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- ◆ It is recommended that authorities make clear in their regulatory material that STC installers, **CAMOs and air-operators must report occurrences concerning STCs and its affected areas to the STC-H (and inform the TC-H).** When in doubt about the origin of the event reporting is to be made to both the TC-H and STC-H.

## Continued Airworthiness Phase: RI n° C4

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- ◆ It is recommended that EASA amend the wording of ORO.GEN.160(b) concerning the operator's reporting duties in line with the wording of EU Part 21 §21.A.3, so that **it is made clear that reporting of occurrences for the STC and its affected areas must be made to the STC-H.**

## Continued Airworthiness Phase: RI n° C5

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- ◆ It is recommended that FAA and ANAC amend §21.3(a) in line with the EU Part 21 §21.A.3 so that **the STC-H reports and investigates design defects, even if the modification is not manufactured by him.**



## Continued Airworthiness Phase: RI n° C6

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- ◆ It is recommended that guidance materials clarify **the STC-H monitor ADs in order to identify if they could impact his STC and that, in case of impact, that the STC-H performs any needed adaptations of the STC so that it is compatible with the AD.**