

V. NOT AFFECTED AREA EXCEPTION

***Not Affected Area
Exception***

Section V

CPR 3/03 162

A. Overview

Section V, Purpose & Overview 

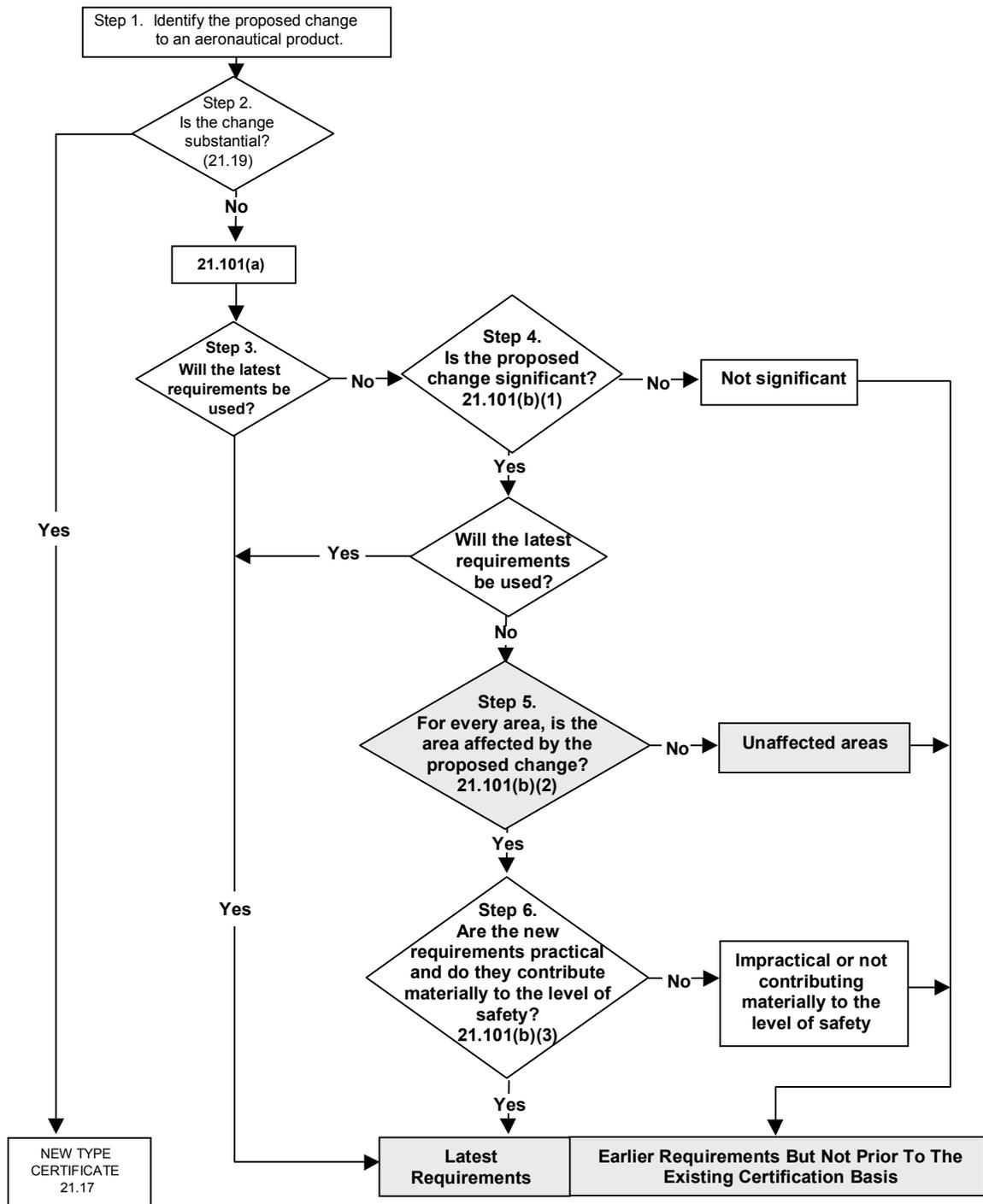
- **Purpose:** Describe concept of *affected area* and how it is used as an exception to applying the latest regulations for significant product-level changes
- **Overview:** This section will review the basic concept and then apply it to the Case Study

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B. Where Are We in the Process of Establishing the Certification Basis?

- Figure 1 on the next page of this Guide highlights **21.101(b)(2)**. If a change is *significant*, the next step is to define the areas that are either **physically or functionally affected** by the change. Obviously, once you have defined what *is* affected, then you can move to knowing what *is not* affected.

Figure 1 of AC 21.101-1 with 14 CFR 21.101(b)(2) Highlighted



C. Defining the Not Affected Areas

21.101(b)(2)



- The applicant may show compliance with an earlier amendment of a regulation for:
 - (b)(2) Each area, system, component, equipment, or appliance that the Administrator finds is *not affected* by the change**
- **Assess physical changes & functional effects**

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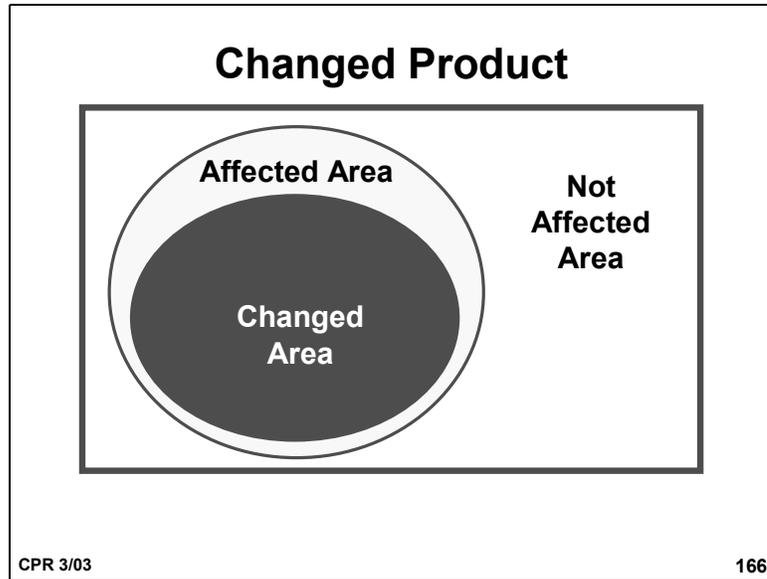
- This is interpreted to mean that the unaffected areas remain at the existing certification basis. Obviously, no compliance demonstration is required since they are unchanged.

Not Affected Area



- **Rule change did *not* introduce a new concept regarding *not affected area***
- **No new procedures**

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- The **inner oval** is everything that is actually changed.
- The **outer oval represents those things that are *not* changed but are still affected.** These things must be included in the *affected* area.
- The **rectangle** is the whole product, both *affected* and *not affected* areas.

Affected Area



- **Affected areas include:**
 - Physical changes
 - Functional characteristics of proposed significant change
- **Assess areas not physically affected for possible functional effects**
- **Encompass all aspects where there is a need for re-evaluation**

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Physical Changes



- **Changes to structures, systems, equipment, components, appliances**
- **Part of a significant, product-level change**
- **Clearly in the affected area**

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- Examples of physical changes from the Case Study include:
 - Lengthening the fuselage,
 - Extending the floor,
 - Adding two rows of seats,
 - Increasing local skin gauges,
 - Lengthening control cable runs, and
 - Adding overhead bins.

Functional Characteristics 

➤ **Changes such as, but not limited to:**

- Performance
- Handling qualities
- Emergency provisions
- Fire protection
- Crashworthiness
- Containment
- Structural integrity
- Aeroelastic characteristics
- Ingestion
- Durability

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- Once a determination is made that a functional characteristic is affected, we must assess the magnitude of that effect.

Functional Characteristics, Question 

➤ **What are some examples of a change and the resulting functional characteristics that are affected?**

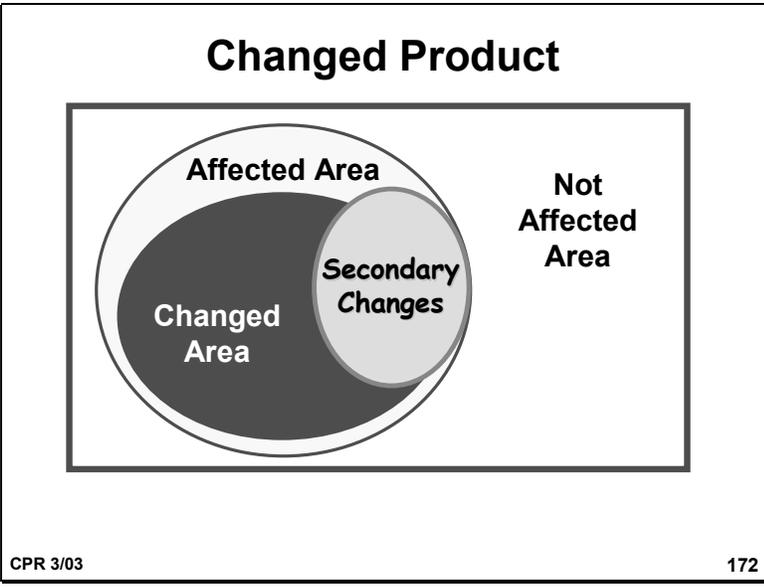
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Functional Characteristics, Question, cont.



➤ **More functional characteristics**

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- **Secondary changes** are **part of the area affected by the change**. They may be both physically or functionally affected.

**Physical Secondary Changes,
Order 8110.CPR, 8(I)**



- **Changes to affected area that are part of, and consequential to, the design change**
- **Do not add new capability or capacity to product**
- **Always required by significant change to complete the installation**

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**Physical Secondary Changes,
Order 8110.CPR, 8(I), cont.**



- **Examples include:**
 - **Extending hydraulic line for landing gear**
 - **Adding circuit breakers for a comprehensive flight deck upgrade**
 - **Lengthening control cables to accommodate a fuselage plug**

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Why Define Secondary Changes?



- **Part of significant change, so required to comply with the latest regulations**
 - However, applying latest regulations to a these changes would not materially contribute to product's level of safety
 - So, these changes permitted to comply with existing certification basis

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Why Define Secondary Changes?, cont.



- ***Secondary changes* have been affected by the change, so may comply with existing certification bases, but applicant *must demonstrate compliance***
- ***Areas not affected by change* continue to comply with existing certification bases and *require no compliance demonstrations***

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D. Case Study: Determination of Affected / Not Affected Areas

 **Case Study**



➤ **Two significant product-level changes**

- **Fuselage plug**
- **Thrust increase**

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Case Study – Transport Airplane Amended TC

Product Being Changed: Twin jet engine transport, existing certification basis at Amendment 25-41. Date of application: June 30, 2003, latest regulations at Amendment 25-108.

Description of Changes in the Application:

**I. Lengthen Fuselage (same gross weight, trade payload for range)
Determined to be Significant**

| Physical Changes | Functional Characteristics |
|--|----------------------------|
| <ul style="list-style-type: none"> ➤ Add 10 ft. fuselage plug; total fuselage length is now 80 ft ➤ Extend floor ➤ Add two rows of seats ➤ Add overhead bins ➤ Increase size of cargo compartment by 30% ➤ Lengthen control cable runs ➤ Extend services (O₂, plumbing, etc.) ➤ Increase local skin gauges at wing root | |

**II. Increase Engine Thrust (takeoff on shorter runway)
Determined to be Significant**

| Physical Changes | Functional Characteristics |
|--|----------------------------|
| <ul style="list-style-type: none"> ➤ Increase engine thrust by 3% (9% previous increases without update of the certification basis) ➤ Change nacelle cooling flow ➤ Redesign pylon to increase strength | |

 **Case Study, cont.**



- **Identify all areas affected by the change**
 - **Identify affected physical components and functional characteristics**
 - **Identify secondary changes; comply with existing certification basis, substantiate compliance**
 - **Everything not affected may comply with the existing certification basis**

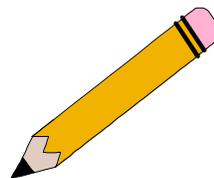
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 **Case Study, cont.**



- **Are there any physical secondary changes associated with lengthening fuselage?**



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 **Case Study, cont.**



- **Conditions determine if increase in local skin gauges at wing root a secondary change**
 - Applicant adding fuselage plug but not increasing aircraft's gross weight
 - Aircraft's zero fuel weight and landing loads will increase
 - Necessary to increase gauge thickness locally to accommodate these loads
 - Does not add new capabilities or capacity

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 **Gauge Thickness Example**



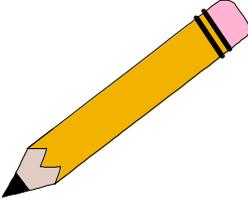
- **Increase gauge thickness to accommodate a change that increases gross weight**
- **NOT a secondary change if increasing gauge thickness**
 - Occurred over a larger area
 - Was made to increase the wing strength
 - Increased aircraft's capabilities and capacities

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 **Case Study, cont.** 

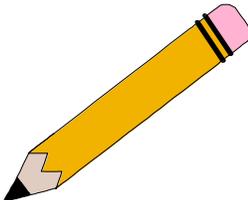
➤ **Are there any secondary changes for the engine thrust increase?**



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 **Case Study, cont.** 

➤ **What are some functional characteristics affected by lengthening the fuselage?**

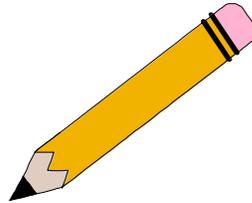


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 **Case Study, cont.**



- **What are some functional characteristics affected by the 12% thrust increase?**



E. Summary of *Not Affected Area* Exception

Summary Questions



- In determining if an area is not affected, what do you look for?
- How does the process of determining the *not affected area* differ from that used today?

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Summary Questions, cont.



- What is a secondary change?

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Summary Questions, cont.



- **How is a secondary change treated?**

Section V, Summary



- **To determine if an area, system, component, equipment, or appliance is affected by a change, evaluate *both*:**
 - **Physical change, *and***
 - **Changes in functional characteristics**

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Section V, Summary, cont.



- **Areas NOT affected**
 - **Comply with existing certification basis**
 - **No substantiation required**
- **Areas AFFECTED**
 - **Comply with latest regulations, unless 21.101(b)(3) applies**

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Section V, Summary, cont.



➤ **Secondary changes**

- **Comply with existing certification basis**
- **Compliance must still be substantiated**