

Clarifications and Updates for:

Practical Analysis or Aircraft Composites

February 1, 2019

Each item is classified by the: **PRIORITY-ITEM NUMBER**, where:

PRIORITY

H = High

M = Medium

L = Low

For example, a heading of **L-1** is the first clarification (or update) that has a **Low** priority.

The highest priority items are listed first. This document contains **clarifications and updates**. A companion document contains corrections.

*NOTE: Only technical issues are considered. Grammar is not considered.

L-1 CLARIFICATION**Priority: Low****Date Added: October 1, 2018**

On p. 665, for Table F.2, t is not explicitly defined. “ t ” is the thickness of the laminate and the “thinner” dimension of the element in question (for either the flange or the web).

L-2 CLARIFICATION**Priority: Low****Date Added: October 1, 2018**

p. 656, Section E.7

Current:

“Current NDI methods are incapable of indentifying *weak bond interfaces* that are in intimate contact with the adhesive.”

Clarification:

“Current NDI methods are incapable of indentifying *weak bond interfaces* where there is *intimate contact* at the interface.”

L-3 CLARIFICATION**Priority: Low****Date Added: October 1, 2018**

p. 661 and 666

The Category 3 section may be unsymmetric about the vertical axis (such as a C-channel), but the properties will be calculated about the Y-axis as shown in Figure F.3. The distinction (for an unsymmetric section about the vertical axis) is that the principal axis will not be aligned with the Y-axis.

L-4 CLARIFICATION**Priority: Low****Date Added: October 1, 2018**

p. 120, 121, 122, 123, 634

Carpet plots (general)

For carpet plots, the vertical title specifically refers to the *laminate*.

L-5 CLARIFICATION**Priority: Low****Date Added: October 1, 2018**

p. 120, 121, 634

Carpet plots (general)

The indicator with an arrow:

Current:

“Percent Fibers in Direction of Interest”

Clarification:

“Percent Fibers/Plies in Direction of Interest”

L-6 UPDATE**Priority: Low****Date Added: October 1, 2018**

p. 319

Reference title is incorrect

Current:

Volkersen, O., Die Niekraftverteilung in Zugbeanspruchten mit Konstanten Laschenquersritten. Luftfahrtforschung, Vol. 15, 1938, pp. 41–47.

Correct:

Volkersen, O., Die Nietkraftverteilung in zugbeanspruchten Nietverbindungen mit konstanten Laschenquersritten, Luftfahrtforschung, Vol. 15, 1938, pp. 41–47.

L-7 CLARIFICATION

Priority: Low

Date Added: October 1, 2018

p. 634

Section B.5 and Figure B.3

CTE carpet plot valid range

As stated in Section 5.4, carpet plots are only valid if the laminate is balanced. Also, they are most valid when the laminate is symmetric (or restrained from curvature when an in-plane load is applied). Figure B.3 should have a caption similar that used for the infinite plate, orthotropic stress concentration factor as shown in Figure 10.2.

Figure 10.2 Carpet plot for the infinite plate, orthotropic stress concentration factor for a specific material system. Laminate is symmetric and balanced; also appropriate for an unsymmetric laminate that is restrained from curvature in all directions.

L-8 CLARIFICATION

Priority: Low

Date Added: February 1, 2019

p. 684 and p. 687

Unbalanced laminate allowables

When viewing the laminate from the $+45^\circ$ and -45° directions, the laminate is not balanced. In general, the allowables (as shown in Equations G.13 and G.19) are developed for laminates that are balanced. This is because unbalanced coupons may have unrepresentative failure modes due to grip restraint of in-plane shearing and edge effects.

One possible approach is to recognize that the degree of unbalance is relatively minor and is expected to be a small secondary effect. Therefore, the max strain criterion (laminate-based) is still expected to be applicable. To validate this assumption, testing at the higher levels is performed (building block testing). Provided the higher level testing does not produce unanticipated failures, the basic assumption is acceptable. From p. 607, "Sub-component and/or component testing is necessary to discover and address unanticipated failure modes, which may not be present in lower-level testing."

p. 64, Section 2.7

p. 65, Section 3.8

p.108, Section 4.8

Transverse shear stiffness

There is a clarification to the following statement and statements similar to it:

“Note that for the *stiffness* response, a state of plane stress is appropriate since the localized 3D stresses do not affect the overall stiffness.”

The transverse shear stiffness (the stiffness related to the shear stresses τ_{xz} and τ_{yz}) are not always localized. They sometimes occur at a more global level with respect to the laminate. Although the secondary effect of transverse shear stiffness is not usually significant for solid laminates (more common for sandwich structures) the degree of significance will depend on the type of structure and problem being analyzed. See the term “Transverse shear stiffness” in the Index for relevant information.