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Interactive comment on "Benefits of sub-component over full-scale blade testing elaborated on a trailing edge bond line design validation" *by* Malo Rosemeier et al.

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Erroneously, we have given DNVGL guideline 2015 as reference for the definition of a "sub-component" or an "element/ detail". Correctly, the terms that we refer to are defined in the upcoming standard IEC61400-5 revU WIND ENERGY GENERATION SYSTEMS – Part 5: Wind turbine blades (currently open for comments). Since this standard is not yet publicly available, the relevant excerpt is shown in the following:

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6.1.2 Building Block Approach for Composite Structural Design

The traditional detailed design (analytic and numerical calculation together with validated material data and full blade testing) of FRP structures can be enhanced by a building-block approach, starting with coupon-level tests, analysis and testing of more complicated structures; and culminating in a full blade test. This relationship is shown in Figure 1, where increasingly more complex tests are developed to evaluate more complicated loading conditions and failure modes.

The approach can be summarized as follows:

Coupons: A number of tests are conducted at the coupon level, where confidence in repeatable physical properties is developed. Procurement specifications are developed for the individual constituents, and allowable design variables developed for lamina/laminate combinations.

Elements and Details: Critical areas from the design analysis identify elements for further testing and analysis at the design conditions with representative specimens. This may include such tests as the spar cap to web bond line or ply drops in the spar cap laminate.

Sub-Components: Parts and sections representative of the blade design are tested to evaluate specific loading conditions and failure modes. Examples include spars, shells and root sections. The test components may be full or partial scale where demonstrated to be representative.

Full Blade: A full blade or significant part of a blade, representative of the blade design is tested to evaluate specific loading conditions and failure modes. The blade may be full or partial scale where demonstrated to be representative.

The number of tests required for each level should be tailored for each design activity, with the blade designer responsible for the development of a reasonable number of

tests at each stage.

Tests on the element and detail as well as sub-component level will increase the confidence in the structural design.

For design values (strength, stiffness, etc.) developed from test at any building block level (material sample, sub-component, etc.), the validity of such design values shall be described and limited by acceptance criteria and tolerances to be met in the final design.

Please also note the supplement to this comment:
https://www.wind-energ-sci-discuss.net/wes-2017-35/wes-2017-35-AC6-supplement.pdf

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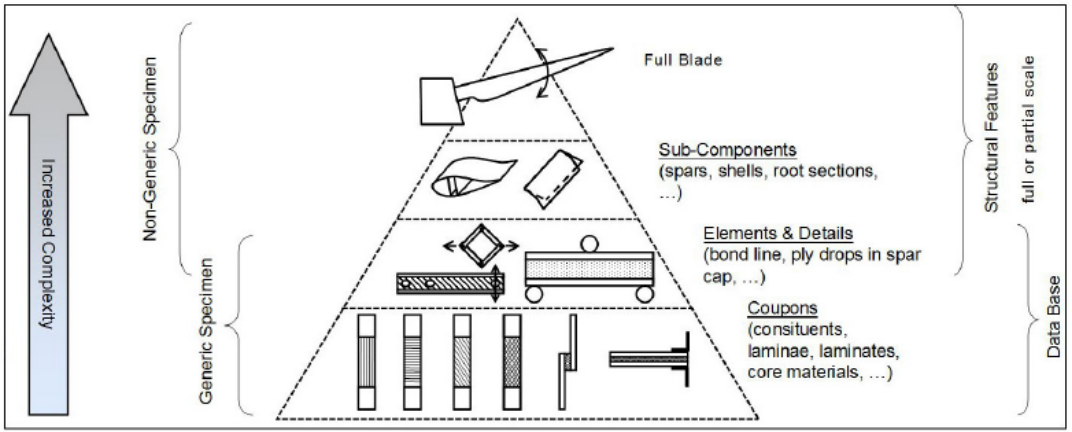

Fig. 1.

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