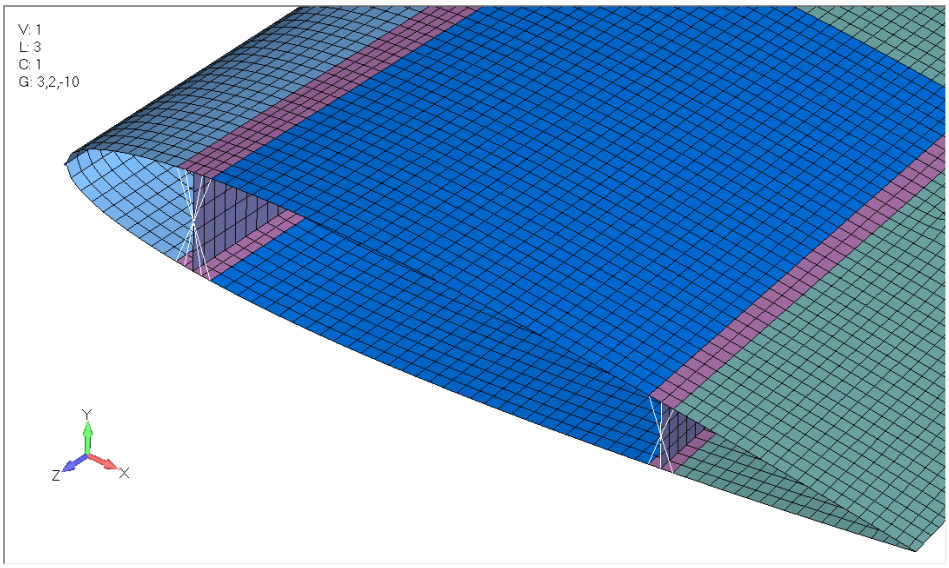
Aerobatic Wing

Honeycomb variant

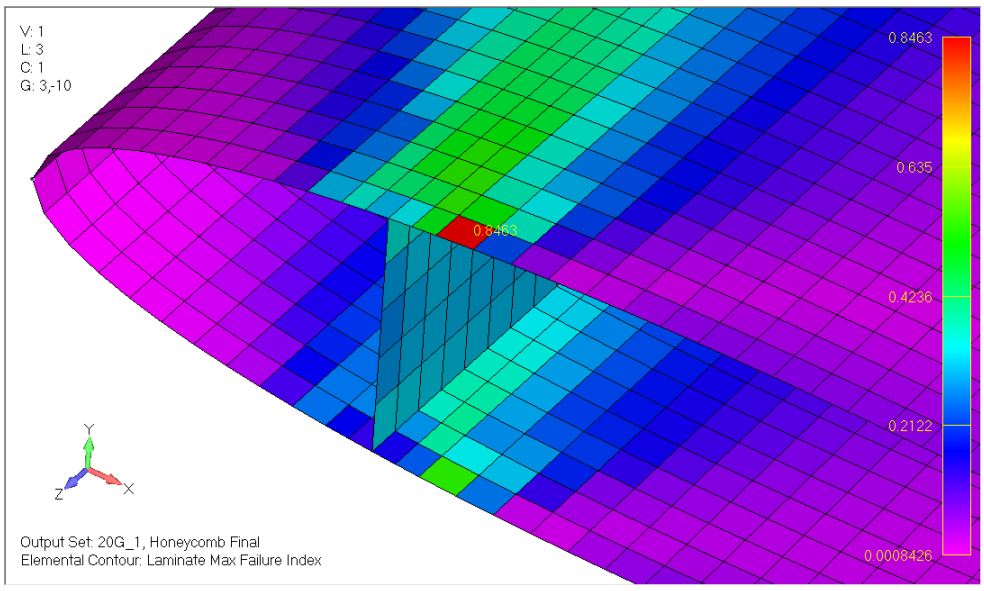
Results

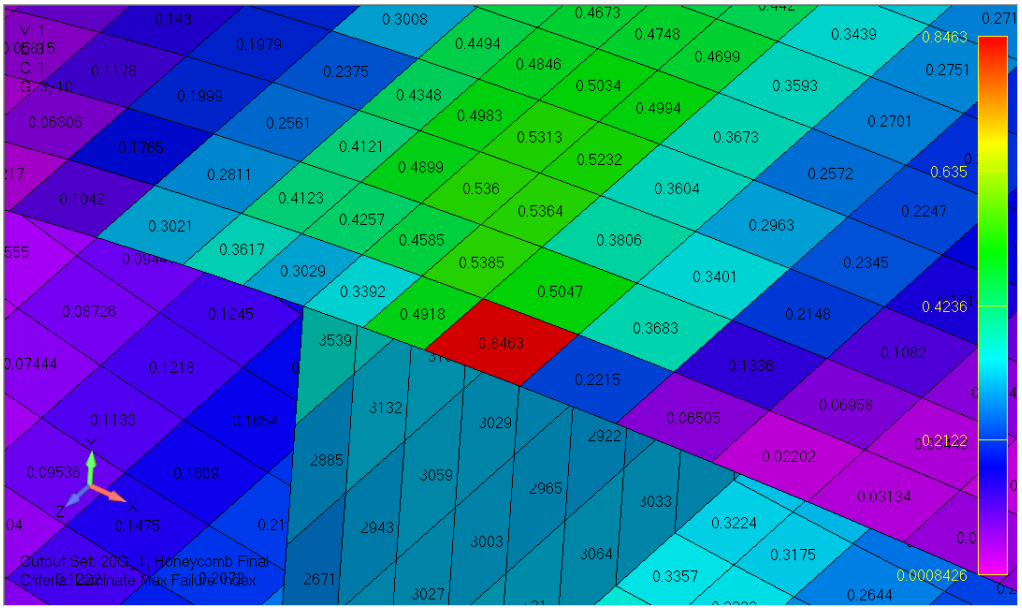
Chosen configuration of composite layups has proven satisfactory for load conditions of 20G.

Root rib is fixed using REB3 element as not to add additional stiffness to the structure which sometimes is the issue when applying encastre to, for example, whole surface of root rib.



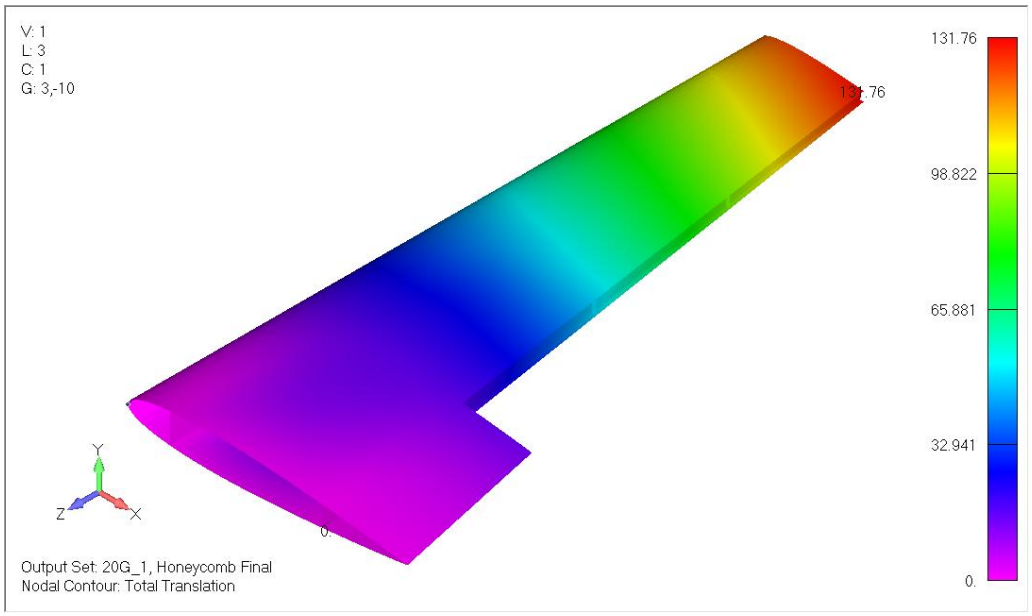
Maximum failure index, according to Tsai Wu theory, has critical value at the connection site of inner skin and front spar cap which equals to 0,8463. Observing the surrounding elements, we can notice the sudden peaks in value might be attributed to differences in stiffnes of the inner middle skin and front spar cap, while also being influenced by boundary conditions which are applied on the edges of the spar caps and webs.

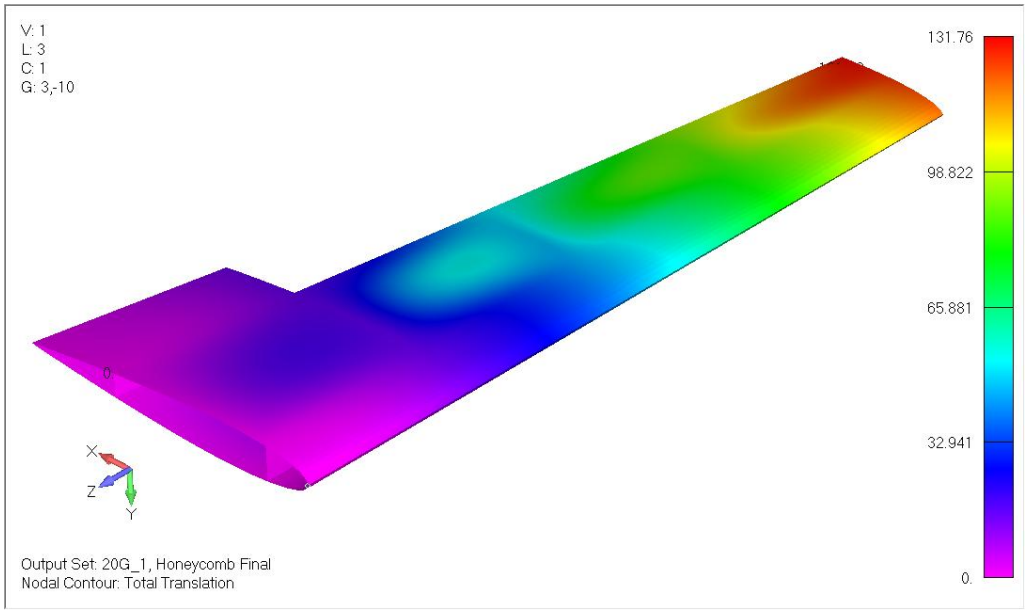




Maximum deflection is as expected at the wing at 131,76 mm. Skin buckling is noticeable at the lower surface of the wing with maximum value happening between #3 and #4 ribs at around 54 mm.

NOTE: Considering how the pressure field is applied to the wing, these types of displacements of the skin are to be expected.





Enveloping von Mises results for each layer, it is found that stress peaks appear to be on the 45th ply in the inner middle skin layup which has orientation of -45°. Ply numbered 129 found on front spar cap layup is the one of the reinforcement with orientation of 0°.