



Supporting Information

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Triple stiffness: A bioinspired strategy to combine load-bearing, durability and impact-resistance

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Supplementary materials

Fig. S1. An exploded view of the ‘reference model’ to demonstrate the relationship between its key components.

Fig. S2. The developed 3D printed models: (A) ‘reference model’, (B) ‘no mechanical stopper model’, (C) ‘no buckling model’, (D) ‘no flexible joint model’.

Fig. S3. 3D printed airplane model with ‘triple stiffness’ wings.

Fig. S4. 3D printed airplane model with ‘double stiffness’ wings.

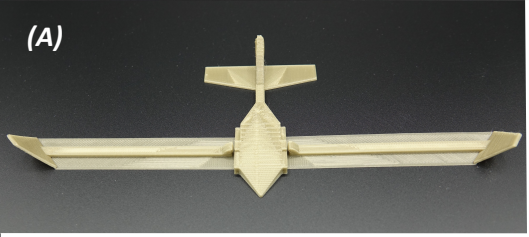
Vid. S1. A visual representation of the mechanical performance of triple stiffness structure (i.e. ‘reference model’) under loading.

Vid. S2. Mechanical performance of the ‘reference model’ vs. ‘no mechanical stopper model’, ‘no buckling model’ and ‘no flexible joint model’ during static, dynamic and fatigue tests, respectively.

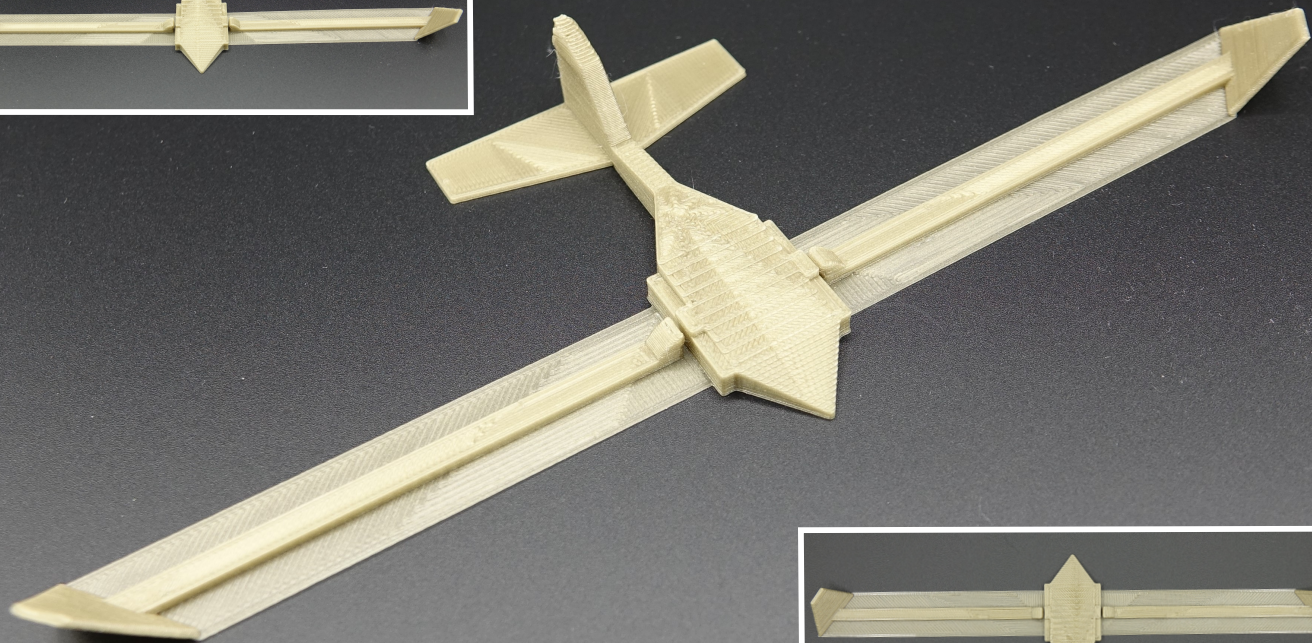
Vid. S3. Collision and free fall tests of airplane models with ‘triple stiffness’ and ‘double stiffness’ wings.

Vid. S4. A summary of the article for the general audience.

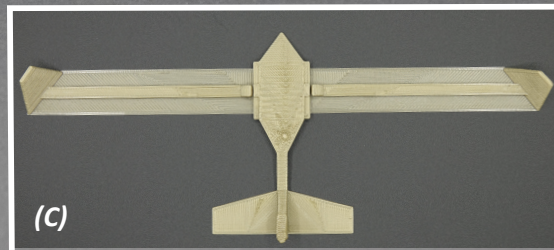
(A)



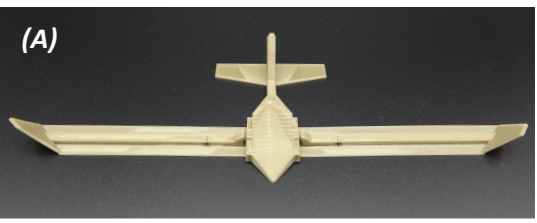
(B)



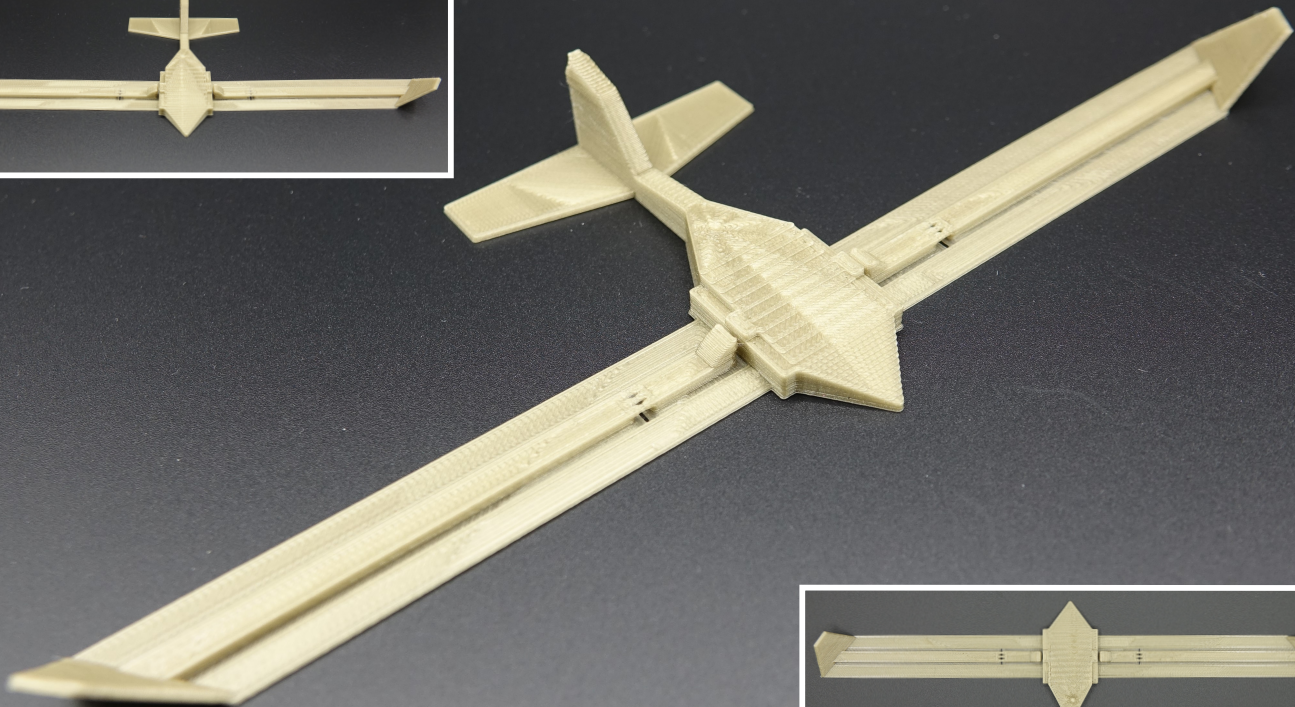
(C)



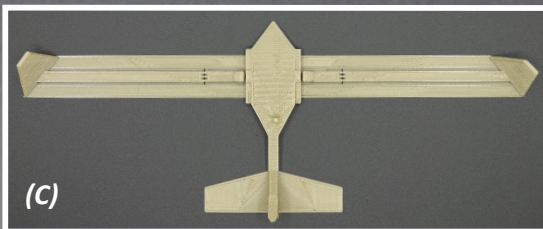
(A)



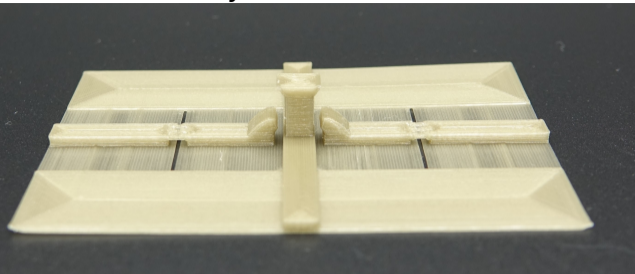
(B)



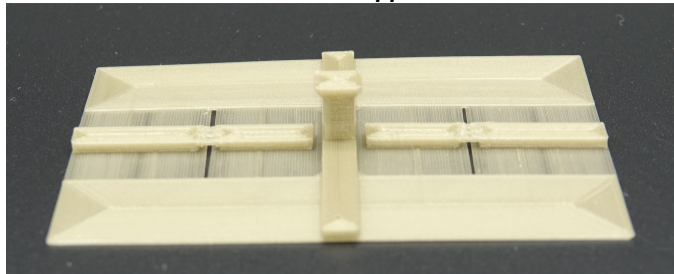
(C)



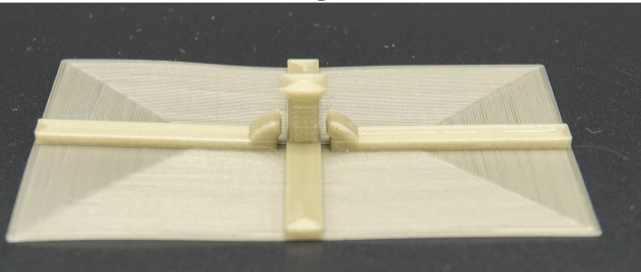
(A) *'reference model'*



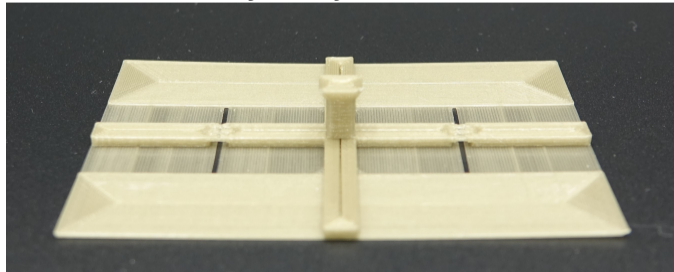
(B) *'no mechanical stopper model'*

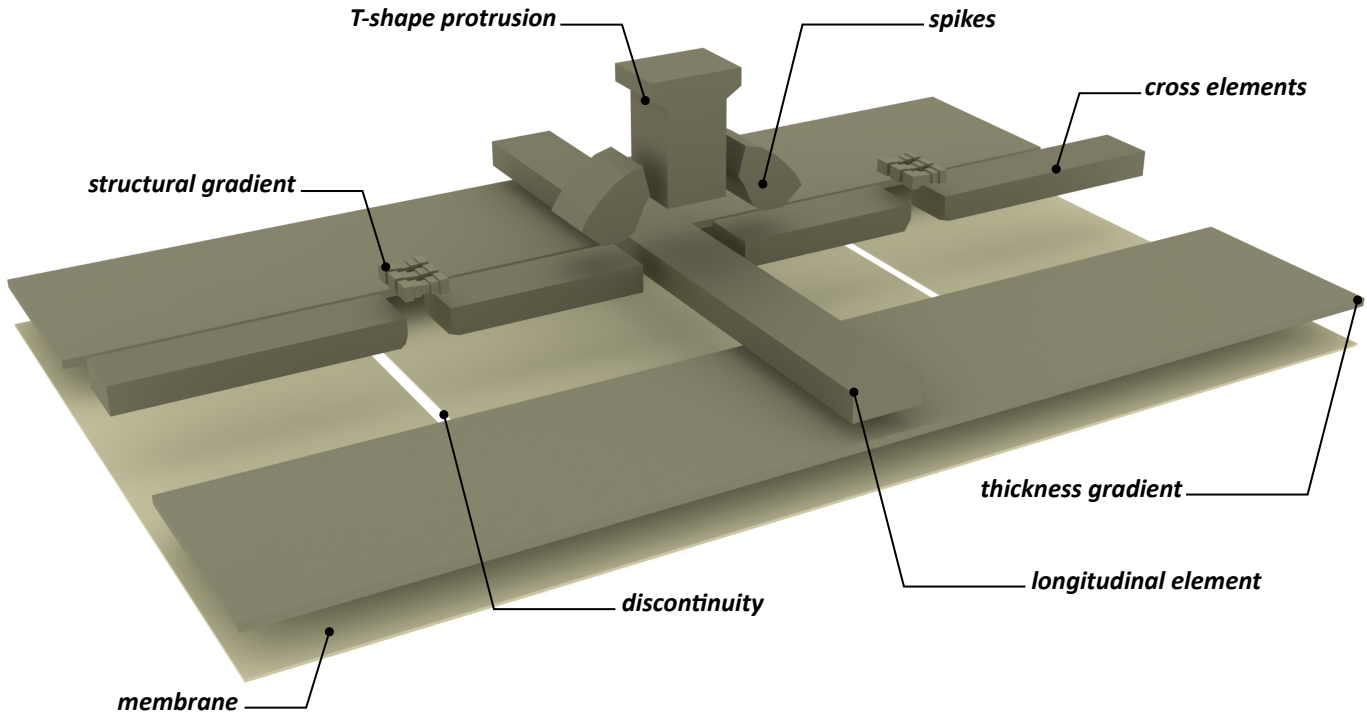


(C) *'no buckling model'*



(D) *'no flexible joint model'*





T-shape protrusion

spikes

cross elements

structural gradient

thickness gradient

longitudinal element

discontinuity

membrane