CLAIMS:

What is claimed is:

1. A system comprising:

a leading edge tubular member (114);

an upper tubular member (110);

a lower tubular member (112);

one or more upper rib members (124) connected between the leading edge tubular member (114) and the upper tubular member (110);

one or more lower rib members (126) connected between the leading edge tubular member (114) and the lower tubular member (112);

a rigid sandwich shell (102) disposed between the upper tubular member (110) and the leading edge tubular member (114), wherein the rigid sandwich shell (102) comprises one or more expansion joints (122A, 122B); and

a sandwich shear web (104) disposed between the upper tubular member (110) and the lower tubular member (112);

wherein the rigid sandwich shell (102) and the sandwich shear web (104) form a D-shape.

2. The system of claim 1, wherein the leading edge tubular member (114), the upper tubular member (110), and the lower tubular member (112) carry all bending loads.

3. The system of claim 1, wherein each expansion joint (122A, 122B) runs between the leading edge tubular member (114) and the upper tubular member (110).

4. The system of claim 3, further comprising a polyvinyl fluoride (PVF) film that covers the system except for the rigid sandwich shell 102, wherein the PVF film provides an airfoil shape.

5. The system of claim 4, wherein the PVF film covers one or more channels formed by the one or more expansion joints.

6. The system of claim 1, wherein the rigid sandwich shell (102) comprises two thin composite face sheets separated by a low-density core.

7. The system of claim 6, wherein the two thin composite face sheets comprise carbon fiber and epoxy.

8. The system of claim 6, wherein the low-density core comprises foam.

9. The system of claim 6, wherein the low-density core comprises a honeycomb.

10. The system of claim 1, further comprising:
one or more cross-bracing members (108) connected between each of the one or more lower rib members (126).

11. The system of claim 10, wherein each of the one or more cross-bracing members (108) are configured to pull the lower tubular member (112) toward the leading edge tubular member (114).

12. A system comprising:
a leading edge tubular member (114);
an upper tubular member (110);
one or more upper rib members (124) connected between the leading edge tubular member (114) and the upper tubular member (110); and
a rigid sandwich shell (102) disposed between the upper tubular member (110) and the leading edge tubular member (114), wherein the rigid sandwich shell (102) comprises one or more expansion joints (122A, 122B).

13. The system of claim 12, further comprising:
a lower tubular member (112).

14. The system of claim 13, further comprising:
one or more lower rib members (126) connected between the leading edge tubular member (114) and the lower tubular member (112).

15. The system of claim 14, further comprising:
a sandwich shear web (104) disposed between the upper tubular member (110) and the lower tubular member (112).

16. The system of claim 15, wherein the rigid sandwich shell (102) and the sandwich shear web (104) form a D-shape.

17. The system of claim 16, wherein the leading edge tubular member (114), the upper tubular member (110), and the lower tubular member (112) carry all bending loads.

18. The system of claim 12, wherein each expansion joint (122A, 122B) runs between the leading edge tubular member (114) and the upper tubular member (110).