AIRBUS 3.0-049

CLAIMS

1. A wing unit, in particular a spar box, for forming on aerodynamically active surface of an aircraft, in particular airfoils, horizontal tail units, or rudder units of a plane, comprising:

an upper shell ,

and a lower shell, the upper shell and the lower shell forming the aerodyanically active surface and

at least one actuating member,

wherein in a region between the upper shell and the lower shell the at least one actuating member is arranged for modifying the surface geometry of the aerodynamically active surface and/or the mechanical properties of the wing unit.

2. The wing unit according to claim 1,

wherein the at least one actuating member is adapted in such a way that a surface geometry of an aerodynamically active surface is changeable by using a control and regulation device, depending on loading states prevailing in the wing unit.

3. The wing unit according to claim 1,

wherein the at least one actuating member is adapted in such a way that a bending/torsion coupling of the wing unit is changeable by a control and regulation device, depending on the loading states prevailing in the wing unit.

4. The wing unit according to claim 1, further comprising:

at least one spar arranged between the upper shell and the lower shell.

5. The wing unit according to claim 1, further comprising:

at least one rib arranged between the upper shell and the lower shell.

6. The wing unit according to claim 4,

wherein the at least one spar is shear flexible in the region of the at least one actuating member.

7. The wing unit according to claim 5,

wherein the at least one rib is transverse force flexible in the region of the at least one actuating member.

8. The wing unit according to claim 1,

wherein a dimension of the at least one actuating member is variable by a control and regulation device.

9. The wing unit according to claim 1, further comprising:

two ribs, and

a spar,

wherein the two ribs are arranged between the upper shell and the lower shell,

wherein the spar is arranged between the upper shell and the lower shell,

wherein between the two ribs the at least one actuating member is arranged, and

wherein the at least one actuating member is arranged substantially in parallel to the spar.

10. The wing unit according to claim 1, further comprising:

at least two ribs,

at least two actuating members, and

at least two spars,

wherein between the at least two ribs the at least two actuating members are arranged crosswise for forming a tension shear,

wherein the at least two actuating members are arranged substantially in parallel to the at least two spars.

11. The wing unit according to claim 1, further comprising:

at least two actuating members,

a first rib having a lower rib foot and an upper rib foot,

a second rib having a lower rib foot and an upper rib foot,

wherein the at least two actuating members are arranged crosswise,

wherein one of the at least two actuating members is arranged between the lower rib foot of the first rib and the upper rib foot of the second rib, and

wherein the other one of the at least two actuating members is arranged between the upper rib foot of the first rib and the lower rib foot of the second rib.

12. The wing unit according to claim 1, further comprising:

a rib,

wherein the rib is arranged between the upper shell and the lower shell,

wherein the at least one actuating member is arranged substantially parallel to the rib in the region between the upper shell and the lower shell.

13. The wing unit according to claim 1, further comprising:

at least two actuating members; and

at least one rib;

wherein the rib is arranged between the upper shell and the lower shell; and

wherein the at least two actuating members are arranged crosswise to each other substantially in parallel to the at least one rib for forming a tension shear field.

14. The wing unit according to claim 1,

wherein the at least one actuating member is rod-shaped.

15. The wing unit according to claim 1,

wherein the at least one actuating member comprises at least one actuator,

wherein the at least one actuator is adapted to vary a length of the at least one actuating member.

16. The wing unit according to claim 15,

wherein the at least one actuator is formed with at least one piezoelectric element, in particular piezoelectric stacks, piezoelectric plates, piezoelectric filaments and/or with at least one shape memory element,

wherein the at least one piezoelectric element is adapted in such a way that it is operateable through control signals generated by a control and regulation device.

17. The wing unit according to claim 16,

wherein the control signals for the at least one actuator are electrical voltages and/or electrical currents.

18. The wing unit according to claim 1,

wherein the at least one actuating member comprises at least one sensor,

wherein the at least one sensor is adapted to detect loading states in the at least one actuating member and/or a length variation of the at least one actuating member.

19. The wing unit according to claim 1, further comprising:

a plurality of spars;

a plurality of ribs; and

at least one sensor,

wherein the at least one sensor is arranged in a region of the upper shell, the lower shell, the plurality of spars, as well as the plurality of ribs,

wherein the at least one sensor is adapted to detect at least one loading state and/or at least one length variation in the region of the upper shell, the lower shell, of at least one of the plurality of spars, as well as of at least one of the plurality of ribs.

20. The wing unit according to claim 19,

wherein the at least one sensor is formed with at least one piezoelectric element, in particular piezoelectric stacks, piezoelectric plates, piezoelectric filaments, strain gauges, or the like.

21. The wing unit according to claim 2 further comprising a control and regulation device associated with actuating member to change the surface geometry at the aerodynamically active surface depending on loading status prevailing in the wing unit.

22. The wing unit according to claim 21 further comprising a bending/torsion coupling associated with actuating member.