moveable relative to each other to allow tilt adjustment of the seatback 14 relative to the seat portion 12. To this end, one of the two tilt adjustment members 18, 20 is on each of the seat portion 12 and seatback 14.

[20] At least one vehicle reinforcing member 26, 28, 30 (members 26 and 28 being shown in dashed, broken lines and member 30 being shown in dotted broken lines) may be provided in one or both of the seat elements – in other words in one of the seat portion 12 and seatback 14 – or even in the seat base 24 or structure supporting the floor 22. Since the vehicle reinforcing members 26, 28, 30 (and other members as described herein) form part of the vehicle seat, the term "vehicle reinforcing member" may be used interchangeably with "seat reinforcing member" as appropriate. Presently, three such vehicle reinforcing members 26, 28, 30 are shown to provide exemplary illustration of where such members may be used. The vehicle reinforcing members 26, 28, 30 are formed, for example, using the process steps shown in FIGs. 5a to 5d.

[21] In each case, the vehicle reinforcing members 26, 28, 30 are provided to substitute for a traditional reinforcing or structural member. In most cases, the relevant vehicle reinforcing member will also form part of a safety system. For example, the vehicle reinforcing member 28 in the seat portion 12 is mounted to the main structure of the vehicle via the floor 22. In the present case, the seat portion 12 is mounted to the floor 22 via mechanism 24 as discussed above. In the event of a front end collision with the vehicle, the inertia of an occupant sitting in the seat 10 will try to propel the occupant forward in the direction of arrow X. The occupant's bottom will push against the vehicle reinforcing member 28, which will absorb some of the occupant's inertia.

[22] In so doing, the vehicle reinforcing member 28 provides structural reinforcement to other components of the seat portion 12, yet also performs the safety function of absorbing forward energy of an occupant sitting in the seat 10, preventing the occupant from "submarining" underneath the seatbelt during a frontal collision.

[23] Similarly, the vehicle reinforcing member 26 in the seatback 14 is mounted, via the tilt adjustment mechanism 16, to the seat portion 12. In the event of a rear impact with the vehicle, the occupants' inertia will push them into the seatback 14 in the direction of X'~~40~~. The vehicle reinforcing member 26 will absorb some of the force imparted by the occupant to the seat 10, but will transfer a significant proportion of that force through the tilt adjustment mechanism 16 into the seat portion 12. The seat portion 12 will similarly transfer some of that force into the floor 22 of the vehicle and so on.

[24] Again, the vehicle reinforcing member 26 reinforces the structure of the seatback 14 of the seat 10, yet also performs safety functions. In particular, during a rear end collision energy is transferred from an occupant into the seatback 14, from the seatback 14 into the tilt adjustment mechanism 18, 20, then on into the seat portion 12 and from the seat portion 12 into the floor 22 of the vehicle. Other force is absorbed during deformation of the vehicle reinforcing member 26 and other components of the vehicle seat 10. The vehicle reinforcing member 26 also maintains the structure of the seatback 14.

[25] It will be appreciated the phrases "maintaining the structure", "maintaining the shape" and similar, when used in terms of collision and destructive events, may include within their scope some change in the shape or structure of the seat 10 but not to the extent that an occupant will be severely injured by that change under tests performed according to relevant safety standards. In other words, those phrases include within their scope the ability of the seat to sufficiently maintain its shape and structure to ensure the safety of the occupant, even where the seat is destroyed (i.e. no longer be fit for purpose) in an accident. The phrase "maintain the structure" is not intended to limit the seat 10 to necessarily being capable of withstanding collisions while remaining operational.

[26] The vehicle reinforcing member 26 comprises one of the tilt adjustment members 18, 20 and vehicle reinforcing member 30 comprises the other of the tilt adjustment members 18, 20. In particular, vehicle reinforcing member 26 comprises tilt adjustment member 20. The tilt adjustment members 18, 20 are movably connected, thereby to connect the seat portion 12 and seatback 14. In other words, member 18 can be locked to member 20 in a variety of tilt positions, and can be selectively moved between those positions.

[27] The vehicle reinforcing member 26 extends from the tilt adjustment member 18 (which forms part of a hinge mechanism enabling rotation to tilt the seatback 14 relative to the seat portion 12) to a point further away from the respective tilt adjustment member 18 (i.e. to a point further away from the relevant hinge mechanism). The vehicle reinforcing member 26 of the illustrated embodiment does not necessarily extend the entire height of the seat 10. The vehicle reinforcing member ~~18~~ 26 instead extends, for example, to a shoulder height at which it is anticipated the shoulder of the average height occupant will be positioned when in the seat 10 or as deemed necessary by engineering for the specific seat design.

[63] Once the bond is formed, the CFRM sheet 504 is cured or cooled in order to set it in shape. During curing or cooling, for example when the CFRM sheet 504 is partially cured or cooled, the shape defining member 506 can be withdrawn from the CFRM sheet 504. If the shape defining member 506 is withdrawn too early – in other words, before the CFRM sheet 504 has set sufficiently to maintain its shape without the shape defining member 506 – the CFRM sheet 504 may collapse. If an attempt is made to withdraw the shape defining member 506 too late, the high strength and rigidity of the cured or cooled vehicle reinforcing component formed from the CFRM sheet 504 may preclude withdrawal of the shape defining member 506.

[64] To precisely control the rate of curing or cooling, the temperature of the shape defining member 506 may be controlled. Controlling the temperature of the shape defining member 506 controls the temperature of the CFRM sheet 504 during curing or cooling. To this end the shape defining member 506 comprises a heating and/or cooling element 536. The heating and/or cooling element may comprise a filament or may comprise a series of conduits or channels through which coolant and/or radiant passes to control the temperature of the shape defining member 506.

[65] The curing or cooling process described above is active cooling – the curing or cooling process is actively controlled. In some embodiments, the curing process may be passive and simply comprise awaiting cooling of the CFRM sheet 504 through heat dissipation to atmosphere and into the shape defining member 506.

[66] In some embodiments, the shape defining member may form part of a component comprising the vehicle reinforcing member. The shape defining member in such embodiments need not be withdrawn from the closed cross-section CFRM vehicle reinforcing member once it has been formed.

[67] As mentioned with reference to FIG. 3, the method described with reference to FIGs. 5a to 5d may involve bonding a metal fixture 538 to the CFRM sheet 504. The metal fixture 538 enables the vehicle reinforcing member formed from the CFRM sheet 504 to be attached to another structure such as a the tilt adjustment member of a seat portion.

[68] The metal fixture 538 can be attached using traditional methods, such as riveting, bolting or by shaping the vehicle reinforcing member to enable an interference fit. In FIG. 5d, the metal fixture 538 comprises a tilt adjustment member of a tilt adjustment mechanism, and is pre-treated with an adhesive agent. The adhesive agent is compatible with the metal of the metal fixture 538 and thereby adhesively bonds to the

maintaining dimensional stability – in other words, while preventing collapse of the vehicle reinforcing members until they are cured or cooled to sufficient rigidity to allow withdrawing the shape defining members. The mould (910, 912) may similarly be provided with a cooling system. ~~@Sprusen, consider thermal management system to make flexible heating/cooling as we learn more from development testing?~~

[84] It will be appreciated by a person skilled in the art that numerous variations and/or modifications may be made to the present invention as shown in the specific embodiments without departing from the spirit or scope of the invention as broadly described. The present embodiments are, therefore, to be considered in all respects to be illustrative and not restrictive.

CLAIMS

1. A method for forming a vehicle reinforcing member, the method comprising:

conforming a planar body of fibre reinforced material (CFRM) to a shape of a shape defining member, the shape defining member being tapered in a longitudinal direction of the shape defining member, the material comprising continuous fibres in a synthetic matrix and the tapered shape defining member defining ~~an~~ a tapered internal volume of a closed cross-section portion of the vehicle reinforcing member; ~~and~~

bonding a first edge portion of the CFRM body to a second edge portion of the CFRM body thereby to form, around the shape defining member, the closed cross-section portion of the vehicle reinforcing member; and

overmoulding a shell onto the vehicle reinforcing member to integrally connected the shell and CFRM body, while keeping the shape defining member in the closed-cross-section portion.

2. A method according to claim 1, further comprising:

at least partially curing the conformed CFRM body; and

withdrawing the shape defining member from the internal volume of the closed cross-section portion of the vehicle reinforcing member.

3. A method according to claim 1 or 2, wherein conforming the CFRM body comprises contacting a first mould member with the CFRM body and bringing the first mould member and shape defining member together, with the CFRM body therebetween, to at least partially conform the CFRM to a shape of the shape defining member.

4. The method of claim 3, wherein the first mould member comprises a surface disposed at an incline to a vertical direction wherein the step of contacting the first mould member with the CFRM body comprises loading the CFRM body onto the inclined surface.

5. A method according to claim 3 or 4, wherein the first mould member comprises a concave section shaped to cooperate with the shape of the shape defining member, and wherein bringing the first mould member and shape defining member together comprises positioning the CFRM body between the concave section and shape defining member.

6. The method of ~~any one of~~ claims ~~3 to~~ 5, further comprising positioning the CFRM body such that the first and second edge portions protrude outside of the concave section.

7. The method of claim 6, wherein bonding the first edge portion to the second edge portion comprises contacting the CFRM body with a second mould member and third mould

member respectively to bring one of the first edge portion and second edge portion against the shape defining member, the second and third edge portion overlapping each other.

8. The method of claim ~~9~~7, wherein the third mould member is heated.

9. The method of claim ~~10~~8, wherein the third mould member is heated to a bonding temperature of the CFRM.

10. The method of any one of claims ~~9~~ 7 to ~~11~~9, wherein the second mould member and third mould member are attached to a reciprocating device, the reciprocating device bringing sequentially the second mould member into contact with the CFRM body, then removing the second mould member from contact with the CFRM body while bringing the third mould member into contact with the CFRM body.

11. The method of any preceding claim, further comprising adhesively bonding a metal fixture to the CFRM body, the metal fixture enabling the vehicle reinforcing member to be attached to another structure.

12. The method of any ~~preceding claim~~one of claims 8 to 10, wherein vehicle reinforcing member is elongated in a longitudinal direction and the method further comprises withdrawing the second mould member in the longitudinal direction of the vehicle reinforcing member.

13. The method of any preceding claim, wherein the bonding step comprises bonding the first edge portion and the second edge portion by fusion.

14. The method of any of claims 2 to 13, further comprising controlling a temperature of the shape defining member thereby to control a rate of curing of the vehicle reinforcing member.

15. The method of claim ~~17~~14, wherein the step of controlling the temperature of the shape defining member comprising passing coolant and/or radiant through one or more channels in the shape defining member to control a temperature of the shape defining member and thereby control a temperature of the CFRM body.

16. A vehicle reinforcing member manufactured using the method of any preceding claim, the vehicle reinforcing member comprising a closed cross-section portion and a seam joining the first and second edge sections.

17. A method of manufacturing a reinforcing structural member of a vehicle seat, the vehicle seat comprising a seat portion and a seatback connected to the seat portion by a tilt adjustment mechanism, the tilt adjustment mechanism comprising two movably connected tilt adjustment members moveable relative to each other to allow tilt adjustment of the seatback relative to the seat portion, one of the two tilt adjustment members being on each of the seat portion and seatback, the method comprising:

forming a vehicle reinforcing member of a seat element using the method of any one of claims 1 to ~~18~~15, the seat element being one of the seat portion and seatback; and

attaching one of the two tilt adjustment members to the vehicle reinforcing member for connecting the vehicle reinforcing member to the other of the two tilt adjustment members and thereby to connect the seat portion and seatback.

18. The method of claim 17, wherein the attaching step is performed using adhesive bonding.

19. The method of claim 17 or 18, wherein the seat element is the seatback, the tilt adjustment mechanism comprises a hinge mechanism on each of two opposed sides of the seatback, one of the hinge mechanisms comprising the tilt adjustment members and the other hinge mechanism also comprising two movably connected tilt adjustment members moveable relative to each other to allow tilt adjustment of the seatback relative to the seat portion, the method comprising:

forming a further vehicle reinforcing member in accordance with the method of any one of claims 1 to ~~10~~15, the vehicle reinforcing member and further vehicle reinforcing member each comprising a tilt adjustment member from the respective hinge mechanism and extending along the two opposed sides of the seatback from the respective hinge mechanism to a point further away from the respective hinge mechanism; and

overmoulding ~~a~~ the shell onto the vehicle reinforcing member and further vehicle reinforcing member, to integrally connected the shell, vehicle reinforcing member and further vehicle reinforcing member.

20. A vehicle seat comprising:

a seat portion;

a seatback;

a tilt adjustment mechanism connecting the seatback to the seat portion, the tilt adjustment mechanism comprising two movably connected tilt adjustment members moveable relative to each other to allow tilt adjustment of the seatback relative to the seat portion, one of the two tilt adjustment members being on each of the seat portion and seatback,

wherein a seat element, the seat element being one of the seatback and seat portion, comprises at least one vehicle reinforcing member formed using the method of any one of claims 1 to ~~13~~15, the at least one vehicle reinforcing member comprising one of the tilt adjustment members movably connected to the other tilt adjustment member thereby to connect the seat portion and seatback.

~~21. A vehicle seat comprising:~~

~~a seat portion;~~

~~a seatback;~~

~~a tilt adjustment mechanism connecting the seatback to the seat portion, the tilt adjustment mechanism comprising two movably connected tilt adjustment members moveable relative to each other to allow tilt adjustment of the seatback relative to the seat portion, one of the two tilt adjustment members being on each of the seat portion and seatback,~~

~~wherein a seat element, the seat element being one of the seatback and seat portion, is formed according to the method of any one of claims 19 to 21, the at least one vehicle reinforcing member comprising one of the tilt adjustment members movably connected to the other tilt adjustment member thereby to connect the seat portion and seatback.~~

~~22.~~21. A vehicle seat according to claim 20 ~~or 21~~, wherein the seat element comprises two vehicle reinforcing members extending along opposite sides of the seat element from the tilt adjustment mechanism to a point further away from the tilt adjustment mechanism.

~~23.~~22. A vehicle seat according to claim ~~22~~21, wherein the tilt adjustment mechanism comprises two hinge mechanisms, one hinge mechanism being on each of the opposite sides of the seat element, the tilt adjustment members forming part of one of the two hinge mechanisms, the other hinge mechanism also comprising two movably connected tilt adjustment members

moveable relative to each other to allow tilt adjustment of the seatback relative to the seat portion, and wherein each vehicle reinforcing member comprises one of the two tilt adjustment members of the respective hinge.

~~24.~~23. A vehicle seat according to any one of claims 20 to ~~23~~22, wherein a cross-section of the closed cross-section portion of each vehicle reinforcing members is a substantially elliptical.

~~25.~~24. A system for fabricating a vehicle reinforcing member comprising:

a shape defining member, the shape defining member being tapered in a longitudinal direction of the shape defining member and defining an internal volume of a closed cross-section portion of the vehicle reinforcing member, the vehicle reinforcing member formed, in use, from a planar body of continuous fibre reinforced material (CFRM) comprising continuous fibres in a synthetic matrix;

a first mould member, the first mould member and tapered shape defining member being configured to be brought together to with the CFRM body therebetween, to ~~at least partially conform~~form a closed cross-section portion from the CFRM body, the closed cross-section portion being formed around ~~to~~ the tapered shape defining member; ~~and~~

a bonding device movably mounted to the first mould member and movable towards the shape defining member in use to bond a first edge portion and a second edge portion of the CFRM body together to form the vehicle reinforcing member; and

an overmoulding mould for use in overmoulding a shell onto the vehicle reinforcing member to integrally connected the shell and CFRM body, while keeping the tapered shape defining member in the closed-cross-section portion.

~~26.~~25. The system of claim ~~25~~24, further comprising a second mould member movably mounted to the first mould member and movable, in use, to bring the second mould member into contact with the CFRM body to bring a first edge portion of the CFRM body into conformity with the shape defining member.

~~27.~~26. The system of claim ~~26~~25, further comprising a third mould member, the second mould member and third mould member being mounted to a reciprocating device attached to the first mould member, the reciprocating device in use bringing the second mould member into contact with the first edge portion, then removing the second mould member from contact with

the first edge portion and bringing the third mould member into contact with a second edge portion of the CFRM body to bond the second edge portion to the first edge portion.