a second plastics. By this sandwich molding, also recesses at the corners of the shuttering element can be filled with plastics, which represent the corners of the finished shuttering element.

The EP 2 055 864 A2 describes a shuttering plate with a holding groove that extends continuously along the plate edge and a reinforcement edge of plastics is arranged in the holding groove, with the outer surface of said reinforcement edge facing away from holding groove being flush with the plate edge. In one embodiment, the edge protection has a surface covering, which can also be formed of plastics, additionally to the reinforcement edge.

The DE 26 18 366 A1 discloses a shuttering panel with a revolving edge protection made of an elastic soft material, which is fixed to the panel representing the shuttering area. In order to be protected against impacts, more elastic material can such be arranged in the corners, that the edge protection in the region of the corners has a larger cross section.

The DE 196 11 413 A1 shows a shuttering panel with an edge protection of plastics, which completely covers the main body at its edge face in at least one region of the corner. In this case the edge faces of the base plate in the corner section are backwardly offset relative to the rectangular corner of the whole shuttering panel.

From the DE 23 05 797 A1, a shuttering plate with a covering layer of plastics is known, which has an edge covering layer of plastics at the narrow faces at the edges along the plate edges.

The objective of the invention is to provide a shuttering element with an edge protection as well as a method for the manufacture thereof, where a high mechanical strength of the edge protection and a good protective effect against the entry of moisture into the shuttering element is achieved in spite of economical manufacturing methods.

The objective of the invention is provided by a shuttering element with the features of the characterizing part of patent claim 1 as well as a method having the characterizing measures of patent claim 12. Due to the fact that at least at a second sub-face of the edge face of the main body and/or at an outer face of the first protective edge portion, a second protective edge portion made of a second plastics material is arranged by means of an injection molding and

the second protective edge portion adjoins a contact face at a first protective edge portion in a durable mechanically loadable and waterproof way, manufacturing methods that are advantageous for the respective protective edge portions can be chosen and characteristics of the protective edge adjusted to the respective appearing stresses can be achieved by the choice of the plastics material and the joints do not represent weak spots with respect to mechanical strength and protection against moisture due to the permanent connection at the contact faces between the first and the second protective edge portion. Due to the fact that the manufacturing of the edge protection of plastics material in the individual protective edge portions can be chosen to be respectively optimal, such an embodiment or such a manufacturing method is particularly applicable with respect to providing shuttering elements also having complicated edge faces with an edge protection having a high protective effect in an economical way. In particular, the entire edge face of a shuttering element can thus be provided with an edge protection and no distinct weak spots at the contact faces with respect to the protective effect result. The design of the main body of wood and/or wood material is not described in detail herein, because sufficiently applicable embodiments and manufacturing methods are known from prior art, but at this stage, the usage of solid wooden boards, 3-ply sheets, glued laminated timber, plywood, oriented strand boards, particle boards, hardboards, medium-density fiberboards, wood-plastic composite panels, boards of wood-plastic composite, boards of all materials previously mentioned with thermoplastic or thermosetting coatings and suchlike should be mentioned as examples for advantageous embodiments of a main body. The embodiment of the shuttering element, which is particularly advantageous to produce, is that the second protective edge portion extends over a corner of the main body or a corner of the main body covered by the first protective edge portion or an portion of a rounded or a chamfered directional change of the edge face or of the first protective edge portion, because in particular the corner portions or transition portions of the edge face are exposed to high mechanical stresses during the later usage of the shuttering element and the second protective edge portion can be embodied especially according to said requirements. Furthermore, an attachment of a continuous first protective edge portion is easier if the edges or the directional change portions are rounded or chamfered, than it is in the case of sharp corners of the main body.

The embodiment according to the invention is particularly advantageous to use with 3-ply sheets, because in every part of the edge face, at least parts of the main body are cut in per-

pendicular direction to the wood fiber and these areas of so-called cross-grained wood have to be protected against influences of moisture due to their high capacity to absorb water.

A high bonding capacity between edge protection and 3-ply sheets as well as high mechanical strength of the edge protection during usage is achieved, if the plastics of the first protective edge portion and the plastics of the second protective edge portion is essentially made of elastic plastics, in particular thermoplastic polyurethane (TPU). In this case, the two plastics materials do not have to be identical, but they shall establish a good adhesive composite with respect to one another at their contact faces and the mechanically permanent connection is amongst others effected by Van der Waals forces as well as interdiffusion between the macromolecules of the first plastics material and the macromolecules of the second plastics material. Between the plastics material of the first protective edge portion and the plastics material of the second protective edge portion, a mechanical anchoring, for example by undercuts or apertures in the first protective edge portion, can additionally be effected, that can be effective in addition to the adhesive composite. The connection between the first protective edge portion and the second protective edge portion can be furthermore improved by pretreating the contact face at the first protective edge portion by means of adhesive agents or primers. In particular using similar plastics material with respect to the first protective edge portion and the second protective edge portion ensures a good and permanent connection.

An advantageous embodiment of the shuttering element is furthermore that at least sections of the second protective edge portion along the edge face have a constant thickness perpendicular to the edge face, because in such sections having a constant thickness, the edge face at the main body represents a parallel curve with respect to the finished protective edge and the main body can thus easily be prepared for the attachment of the second protective edge portion. It is furthermore thereby achieved that as few changes as possible regarding the mechanical characteristics are present within the second protective edge portion, what should be the aim regarding the entire circumference of the shuttering element.

The mechanical anchoring of the second protective edge portion to the first protective edge portion and, if applicable, also to the main body is particularly encouraged by the fact that a contact surface of the second protective edge portion with the first protective edge portion and, if applicable, also with the main body, at least corresponds to in a third of the entire cir-

cumferential surface of the second protective edge portion. The entire circumferential surface thereby corresponds to the entire surface of the second protective edge portion, considered to be a solid model, less the sub-faces situated in the plate surfaces of the shuttering element. The entire surface can also equated with the interior surface of the mold cavity for the injecting of the second protective edge portion. Thus, the risk of a removing caused by mechanical stress can be reduced.

An advantageous embodiment of the shuttering element that can also be combined with other variants of embodiment is that the end sections of the first protective edge portion form the contact faces or the joints or the frontal surfaces, where later a second protective edge portion follows, are arranged at rectilinear sections of the edge face. These end sections are thus not connected to the edge face of the main body in a curved state and the risk of an undesired removal of the end sections from the edge face due to interior tension is avoided. This is particularly of advantage if a larger time lag is between the attachment of the first protective edge portion and the second protective edge portion. After the injecting of the second protective edge portion, the danger of a removal is insignificant, due to the end sections being fixed to the main body by the second protective edge portion.

At one directional change portion of the main body or the first protective edge portion, in particular a corner, the thickness of the second protective edge portion can preferably be between 5 times and 15 times as much as the thickness of the first protective edge portion, measured along an angle bisector of two edge faces following the directional change portions, with the result that in particular the corners of the main body that are exposed to high mechanical stress are optimally protected against damages by the protective edge according to the invention.

In the region of the contact face, the thickness of the second protective edge portion, measured perpendicularly to its outer surface, can be between one and three times as much as the thickness of the first protective edge portion and preferably with similar mechanical characteristics of the plastics material of the first protective edge portion and the plastics material of the second protective edge portion, preferably a approximately identical thickness of the two protective edge portions at the contact face is chosen in order to effect as few changes as pos-

sible of the mechanical characteristics of the finished protective edge in the region of the contact face.

In the event of different mechanical characteristics between the plastics material of the first protective edge portion and the plastics material of the second protective edge portion, the mechanical characteristics, in contrast, of the second protective edge portion can be adjusted to mechanical characteristics of the first protective edge portion by varying its thickness or mechanical characteristics different from these of the first protective edge portion can be achieved in the second protective edge portion, as there is for example an increased flexibility but also a lower flexibility in the event of pressure load.

In order to avoid abrupt changes of the mechanical characteristics within the second protective edge portion, is can be of advantage if the latter has a changeable thickness perpendicular to the edge face at least in sections along the edge face, with the result that, on the one hand, smooth transitions, which are for the manufacturing using an injection molding favorable in terms of flow, are achieved due to smooth changes of the diameter. Due to the fact that the shuttering elements, when used, are frequently pulled over a corner, it is advantageous, if the protective edge of a shuttering element has as few mechanical unsteadinesses as possible, i.e. it has the most even possible flexibility or elasticity, because a protective edge having a rapidly changing flexibility is exposed to an extremely high stress in the region of this mechanical unsteadiness when it is pulled over an edge, which could cause a tearing of the protective edge. It is therefore advantageous, if the first protective edge portion and the second protective edge portion have at least approximately the identical stiffness in the region of the contact face, when they are stressed perpendicularly to the edge face of the main body or the surface of the protective edge and the stiffness is defined as a ratio of the tensile modulus of the respective plastics material to the thickness of the respective plastics material perpendicular to the edge face.

A particular efficient manufacturing of a shuttering element according to the invention is possible, if the first protective edge portion and/or the second protective edge portion are connected with respect to the entire surface and butt-jointed to the edge face of the main body, because in this case, the pre-sizing of the main body can be performed by means of very simple tools, as there is for example a saw blade or a jointing cutter or a chipper. In particular by

the injection of the second plastics material is largely avoided with a complete or but pre-sizing of the edge face of the main body.

An additional enhancement of the mechanical stability of the connection between the first protective edge portion and the second protective edge portion can be achieved if they have cooperating positive-locking elements in the region of the contact face. At the first protective edge portion, for example, which is e.g. formed of prefabricated edge material of the first plastics, appropriate undercuts at the contact face can be provided during the application, which are filled with the plastics of the second protective edge portion while the second protective edge portion is subsequently applied by means of an injection molding and after the second plastics is solidified, a positive-locking, mechanical connection between the two protective edge portions is established. Due to such undercuts or recesses, the common surface of the contact face is additionally enlarged and thus a larger area for an adhesive effect is available between the first plastics material and second plastics material. With respect to the first protective edge portion being formed from prefabricated roller material, such an undercut or recess can be produced by means of an appropriate punch during the step of cutting.

As already mentioned, it is advantageous if the first protective edge portion and the second protective edge portion have as much similar or equivalent physical, in particular mechanical-technological characteristics as possible and thus the most homogenous possible protective edge is present along the entire circumference of a shuttering element. This can be achieved if the plastics material of the first protective edge portion and the plastics material of the second protective edge portion have at least approximately identical technological characteristics, in particular elasticity, tensile strength, hardness, melting temperature and suchlike.

It can alternatively also be possible if the plastics material of the first protective edge portion and the plastics material of the second protective edge portion have considerably different mechanical-technological characteristics with respect to each other. For example in the region of corners of the protective edge, which is formed of the second protective edge portions and which are generally exposed to higher mechanical loads during usage, in this embodiment, a plastics material different from the plastics material of the first protective edge portion, extending over a large part of the longitudinal edges or the transverse edges of a shuttering panel, can be used.

In order to achieve a balanced relationship between high mechanical load capacity and efficient manufacturing of a shuttering element with protective edge it is advantageous if the thickness of the first protective edge portion is between 0.1 times and 0.5 times of the thickness of the main body. The main bodies of shuttering elements frequently have a thickness between 10 mm and 35 mm but in practice, an average thickness of a first protective edge portion of 2 mm to 8 mm has turned out to be advantageous. In case of a first protective edge portion or a second protective edge portion having such a thickness it is ensured that also punctiform, impulsive loads at the edge of such a shuttering element are spread over a larger area by the plastics material of the protective edge and the main body below of wood and/or wood material is exposed to slight mechanical loads, which can therefore be borne without causing damages.

Due to the fact that shuttering elements according to the invention have a very large service life, and represent high-quality equipment, it is furthermore possible to provide a measuring sensor element and/or a RFID transponder element in the region of the protective edge. For example, before the first protective edge portion is attached, an appropriate element can be built into a recess of the main body, or also before the attachment of the second protective edge portion it is in particular possible to cast such an element into the second protective edge portion, because the second protective edge portion is attached by an injection molding. A measuring sensor element can for example be used to measure the temperature in the region of the shuttering. An RFID transponder element is for example applicable for a contactless and/or automatable identification of single shuttering elements, whereby also the usage of such shuttering elements can be tracked over their entire service life or the values of a measuring sensor element can be provided in a contactless readable way.

A particular advantageous embodiment of a shuttering element is that the first protective edge portion is essentially flush with the plate surface and the second protective edge portion has an elevated surface which stands proud in particularly by at least 0.5 mm with respect to the plate surface of the main body. The corners, made from the second plastics, of such a shuttering element are consequently a little bit thicker than the main body and the first protective edge portions. At a concrete area, manufacture therewith, in the corner regions of the shuttering element, slightly recessed sections result, which correspond to the elevations, which either

Once the first protective edge portion is applied, the second protective edge portion is applied by using an in-mold assembly encompassing the main body and a sub-face of the first protective edge portion or two adjacent first protective edge portions in the region of the contact face.

The mold cavity for the molten second plastics material to be put into is thus on the one hand limited by the walls of the mold of the in-mold assembly and on the other hand by the exterior face of the first protective edge portion of the edge face of the main body together with the abutting faces and the exterior faces od adjacent first protective edge portions. As a primary shaping process, this method is immune to variations in terms of geometry of the edge faces or the abutting faces of adjacent first protective edge portions and thus, the pre-sorted substeps of the sizing as well as the application of the first protective edge portion can be performed with less high requirements in terms of accuracy.

A high-quality, permanent, particularly mechanically highly loadable and waterproof connection at the contact face is achieved by producing the connection of the second protective edge portion with the first protective edge portion at the contact face by a partial melting process or a welding process, which causes the deep connection between the plastics material of the first protective edge portion and the plastics material of the second protective edge portion. Due to the highest possible temperature of the molten plastics material of the second protective edge portion, also the surface plastics material of the first protective edge portion is melted during the injection process, resulting in the creation of a deep connection. A particularly good connection is achieved if the plastics material of the first protective edge portion and the plastics material of the second protective edge portion are at least similar or even largely identical, i.e. have an equivalent chemical composition.

Once the injection molding operation has been performed, heat is withdrawn from the plastics material of the second protective edge portion via the in-mold assembly and the remaining shuttering element, with the result that the initially molten plastics material solidifies and the second protective edge portion gets the desired solidness. In order to accelerate the cooling down of the second protective edge portion and thus to reduce the time required to remove the shuttering element, the in-mold assembly can have cooling equipment in the form of cooling channels flown through by liquid.

Due to the fact that it is the most cost-efficient way to perform the pre-sizing of the main body in a continuous process, it is advantageous if the first protective edge portion or the first protective edge portions are attached to the edge face of the main body in a continuous process. It is therefore possible to integrate the corresponding devices for the attachment of the first protective edge portion into a double end tenoner but also into a single edge banding machine, where the sizing of the main body is effected. Nevertheless, the plastics material of the first protective edge portion and/or the second protective edge portion can also bey applied on an independent machining station, independent from the pre-sizing.

The plastics material for the first protective edge portion can therefore advantageously be present in the form of prefabricated edge material, being applied in the form of strips or roll goods, but this embodiment can also be advantageously combined with other embodiments described.

Irrespective of the way of attachment of the first protective edge portion and the second protective edge portion, the edge face can be subjected to a pre-treatment before application, which can comprise the application of primers of similar adhesive agents in order to improve the adhesive strength of the edge protection.

It is furthermore possible that the contact face at the first protective edge portion and/or the edge face at the second protective edge portion is subjected to a machining process. During this can, in particular also with a continuous process, a machining process with geometrically defined cutters, e.g. sawing or milling, or geometrically undefined cutters, e.g. grinding, can be effected. By means of such an intermediate sizing of the shuttering element before the second protective edge portion is attached, the requirements with respect to accuracy to the preceding attachment of the first protective edge portion can be kept down, whereby the economic efficiency of the entire process can be increased. Due to this additional machining process between the applications of the individual protective edge portions, a certain geometry can be achieved between a second protective edge portion and the contact faces, with the result that a particularly high flexibility and elasticity, but also a high resistivity and high rigidity can be achieved. In order to achieve a clean cutting edge with these machining processes after the

The first protective edge portions 10, 10', 10'' and 10''' are made of a first plastics material, having a high resistance to environmental influences, such as moisture, concrete ingredients, chemical substances, increased temperature, solar radiation and UV radiation.

When used, the second protective edge portions 12, 12', 12'' and 12''' are exposed to comparable mechanical loads and comparable environmental influences like the first protective edge portions 10 and they are made of a second plastics material, which is at least approximately identical to the first plastics material of the first protective edge portions 10, but they can also be made of a second plastics material having characteristics considerably differing from those of the first plastics material.

The first protective edge portions 10, 10', 10'' and 10''', covering a large part of the longitudinal edges or the transverse edges of the main body 3 in the embodiment shown, are e.g. attached to its edge face 8 in a continuous process and can be formed of a semi-finished material of the respective plastics materials, for example in the form of prefabricated strip material, or endless roll goods, which is applied to the edge face 8 in an corresponding length. For this application of the first protective edge portions 10, 10', ..., for example all common methods for gluing on can be used, where high-strength and moisture-proof glue systems are used. At this stage, PUR hot melt adhesives should be mentioned as an example for an applicable adhesive method, that are amongst others characterized by the fact that they can set under the influence of heat and/or under the influence of moisture and an excellent adhesive strength of a protective edge 4 at the main body 3 is achieved.

The second protective edge portions 12, 12', 12'' and 12'''being disposed in the corner regions of the main body 3, are applied to the main body 3 and the first protective edge portions 10, 10' by means of an injection molding and respectively extend between two first protective edge portions 10. For the injection molding to be performed, an in-mold assembly is disposed at the main body 3 with the first protective edge portions 10 already being arranged thereto so that a mold cavity applicable for the manufacturing of the second protective edge portions 12 is created, which is on the one hand limited by elements of molded parts of the in-mold assembly itself and on the other hand by a second sub-face 11 at the edge face 8 as well as front faces of the adjacent, first protective edge portions 10. Other details of embodiment of this

approximately perpendicular to the protective edge 4, for example in order to compensate different degrees of hardness or elasticity between the plastics material of the first protective edge portion 10 and the plastics material of the second protective edge portion 12. It is thus recommended to use similar a same thickness 16' of the second protective edge portion 12 and the thickness 17 of the first protective edge portion 10', if both plastics materials have the approximately same elasticity, whilst e.g. a lower elasticity of a plastics material of the second protective edge portion 12 can be compensated with respect to the plastics material of the first protective edge portion 10 by choosing the for the second protective edge portion thickness larger 16 than the thickness 17 for the first protective edge portion 10, provided that both plastics materials have a higher elasticity than the main body 3 of wood and/or wood material, what can generally be assumed.

Fig. 2 furthermore shows that the edge face 8 can be machined after the first protective edge portion 10 has been applied and that similarly, the frontal surfaces of the first protective edge portion 10 forming the contact faces 13 can be prepared for being connected with the second protective edge portion 12. The limiting curve of the edge face 8 shown in Fig. 2 results e.g. from the fact that after the first protective edge portion 10 has been applied, into the passage, a milling tool is being attached which rotates with an axis of rotation oriented perpendicularly to the main body plane and is fed in immersion direction 18 perpendicular to the longitudinal edge of the shuttering element 1. The main body 3 is then further machined in a constant extent by moving the milling tool parallel to the longitudinal edge and at the end of the main body 3, another feed motion 19 perpendicular to the longitudinal direction is performed, effecting a curved runout zone 20 of the edge face 8 of the main body.

It is thereby of advantage if the arms of the angle-shaped, second protective edge portion 12 extend from the corner 15 of the finished shuttering element 1 across a multiple of the thickness 16 along the edge face 18, with the result that additional to the connection with the first protective edge portions 10, 10' at the contact faces 13, a large contact face between the second protective edge portion 12 and the main body 3 is achieved and thus, a high mechanical load capacity in terms of shearing procedures or peeling procedures is achieved. A sufficiently large adhesive surface between the second protective edge portion 12 and the main body 3, a joining surface 21 of the second protective edge portion 12 with the first protective edge

portion 10 and, if applicable, also with the main body 3 corresponds at least to a third of the total circumferential surface of the second protective edge portion 12.

The second protective edge portion 12 shown in Fig. 2 furthermore has, at least in sections, an approximately constant thickness 16, with the result that also in these sections largely constant, mechanical characteristics can be deemed to be the basis.

As an example for an alternative embodiment of a shuttering element 1, Fig. 3 shows a section of a corner 15 of a shuttering panel 2, where the curved edge face 8 of the main body 3 in the corner region and the two straight edges following thereto – for example the longitudinal edge and the transverse edge of a rectangular main body 3 is engaged by a first, continuous protective edge portion 10, and the corner 15 of the finished shuttering element 1 is formed of a second protective edge portion 12, which pointed at an outer surface 22 of the first protective edge portion 10. The outer face 22 of the first protective edge portion 10 can additionally be subject to a processing, to increase the durability of the connection. For example by machining the corner region provided with the first protective edge portion 10, the contact face 13 can be increased, with the result that additionally, a mechanical anchoring between the first protective edge portion 10 and the second protective edge portion 12 can be effected. If applicable, an additional anchoring of the second protective edge portion 12 in the main body 3 can be achieved by a boring going into the main body 3.

The contour of the edge face 8 is in this exemplary embodiment rounded in the form of a quadrant in the region that will be a corner 15 later, but in a modification, it can also be given a more rounded contour by means of an edge-gated chamfer or by two straight cuts, adumbrated by dash-dotted lines, compared to a rectangular trimmed main body 3 at the corner 15, with the result that the latter has a corner angle being larger than 90°, i.e. for example 135°. Compared to the rounded embodiment or the exemplary embodiment in Fig. 2, where the contour of the edge face 8 is machined by means of a cylindrical milling tool, a contour of the edge face 8 in the region of the outer corner being composed from straight sections can be produced by means of two or more straight saw cuts.

A rounding of chamfering in the region of the corner is advantageous for the application of the first protective edge portion 10, because if plastics material in the form of semi-finished

material is used, it has a certain inherent rigidity and by avoiding sharp edges of the edge face 8 in directional change portions 14, the application, in particular the circumferential gluing of the first protective edge portion 10 in one single stroke is substantially easier and the bonding at the main body 3 is better.

In the embodiment according to Fig. 3 or with a chamfering in the corner region, the second protective edge portion 12 has a changeable thickness 16, which also causes different mechanical characteristics at different places of the second protective edge portion 12. Due to the fact that no sudden changes of the thickness 16 of the second protective edge portion 12 is provided, the risk of impact loads when a shuttering element 1 of this kind is drawn or pushed over an edge of another item does not exist. The continuous changing of the thickness shown can, as well as the gentle transitions shown in Fig. 2, cause favorable flow conditions in terms of injection molding when the second plastics material in injected.

With dashed lines, Fig. 3 adumbrates an in-mold assembly 23, with which the second protective edge portion 12 can be applied to the corner region of a main body 3 already provided with a first protective edge portion 10. The in-mold assembly 23 thereto has a recess for molded part 24, which, together with the edge face 8 as well as the outer face 22 of the already applied first protective edge portion 10 borders a mold cavity 25 that corresponds to the later, second protective edge portion 12. For this purpose, at least one feed channel 26 is disposed within the in-mold assembly 23, via which the molten plastics material can be fed to the mold cavity 25. The feed channel 26 or the system of feed channels flows into at least one gate 27, probably also in several gates 27 in the mold cavity 25, and the gate(s) are positioned in a favorable way in terms of injection molding. In order to accelerates the setting of the molten plastics material of the second protective edge portion 12 and thus to shorten the required production time, preferably one cooling system is additionally disposed, to support the fast cooling of the second protective edge portion 12 after having been injected.

With respect to Fig. 3, a modification of the embodiment of the corners is also possible, where the first protective edge portion 10has a joint 28 in the corner region, which is closed when the second protective edge portion 12 is being injected. At least one joint 28 of this kind inevitably results from the application of several first protective edge portions 10 or also of only one integrally circulating first protective edge portion 10 at the edge face 8 of the main

ings described on the basis of Fig. 3 serve for guiding the first protective edge portion 10 around the corner sections simpler and without sharp bucklings. In the following, the corners 15 of the shuttering element 1 are such manufactured that second protective edge portions 12 are attached in the corner regions or the directional change portions 14 of the outer surface of the first protective edge portion 10 by means of an injection molding, and the sharp-edged and rectangular corners 15 of the finished shuttering element 1 are embodied by the injected plastics material of the second protective edge portion 12. Between the first protective edge portion 10 and the second protective edge portion 12, a permanent connection is manufactured by the injecting at the contact faces 13.

At the joint 28 – in Fig. 8 shown in the bottom right – the distance being present between the beginning and the end of the first protective edge portion 10 closed by the second protective edge portion and the contact face 13 also extends to the frontal surface 29 of the first protective edge portion 10. The manufacturing method of this embodiment of a shuttering element 1 can be similar to the method described on the basis of Fig. 7, and the sizing of the corner regions, in this case the manufacture of the chamfers 44 is effected directly after the longitudinal edges have been trimmed 38 and after the transverse edges have been trimmed 40. The application of the first protective edge portion12 by edge banding 39 and 41 can be combined to one single circulating edge banding process, if applicable. The subsequent injecting of the second protective edge portions 12 in the corner regions completes the shuttering element 1.

Thus, Fig. 8 is an exemplary embodiment, where three corners 15 of the shuttering element 1 the respective second protective edge portion 12 is only connected to the outer faces 22 of the first protective edge portion 10via the contact faces 13 and at the corner 15 having the joint 28 of the second protective edge portion 12, the second protective edge portion 12 is additionally to the contact face 13 disposed at the outer face 22 and the frontal surfaces 29 of the first protective edge portion 10 also connected to the edge face 8 of the main body 3.

According to the exemplary embodiments according to Figs. 1, 2, 5, 6, 7 and 8, the frontal surfaces 29, being formed from the end sections of the first protective edge portion 10 and which form the joints 28, are disposed in the straight sections of the edge face 8, with the result that the end sections are not subject to a curvature, which could probably effect an peeling off of the first protective edge portion from the main body due to bending stress.

A further embodiment of a shuttering element 1, in Fig. 9 shown in a sectional view, can be that the first protective edge portion 10 is not made of a homogenous plastics material, but, in the direction thickness of the shuttering element, is combined of at least three sections 45a, 45b, 45c, and these sections 45a, 45b, 45c can be made of different plastics materials, which also can have different mechanical properties each. The sections 45a, 45b, 45c can be connected to each other by adhesive bonds, it is nevertheless advantageous to manufacture the plastics material for the first protective edge portion 10 by a so-called coextrusion method, which, in a extrusion process, connects different plastics materials to an integral extruded profile, being used for the first protective edge portion 10 as a semi-finished product. An advantageous embodiment of such a first protective edge portion 10 is achieved if the outer sections 45a and 45c are made of a material having a high resistance to wear and tear and also high toughness, e.g. thermoplastic polyurethane (TPU) and if the section 45b lying in between is made of another material – preferably also TPU – having a higher elasticity and can quasi act as an expansion part which can expand in the event that the main body 3 changes its thickness due to influence of moisture and the two outer sections 45a and 45b remain flush with the plate surfaces 5, 6 of the main body 3 because they can follow the change of the thickness of the main body 3 due to the relatively elastic section 45b, and the danger that the glue joint peels off due to high shear stress does not exist.

The local higher elasticity of such a protective edge portion 10 comprising several sections can alternatively or in addition to the above described measures achieved by the measure that the thickness 16 of the protective edge 4 is not constant in the direction of the shuttering element but has a local reduction of cross-section, for example in the form of a grooving, recess, flute or suchlike extending in circumferential direction of the edge face, with the result that the plastics provided with elastic properties locally allows a larger deformation and the protective edge portion 10 can bear modifications of the thickness of the main body 3 without sustaining damages.

Another feature of embodiment of a shuttering element 1 that can be combined with above described embodiments is shown in partial view in Fig. 10 as well as in a sectional view according to XI – XI in Fig. 11. This being the case, the second protective edge portion 12 is injected to a directional change portion 14 in the form of a rectangular corner 15 directly at

Claims

1. Shuttering element (1) with a protective edge (4), in particular a shuttering panel (2), comprising a two-dimensional main body (3) made of wood and/or wood material and/or wood-plastics composite and defined by an edge face (8), a first protective edge portion (10) made of a first plastics material or a combination of a plurality of first plastics materials and arranged on first sub-face (9), at least corresponding to the entire edge face (8) of the main body (3), of the edge face (8), a second protective edge portion (12) made of a second plastics material by means of an injection molding process being mounted on at least one second sub-face (11) of the edge face (8) of the main body (3) and/or an outer face (22) of the first edge protection portion (10) and at a contact face (13), the second edge protection portion (12) is attached to the first edge protection portion (10) and at the contact face (13), the second edge protection portion (12) is permanently connected to the first protective edge portion (10), characterized in that the second protective edge portion (12) extends over a directional change portion (14), in particular a corner (15), of the edge portion (8) of the main body (3) or over a directional change portion (14) of the outer face (22) of the first protective edge portion (10).

2. Shuttering element (1) according to claim 1, characterized in that the plastics material or the plastics materials of the first protective edge portion (10) and the plastics material of the second protective edge portion (12) are essentially made of a permanently elastic plastics, in particular of thermoplastic polyurethane.

3. Shuttering element (1) according to claim 1 or 2, characterized in that the second protective edge portion (12) at least in sections provides a constant thickness (16) perpendicular to the respective edge face (8) or outer face (22).

4. Shuttering element (1) according to one of the preceding claims, characterized in that the end sections of the first protective edge portion (10) that form the frontal surfaces (29) are arranged at straight sections of the edge face (8).

5. Shuttering element (1) according to one of the preceding claims, characterized in that at a directional change portion (14) of the main body (3) or of the first protective edge

portion (10), in particular a corner (15), the thickness (16) of the second protective edge portion (12) measured along the angle bisector of two edge faces (8) following the directional change portion (14) is between 5 times and 15 times the thickness (17) of the first protective edge portion (10).

6. Shuttering element (1) according to one of the preceding claims, characterized in that the first protective edge portion (10) is connected to the edge face (8) of the main body (3) in a butt way and over the entire surface and the second protective edge portion (12) is connected to the edge face (8) of the main body (3) and/or the outer face (22) of the first protective edge portion (10) in a butt way over the entire surface.

7. Shuttering element (1) according to one of the preceding claims, characterized in that the edge face (8) or the outer face (22) below the second protective edge portion (12) has at least one recess (33), in particular in the form of a slot or a boring, in the main body (3) and/or the first protective edge portion (10) or a profiling, in particular a groove (31), extending along the edge face (8) of the main body (3) and/or the outer face (22) of the first protective edge portion (10).

8. Shuttering element (1) according to one of the preceding claims, characterized in that the first protective edge portion (10), in direction of the thickness of the main body (3) is composed of at least three sections (45a, 45b, 45c) and the two sections (45a, 45c) being nearest to the plate surfaces (5, 6) are made of a plastics material having at least approximately identical mechanical properties and the at least one section (45b) being in between has a higher elasticity compared to the sections (45a, 45c).

9. Shuttering element (1) according to one of the preceding claims, characterized in that the first protective edge portion (10) is essentially flush with the plate surface (5, 6) and the second protective edge portion (12) has an elevated portion (46), which is raised with respect to the plate surface (5, 6) of the main body (3), in particular by at least 0.5 mm.

10. Shuttering element (1) according to claim 9, characterized in that the elevated portion (46) has an elevated surface (48), which is parallel to the plate surface (5, 6) and extends to a

corner (15) of the shuttering element (1).

11. Shuttering element (1) according to claim 10, characterized in that the elevated portion (46) has a transition area (49), which extends in ramp-like way from the level of the plate surface (5, 6) to the elevated surface (48).

12. Method for the manufacture of a shuttering element (1) with a protective edge (4), in particular a shuttering panel (2), comprising sizing of a two-dimensional main body (3) of wood or wood material for manufacturing an edge face (8), attaching a first protective edge portion (10) made of a first plastics material to a first sub-face (9) at least approximately corresponding to the entire edge face (8) of the main body (3), of the edge face (8) by means of a bonding techniques or an injection procedure, and following attaching a second protective edge portion (12) made of a second plastics material to a second sub-face (11) of the edge face (8) and/or to an outer face (22) of the first protective edge portion (10), and the second protective edge portion (12) is at a contact face (13) directly connected to the first protective edge portion (10) by means of an injection molding process by using an in-mold assembly (23) encompassing the main body (3) and a section of the first protective edge portion (10), and by the attachment of the second protective edge portion (12) at the contact face (13), a permanent connection between the first protective edge portion (10) and the second protective edge portion (12) is established, characterized in that the second protective edge portion (12) is attached via a directional change portion (14), in particular a corner (15), of the edge face (8) of the main body (3) or a directional change portion (14) of the outer face (22) of the first protective edge portion (10).

13. Method according to claim 12, characterized in that the connection of the second protective edge portion (10) to the first protective edge portion (10) at the contact face (13) is made by a partial melting process or a welding process.

14. Method according to claim 12 or 13, characterized in that the first protective edge portion (10) is attached as prefabricated edge material.

15. Method according to one of the claims 12 to 14, characterized in that before the second protective edge portion (12) is attached, the contact face (13) at the first protective edge

portion (10) and/or the edge face (8) of the main body (3) is subject to a machining, in particular in a continuous process.

16. Method according to one of the claims 12 to 15, characterized in that at the edge face (8) of a main body (3), a continuous first protective edge portion (10) or a plurality of first protective edge portions (10, 10', 10'', 10''', ...) are attached and subsequently, at directional change portions (14) of the outer face (22) of the continuous first protective edge portion (10) or at joints (28) between the first protective edge portions (10, 10', 10'', 10''', ...), the second protective edge portions (12) are attached by means of an injection molding process.