(57) **Abstract:**
A panel for use in constructing a mat or a road and method for same is provided. The panel can include a wafer having at least three sides operatively coupled to an edge having a complementary profile for overlapping and attaching to another edge coupled to another wafer. The edge can be attached to the wafer using a scarf joint or a mortise and tenon joint. The complementary profile can include a lap joint, a tapered lap joint, an S-shaped lap joint or a modified lap joint for use with fasteners for attaching two edges together.
ABSTRACT

A panel for use in constructing a mat or a road and method for same is provided. The panel can include a wafer having at least three sides operatively coupled to an edge having a complementary profile for overlapping and attaching to another edge coupled to another wafer. The edge can be attached to the wafer using a scarf joint or a mortise and tenon joint. The complementary profile can include a lap joint, a tapered lap joint, an S-shaped lap joint or a modified lap joint for use with fasteners for attaching two edges together.
TITLE

MULTI-PURPOSE PANELS WITH A MODULAR EDGE

THE FIELD

The present invention relates to multi-purpose panels for constructing a continuous surface and, in particular, panels comprising of wafers having at least one modular edge.

BACKGROUND

Access into wilderness areas for the purposes of natural resource discovery and exploitation requires that heavy equipment traverse areas having sensitive soil types that are easily compressed or damaged by the presence of workers, machinery and vehicles. Some representative examples of such areas are desert, muskeg, tundra, and farmland.

The fact that such environments are sensitive to the damage by compression or erosion caused by workers, machinery and vehicles has a two-fold impact. First, ongoing damage to such an environmentally sensitive area may prevent the movement of workers, machinery or vehicles over the surface of the area and cause the area to be inaccessible. Second, the damaged caused by workers, machinery and vehicles may take a decade or more to repair and thus lead to long-term environmental damage to the area.

In order to allow access to environmentally sensitive areas and to prevent environmental damage, it is known to lay temporary work surfaces, roads and landing surfaces over environmentally sensitive areas. These surfaces are designed to provide surface protection to the area and distribute the load of the weight of the objects over as wide an area as possible. Generally, more recent versions of the surface are made up of a system of interconnecting wafers that may be joined together at the edges of their sides.
The panels are designed to be as stiff as possible to distribute any load over the total surface area of the wafer and lightweight in order to allow easy transportation and placement and recovery of the panels that create the surface.

The joint system used to attach each panel together to form the surface is designed to be as strong and rigid as possible to ensure that the panels stay joined together and do not move relative to one another. Further, the joints are rigid, in order to transmit load from one panel onto adjacent panels; further reducing the damage that the load of heavy equipment may have on the environmentally sensitive area.

The first of such systems consisted of roadways made of planks, boards or logs laid out in various configurations and often nailed, bolted or lashed together. These roadways used heavy materials that were difficult to handle, put into place and joint together. As the materials were hard to use these roadways could not be recovered and became permanent structures that were difficult to repair and maintain, and as such were abandoned over time, thus preventing the natural recovery of the environmentally sensitive area.

A second version of a surface system comprises a system of interlocking wood planks that are fastened together to form a mat. United States Patent No. 4,600,336 issued in the name of Waller, Jr. and United States Patent No. 4,462,712 issued in the name of Penland, Sr. disclose wooden mats that are arrangements of layers of closely spaced wooden planks, the planks of each layer orientated substantially parallel to the orientation of the wooden planks of the layer above and below it. These prior art systems require the arrangement and assembly of individual boards and are labour intensive to assemble and disassemble. The joint system in these systems are an arrangement of boards in a staggered pattern in so that alternating boards extend onto an adjacent panels. As such, the joints between the boards do not provide sufficient structure to provide a rigid joint to transfer load between each of the mats. Further, as the joints are of a fixed configuration, changing
the shape or profile of each joint on each mat is not possible.

United States Patent No. 4,875,800 issued in the name of Hicks and United States Patent No. 4,973,193 issued in the name of Watson disclose wooden mat systems using intermeshing wooden mats having overlapping edges. As with the previous mat systems, the joints are of a fixed configuration that does not provide sufficient structure to provide a rigid joint to transfer load between each of the wafers.

Current panels by a variety of methods including molding, pultrusion, assembly of component parts such as the upper wafer skin, core and lower wafer skin amongst others. With current panel systems, the edge of the panel is an integral part of the panel that is unable to be removed, as it is formed during the creation of the panel.

United States Patent No. 4,629,358 issued in the name of Springer, United States Patent No. 6,685,388 issued in the name of Webster, and United States Patent No. 6,695,527 issued in the name of Seaux, all disclose a system consisting of two offset overlapping wafers to form a panel. The wafers are offset to expose upper and lower lips that facilitate adjacent panels to be joined together by overlapping edges using bolts, screws, nails, glue or other connecting means. As such, these prior art systems have panels that fit together in a pre-determined and specific orientation, and do not allow modification to the edges of the panels to facilitate different types of connections or edge profiles.

United States Patent Application Publication No. 2006/0010830 in the name of Warren et al., discloses a wafer system having an integral wedge shaped edge that forms a scarf joint that allows adjacent panels to interlock together using bolts, screws, nails, glue or other connecting means. As with the other prior art systems, the edge once formed for each panel cannot be changed and cannot be modified after the fabrication of the panel.
It is, therefore, desirable to provide a panel system that overcomes the shortcomings of the prior art.
SUMMARY OF THE INVENTION

An apparatus to construct a continuous surface is provided. In one embodiment, a panel is provided having a wafer and a modular joint system that is designed to have a stiffness and weight to satisfy the requirements for a variety of surfaces such as oil rig sites, helicopter pads, temporary roads, housing sites amongst other applications. Each wafer can have at least three sides. An edge having the same or a different profile is attached to one of the sides of the wafer to allow each wafer to be attached to an adjacent wafer. The modular design of the joint system allows for the manufacturer to use and modify existing wafers with different edges to produce a panel that meets the needs of the end user without compromising the strength or rigidity of the joint to facilitate the transfer of load from one panel onto adjacent panels.

In one embodiment, the wafer and the edge can be changed with little modification to either piece to continually allow for the development of wafers and edges that better fulfill the requirements of industry and the environment or to reuse either the edge or the wafer.

In another embodiment, the wafer can have a modular design that allows it to be constructed to allow the edges to be interchanged and to allow the selection of different edges on each side of the wafer. As such, a surface can be made using a variety of panels having a variety of edge designs in order to address differences in the requirements of the panel depending on variations on ground conditions or use.

In another embodiment, the wafer and the edge can have a modular design that allows for the mass production of panel components using highly automated manufacturing techniques, driving the cost of production down and increasing the quality and reliability of the end product.
In yet another embodiment, allows for the integration of the best possible edge design for any given application and to provide the correct joint system that is appropriate for a given task and demands of the market place.

In yet another embodiment, the wafer can have a modular design that allows for the integration of the best possible edge design for any given application. There are a wide variety of needs any mat system is required to fulfill, but making the edge and the wafer into separate components that can be interchanged with one another allows the current invention to meet the changing needs of the market-place.

While the apparatus can be described in conjunction with illustrated embodiments, it will be understood that it is not intended to limit the apparatus to such embodiments. On the contrary, it is intended that all alternatives, modifications and equivalents as may be included within the spirit and scope of the invention as defined by the present patent specification as a whole. For example, it is contemplated that the apparatus can encompass a variety of different edge profiles designed to achieve a specific purpose desired by the end user. As by way of example and without limitation, some edges may be designed to interlock together, to provide a smooth transition from the surface of the ground to the surface of the mat, to contain spills on the surface of the mat or to act as a barrier to prevent objects from collecting on the top surface of the mat. It is also contemplated that different configurations and connections can be utilized to attach the edge to the mat. Both permanent and detachable means can be used so long as the edge is fastened to the wafer in the manner that would allow the edge and the wafer to remain securely fastened. Further, it will be understood that all dimensions and sizes described herein, both relative and absolute, may be varied within a broad range in order to meet the needs of the end-user. As well, materials described herein are merely intended to be illustrative and are subject to a range of alternatives.
BRIEF DESCRIPTION OF THE DRAWINGS

These and other advantages of the invention will become apparent upon reading the following detailed description and upon referring to the drawings in which:

5 FIGURE 1 is an exploded view depicting a panel with a modular edge;

FIGURE 2 is an elevation depicting a panel of a panel with a modular edge;

FIGURE 3 is an isometric view depicting a wafer for the panel of FIGURE 1;

FIGURE 4 is an elevation view depicting the wafer of FIGURE 3;

FIGURE 5 is an elevation view depicting an edge for the panel of FIGURE 1;

10 FIGURE 6A is a cross-section view depicting Section I-I of the panel of Figure 2;

FIGURE 6B is an exploded view depicting Section I-I of the panel of Figure 2;

FIGURE 7A is an elevation view depicting a pair of edges having a lap joint profile;

15 FIGURE 7B is an elevation view depicting a pair of edges having a tapered lap joint profile;

FIGURE 7C is an elevation view depicting a pair of edges having an S-shaped lap joint profile;

FIGURE 7D is an elevation view depicting a pair of edges having a modified lap joint profile for use with at least one fastener;
FIGURE 8A is an elevation view depicting a first embodiment of an end close-out for a wafer;

FIGURE 8B is an elevation view depicting a second embodiment of an end close-out for a wafer;

FIGURE 8C is an elevation view depicting a third embodiment of an end close-out for a wafer;

FIGURE 9 is an isometric view depicting three panels of FIGURE 1 joined together at their edges;

FIGURE 10 is an exploded isometric view depicting a rectangular panel having edges on two adjacent sides of the wafer;

FIGURE 11 is an isometric view depicting a rectangular panel having edges on all four sides of the wafer;

FIGURE 12 is an exploded isometric view depicting a five-sided wafer having edges on three sides;

FIGURE 13 is an isometric view depicting an array of panels connected together; and

FIGURE 14 is an isometric view depicting an array of panels connected together to form a continuous curved surface.

The present invention will now be described by way of a non-limiting description of certain detailed embodiments.

**DETAILED DESCRIPTION OF THE EMBODIMENTS**

In the following description, similar features in the drawings have been given identical reference numerals where appropriate. All dimensions described
herein are intended solely to illustrate an embodiment. These dimensions are not intended to limit the scope of the wafer described herein, which can depart from these dimensions.

An embodiment is illustrated and described in context of providing a modular edge system for temporary surface used to distribute the load of workers, equipment and vehicles over a large surface area. However, it is contemplated that the modular edge system may be applied to any surface panel or wafer such as wall panels, ceiling panels, roofing, flooring, walkways or the like.

Referring to Figures 1 and 2, there is illustrated a panel (100) according to one embodiment of the present invention having, a wafer (1), an upper wafer skin (5) and an opposing bottom wafer skin (15). Referring to Figures 3 and 4, the wafer has at least three sides (10) with at least one of the sides adapted to accept an edge (20). In the embodiments shown in Figures 3 and 4, a four-sided wafer is shown to have two opposing edges adapted to accept an edge (20). However it is contemplated that a wafer (1) may have three or more sides and that a single side, two or more sides of the wafer (1) being spaced apart or adjacent to each other, or all sides could be adapted to accept an edge (20).

Wafer skin (5) materials can include virtually any material that has the desired material properties of strength, toughness, weight, durability and others as may be required by the application and the designer. Provided that such materials can be adhered to the core (38) so as to provide the desired properties, in such a fashion that is both structurally sound and economically viable.

In some instances, core or skin materials may require that a variety of surface treatment technologies known in the art be applied. These include, but are not limited to; mechanical abrading, chemical abrading, chemical etching, application of bonding agents, coupling agents, or sizes of a variety of
chemical structures; other surface modification such as flame treating, corona treatment, plasma treatment, exposure to UV radiation, and exposure to chemical gases and liquids such as fluorine, chlorine, chromic acid, and others known in the art. The object is to create a surface that will facilitate the adhesion of the core to the skin to ensure that the skin remains intact and in place.

There are a large number of techniques known to those practiced in the art of attaching the skin materials to the core materials. These include but are not limited to; welding of like materials; hand lay-up of fibre-reinforced liquid thermoset resins onto the core surface; hand lay-up of fibre-reinforced thermoplastic resins onto the core and the subsequent addition of heat sufficient to cause the thermoplastic resin to flow and cure to the core, application of a vacuum bag to provide clamping forces to such lay-ups; resin transfer moulding; vacuum assisted resin transfer moulding; resin infusion moulding; vacuum assisted resin infusion moulding; vacuum resin transfer moulding, compression moulding, pultrusion, extrusion, and plate compression.

Wafer core (38) materials can range from a long-list of materials. These include but are not limited to; wood, end-grain balsa wood; foams made of polyurethane, polyethylene, epoxy, polymethacrylimide, and phenolic resins; foams of the materials listed previously with various fillers such as hollow glass spheres or hollow ceramic spheres; honeycomb core materials made of aluminium, steel, stainless steel, titanium, or other metals; honeycomb core materials made of; paper either resin coated or not, produced from but not limited to, fibreglass, Nomex®, Kevlar®, wood-pulp, carbon, graphite; or other materials including but not limited to; extruded or welded polypropylene, polycarbonate, polyethylene, polyurethane, polyester, or other thermoplastics; and pultruded, extruded, or welded I-beams interlaced with any or all of the above mentioned materials that are strong enough to provide support the objects that are to be placed on the surface of the wafer.
Wafers (1) and edges (20) can be impermeable, or semi-impermeable to restrict or prevent liquids or gasses from seeping into or through the wafer. This reduces and may eliminate the "pumping" action associated with prior art panel systems that cause environmental damage and facilitate the recovery of the panels for reuse by preventing the panels from being embedded in the ground on which the panel system is placed. The "pumping action" occurs when the panels or joints between the panels flex under the load moving over the surface of the panel system. As the panels and joints flex, water and debris accumulate onto the panels, by flowing over the sides of the panel, through the panel itself, if it is not made of a water proof and/or mud proof material, or through the joints between the panels of the panel system. As the action is repeated, the panel sinks further into the ground making the recovery of the panels difficult.

Referring to Figures 5, 6A, 6B and 7A-D, there is illustrated an edge (20) according to one embodiment of the wafer (1) having an upper edge skin (25), a joint end (30) and an opposing connector end (35). The upper edge skin (25) may consist of the same types of material as the upper (5) and the lower (15) wafer skins of the wafer (1). The edge (20) may also have a lower edge skin (45) as illustrated in the example embodiments of Figures 6 and 7.

Additional processes could be used to attach a variety of lifting rings and other lifting devices and well as the application of a variety of coating materials to protect the wafer and edge from damage caused by the environment and end-users. For example, hand grabs and lifting rings may be found on either side of the wafer (1) or edge (20) to allow better handling of the wafer (1).

The modular design also allows for the integration of the best possible edge design for any given application. By way of example, complementary interlocking edges may be attached to adjacent panels to ensure that the panels remain secured, and to provide a means to create a continuous surface.
An edge (20) of the wafer (1) can be made of any material that meets these requirements. These materials include but are not limited to; fibreglass reinforced plastic utilising both thermo-set and thermoplastic resin formulations; carbon-fiber reinforced plastics utilising both thermo-set and thermoplastic resin formulation; other fibre reinforcements utilising both thermo-set and thermoplastic resin formulations; other 'engineered' plastics, aluminum, steel, and other metals; wood, ceramic, and any other material that can be formed into the shape of the required edge.

Manufacturing techniques known to those practiced in the art that may produce the edge (20) and the wafer (1) include, but are not limited to, compression moulding, extrusion, pultrusion, injection moulding, blow-moulding, rotational moulding, machining, shaping, routing, welding, bending and forming or any other technique that is suitable for the shaping of the material that makes up the edge (20) and/or wafer (1). These same techniques can be used to shape the sides of the wafer (10), the connecting end (35) of an edge (20) and the joint end (30) of an edge (20). The length of the edge (20) may also vary based on the requirements of the shape of the profile or the application in which the temporary or permanent surface may be placed.

The edge (20) may also be reinforced to protect the edge from damage or to protect the edge from unnecessarily compressing. The edge (20) may be reinforced with a variety of materials which includes, but are not limited to, fiber reinforced materials, such as pultruded fiberglass; polymetric rods, such as rods made of various plastics, wood, steel, aluminum and other materials suited to protect the edge from damage and compression. The reinforcing materials may be integrated throughout the edge (20), placed at either the connecting end (35) or the joint end (30), or provide an inner or outer protective shell to the edge (20).

Referring to Figures 7A-D, there is illustrated a joint end (30) according to one embodiment of the present invention that is adapted to fit a complimentary
joint end (31) of an adjacent wafer (2). The profile and shape of a joint end (30) is dimensioned to be complementary to the profile and shape of the joint end (31) of an adjacent wafer (2) so that the joint ends (30) and (31), form a joint system with sufficient strength and rigidity to hold the adjacent wafers (1) and (2) together and to transfer load from one wafer onto the adjacent wafer.

A joint end (30) can be a wide variety of shapes and designs to meet the requirements of various applications. As illustrated in the embodiments set out in Figures 7, 9 and 12, a joint end (30, 30(a), 30(b), 30(c)) of an edge (20) of a panel (1) may be profiled to fit in mated or interlocking attachment with the profile of a complementary joint end (31, 31(a), 31(b), 31(c)) of the edge (20) of an adjacent wafer (2). It is known by a person skilled in the art of panel construction and use that other edge profiles would allow the joining of adjacent wafers (1) and (2).

Known profiles for joint ends (30) for an edge (20) are illustrated in Figures 7A-D in which the profile of the joint end (30) of an edge (20) is a lip or tab that is dimensioned to overlap with the lip of a complementary joint end (31) of an edge (20) of an adjacent wafer (2). As shown in Figure 7A, the profile and shape of joint ends (30,31) can be a lap joint. As shown in Figure 7B, the profile and shape of joint ends (30,31) can be a tapered lap joint. As shown in Figure 7C, the profile and shape of joint ends (30,31) can be an S-shaped lap joint. As shown in Figure 7D, the profile and shape of joint ends (30,31) can be a modified lap joint for use with at least one fastener, such as a bolt and nut or any other suitable fastener as well known to those skilled in the art. The profile of complementary edges need not be mirror images of each other; they need only to fit together to form a sufficiently rigid joint with or without an attachment means (36), so that load is transferred from one wafer to the adjacent wafer to which it is attached. Suitable attachment means of complementary joint ends (30) and (31) may be achieved by any number of joint attachment means known in the art, which includes but is not limited to frictional fit, nails, screws, bolts and nuts, mortises and tenons, rivets, welding, soldering, glue, hook and loop fasteners (such as Velcro™), or any other
means that provides a secure attachment that allows the complementary joint ends (30) and (31) to transfer load from one panel to its adjacent panel. It is also contemplated that a number of joint attachment means may be used alone or in combination with other attachment means to attach complementary joint ends (30) and (31). Further, the attachment may be permanent or transient to allow the creation of a permanent or a temporary surface that may be disassembled.

Referring to Figures 5, 6A and 6B, there are illustrated embodiments having a connector end (35) of an edge (20) of an embodiment of the present invention that is adapted to fit in mated attachment with the side of a wafer (10) as illustrated in Figure 9. The connector end (35) is dimensioned so that it may be meet the edge (20) in mated or interlocking attachment. The attachment of the edge (20) via its joint edge (35) to the side of the wafer (10) may be achieved by any number of edge attachment means known in the art, which includes but is not limited to frictional fit, a tongue-in-groove joint with removable tongue (40), nails, screws, bolts and nuts, mortises and tenons, rivets, welding, soldering, glue, hook and loop fasteners (such as Velcro™), or any other means that provides a secure attachment that allows the edge (20) to remain attached to the connector end (35) of the side of the wafer (10). It is also contemplated that a number of edge attachment means may be used alone or in combination with other attachment means to attach a given edge (20) to a given side of a wafer (10). Further, the attachment may be permanent or transient to allow the modification of a given side of a wafer (10) with a different edge (20).

Referring to Figure 8A, an edge close out (50a) may be applied to an edge of a wafer (10) to allow the attachment of an edge (20) to the wafer (1). Alternatively, an edge close out (50b) (as shown in Figure 8B) or (50c) (as shown in Figure 8C) may be applied to cover or protect an edge of the wafer (10). The edge close out can take a large variety of shapes and sizes and can be made from a similar list of materials as the upper and lower wafer skins (5) and (15) and the edge (20) so long as the edge close out (50a) will
allow the necessary amount of strength to maintain the integrity of the wafer (1) to be maintained where the wafer (1) and edge (20) are connected or where the wafer (1) is covered by the edge close out (50b and 50c).

Referring to Figures 10, 11 and 12, there are illustrated embodiments of the present invention providing examples of confirmations of edge attachment to a wafer having at least three sides. Referring to Figure 10, there is an embodiment illustrating, modular edges (20) attached to adjacent sides of a wafer (1). Referring to Figure 11, there is an embodiment illustrating modular edges (20) attached to all sides of a wafer (1). Referring to Figure 12, there is an embodiment illustrating attachment of modular edges (20) to adjacent sides of a wafer (1) and to the opposite side of the wafer (1).

The wafer may be made with a continuous wafer skin, and all spaces between the edges and the wafers and between edges of adjacent wafers may be sealed using a number of methods and techniques known in the art that prevent the accumulation of water, dirt, mud, ice or other debris in the spaces. Examples of suitable techniques known in the art are, but not limited to welding, soldering, coating, taping, or caulking.

The dimensions of the wafers of the present invention can easily be varied with changes in production tooling. In one embodiment, the wafers with edges may be approximately 1" to 100" in width, 1" to 500" in length and 1/16" to 6" in thickness. The width and length of the wafer may vary so that the wafers may be easily loaded and transported by standard vehicles and containers. The thickness of the wafer and the edge may also vary depending on the application, and the material used to construct the wafer.

The shapes and sizes of the wafers can vary in order to meet the requirements of an application. For example, wafers of different shapes can be assembled to form curves, slopes and other shapes required to avoid obstacles in the environment.

The embodiments illustrated in Figures 1-14 would allow the fabrication of
wafers (1) separate from edges (20) to allow the mass production of wafers (1) that are able to connect to different edges (20) with different joint ends (30). This allows for lower production costs and less time wasted in adjusting the manufacture machinery to produce a panel with a specific profile to the joint end (30).

Further, the embodiments illustrated in Figures 1-14 allow the user to select an appropriate joint end (30) for a wafer (1) to match up with the joint end (31) of the adjacent wafer (2). As such, the user does not have to account for the orientation of the fixed edges present in the prior art panel systems, to ensure that all the panels are correctly position so that the appropriate joint end will meet up with the complementary joint end of the adjacent panel. The embodiments illustrated in Figures 1-14 would allow the user to start building a continuous surface made up of the panels (100) from multiple positions without consideration of the orientation of the panel, as the user is able to select an edge (20) for a wafer (1), the edge (20) having a complementary joint end (30) to the joint end (31) of the adjacent wafer (2).

Referring to Figure 9, an embodiment of wafer (1) is illustrated that provides a panel system forming a flat linear surface of panels with parallel sides connected end-to-end to form a straight roadway. However, as illustrated in Figure 14, the curved surfaces can be assembled by changing the shape of the panel to a trapezoidal or substantially wedge shaped panel by varying the length of opposing sides of the wafer (10a and 10b). As further illustrated in Figure 14, a number of panels of different shapes and dimensions can be connected together to form a continuous curved surface, so that the user may form the continuous surface of panels to avoid objects in the user's path.

Referring to Figure 13, an embodiment is illustrated that provides for an array of panels stretching in two dimensions. The array of panels may be placed in off-set rows in which each panel is joined to at least two adjacent panels on at least one side of the panel. In another embodiment, a panel may be connected to two adjacent panels along at least two adjacent edges.
Further, the panel system may be used as a continuous surface supported by scaffolding, frame or the like to provide structures such as roofing, bridge decking, walkways, catwalks, docks, gang planks, flooring for buildings and the like.

5 Although the present invention has been described by way of a detailed description in which various embodiments and aspects of the invention have been described, it will be seen by one skilled in the art that the full scope of this invention is not limited to the examples presented herein. The invention has a scope which is commensurate with the claims of this patent specification including any elements or aspects which would be seen to be equivalent to those set out in the accompanying claims.
WE CLAIM:

1. A panel, comprising:
   a) a wafer comprising at least three sides of which at least one side
      in configured to operatively couple to an edge;
   b) an edge comprising a first end further comprising a
      complementary profile for overlapping and attaching to another
      edge comprising the complementary profile, the edge
      comprising a second end configured for operatively coupling to
      the at least one side of the wafer; and
   c) attachment means for operatively coupling the second end of
      the edge to the at least one side of the wafer.

2. The panel as set forth in claim 1 wherein the complementary profile is
   selected from the group consisting of a lap joint, a tapered lap joint, an
   S-shaped lap joint and a modified lap joint for use with at least one
   fastener.

3. The panel as set forth in claim 1 wherein the attachment means further
   comprises each of the at least one side of the wafer and the second
   end of the edge being configured to form a scarf joint when the edge
   and the wafer are attached together.

4. The panel as set forth in claim 1 wherein the attachment means further
   comprises a mortise and tenon joint.

5. The panel as set forth in claim 4 wherein the attachment means further
   comprises mortises disposed at least partially along both of the at least
   one side of the wafer and the second end of the edge, and a tenon
   configured for insertion into the mortises disposed on the edge and the
   wafer whereby the edge can be attached to the wafer.

6. The panel as set forth in claim 4 wherein the attachment means further
   comprises a mortise disposed at least partially along the at least one
   side of the wafer and the second end of the edge configured to form a
tenon for insertion into the mortise whereby the edge can be attached to the wafer.

7. A mat comprising two or more panels configured for attachment to each other, each panel comprising:
   a) a wafer comprising at least three sides of which at least one side in configured to operatively couple to an edge;
   b) an edge comprising a first end further comprising a complementary profile for overlapping and attaching to another edge of a second panel comprising the complementary profile, the edge comprising a second end for operatively coupling to the at least one side of the wafer; and
   c) attachment means for operatively coupling the second end of the edge to the at least one side of the wafer.

8. The mat as set forth in claim 7 wherein the complementary profile is selected from the group consisting of a lap joint, a tapered lap joint, an S-shaped lap joint and a modified lap joint for use with at least one fastener.

9. The mat as set forth in claim 7 wherein the attachment means further comprises each of the at least one side of the wafer and the second end of the edge being configured to form a scarf joint when the edge and the wafer are attached together.

10. The mat as set forth in claim 7 wherein the attachment means further comprises a mortise and tenon joint.

11. The mat as set forth in claim 10 wherein the attachment means further comprises mortises disposed at least partially along both of the at least one side of the wafer and the second end of the edge, and a tenon configured for insertion into the mortises disposed on the edge and the wafer whereby the edge can be attached to the wafer.

12. The mat as set forth in claim 10 wherein the attachment means further
comprises a mortise disposed at least partially along the at least one side of the wafer and the second end of the edge configured to form a tenon for insertion into the mortise whereby the edge can be attached to the wafer.

5 13. A method for constructing a mat or a road comprising two or more panels, the method comprising the steps of:
   a) providing a first panel and a second panel, each panel comprising:
      i) a wafer comprising at least three sides of which at least one side in configured to operatively couple to an edge,
      ii) an edge comprising a first end further comprising a complementary profile for overlapping and attaching to another edge comprising the complementary profile, the edge comprising a second end configured for operatively coupling to the at least one side of the wafer, and
      iii) attachment means for operatively coupling the second end of the edge to the at least one side of the wafer; and
   b) attaching the second panel to the first panel by overlapping the complementary profiles of the edges of the panels together whereby the panels can be attached to each other.

14. The method as set forth in claim 13 further comprising the step of attaching the first and second panels together with attachment means.

15. The method as set forth in claim 14 wherein the attachment means comprises one or more from the group consisting of nails, screws, bolt and nuts, mortises and tenons, rivets, welding, soldering, glue and hook and loop fasteners.

16. The method as set forth in claim 13 wherein the complementary profile is selected from the group consisting of a lap joint, a tapered lap joint, an S-shaped lap joint and a modified lap joint for use with at least one fastener.
17. The method as set forth in claim 13 wherein the attachment means further comprises each of the at least one side of the wafer and the second end of the edge being configured to form a scarf joint when the edge and the wafer are attached together.

5 18. The method as set forth in claim 13 wherein the attachment means further comprises a mortise and tenon joint.

19. The method as set forth in claim 18 wherein the attachment means further comprises mortises disposed at least partially along both of the at least one side of the wafer and the second end of the edge, and a tenon configured for insertion into the mortises disposed on the edge and the wafer whereby the edge can be attached to the wafer.

20. The method as set forth in claim 18 wherein the attachment means further comprises a mortise disposed at least partially along the at least one side of the wafer and the second end of the edge configured to form a tenon for insertion into the mortise whereby the edge can be attached to the wafer.

21. The use of a panel for constructing a mat or a road, the panel comprising:
   a) a wafer comprising at least three sides of which at least one side in configured to operatively couple to an edge;
   b) an edge comprising a first end further comprising a complementary profile for overlapping and attaching to another edge comprising the complementary profile, the edge comprising a second end configured for operatively coupling to the at least one side of the wafer; and
   attachment means for operatively coupling the second end of the edge to the at least one side of the wafer.