Title: SYSTEMS AND METHODS FOR PROVIDING STRUCTURAL SUPPORT AND REINFORCEMENT

Abstract: Systems and methods for providing structural support and reinforcement for surfaces, materials and devices, including drywall. A structural support and reinforcement system includes one or more structural support and reinforcement panels located behind one or more surfaces, materials and/or devices. In one embodiment, the structural support and reinforcement panel is placed between the structural studs and a desired section of drywall during original construction. In another embodiment, the structural support and reinforcement panel is placed between the structural studs and the desired section of drywall during repair or renovation. A user can apply an external load to the drywall by way of an attachment device, such as a screw, which extends through the drywall and the structural support and reinforcement panel. By attaching the external load through the drywall and the structural support and reinforcement panel the load bearing capacity of the drywall is enhanced.
SYSTEMS AND METHODS FOR PROVIDING STRUCTURAL SUPPORT AND REINFORCEMENT

1. Field of the Invention
The present invention relates to providing structural support and reinforcement. In particular, the present invention relates to systems and methods for providing structural support and reinforcement for drywall to thereby increase the load bearing capacity of the drywall. Further, the present invention relates to providing structural support and reinforcement backing to a variety of surfaces, devices and/or materials.

2. Background and Related Art
Traditionally, drywall is relatively weak and unable to support additional and sustained loads. When loads are provided directly on drywall for any length of time the drywall can deform, break, tear, crumble, or otherwise fail, leaving unsightly holes and gashes and ruining associated aesthetic coverings such as wall paper and paint. As a result, the drywall must be replaced or patched and filled with a joint compound and the entire surface where the failure occurred must be aesthetically repaired, resulting in expensive and time consuming restoration.

Loads that can cause such damage may derive from relatively trivial external sources, such as hanging a picture or mirror on a section of drywall, or from essential external sources such as hanging sinks, light fixtures, hand railings, and especially weight bearing devices designed to aid the physically disabled. Regardless of the source responsible for the additional load, if failure occurs, the result is that the drywall deforms, breaks, tears, crumbles, or otherwise fails, leaving unsightly holes and gashes, and ruining associated aesthetic coverings such as wall paper and paint.

Attempts have been made to allow traditional drywall to sustain greater applied loads. However, such attempts are limited and often cause substantial damage. For example, drywall anchors enable drywall to sustain additional loads but they are limited to a single location. In addition, the nature and diameter of the individual anchors prevent locating additional anchors proximate an initial anchor. Likewise, the drywall anchors themselves result in fairly large holes when placed in drywall thus necessitating costly and time consuming restoration once removed. Further, if one attempts to place a drywall anchor in a specific location and inadvertently does so over an underlying structural stud, the surface of the drywall will be severely damaged again, necessitating costly and time
consuming restoration. Finally, if the drywall anchor itself fails, the damage to the surrounding drywall is likely to intensify.

Thus, while techniques currently exist that are used to increase the load bearing capacity of drywall, challenges still exist, including improving load bearing capacity at numerous proximate locations simultaneously and preventing damage resulting from the technique itself. Accordingly, it would be an improvement in the art to augment or even replace current techniques with other techniques.

**SUMMARY OF THE INVENTION**

The present invention relates to providing structural support and reinforcement. In particular, the present invention relates to systems and methods for providing structural support and reinforcement for drywall to thereby increase the load bearing capacity of the drywall. Further, the present invention relates to providing structural support and reinforcement backing to a variety of surfaces, devices and/or materials.

Implementation of the present invention takes place in association with a structural support and reinforcement system that includes one or more structural support and reinforcement devices or panels located behind one or more surfaces, devices and/or materials. For example, the one or more structural support and reinforcement devices or panels are located behind one or more sections of drywall.

In one implementation, the structural support and reinforcement panel is placed between the structural studs and the inner surface of the desired section of drywall during original construction. The structural support and reinforcement panel is then used to increase the load bearing capacity of the drywall to thereby support external loads applied to the drywall. A user can then apply an external load to the drywall such as by way of an attachment device, such as a screw or other device, which extends through the drywall and the structural support and reinforcement panel. By attaching the external load through the drywall and the structural support and reinforcement panel the load bearing capacity of the drywall is enhanced.

In another implementation, the structural support and reinforcement panel is placed between the structural studs and the inner surface of the desired section of drywall during repair or renovation. The structural support and reinforcement panel is then used to increase the load bearing capacity of the drywall to thereby support external loads applied to the drywall. A user can then apply an external load to the drywall such as by way of an attachment device, such as a screw or other device, which extends through the drywall and the structural support and reinforcement panel. By attaching the external load
through the drywall and the structural support and reinforcement panel the load bearing capacity of the drywall is enhanced.

While the methods and processes of the present invention have proven to be particularly useful in the area of improving the load bearing capacity of drywall, those skilled in the art can appreciate that the methods and processes can be used in a variety of different applications and in a variety of different areas of manufacture to yield increased structural support and reinforcement systems to thereby improve load bearing capacity.

For example, in other implementations the structural support and reinforcement device or panel is placed behind a surface of a liner, insert, inlay, packing, pad, footing, pan or other device or material to provide a rigid surface or backing. In a further implementation, the structural support and reinforcement device is provided behind a surface of a shower pan to provide a rigid surface or backing to the shower pan.

These and other features and advantages of the present invention will be set forth or will become more fully apparent in the description that follows and in the appended claims. The features and advantages may be realized and obtained by means of the instruments and combinations particularly pointed out in the appended claims. Furthermore, the features and advantages of the invention may be learned by the practice of the invention or will be obvious from the description, as set forth hereinafter.

**BRIEF DESCRIPTION OF THE DRAWINGS**

In order that the manner in which the above recited and other features and advantages of the present invention are obtained, a more particular description of the invention will be rendered by reference to specific embodiments thereof, which are illustrated in the appended drawings. Understanding that the drawings depict only typical embodiments of the present invention and are not, therefore, to be considered as limiting the scope of the invention, the present invention will be described and explained with additional specificity and detail through the use of the accompanying drawings in which:

Figure 1 illustrates a representative prior art device designed to increase the load bearing capacity of drywall at a single location;

Figure 2 illustrates using the representative prior art device of Figure 1 to secure a bracket to a representative section of drywall;

Figure 3 illustrates a representative embodiment of the present invention for providing structural support and reinforcement to increase the load bearing capacity of a device or material, such as drywall;
Figure 4 illustrates a representative manner for locating an embodiment of the present invention;

Figure 5 illustrates a representative manner for placing and/or locating an embodiment of the present invention;

Figure 6 illustrates a representative manner for securing an embodiment of the present invention to structural studs;

Figure 7 illustrates a representative system, wherein a plurality of representative structural support and reinforcement panels are secured to structural studs at a plurality of locations;

Figure 8 illustrates the outer surface of a typical sheet of drywall secured to underlying structural studs and covering one or more structural support and reinforcement panels;

Figure 9 illustrates a representative structural support and reinforcement panel after being secured between structural studs and the inner surface of a typical sheet of drywall, and having attachment mechanism(s) placed through both the sheet of drywall and the structural support and reinforcement panel;

Figure 10 illustrates an external attachment secured to a sheet of drywall employing a representative embodiment of the present invention;

Figure 11 illustrates securing an external device to the external attachment illustrated in Figure 10;

Figure 12 illustrates a representative external load being applied to the external device of Figure 11;

Figure 13 illustrates the external attachment illustrated in Figure 10 failing under the external load of Figure 12, wherein the structurally supported and reinforced sheet of drywall has retained its structural integrity;

Figure 14 illustrates an enlarged view of a representative embodiment of the structurally supported and reinforced sheet of drywall of Figure 13, which has retained its structural integrity;

Figure 15 illustrates a representative external device secured to a sheet of drywall employing traditional drywall anchors (not shown);

Figure 16 illustrates a representative external load being applied to the representative external device of Figure 15;
Figure 17 illustrates the external device of Figure 15 failing under the external load of Figure 16 wherein the sheet of drywall employing the traditional drywall anchors has failed; and

Figure 18 illustrates a sheet of drywall, wherein a portion employing an embodiment of the present invention maintained structural integrity under an applied load, while a portion employing a traditional device failed under a similarly applied load.

**DETAILED DESCRIPTION OF THE INVENTION**

The present invention relates to providing structural support and reinforcement. In particular, the present invention relates to systems and methods for providing structural support and reinforcement for drywall to thereby increase the load bearing capacity of the drywall. Further, the present invention relates to providing structural support and reinforcement backing to a variety of surfaces, devices and/or materials.

In accordance with at least some embodiments of the present invention, a structural support and reinforcement system includes one or more structural support and reinforcement devices or panels located behind one or more surfaces, devices and/or materials. In at least some embodiments, a structural support and reinforcement device or panel is placed behind a liner, insert, inlay, packing, pad footing, pan or other device or material to provide a rigid surface or backing. The methods and processes of embodiments of the present invention can be used in a variety of different applications to yield increased structural support and reinforcement and improve load bearing capacity.

By way of example, in accordance with at least some embodiments of the present invention, a structural support and reinforcement system includes one or more structural support and reinforcement devices or panels located behind one or more sections of drywall. In one embodiment, one or more structural support and reinforcement devices or panels are located within one or more portions of a wall. In another embodiment, a plurality of structural and reinforcement devices or panels are located throughout the wall.

In one embodiment, the structural support and reinforcement panel is placed between the structural studs and the inner surface of the desired section of drywall during original construction. A user can apply an external load to the drywall, for example, by way of an attachment device, such as a screw or other attachment device, which extends through the drywall and the structural support and reinforcement panel. By attaching the external load through the drywall and the structural support and reinforcement panel the load bearing capacity of the drywall is enhanced.
In another embodiment, the structural support and reinforcement panel is placed between the structural studs and the inner surface of the desired section of drywall during repair or renovation. A user can then apply an external load to the drywall, for example, by way of an attachment device, such as a screw or other attachment device, which extends through the drywall and the structural support and reinforcement panel. By attaching the external load through the drywall and the structural support and reinforcement panel the load bearing capacity of the drywall is enhanced.

With reference now to Figure 1, a representative prior art device 101 is shown. Likewise, Figure 1 also illustrates a typical drywall surface 102 with holes 103 created therein to accommodate the prior art device 101. The representative prior art device 101 is designed to increase the load bearing capacity of the drywall 102 at a single location. However, as depicted, a fairly large hole 103 must be placed in the drywall 102 to facilitate use of the prior art device 101 resulting in substantial damage to the drywall in the event that the prior art device is removed. Further, additional damage can result to the drywall 102 if the prior art device 101 fails under an applied load. Figure 2 further depicts bracket 104 secured to the drywall 102 by way of prior art device 101.

With reference to Figure 3, a representative embodiment of the present invention is illustrated. In the illustrated embodiment, panel 301 is utilized for providing structural support and reinforcement to increase the load bearing capacity of drywall. In the illustrated embodiment, the structural support and reinforcement panel 301 is placed between the structural studs 401 and the inner surface of the desired section of drywall (not shown) during original construction. In another embodiment, the structural support and reinforcement panel is placed between the structural studs 401 and the inner surface of the desired section of drywall (not shown) during repair or renovation.

In one embodiment the structural support and reinforcement panel 301 is comprised of metal mesh or perforated sheet metal substantially as depicted in Figure 3. The metal mesh or perforated sheet metal allows the panel 301 to be structurally robust while allowing attachment mechanism(s), such as a screw (not shown) or other attachment device, to penetrate the panel 301 without drilling a pilot hole, and thereby quickly and easily secure external loads through the drywall sheet (not shown) to the panel 301. Further, in one embodiment the panel 301 is formed with brakes 302 and flanges 303 to provide structural rigidity and to facilitate mounting panel 301 to the structural studs 401.
In the illustrated embodiment, panel 301 is sufficiently thin such that a drywall sheet (not shown) can be secured over panel 301 and remain substantially flat both over the surface of panel 301 and adjacent to the edges of panel 301. Further, in one embodiment the dimensions between the structural studs 401 are uniform, resulting in a panel 301 of uniform dimension. In another embodiment, the dimensions between the structural studs 401 are non-uniform, resulting in non-uniform panel 301 dimensions. Likewise, the dimensions between adjacent structural studs 401 can be uniform or can vary along the length of a wall, again resulting in uniform or variable panels 301 along the length of a wall, respectively.

While in the illustrated embodiment of the structural support and reinforcement panel 301 is comprised of metal mesh or perforated sheet metal, other embodiments of the structural support and reinforcement panel 301 comprise a variety or combination of solid and/or non-solid materials, including mesh materials. Examples of such materials include metallic materials, polymer materials, acrylic materials, composite materials, other plastic or thermoplastic materials, thermoset materials, wood materials, or any other material that can be used to provide increased support in accordance with an embodiment of the present invention. Further, while in one embodiment panel 301 is depicted with brakes 302 and flanges 303, in another embodiment panel 301 includes flanges and brakes of any dimension and/or geometry or may not include flanges or brakes of any kind. The panel 301 may be attached to the structural studs 401 by way of mounting brackets, screws, nails or other devices.

With reference to the remaining figures, an embodiment of the methods for mounting and using embodiments of the present invention will be discussed in greater detail. In Figure 4, a measuring device 403 and a marking device 404 are used to place a mark 402 onto a structural stud 401. The mark 402 is used to locate the structural support and reinforcement panel of an embodiment of the present invention (not shown). In one embodiment, the mark 402 is placed on the structural stud 401 at any desired location. In another embodiment, the placement of the mark 402 is dictated by the intended use of an embodiment of the present invention. For example, if an embodiment of the present invention is intended to increase the load bearing capacity of drywall such that the drywall can support the weight of a hand railing, then the desired hand railing height determines the location of the mark 402, thereby determining the location of the structural support and reinforcement panel (not shown).
As illustrated in Figure 5, after the mark 402 is placed in the desired location, the structural support and reinforcement panel 301 is located on the structural studs 401 relative to the mark 402. Referring back to Figure 3, an illustrative embodiment of the panel 301 is shown located relative to the mark 402.

With reference now to Figure 6, an embodiment of the structural support and reinforcement panel 301 is illustrated. In Figure 6, the panel 301 has been attached to the structural studs by attachment mechanism(s) 601 facilitated by device 602. Device 602 may be a cordless or a corded powered drill, a screwdriver, hammer, or any other device that can be used to secure attachment mechanism(s). Further, attachment mechanism(s) 601 may be a screw, bolt, bracket, anchor, pin, tack, spike, rivet, brad, nail or any other suitable fastener or coupler. Likewise, a single attachment mechanism 601 or a plurality of attachment mechanisms 601 may be used to secure panel 301 to the structural studs 401 depending on the dimensions of the panel 301 or other concerns and/or preferences.

In Figure 7, a plurality of structural support and reinforcement panels 301 have been attached to numerous points on structural studs 401. The combination of panels 301 constitutes an embodiment of a structural support and reinforcement system 701. In another embodiment, the structural support and reinforcement system 701 may incorporate one or more panels 301. Further, in another embodiment, the system 701 may be configured in any suitable manner and in any geometry to meet structural needs or inclinations, including the covering of the entire wall surface.

As shown in Figure 8, after locating and attaching the desired panels 301 to the structural studs 401 to form the structural support and reinforcement system 701, a sheet of drywall 801 is secured over the top of the panels 301 to the structural studs 401. In one embodiment, the structural support and reinforcement system 701 covers the entire area behind drywall sheet 801. In another embodiment, the system 701 only covers portions of the area behind the drywall sheet 801. The drywall sheet 801 is secured over the system 701 to the structural studs in any manner common in the art. Further, the drywall sheet 801 may be composed of gypsum, plaster, wood, pulp, heavy paper, or any other suitable material common in the art. For clarity, the areas of drywall employing the representative system 701 are hereinafter designated as 801a, while the areas of the drywall not employing an embodiment of the present invention are hereinafter designated as 801b.

Figure 9 depicts a representative embodiment of the present invention located between a drywall sheet 801 and structural stud 401 from behind—a view commonly
obstructed by the opposing face of a wall. As shown in Figure 9, in one embodiment the attachment mechanism(s) 601 fully penetrates the drywall sheet 801a and the structural support and reinforcement panel 301. The attachment mechanism(s) 601 may be placed at any desired location through the drywall sheet 801a and panel 301 according to an embodiment of the present invention including placing numerous attachment mechanism(s) 601 proximate one another. By attaching an external load to the outer surface of the drywall sheet in this manner the load bearing capacity of the drywall is increased.

In Figure 10, a representative embodiment of an external attachment 1001 is illustrated as secured through a sheet of drywall 801a employing a representative embodiment of the present invention. In one embodiment, the external attachment 1001 is secured through the sheet of drywall 801a and a structural support and reinforcement device as depicted previously in Figure 9 by attachment mechanism(s) 601. Turning to Figure 11, a representative embodiment of an external device 1101 is illustrated as secured to the external attachment 1001 of Figure 10.

The external attachment 1001 and the external device 1101 are merely representative embodiments of external sources that result in additional loads on the drywall 801. Such external sources may include cabinetry, hand railings, curtains, curtain rods, blinds, hanging sinks, light fixtures, weight bearing devices designed to aid the physically disabled, shelving, shelving mounts, stabilizing brackets for appliances, miscellaneous brackets or mounts, display boards, flat-screen televisions, speakers, home-theater systems, electrical attachments and covers, air handling vents and returns, cosmetic molding, bath and hand towel bars or hooks, toilet paper role hangers, coat hangers, miscellaneous hooks and hangers, hanging accessories, ceiling hooks, and/or cosmetic attachments such as mirrors, pictures, or other art work or any other external source common in the art. Further, while the external attachment 1001 and the external device 1101 are depicted as separate elements in Figures 10 and 11, respectively, those skilled in the art will appreciate that the external attachment 1001 and the external device 1101 could be combined in a single element. For example, a hand railing could be secured through the sheet of drywall 801a and a structural support and reinforcement device via a mounting bracket that forms part of the hand railing itself.

In Figure 12, a simulated representative external load is illustrated as applied to the external device 1101 in the direction of the arrow 1201. Figure 13 illustrates the simulated representative load 1201 resulting in failure of the external attachment 1001.
Likewise, Figure 14 illustrates an enlarged view of the failed external attachment 1001. Importantly, as illustrated in Figures 13 and 14, while the external attachment 1001 failed under an applied load as illustrated by the deformation of the external attachment 1001 at 1401, the drywall 801a employing an embodiment of the present invention maintained its structural integrity. As illustrated in Figures 13 and 14, the drywall 801a employing an embodiment of the present invention is not broken, deformed, crushed, ripped, torn, crumbled, or otherwise failed in any way.

In Figure 15, a representative embodiment of a second external device 1501 is illustrated as secured through a sheet of drywall 801b not employing a representative embodiment of the present invention. Rather, the second external device 1501 is secured through the sheet of drywall 801b via prior art drywall anchors (not shown). Figure 16 illustrates a simulated representative external load applied to the external device 1501 in the direction of arrow 1502.

In Figure 17, the simulated representative load 1502 is illustrated as having caused the prior art drywall anchors 1702 and the sheet of drywall 801b not employing the present invention to fail. As shown, the second external device 1501 is separated from the drywall 801b and drywall has failed at 1701. Turning to Figure 18, a representative embodiment of a sheet of drywall 801 is shown. As illustrated, a portion of the drywall 801a employing the present invention maintained structural integrity under an applied load while a portion of the drywall 801b not employing the present invention, but rather employing a prior art device, failed under an applied load.

Further, in the event that external loads are removed from a section of drywall employing the present invention, the drywall surface retains minimal holes which can be easily repaired.

While the methods and processes of the present invention have proven to be particularly useful in the area of improving the load bearing capacity of drywall, those skilled in the art can appreciate that the methods and processes can be used in a variety of different applications and in a variety of different areas of manufacture to yield increased structural support and reinforcement systems to thereby improve load bearing capacity.

For example, in some embodiments, the structural support and reinforcement device or panel is placed behind a surface of a liner, insert, inlay, packing, pad, footing, pan or other device or material to provide a rigid surface or backing.

In a further embodiment, the structural support and reinforcement device is provided behind a surface of a shower pan to provide a rigid surface or backing to the
shower pan. In one embodiment, the shower pan is coupled to the structural stud, and the structural support and reinforcement device provides a support edge or surface to provide a rigid backing.

In some embodiments, surfaces, materials, and/or devices are coupled directly into the structural support and reinforcement device. In other embodiments, surfaces, materials, and/or devices are not coupled through the structural support and reinforcement device, but rather the structural support and reinforcement device provides a rigid support surface.

Thus, as discussed herein, embodiments of the present invention embrace structural support and reinforcement systems. In particular, embodiments of the present invention relate to systems and methods for providing structural support and reinforcement for drywall to thereby increase the load bearing capacity of the drywall. Further, embodiments of the present invention relate to providing structural support and reinforcement backing to a variety of surfaces, devices and/or materials.

The present invention may be embodied in other specific forms without departing from its spirit or essential characteristics. The described embodiments are to be considered in all respects only as illustrative and not restrictive. The scope of the invention is, therefore, indicated by the appended claims rather than by the foregoing description. All changes that come within the meaning and range of equivalency of the claims are to be embraced within their scope.

What is claimed is:
1. A structural support and reinforcement system, comprising:
   a structural stud having a first surface;
   a structural support and reinforcement panel secured to the first surface of
   the structural stud; and
   drywall secured over the structural support and reinforcement panel to the
   first surface of the structural stud.

2. A structural support and reinforcement system as recited in claim 1, wherein at least a portion of the reinforcement panel located between the structural stud and the drywall.

3. A structural support and reinforcement system as recited in claim 1, further comprising an attachment device extending through the drywall and into the structural support and reinforcement panel.

4. A structural support and reinforcement system as recited in claim 3, wherein the attachment device enables a load to be applied onto the drywall, and wherein the structural support and reinforcement panel increases the load bearing capacity of the drywall to support the load.

5. A structural support and reinforcement system as recited in claim 1, further comprising a second structural stud, wherein at least a portion of the structural support and reinforcement panel is extends between the structural studs.

6. A structural support and reinforcement system as recited in claim 1, wherein the structural support and reinforcement panel comprises a perforated material.

7. A structural support and reinforcement system as recited in claim 1, wherein the structural support and reinforcement panel comprises a mesh material.

8. A structural support and reinforcement system as recited in claim 1, wherein the structural support and reinforcement panel comprises a brake.

9. A structural support and reinforcement system as recited in claim 1, wherein the structural support and reinforcement panel comprises a flange.

10. A structural support and reinforcement device, comprising:
    a rigid material having a front surface and a back surface, wherein the
    material is configured to be coupled to one or more supports, and wherein the
    material is configured to provide structural support and backing.

11. A structural support and reinforcement device as recited in claim 10, wherein the supports are wall supports.
12. A structural support and reinforcement device as recited in claim 11, wherein at least a portion of the structural support and reinforcement device is configured to extend between a plurality of the wall supports.

13. A structural support and reinforcement device as recited in claim 10, wherein the structural support and backing is provided to a back surface of at least one of: (i) a liner; (ii) an insert, (iii) an inlay, (iv) a packing, (v) a pad, (vi) a footing, (vii) a pan; (viii) a device; and (ix) a material.

14. A reinforcement backing device comprising:
   a rigid material having a front surface and a back surface, wherein the rigid material is configured to be coupled to one or more structural studs, to provide structural support and backing to drywall, and to receive an attachment device extending through the drywall to increase a load bearing capacity of the drywall.

15. A reinforcement backing device as recited in claim 14, wherein at least a portion of the rigid material is configured to extend between a plurality of the structural studs.

16. A reinforcement backing device as recited in claim 14, wherein the attachment device enables a load to be applied onto the drywall, and wherein the rigid material increases the load bearing capacity of the drywall to support the load.

17. A reinforcement backing device as recited in claim 14, rigid material comprises a perforated material.

18. A reinforcement backing device as recited in claim 14, rigid material comprises a mesh material.

19. A reinforcement backing device as recited in claim 14, further comprising a brake.

20. A reinforcement backing device as recited in claim 14, further comprising a flange.
FIG. 1
(Prior Art)