

Method of Applying a Coating Medium And a Preformed Panel

FIELD OF INVENTION

5 The invention relates to a method of applying a coating medium, to a structure, and to a preformed panel.

10 BACKGROUND

Discontinuity, such as joints, on the surface of a structure is common due to the limitation and practical constraints in the size of the components that are assembled to form the structure. Production of larger components would result in
15 lesser joints. The surface of the structure is usually coated with a suitable medium for preventive and aesthetic purposes. However, due to the inevitable movements in the structure, the joints have a tendency to propagate through the coating medium thus defeating the preventive and aesthetic function of the coatings.

20 One example of such a structure is a partition wall.

A typical partition wall of 4 to 5 metres wide usually consists of 7 to 8 precast wall panels. The precast wall panels are erected side by side and the joints between these precast wall panels are usually fully grouted. The surface of the wall, including the
25 joints, is then plastered over with cement mortar or skim-coated to a smooth finish.

Movements in the wall panels develop high stress, which concentrates in the plaster or the skim-coat region above the joint, causing the plaster or the skim-coat region above the joint to crack. Although these cracks have no structural implications,
30 they are not aesthetic.

Movement of the adjoining wall panels may be caused by many factors such as shrinkage due to desiccation and thermal fluctuation, vibration and loadings. Existing methods generally attempt to constrain the movements of the adjoining wall panels by

some mechanical means. In one existing method, the joints are pointed with a groove so that any cracking can be hidden in the groove.

Discontinuity may also result due to cracks on a surface. Applying a coating medium over the crack would also result in the crack propagating through the coating medium, when the crack on the surface continues to extend and widen.

There is thus a need for a method and structure that seeks to address one or more of the above problems.

SUMMARY

According to a first aspect of the invention, there is provided a method of applying a coating medium over a discontinuity between two structural elements; the method comprising: providing a stress redistribution structure over the discontinuity; and applying the coating medium over the stress redistribution structure and such that the coating medium is in contact with surfaces of the respective structural elements adjacent the stress redistribution structure.

The step of providing the stress redistribution structure may comprise providing a first sheet over the discontinuity such that the first sheet is in fixed contact with the surfaces of the respective structural elements on both sides of the discontinuity; and providing a second sheet over the first sheet such that, after the coating medium is applied, the second sheet is moveable with respect to the first sheet in a plane parallel to the structural elements whereby stress as a result of relative movement of the structural elements is redistributed along a width of the first and second sheets.

The method may further comprise providing a gauze member over the stress redistribution structure prior to applying the coating medium.

The step of providing the first and the second sheets may comprise disposing adjoining surfaces of the first and the second sheets such that the relative movement between the first and the second sheets is substantially frictionless.

The method may further comprising providing a third sheet between the first sheet and a jointmaterial filled in the discontinuity such that the first sheet is free from direct contact with the jointmaterial.

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The method may further comprise providing one or more further sheets between the first and second sheets.

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The step of providing the stress redistribution structure may comprise providing an elastomeric filler in recesses formed in the surfaces of the respective structural elements at the discontinuity such that, after the coating medium is applied, the elastomeric filler is deformable in a plane parallel to the structural elements whereby stress as a result of relative movement of the structural elements is redistributed along a width of the elastomeric filler.

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The elastomeric filler may extend into the discontinuity.

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The recesses formed in the surfaces of the respective structural elements at the discontinuity may form a funnel shaped notch with the discontinuity at a base of the funnel shaped notch.

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The stress as a result of relative movement of the structural elements in the region of the coating medium over the stress redistribution structure may change linearly with strain as a result of relative movement of the structural elements in the region of the coating medium over the stress redistribution structure.

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The method may further comprise providing the stress redistribution structure and applying the coating medium on an opposing surface of the structural elements.

The stress redistribution structure may prevent fluid from leaking through the discontinuity.

According to a second aspect of the invention, there is provided a structure comprising two structural elements; a discontinuity between the two structural

elements; a stress redistribution structure formed over the discontinuity; and a coating medium formed over the stress redistribution structure such that the coating medium is in contact with surfaces of the respective structural elements adjacent the stress redistribution structure.

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The structure may comprise a first sheet over the discontinuity, the first sheet being in fixed contact with the surfaces of the respective structural elements on both sides of the discontinuity; and a second sheet over the first sheet, the second sheet being moveable with respect to the first sheet in a plane parallel to the structural elements whereby stress as a result of relative movement of the structural elements is redistributed along a width of the first and second sheets.

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The structure may further comprise a gauze member over the stress redistribution structure.

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The adjoining surfaces of the first and the second sheets may be disposed such that the relative movement between the first and the second sheets is substantially frictionless.

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The structure may further comprise providing a third sheet between the first sheet and a joint material filled in the discontinuity such that the first sheet is free from direct contact with the joint material.

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The method may further comprise providing one or more further sheets between the first and second sheets.

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The stress redistribution structure may comprise an elastomeric filler in recesses formed in the surfaces of the respective structural elements at the discontinuity, the elastomeric filler being deformable in a plane parallel to the structural elements whereby stress as a result of relative movement of the structural elements is redistributed along a width of the elastomeric filler.

The elastomeric filler may extend into the discontinuity.

The recesses formed in the surfaces of the respective structural elements at the discontinuity may form funnel shaped notches with the discontinuity at a base of the funnel shaped notch.

5 Stress as a result of relative movement of the structural elements in the region of the coating medium over the stress redistribution structure may change linearly with strain as a result of relative movement of the structural elements in the region of the coating medium over the stress redistribution structure.

10 The structure may further comprise the stress redistribution structure and the coating medium on an opposing surface of the structural elements.

The stress redistribution structure may prevent fluid from leaking through the discontinuity.

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According to a third aspect of the invention, there is provided a preformed panel comprising a recess formed in a surface of the panel at a joint end thereof for receiving an elastomeric filler when the panel is joined to another panel.

20 BRIEF DESCRIPTION OF THE DRAWINGS

Embodiments of the invention will be better understood and readily apparent to one of ordinary skill in the art from the following written description, by way of example only, and in conjunction with the drawings, in which:

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Figure 1 shows a schematic cross-sectional view of two structural elements in accordance with an embodiment of the invention.

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Figure 2 shows a schematic front view of a test specimen.

Figure 3 shows a schematic side view of a control specimen.

Figures 4 to 7 show schematic side views of test specimens employed to test the effectiveness of membrane layers acting as crack arrestor strips.

Figures 8A and 8B are photographs illustrating preparation of the test specimen of Figure 5.

Figure 9 shows a schematic drawing of a test specimen undergoing testing.

Figure 10 shows a photograph of test system used to conduct tests on a test specimen.

Figure 11 shows a plot of the stress versus the strain experienced by a plaster above a joint.

Figures 12A to 12D respectively show photographs of the front and back of the test specimens after plaster cracking occurred.

Figure 13 shows a plot of the stress versus the strain experienced by a plaster above a joint.

Figure 14 shows a plot of the joint width against the crack arrestor length for test specimens.

Figure 15 shows a schematic cross-sectional view of two structural elements in accordance with an embodiment of the invention.

Figure 16 shows a flowchart illustrating a method of applying a coating medium over a joint between two panels according to an example embodiment.

DETAILED DESCRIPTION

Figure 1 shows a cross-sectional view of two structural elements 102 in accordance with one embodiment of the invention.

In Figure 1, the two structural elements 102 are shown with their respective edges 104 and 106 adjacent to each other so that a joint 108 is defined in the region between the adjacent edges 104 and 106. Grout is used as the joint 108 material. A stress redistribution structure in a form of two membrane layers 110 are placed over and in contact with the joint 108. Portions of the membrane layers 110 also stretch distances 114 and 116 respectively adjacent to the edges 104 and 106 to be in contact with the structural elements 102. A coating medium 120 is then formed over the membrane layers 110 and the remaining exposed portion of the structural elements 102. An optional layer of gauze 122 can be incorporated between the membrane layers 110 and the coating medium 120 to strengthen the coating medium 120.

The width of the joint 108 defines a distance, termed L_{JOINT} 126 while the length of the membrane layers 110 is termed the effective width $L_{(EFF-JOINT)}$ 128.

In this embodiment, the coating medium 120 near the joint 108 is debonded over the distance $L_{(EFF-JOINT)}$ 128 by incorporating between the coating medium 120 and the structural elements 102, the two membrane layers 110. The two membrane layers 110 are two sheets of plastic, where the smooth surfaces of each sheet are positioned to face one another to mitigate friction. It will be appreciated that material used for the membrane layers 110 include, but is not limited to PVC, metal sheets and material that is durable and not reactive with the coating medium 120. The two membrane layers 110 have freedom of movement in the in-plane direction but are constraint from any movement in the out-of-plane direction. The out-of-plane constraint is to provide bonding effect of the coating medium 120 onto the structural elements 102. This can, for example, be provided by sewing together the two sheets of plastic with a suitable string. In this manner, while the lower membrane layer 110L remains substantially stationary above the joint 108 and the structural elements 102, the upper membrane layer 110U has a degree of in-plane movement relative to the lower membrane layer 110L. It is noted that further sheets or membranes (not shown) may be providing between the two membrane layers 110 in different embodiments.

When movement takes place in conventional precast wall panels, these movements concentrate at the joints due to relative stiffness of the wall panels and the joints. Grout, used as joint material, is seldom effective in transferring the movement of one panel relative to an adjacent panel, hence resulting in stress concentration at the joints. Although grout by itself is strong, the bond between the grout and the adjacent wall panel joints is usually weak. This weakness accentuates as the joint fatigues with time due to repeated movement of the wall panels. As the joint weakens, stress concentrates in the coating medium, such as plaster formed over the joint. This stress concentration is relative to the joint width in comparison with panel width. The stress concentration, σ , occurring in the plaster at the wall panel joint is expressed using the formula:

$$\sigma = \frac{\Delta L}{L_{JOINT}} E_{PLASTER} \quad (1)$$

where ΔL is the cumulative movement of the wall panel, L_{JOINT} is the width of the wall panel joint and $E_{PLASTER}$ is the elastic modulus of the plaster.

In contrast, the embodiment of Figure 1 reduces the stress level within the coating medium 120 by redistributing the stress concentration, σ , across the region of coating medium 120 that is above the membrane layers 110. The membrane layers 110 act to increase the effective width of the joint 108 in accordance with the following formula:

$$\sigma = \frac{\Delta L}{L_{JOINT}} E_{COATING} \times \left(\frac{L_{JOINT}}{L_{(EFF-JOINT)}} \right) \quad (2)$$

where $L_{(EFF-JOINT)}$ is the effective width 128 of the membrane layers 110 while L_{JOINT} is the width 126 of the joint 108, and $E_{COATING}$ is the elastic modulus of the coating medium. Thus, when the effective width $L_{(EFF-JOINT)}$ 128 in the present embodiment is chosen such that the resulting stress in the coating medium 120 is less than the critical stress at which the coating medium 120 fails, cracking of the coating medium 120 will be prevented. As such, the membrane layers 110 act as crack

arrestor strips. The membrane layers 110 also act to prevent fluid from leaking through the joint 108.

The performance of the crack arrestor technique described above was tested through direct tension using different plaster lengths and membrane layers widths over joints between cement blocks. Schematic drawings of the test specimens used are shown in Figures 2 to 7.

Figure 2 shows a front view 200 of a test specimen 240. Figure 3 shows a side view of a control specimen 340 that does not contain a crack arrestor strip, while Figures 4 to 7 show side views of test specimens 440, 540, 640 and 740 employed to test the effectiveness of membrane layers acting as crack arrestor strips 410, 510, 610 and 710 respectively.

In Figure 2, the test specimen 240 has two cement blocks 242 and 244, where each cement block 242, 244 has two cement boards 202 glued together along opposing surfaces. Each cement board 202 has dimensions 350×200×9 mm, so that each cement block 242 and 244 has a dimension of 350×200×18 mm. Altogether, five test structures 340, 440, 540, 640 and 740 were prepared as illustrated in Figures 3 to 7 respectively having the same dimensions of the test structure 240. Four test specimens 440, 540, 640 and 740 (Figures 4 to 7) contained crack arrestors 410, 510, 610 and 710 (Figures 4 to 7) of widths 50, 100, 150 and 200 mm respectively while the remaining test specimen 340 (Figure 3) contained no crack arrestor and served as a control specimen.

Figures 8A and 8B illustrate how the test specimen 540 of Figure 5 was prepared. It will be appreciated that the test specimens 440, 640 and 740 of Figures 4, 6 and 7 are respectively prepared in the same manner.

In Figure 8A, cement blocks 542 and 544 are placed side by side with their edges adjacent to each other and held with clamps 850 as shown in Figure 8. To keep the joint 508 defined between the two edges free from bonding, a thin plastic sheet (not shown) was placed in the joint 508. Similarly, a thin plastic sheet was also placed in the joint 308 (Figure 3) in the control specimen 340 (Figure 3).

A crack arrestor 510 of 100mm length (or width) across the joint is then glued over the joint 508. In Figures 4, 6 and 7, the lengths of the crack arrestors 410, 610 and 710 are 50 mm, 150mm and 200mm respectively.

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In Figure 8B, plaster 520 of length 400mm and a thickness of 10mm is then formed over the joint 508 and the crack arrestor 510 (Figure 8A). As illustrated in Figures 3, 4, 6 and 7, plasters 320, 420, 620 and 720 of lengths 300, 350, 450 and 500mm with the same thickness of 10mm are respectively formed.

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The plastered surface is kept covered with polyethylene sheets. On the next day, the structure 530 is flipped around to form another crack arrestor and plaster on the opposing structure 530 surface and over the joint 508 in the same manner as described above.

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The completed test specimen 540, shown in Figure 9, is kept covered with polyethylene sheets for another day and then kept in a moist room for six more days. Thereafter, the test specimen 540 is left under normal laboratory environment conditions until testing is performed.

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Figure 9 illustrates the test specimen 540 undergoing testing. It will be appreciated that the joint 508 and the crack arrestor 510 are beneath the plaster 520, while portions of the cement blocks 542 and 544 are beneath the plaster 520. The test specimen 540 is gripped at each end by a 75×75 mm clamp 970.

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Two 10mm linear variable displacement transducers (LVDT) 950 are used to measure the joint width 526. The LVDT 950 are connected between two 10mm strips 960 and mounted at opposite ends of the joint 508 adjacent the edges of the cement boards 542 and 544.

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Wire strain gauges 964 of 10mm length are attached to the plaster 520 surface along the central axis 966 of the joint 508 and along a longitudinal axis 968 of the plaster 520.

Figure 10 shows a test system 1000 used to conduct tests on the test specimen 540. Direct tension with a constant rate of displacement was applied through the clamps 970 using a servo-controlled Instron actuator 972. The displacement and strain data from the LVDT 950 and strain gauges 964 for the test specimen 540 are respectively captured by a personal computer 1002 at regular displacement and load intervals.

For instance, 20 days from when the first surface of the structure 530 (Figure 8B) was plastered, it was found that the strength of the plaster was 20.4 and 22.7 MPa for the first and the opposing second surface, respectively.

Returning to Figure 9, under the direct tension and constant rate of displacement applied by the test system 1000 (Figure 10), the test specimen 540 was stressed and consequently the joint width 526 widened. The plaster 520 over the joint 508 and the cement blocks 542 and 544 was subject to strain from the applied tension. When the strain applied to the cement blocks 542 and 544 exceeded the strain capacity of the plaster 520, the plaster 520 cracked and the test specimen 540 was considered to have failed.

However, before the test specimen 540 failed, the test results (Figure 11) showed that the strain in the plaster 520 over the joint 508 was quite uniform.

Figure 11 is a plot of the stress versus the strain experienced by the plaster 520 above the joint 508. It can be observed that the curves 1102, 1104 and 1106 are generally linear, where curve 1102 is derived from measurements taken along the joint central axis 966 (Figure 9), while the curves 1104 and 1106 is derived from measurements taken at 20mm from the left and right respectively of the central axis 966 (Figure 9). Thus, the stress experienced by the plaster 520 adjacent the joint 508 was quite uniform. This uniformity in strain indicates that no end effect disturbed the uniform tension experienced at the joint 508 region.

The same test setup described with reference to Figures 9 and 10 was used for the test specimens 340, 440, 640 and 740 of Figures 3, 4, 6 and 7. The displacement and strain data from the LVDT 950 and strain gauges 964 for the

various specimens 340, 440, 640 and 740 of Figures 3 to 7 were respectively captured by the personal computer 1002 (Figure 10) at regular displacement and load intervals.

Figures 12A to 12D respectively are photographs of the front and back of the test specimens 440, 540, 640 and 740 of Figures 4, 5, 6 and 7 after plaster 420, 520, 620 and 720 cracking occurred. From Figures 12A to 12D, it was observed that cracking of the respective plasters occurred above the edges of the crack arrestors 410, 510, 610 and 710 of Figures 4, 5, 6 and 7 respectively. The results showed that the objective of achieving a uniform stress region along the plasters above their respective crack arrestors was achieved, although stress concentration at the plasters above the crack arrestor edges still occurred.

Figure 13 is a plot of the stress versus the strain experienced by the plaster 620 above the joint 608 of Figure 6. It can be observed that the curves 1302, 1304 and 1306 are generally linear, where curve 1302 is derived from measurements taken along the center of the joint 608 (Figure 6), while the curves 1304 and 1306 are derived from measurements taken at 22.5mm and 45mm from the center of the joint 608 (Figure 6). Thus, the stress experienced by the plaster 620 (Figure) was quite uniform.

Table 1 summarises the failure stress, the joint strain and the joint width of the test specimens 440, 540, 640 and 740 of Figures 4 to 7 respectively at the time of failure, while Figure 14 is a plot of the joint width against the crack arrestor length for the respective test specimens 440, 540, 640 and 740 of Figures 4 to 7.

Table 1: Stress and strain of plaster, and joint width at time of failure

Specimen	Failure Stress (MPa)	Strain over Joint (microstrain)	Joint width (mm)
440	1.39	73	0.008
540	1.63	88	0.022
640	1.34	99	0.024
740	1.69	170	0.033

A direct tension test on plaster showed that the cracking stress and strain of the plaster was 2.0 MPa and 185 microstrain, respectively. Thus it was observed that the failure stress and strain of the plaster in the test specimens 440, 540, 640 and 740 were lower compared to the direct tension test results. Stress concentration occurring at the edges of the crack arrestors 410, 510, 610 and 710 in Figures 4 to 7 and inevitable minor eccentricity of the loading arrangement may have been the reason for the difference.

However, from the results in table 1 and the curve 1402 of Figure 14, it can be appreciated that the joint width increased with an increase in crack arrestor length in line with equation (2). Thus, the results show that a crack arrestor length of between 100 and 200 mm would be practical. By extrapolating the curve 1402, it will be appreciated that for the control specimen 340 (Figure 3), the joint width at which cracking in the plaster 320 (Figure 3) occurs approaches 0 mm, which illustrates that the joint width at which cracking occurs increases with the presence of crack arrestors.

From the experiments conducted above, it will be appreciated that a coating medium on structural elements having similar crack arrestors as described above will experience the same stress-strain and displacement relationship as plaster on cement blocks, wherein the crack arrestors facilitate stress redistribution which would otherwise concentrate at the coating medium region above the structural elements joint hence causing the coating medium region to crack. Further, as the length of the crack arrestor used is increased, the failure strain of the coating medium formed over the crack arrestor would similar increase.

Figure 15 shows a cross-sectional view of two structural elements 1502 in accordance with another embodiment of the invention.

In Figure 15, the two structural elements 1502 are shown with their respective edges 1504 and 1506 adjacent to each other. A joint 1508 of varying width is formed between the adjacent edges 1504 and 1506. A stress redistribution structure in the form of an elastomeric filler 1510 is used to fill the region 1510. The elastomeric filler 1510 has good bonding onto the edges 1504 and 1506 of the structural elements 1502. In addition, the filler 1510 has good elongation, that is, high elastic limit,

and high tensile and shear strength. Coating medium 1520 is then formed over the filler 1510 and the remaining exposed portion of the structural elements 1502.

Material used for the elastomeric filler 1510 includes, but is not limited to polyurethane and polymer modified grout. The physical and mechanical properties of the filler 1510 can be deduced based on the maximum movement anticipated at the joint notch 1508.

The joint 1508 has a first portion 1508A having a substantially constant width 1526 and second portions 1508B adjacent to the first portion 1508A where the widths of the second portions 1508B increases gradually from the interface between the first and second portions 1508A and 1508B to the maximum widths 1528 of the second portions 1508B.

The width 1526 of the first portion 1508A defines the actual width L_{JOINT} 1526 of the joint 1508 while the maximum widths 1528 of the second portions 1508B define the effective width $L_{(EFF-JOINT)}$ 1528 of the joint 1508.

The working principle of the embodiment of Figure 15 is the same as the embodiment of Figure 1, i.e. the stress level within the coating medium 1520 is reduced by redistributing the stress concentration, σ , across the region of coating medium 1520 that is above the elastomeric filler 1510. The elastomeric filler 1510 acts to increase the effective width of the joint 1508 in accordance with the following formula:

$$\sigma = \frac{\Delta L}{L_{JOINT}} E_{COATING} \times \left(\frac{L_{JOINT}}{L_{(EFF-JOINT)}} \right) \quad (2)$$

where $L_{(EFF-JOINT)}$ is the effective width 1528 of the elastomeric filler 1510 while L_{JOINT} is the actual width 1526 of the joint 1508, and $E_{COATING}$ is the elastic modulus of the coating medium. Thus, when the effective width $L_{(EFF-JOINT)}$ 1528 in the present embodiment is chosen such that the resulting stress in the coating medium 1520 is less than the critical stress at which the coating medium 1520 fails, cracking of the

coating medium 1520 will be prevented. As such, the elastomeric filler 1510 acts as a crack arrestor element. The elastomeric filler 1510 also prevents fluid from leaking through the joint 1508.

5 Figure 16 shows a flowchart 1600 illustrating a method of applying a coating medium over a discontinuity between two structural elements according to an example embodiment. At step 1602, a stress redistribution structure is provided over the discontinuity. At step 1604, the coating medium is applied over the stress redistribution structure and such that the coating medium is in contact with surfaces
10 of the respective structural elements adjacent the stress redistribution structure.

The discontinuity may be a joint between two distinct structural elements such as precast wall, ceiling or floor panels, timber planks, steel plates, etc., including mixtures of the same, e.g. a timber plank joint to a precast wall panel. Generally, the
15 discontinuity resembles a scenario in which a weaker material (in tensile, shear or bond) has been used to join two stronger materials. On the other hand, the discontinuity may be a crack etc. in a surface of a structure, in which case the structural elements comprise portions of the structure on respective sides of the crack. One such example would be a crack in a precast wall panel or concrete slab,
20 where the described method can be used to arrest the crack and prevent leakage through the crack, which can render the wall panel or concrete slab still fit for use in e.g. construction.

One objective of the example embodiments is to prevent or minimise the
25 propagation of the discontinuity to the coating medium. Another objective of the example embodiments is to provide a water-stop to prevent leakage through joints, cracks, etc.

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

CLAIMS

1. A method of applying a coating medium over a discontinuity between two structural elements; the method comprising:

- 5 providing a stress redistribution structure over the discontinuity; and
applying the coating medium over the stress redistribution structure and such that the coating medium is in contact with surfaces of the respective structural elements adjacent the stress redistribution structure.

- 10 2. The method as claimed in claim 1, wherein the step of providing the stress redistribution structure comprises:

providing a first sheet over the discontinuity such that the first sheet is in fixed contact with the surfaces of the respective structural elements on both sides of the joint; and

- 15 providing a second sheet over the first sheet such that, after the coating medium is applied, the second sheet is moveable with respect to the first sheet in a plane parallel to the structural elements whereby stress as a result of relative movement of the structural elements is redistributed along a width of the first and second sheets.

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3. The method as claimed in claims 1 or 2, further comprising
providing a gauze member over the stress redistribution structure prior to applying the coating medium.

- 25 4. The method as claimed in claims 2 or 3, wherein the step of providing the first and the second sheets comprises

disposing adjoining surfaces of the first and the second sheets such that the relative movement between the first and the second sheets is substantially frictionless.

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5. The method as claimed in any one of claims 2 to 4, further comprising providing a third sheet between the first sheet and a joint material filled in the discontinuity such that the first sheet is free from direct contact with the joint material.

6. The method as claimed in any one of claims 2 to 5, further comprising providing one or more further sheets between the first and second sheets.

5 7. The method as claimed in claim 1, wherein the step of providing the stress redistribution structure comprises:

providing an elastomeric filler in recesses formed in the surfaces of the respective structural elements at the discontinuity such that, after the coating medium is applied, the elastomeric filler is deformable in a plane parallel to the structural elements whereby stress as a result of relative movement of the structural elements is redistributed along a width of the elastomeric filler.

8. The method as claimed in claim 7, wherein the elastomeric filler also extends into the discontinuity.

9. The method as claimed in claims 7 or 8, wherein the recesses formed in the surfaces of the respective structural elements at the discontinuity form a funnel shaped notch with the discontinuity at a base of the funnel shaped notch.

10. The method as claimed in any one of the preceding claims, wherein stress as a result of relative movement of the structural elements in the region of the coating medium over the stress redistribution structure changes linearly with strain as a result of relative movement of the structural elements in the region of the coating medium over the stress redistribution structure.

11. The method as claimed in any one of the preceding claims, further comprising:

providing the stress redistribution structure and applying the coating medium on an opposing surface of the structural elements.

12. The method as claimed in any one of the preceding claims, wherein the stress redistribution structure prevents fluid from leaking through the discontinuity.

13. A structure comprising:

two structural elements;
a discontinuity between the two structural elements;
a stress redistribution structure formed over the discontinuity; and
a coating medium formed over the stress redistribution structure such that

5 the coating medium is in contact with surfaces of the respective structural elements adjacent the stress redistribution structure.

14. The structure as claimed in claim 13, wherein the stress redistribution structure comprises:

10 a first sheet over the discontinuity, the first sheet being in fixed contact with the surfaces of the respective structural elements on both sides of the discontinuity; and

a second sheet over the first sheet, the second sheet being moveable with respect to the first sheet in a plane parallel to the structural elements whereby stress
15 as a result of relative movement of the structural elements is redistributed along a width of the first and second sheets.

15. The structure as claimed in claims 13 or 14, further comprising a gauze member over the stress redistribution structure.

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16. The structure as claimed in claims 14 or 15, wherein adjoining surfaces of the first and the second sheets are disposed such that the relative movement between the first and the second sheets is substantially frictionless.

25 17. The structure as claimed in claims 14 to 16, further comprising providing a third sheet between the first sheet and a joint material filled in the discontinuity such that the first sheet is free from direct contact with the joint material.

18. The structure as claimed in any one of claims 14 to 17, further comprising
30 one or more further sheets between the first and second sheets.

19. The structure as claimed in claim 13, wherein the stress redistribution structure comprises

an elastomeric filler in recesses formed in the surfaces of the respective structural elements at the discontinuity, the elastomeric filler being deformable in a plane parallel to the structural elements whereby stress as a result of relative movement of the structural elements is redistributed along a width of the elastomeric filler.

20. The structure as claimed in claim 19, wherein the elastomeric filler extends into in the discontinuity.

21. The structure as claimed in claims 19 or 20, wherein the recesses formed in the surfaces of the respective structural elements at the discontinuity form funnel shaped notches with the discontinuity at a base of the funnel shaped notch.

22. The structure as claimed in claims 13 to 21, wherein stress as a result of relative movement of the structural elements in the region of the coating medium over the stress redistribution structure changes linearly with strain as a result of relative movement of the structural elements in the region of the coating medium over the stress redistribution structure.

23. The structure as claimed in claims 13 to 22, further comprising:
the stress redistribution structure and the coating medium on an opposing surface of the structural elements.

24. The structure as claimed in claims 13 to 23, wherein the stress redistribution structure prevents fluid from leaking through the discontinuity.

25. A preformed panel comprising:
a recess formed in a surface of the panel at a joint end thereof for receiving an elastomeric filler when the panel is joined to another panel.