An article of manufacture that has at least three layers of sealable material. There is at least one first seal between at least two of the layers in a first area having a first sealing affinity effected at a first sealing parameter. There is also at least one second seal between at least two more layers, where at least one of these two layers is distinct from the at least two layers joined by the first seal, in a second area having a second sealing affinity effected at a second sealing parameter, where the second sealing parameter is different than the first sealing parameter, thereby allowing for sealing of discrete areas of the article in discrete steps.
The subject invention relates to products formed of multiple layers of sealable materials. More particularly, the subject invention relates to products formed of multiple layers of sealable materials with distinct sealing affinities that are sealable at different sealing parameters in discrete areas of the product.

There are numerous products formed using sealable materials, including pouches and other containers. They are manufactured by heat sealing together different layers of the materials in multiple locations to achieve the various sizes and shapes desired. U.S. Patent Nos. 5,536,542 and 5,484,375 generally disclose articles created by heat sealing polymeric layers together.

It is often desirable to heat seal a multi-layer product in an area at a given temperature while not affecting one or more of the layers for design or functional reasons. Currently, this is achieved by introducing barrier layers such as paper, treating the layer that is to be protected with a lubricant or paint, or using a mechanical process to prevent a heat seal from occurring between certain layers in that area. This inevitably leads to additional multi-step processes which add time and cost to the manufacturing process. It would be advantageous to effect seals between
layers in some areas based on a sealing parameter and in other areas based on a different sealing parameter without the need for additional intermediary steps.

[0004] U.S. Patent No. 6,996,951 discloses a flexible multi-compartment container with peelable seals and a method for making such a container. In one specific embodiment, the container includes multiple layers, with an outer layer having a higher melting temperature than an inner seal layer. U.S. Patent No. 4,147,827 discloses a method for the production of heat sealable co-extruded films having a high melting point core layer coated on at least one side with a lower melting point skin layer.

[0005] Thus, while the above references describe articles created by sealing together multiple layers of material, some of which may have different melting temperatures, none of them discloses, teaches or suggests a product formed of multiple layers that are sealed together wherein, in some areas, the materials forming the product are sealable at a sealing parameter, and in other areas, the materials forming the product are sealable at a different sealing parameter, thereby allowing for sealing of discrete areas of the product in discrete steps.

SUMMARY OF THE INVENTION

[0006] It is therefore an object of the present invention to provide an improved process for producing articles formed of multiple layers of sealable material, which accommodates the sealing of discrete areas of the product in discrete steps.
It is a further object of the present invention to provide such an improved process which eliminates the need for intermediary steps within the process to impede sealing between layers in certain areas, where seals are not desired, to make the process more efficient and cost effective.

The subject invention results from the realization, in part, that a more time and cost effective process for producing articles formed of multiple layers of sealable material having distinct sealing affinities can be achieved by providing a process wherein certain layers of the product are sealable at one sealing parameter, and in other areas, certain layers of the product are sealable at a different sealing parameter.

The subject invention, however, in other embodiments, need not achieve all these objectives and the claims hereof should not be limited to structures or methods capable of achieving these objectives.

The subject invention features an article of manufacture comprising at least three layers of sealable material. There is at least one first seal between at least two of the layers in a first area having a first sealing affinity and effected at a first sealing parameter. Also, there is least one second seal between at least two of the layers, wherein at least one of these two layers is distinct in sealing affinity from the two layers joined by the first seal. This second seal is in a second area having a second sealing affinity and is effected at a second sealing parameter that is different than the first sealing parameter, thereby allowing for sealing of discrete areas of the article in discrete steps. In forming the seals on materials having distinct sealing affinities, said first and second sealing parameters may be based on employing various sealing techniques, such as constant temperature, impulse heat sealing, radio frequency (R.F.) heat sealing, also known as dielectric sealing, and/or ultrasonic sealing.
[0012] In one example, the at least three layers of sealable material comprise at least one laminate sheet. This sheet comprises a first face of material having a first sealing affinity which is sealable at the first sealing parameter, which may be at a first temperature or correlate to the first sealing affinity, and a second face of material having a second sealing affinity that is sealable at the second sealing parameter, which may be at a second temperature or correlate to the second sealing affinity.

[0013] In another example, the article of manufacture is a flexible ported pouch. Here, the least three layers of sealable material comprise two pouch layers with the first seal therebetween and two port layers with the second seal therebetween.

[0014] In still another example, the article of manufacture is a dual layer baffle system. In this embodiment, the at least three layers of sealable material comprise two exterior layers connected to a plurality of baffles by a plurality of first seals, and a plurality of two baffle layers with the second seal there between.

[0015] In yet another example, the article of manufacture is a core film baffle system. In this embodiment, the at least three layers of sealable material comprise two exterior layers connected to a plurality of core film baffles by a plurality of first seals, and a plurality of two core film baffle layers with the second seal there between.

[0016] The subject invention also features a method for forming an article of manufacture. The method comprises the steps of providing at least three layers of sealable material. At least one layer of the at least three layers and at least one opposing layer of the at least three layers are affected at a first sealing parameter in a first area having a first sealing affinity to effect at least one first seal. Then, at least one layer of the at least
three layers and at least one opposing layer of the at least three layers are affected at a second sealing parameter, wherein the second sealing parameter is different from the first sealing parameter. This forms at least one second seal in a second area having a second sealing affinity, thereby allowing for sealing of discrete areas of the article in discrete steps. In forming the seals on materials having distinct sealing affinities, said first and second sealing parameters may be based on employing various sealing techniques, such as constant temperature, impulse heat sealing, dielectric sealing, and/or ultrasonic sealing.

[0017] In one example of this process, the at least three layers of sealable material comprise at least one laminate sheet. This sheet comprises a first face of material having a first sealing affinity sealable at the first sealing parameter, which may be at a first temperature or correlate to the first sealing affinity, and a second face of material having a second sealing affinity sealable at the second sealing parameter, which may be at a second temperature or correlate to the second sealing affinity.

[0018] The subject invention also features a flexible ported pouch with an interior. In an exemplary embodiment, the pouch comprises a first pouch sheet and a second pouch sheet and is formed by a first seal at a first sealing parameter, which may be at a first temperature or correlate to the first sealing affinity, around a periphery of the first and second pouch sheets having a first sealing affinity. This first seal has at least one gap having an opening spaced from the first seal to provide a channel between the first pouch sheet and the second pouch sheet. There is a port that is interposed between the first pouch sheet and the second pouch sheet, and is in communication with the interior of the pouch. This port comprises a first port sheet and a second port sheet, and is formed by a second and third seal along the longitudinal edges, having a second sealing affinity, of the first and second port sheets at a second sealing parameter, which may be at a
second temperature wherein the second temperature is higher than the first temperature, or correlate to the second sealing affinity wherein the second sealing affinity is higher or lower than the first sealing affinity. The first and second port sheets are further sealed to the pouch where the first and second port sheets having the first sealing affinity intersect with the periphery of the first and second pouch sheets at the first sealing parameter, which may be at the first temperature or correlate to the first sealing affinity. The difference in sealing parameters correlating to distinct sealing affinities allows the port to be sealed to the pouch without the interior of the port also being sealed. Said first and second sealing parameters may be based on employing various sealing techniques, such as constant temperature, impulse heat sealing, dielectric sealing, and/or ultrasonic sealing.

[0019] Also, in the exemplary embodiment of the flexible ported pouch, the first and second port sheets are laminates comprising a first face having a first sealing affinity sealable at a first sealing parameter, which may be at the first temperature or correlate to the first sealing affinity, and a second face having a second sealing affinity sealable at a second sealing parameter, which may be at the second temperature or correlating to the second sealing affinity. The first face forms the exterior of the port. The first face is sealable at sealing parameter at a lower temperature or correlating to a lower or higher sealing affinity so this allows the port to be sealed to the pouch at the point of intersection at the low temperature, the low sealing affinity, or the high sealing affinity while leaving the interior of the port unsealed at this intersection.

[0020] In other aspects of the present invention, the flexible pouch configuration can also be achieved by substituting the first and second pouch sheets with a single pouch sheet having a first sealing affinity, folding it over on an axis, and effecting the first seal at a first sealing parameter, which may be at a first temperature or correlate to the first sealing affinity,
around the open pouch edges that are formed. Similarly, the flexible port configuration can be achieved by substituting the first and second port sheets with a single port sheet having a second sealing affinity folded about an axis and replacing the second and third seals with a single seal at a second sealing parameter, which may be at a second temperature or correlate to the second sealing affinity, along the open longitudinal edge. The single sheet port configuration can also feature a single port sheet comprising a laminate. This laminate comprises a first face having a first sealing affinity sealable at the first sealing parameter, which may be at the first temperature or correlate to the first sealing affinity, and a second face having a second sealing affinity sealable at the second sealing parameter, which may be at the second temperature or correlate to the second sealing affinity, with the first face forming the exterior of the port. Said first and second sealing parameters may be based on employing various sealing techniques, such as constant temperature, impulse heat sealing, dielectric sealing, and/or ultrasonic sealing.

[0021] The subject invention further features a method of manufacturing a flexible ported pouch. The method comprises the steps of providing first and second port sheets of sealable material in parallel. The first and second port sheets are then affected along their longitudinal edges, having a first sealing affinity, at a first sealing parameter, which may be at a first temperature or correlate to the first sealing affinity, to effect a first and second seal to form a port with an exterior and an interior. First and second pouch sheets of sealable material having a second sealing affinity are then provided in parallel. The port is introduced by interposition between the first and second pouch sheets. Finally, a periphery of the first pouch sheet, the second pouch sheet, and the exterior of the port, where the exterior of the port intersects with the periphery of the first and second pouch sheets, are affected by a second sealing parameter. The second sealing parameter, which may be at a second temperature that is lower than the first
temperature or correlate to the second sealing affinity that is lower or higher than the first sealing affinity, and effects a third seal without sealing the interior of the port at the intersection of the periphery of the pouch. Said first and second sealing parameters may be based on employing various sealing techniques, such as constant temperature, impulse heat sealing, dielectric sealing, and/or ultrasonic sealing.

[0022] The subject method can also be executed by substituting the first and second port sheets with a single port sheet having a first sealing affinity and folding it upon an axis. The open longitudinal edge can then be affected at the first sealing parameter, which may be at the first temperature or correlate to the first sealing affinity to effect a first seal to replace the first and second seals of the exemplary method. Similarly, the first and second pouch sheets can be replaced by a single pouch sheet having a second sealing affinity folded upon an axis and sealed along the open edges at the second sealing parameter, which may be at the second temperature or correlate to the second sealing affinity. Said first and second sealing parameters may be based on employing various sealing techniques, such as constant temperature, impulse heat sealing, dielectric sealing, and/or ultrasonic sealing.

[0023] The subject invention also includes a dual layer film baffle system. The exemplary embodiment of the baffle system comprises a first and second sheet of sealable material. There is then a plurality of baffle elements interposed between the first and second sheets having a first sealing affinity. These baffle elements comprise a third sheet of sealable material sealed at a first sealing parameter, which may be at a first temperature or correlate to the first sealing affinity, along one edge, having the first sealing affinity, of the third sheet and latitudinally across the first sheet. A fourth sheet of sealable material is sealed at the first sealing parameter, which may be at the first temperature or correlate to the first
sealing affinity, along one edge, having the first sealing affinity, of the fourth sheet and latitudinally across the second sheet. The third and fourth sheets are further sealed together along their common edge, having a second sealing affinity, at a second sealing parameter, which may be at a second temperature wherein the second temperature is higher than the first temperature or correlate to the second sealing affinity wherein the second sealing affinity is higher or lower than the first sealing affinity. Said first and second sealing parameters may be based on employing various sealing techniques, such as constant temperature, impulse heat sealing, dielectric sealing, and/or ultrasonic sealing.

[0024] In the exemplary embodiment of the baffle system, the first and second sheets of sealable material are low temperature, low affinity, or high affinity sealing material and the third and fourth sheets of sealable material are laminates comprising a first face having a first sealing affinity of high temperature, high affinity, or low affinity sealing material and a second face having a second sealing affinity of low temperature, low affinity, or high affinity sealing material.

[0025] The subject invention also features a method of manufacturing a dual layer baffle system. The method comprises the steps of providing a first and second sheet of sealable material in parallel. The sheets are then affected at a first sealing parameter, which may be at a first temperature or correlate to a first sealing affinity, latitudinally across the first and second sheets, having a first sealing affinity, at a longitudinal interval to effect a plurality of first seals. The first and second sheets are then perforated latitudinally across the sheets at the longitudinal interval effecting a plurality of perforated lines. A third sheet of sealable material having a second sealing affinity is then introduced to the exterior of the first sheet. A fourth sheet of sealable material having the second sealing affinity is then introduced to the exterior of the second sheet. Then, the third sheet, the
first sheet, the fourth sheet and the second sheet are affected at a second sealing parameter, which may be at a second temperature wherein the second temperature is lower than the first temperature or correlate to the second sealing affinity wherein the second sealing affinity is lower or higher than the first sealing affinity, latitudinally across the sheets, having the second sealing affinity, at the longitudinal interval, effecting a plurality of second seals between the fourth sheet and the first sheet and a plurality of third seals between the third sheet and the second sheet. Said first and second sealing parameters may be based on employing various sealing techniques, such as constant temperature, impulse heat sealing, dielectric sealing, and/or ultrasonic sealing. Finally, the fourth sheet and third sheet are spread apart, thereby separating the first and second sheets along the perforated lines to effect baffles between the fourth sheet and the third sheet.

[0026] The subject invention also includes a core film baffle system. The core film baffle system comprises a first and second sheet of sealable material. There is then a plurality of core film baffle elements interposed between the first and second sheets having a first sealing affinity. These core film baffle elements comprise a third sheet of sealable material sealed at a first sealing parameter, which may be at a first temperature or correlate to a first sealing affinity, along one edge, having a first sealing affinity, of the third sheet and latitudinally across the first sheet. A fourth sheet of sealable material is sealed at the first sealing parameter, which may be at the first temperature or correlate to the first sealing affinity, along one edge, having the first sealing affinity, of the fourth sheet and latitudinally across the second sheet. A fifth sheet of sealable material is interposed between the third sheet and the fourth sheet. Then, the third sheet, the fourth sheet, and the fifth sheet are sealed together along their common edge, having a second sealing affinity, at a second sealing parameter, which may be at a second temperature wherein the second temperature is higher than the first
temperature or correlate to the second sealing affinity wherein the second sealing affinity is higher or lower than the first sealing affinity. Said first and second sealing parameters may be based on employing various sealing techniques, such as constant temperature, impulse heat sealing, dielectric sealing, and/or ultrasonic sealing.

[0027] Also, in the exemplary embodiments of the core film baffle system, the first and second sheets of sealable material are low temperature, low affinity, or high affinity sealing material, the third and fourth sheets of sealable material are laminates comprising a first face having a first sealing affinity of high temperature, high affinity, or low affinity sealing material and a second face having a second sealing affinity of low temperature, low affinity, or high affinity sealing material, and the fifth sheet is a core sheet of high temperature, high affinity, or low affinity sealing material.

[0028] The subject invention further includes a method of manufacturing a core film baffle system. In an exemplary embodiment, the method comprises the steps of providing a first and second sheet of sealable material in parallel. The sheets are perforated latitudinally across the first and second sheets at a longitudinal interval to effect a plurality of perforated lines. Then, a third sheet of sealable material is provided in parallel with the first and second sheets and interposed between said first and second sheets. The sheets are then affected at a first sealing parameter, which may be at a first temperature or correlate to the first sealing affinity, latitudinally across the first, second, and third sheets, having a first sealing affinity, at the longitudinal interval effecting a plurality of first seals. A fourth sheet of sealable material having a second sealing affinity is then introduced to the exterior of the first sheet. A fifth sheet of sealable material having the second sealing affinity is then introduced to the exterior of the second sheet. Then, the fourth sheet, the first sheet, the fifth sheet,
and the second sheet are affected at a second sealing parameter, which may be at a second temperature wherein the second temperature is lower than the first temperature or correlate to the second sealing affinity wherein the second sealing affinity is lower or higher than the first sealing affinity, latitudinally across the sheets, having a second sealing affinity, at the longitudinal interval, effecting a plurality of second seals between the fifth sheet and the first sheet and a plurality of third seals between the fourth sheet and the second sheet. Said first and second sealing parameters may be based on employing various sealing techniques, such as constant temperature, impulse heat sealing, dielectric sealing, and/or ultrasonic sealing. Finally, the fifth sheet and fourth sheet are spread apart, thereby separating the first and second sheets along the perforated lines to effect core film baffles between the fifth sheet and the fourth sheet.

[0029] In another exemplary embodiment, the subject method can also be executed by substituting the first and second sheets of sealable material provided in parallel with a first and second sheet of pre-perforated sealable material provided in parallel, wherein the perforations are latitudinally across said pre-perforated sheets at a longitudinal interval to effect a plurality of perforated lines. Then, the third sheet of sealable material is provided in parallel with the first and second pre-perforated sheets and interposed between said first and second pre-perforated sheets. These sheets are then affected at a first sealing parameter, which may be at a first temperature or correlate to the first sealing affinity, latitudinally across the first, second, and third sheets, having a first sealing affinity, at the longitudinal interval effecting a plurality of first seals.
BRIEF DESCRIPTION OF THE DRAWINGS

[0030] Other objects, features and advantages will occur to those skilled in the art from the following description of an exemplary embodiment and the accompanying drawings, in which:

[0031] Fig. 1 shows a schematic cross sectional view of an article of manufacture consisting of multiple layers of sealable material having distinct sealing affinities and multiple seals;

[0032] Fig. 2 shows a perspective view of a portion of an assembled flexible ported pouch employing the multiple layers and multiple seals shown in figure 1;

[0033] Fig. 3 shows a greatly enlarged schematic cross sectional view of the port opening of an assembled flexible ported pouch of figure 2;

[0034] Fig. 4 shows a greatly enlarged schematic cross sectional view of the port opening of the exemplary embodiment of an assembled flexible ported pouch of figure 2 wherein the port sheets are laminates;

[0035] Fig. 5 shows a two dimensional side view of a dual layer film baffle system manufacturing process schematic featuring the multiple layers of sealable material having distinct sealing affinities and multiple seals shown in figure 1;

[0036] Fig. 6 shows a greatly enlarged schematic two dimensional view of the baffle sheets from the dual layer film baffle system schematic of figure 5 as laminates;

[0037] Fig. 7 shows a two dimensional overhead view of the dual layer film film baffle system manufacturing process schematic of figure 5;
Fig. 8 shows a greatly enlarged schematic two dimensional view of the dual layer film baffle system schematic of figure 5 as the exterior sheets are being spread apart; and

Fig. 9 shows an enlarged perspective view of a finished dual layer film baffle system produced by the manufacturing process of figure 5.

Fig. 10 shows a two dimensional side view of a core film baffle system manufacturing process schematic featuring the multiple layers of sealable material having distinct sealing affinities and multiple seals shown in figure 1;

Fig. 11 shows another two dimensional side view of a core film baffle system manufacturing process schematic featuring the multiple layers of sealable material having distinct sealing affinities and multiple seals shown in figure 1;

Fig. 12 shows a greatly enlarged schematic two dimensional view of the core film baffle sheets from the core film baffle system schematic of figure 10 as laminates;

Fig. 13 shows a two dimensional overhead view of the core film baffle system manufacturing process schematic of figure 10;

Fig. 14 shows a two dimensional overhead view of the core film baffle system manufacturing process schematic of figure 11;

Fig. 15 shows a greatly enlarged schematic two dimensional view of the core film baffle system schematic of figure 10 as the exterior sheets are being spread apart;
Fig. 16 shows a greatly enlarged schematic two dimensional view of the core film baffle system schematic of figure 11 as the exterior sheets are being spread apart; and

Fig. 17 shows an enlarged perspective view of a finished core film baffle system produced by the manufacturing process of figure 10 or figure 11.

DETAILED DESCRIPTION OF THE INVENTION

Aside from the exemplary embodiments disclosed below, this invention is capable of other embodiments and of being practiced or being carried out in various ways. Thus, it is to be understood that the invention is not limited in its application to the details of construction and the arrangements of components set forth in the following description or illustrated in the drawings. Moreover, the claims hereof are not to be read restrictively unless there is clear and convincing evidence manifesting a certain exclusion, restriction, or disclaimer.

In general, the subject invention is sealing multiple layers of material having distinct sealing affinities at different sealing parameters at various locations. A sheet of material may be a laminate and have one face of material, or layer, with a sealing affinity or temperature that is higher than the sealing affinity or temperature of the opposite face of material, or layer. In forming the seals on materials having distinct sealing affinities, the different sealing parameters may be based on employing various sealing techniques, such as constant temperature, impulse heat sealing, radio frequency (R.F.) heat sealing, also known as dielectric sealing, and/or ultrasonic sealing.
One embodiment of the subject invention is article of manufacture 2, figure 1. Sheet 5 is laminate where layer 6 and layer 7 are sealable at different sealing parameters. Seal 8 is formed by affecting layer 3 and sheet 5 by applying a first sealing parameter, such as heating the layer 3 and sheet 5 to a first temperature, at which a seal between layer 3 and layer 6 is effected. Seal 9 is formed by affecting layer 4 and sheet 5 by applying a second sealing parameter, such as heating the layer 4 and layer 5 to a second temperature, which is different than the first temperature, and at which a seal between layer 4 and layer 7 is effected. In other embodiments, seals 8 and 9 may be formed at different sealing parameters correlating to distinct sealing affinities of various dielectric materials, which is important for instance when said sheet 5 has at least one dielectric layer, such as acetal copolymer, ethyl vinyl acetate (EVA), cellulose acetate, polyamide (PA), polycarbonate, polyvinyl chloride (PVC), or polyvinylidene chloride (saran).

In one particular embodiment, flexible ported pouch 10, figure 2, has a top pouch sheet 20 and a bottom pouch sheet 22 each made of sealable material. In one exemplary embodiment, the material is Low Density Polyethylene (LDPE) and is sealable between 225-275 degrees F, but other sealing sheets or sealing laminates, such as dielectric sheets or laminates of various size and sealability (dielectric sealing affinity), can be used for the pouch sheets 20 and 22. In some other embodiments, pouch sheets 20 and 22 may be a single sealable sheet or sealable laminate folded about an axis to create top pouch sheet 20 and bottom pouch sheet 22.

Port 26, also figure 2, has a top port sheet 30 and bottom port sheet 28 each made of sealable material. In the exemplary embodiment in figure 4, top port sheet 30 is a laminate having one layer 42 with a low sealing temperature, a low sealing affinity, or a high sealing
affinity, and the opposite layer 44 having a high sealing temperature, a high sealing affinity, or a low sealing affinity. Likewise, bottom port sheet 28 is a laminate having one layer 38 with a low sealing temperature, a low sealing affinity, or a high sealing affinity, and the opposite layer 40 having a high sealing temperature, a high sealing affinity, or a low sealing affinity. In this exemplary embodiment, layers 38 and 42 which form the exterior face of port 26 are made of LDPE and are sealable between 225-275 degrees F while layers 40 and 44 which form the interior of port 26 are made of High Density Polyethylene (HDPE) and are sealable between 325-375 degrees F. Other sealable sheets or sealable laminates, such as dielectric sheets or laminates of various size and sealing affinity, may be used for port sheet 28 and port sheet 30 as long as the interior of port 26 is sealable, at a sealing parameter at a higher temperature, or correlating to a higher or lower sealing affinity, than the sealing parameter of pouch sheets 20 and 22, which may, for example, be a dielectric material having a sealing affinity between highest to zero, such as ethyl cellulose, polypropylene, silicone, or Teflon. This prevents the sealing of the interior of port 26 where it intersects with pouch 10 at gap 12. Port sheet 28 and port sheet 30 may, in other embodiments, be a single sealable sheet or sealable laminate folded about an axis to create top port sheet 30 and bottom port sheet 28. In forming the seals, the different sealing parameters may be based on employing various sealing techniques, such as constant temperature, impulse heat sealing, dielectric sealing, and/or ultrasonic sealing.

[0053] In figure 2, port 26 is interposed between top pouch sheet 20 and bottom pouch sheet 22 at gap 12. Figure 3 shows port edge seal 32 and port edge seal 34 between top port sheet 30 and bottom port sheet 28. In the exemplary embodiment in figure 4, layer 44 of top port sheet 30 and layer 40 of bottom port sheet 28 are sealed at port edge seals 32 and 34. For instance, these seals may be effected between a temperature of 325-375 degrees F. Other sealable sheets or sealable laminates may be used
for port sheets 28 and 30, which may, for instance, have at least one
dielectric layer with a sealing affinity between zero to highest, such as a
PVC. In other embodiments, if port 26 is formed using a single sheet or
laminate folded about an axis, only one seal would need to be effected
along the open edge of the folded sheet. In forming the seals, the different
sealing parameters may be based on employing various sealing techniques,
such as constant temperature, impulse heat sealing, dielectric sealing,
and/or ultrasonic sealing.

[0054] Top pouch sheet 20, figure 2, is sealed to bottom pouch
sheet 22 along periphery seal 24 at, for instance, a sealing parameter at a
temperature which is lower than that of the temperature for the sealing
parameter used to seal port 26 at port edge seals 32 and 34. In figure 3,
where periphery seal 24 intersects with port 26 at gap 12, seal 36 is formed
between top pouch sheet 20 and top port sheet 30 and seal 37 is formed
between bottom pouch sheet 22 and bottom port sheet 28. In the exemplary
embodiment in figure 4, where periphery seal 24 intersects with port 26 at
gap 12, seal 36 is formed between top pouch sheet 20 and layer 42 of top
port sheet 30 and seal 37 is formed between bottom pouch sheet 22 and
layer 38 of bottom port sheet 28. For instance, seals 24, 36, and 37 may be
effected at a temperature between 225-275 degrees F. In other
embodiments, layer 42 of top port sheet 30 and layer 38 of bottom port
sheet 28 may be dielectric layers with sealing affinities between highest to
zero, such as polypropylene. This seals the exterior of port 26 to pouch 10
at gap 12 without sealing the interior of port 26 along gap 12. In forming the
seals, the sealing parameters may be based on employing various sealing
techniques, such as constant temperature, impulse heat sealing, dielectric
sealing, and/or ultrasonic sealing.

[0055] The exemplary embodiment of a dual layer film baffle system
manufacturing process 60 is shown in figure 5. Roll 70 dispensessealable
sheet 72 in parallel with sealable sheet 74 which is dispensed by roll 71. In the exemplary embodiment, sealable sheet 72 and sealable sheet 74, figure 6, are laminates. Layers 73 and 76 may correlate to a high or low sealing affinity, or be made of a low temperature sealable material, such as LDPE layers 73 and 76 that are sealable between a temperature of 225-275 degrees F. Layers 77 and 75 may correlate to a high or low sealing affinity, or be made of a high temperature sealable material, such as HDPE layers 77 and 75 that are sealable between a temperature of 325-375 degrees F. In other embodiments, sealable sheet 72 and sealable sheet 74 may have at least one dielectric layer with a sealing affinity between highest to zero. In forming the seals, the sealing parameters correlating to distinct sealing affinities may be based on employing various sealing techniques, such as constant temperature, impulse heat sealing, dielectric sealing, and/or ultrasonic sealing.

[0056] Sheet 72 and sheet 74, figure 5, are brought together at sealing parameter and perforation station 78. At this point, sheet 72 and sheet 74 are affected at a sealing parameter to create seal 79, figure 7, latitudinally across the sheets at some interval 81 dependent upon the desired length of baffles 90 and 91, figure 8. Interval 81 may, for example, be one inch. Also at station 78, figure 5, the now sealed sheets are perforated at interval 81 and immediately preceding seal 79 to create perforated line 80 across the sheets.

[0057] Roll 82, figure 5, dispenses a sealable sheet, such as low temperature sheet 84, onto sheet 72 while roll 83 dispenses a sealable sheet, such as low temperature sheet 85, onto sheet 74. Sheets 84 and 85 may be made of LDPE and are sealable at a sealing parameter at a temperature of 225-275 degrees F. The sheets are brought together at sealing parameter station 88 where a seal, such as low temperature seal 86, is effected between sheet 84 and 72 and a seal, such as low
temperature seal 87, is effected between sheets 85 and 74. These low temperature seals 86 and 87 also cross the sheets latitudinally and are spaced at interval 81. In other embodiments, sheet 84 and sheet 85 may be dielectrics layers having a sealing affinity between highest to zero. In forming the seals, the sealing parameters may be based on employing various sealing techniques, such as constant temperature, impulse heat sealing, dielectric sealing, and/or ultrasonic sealing.

[0058] Sheets 84 and 85, figure 9, are then spread apart. This causes baffle 90, figure 8, to separate from baffle 91 at perforated line 80. The end result is a plurality of two piece baffles between sheets 84 and 85. The two pieces of the baffle are joined to each other, for instance, at high temperature seal 79 and joined to sheet 84 and 85 at low temperature seals 86 and 87.

[0059] In an exemplary embodiment of a core film baffle system manufacturing process 1000 is shown in figure 10. Roll 70' dispenses sealable sheet 72' in parallel with sealable sheet 74' dispensed by roll 71' and sealable sheet 1002 dispensed by roll 1001. In this exemplary embodiment, sealable sheet 72' and sealable sheet 74', figure 12, are laminates. Layers 73' and 76' may correlate to a high or low sealing affinity, or be made of a low temperature sealable material, such as LDPE layers 73' and 76' that are sealable between a temperature of 225-275 degrees F. Layers 77' and 75' may correlate to a high or low sealing affinity, or be made of a high temperature sealable material, such as HDPE layers 77' and 75' that are sealable between a temperature of 325-375 degrees F. In other embodiments, sealable sheets 72', 74', and 1002 may have at least one dielectric layer. In forming the seals, the sealing parameters correlating to distinct sealing affinities may be based on employing various sealing techniques, such as constant temperature, impulse heat sealing, dielectric sealing, and/or ultrasonic sealing.
[0060] Roll 82, figure 10, dispenses a sealable sheet, such as low temperature sheet 84, onto sheet 72' while roll 83 dispenses a sealable sheet, such as low temperature sheet 85, onto sheet 74'. Sheets 84 and 85 may be made of LDPE and are sealable at a sealing parameter at a temperature of 225-275 degrees F. The sheets are brought together at sealing parameter station 88 where a seal, such as low temperature seal 86, is effected between sheet 84 and 72' and a seal, such as low temperature seal 87, is effected between sheets 85 and 74'. These low temperature seals 86 and 87 also cross the sheets latitudinally and are spaced at interval 81'. In other embodiments, sheet 84 and sheet 85 may be dielectrics layers having a sealing affinity between highest to zero. In forming the seals, the sealing parameters may be based on employing various sealing techniques, such as constant temperature, impulse heat sealing, dielectric sealing, and/or ultrasonic sealing.

[0061] Sheet 72' and sheet 74', figure 10, are perforated latitudinally across the sheets at perforation station 1003 and perforation station 1004, respectively. Also, sheet 72' and sheet 74' are perforated at some interval 81' dependent upon the desired length of core film baffles 1200 and 1201, figure 15, to create perforated line 80' across the sheets, figure 13. Interval 81' may, for example, be one inch. Sheet 72', sheet 74', and sheet 1002 are brought together at sealing parameter station 1005, figure 10, where sheet 1002 is sealed between sheet 72' and sheet 74'. Also at this station 1005, sheet 72', sheet 74', and sheet 1002 are brought together when a sealing parameter is introduced to create seal 1006, figure 13, latitudinally across the sheets at interval 81' and immediately following perforated line 80'.

[0062] In another exemplary embodiment of a core film baffle system manufacturing process 1100 is shown in figure 11. Roll 1101 dispenses pre-perforated sealable sheet 1103 in parallel with pre-perforated sealable sheet 1105 dispensed by roll 1102 and sealable sheet 1002
dispensed by roll 1001. In this exemplary embodiment, pre-perforated sealable sheet 1103 and pre-perforated sealable sheet 1105, figure 16, are laminates. Layers 1104 and 1107 may be made of a high sealing affinity, a low sealing affinity, or a low temperature sealable material, such as LDPE layers that are sealable between a temperature of 225-275 degrees F. Layers 1106 and 1108 may be made of a low sealing affinity, a high sealing affinity, or a high temperature sealable material, such as HDPE layers that are sealable between a temperature of 325-375 degrees F. In other embodiments, sealable sheets 1103, 1105, and 1002 may have at least one dielectric layer. In forming the seals, the sealing parameters correlating to distinct sealing affinities may be based on employing various sealing techniques, such as constant temperature, impulse heat sealing, dielectric sealing, and/or ultrasonic sealing.

[0063] Roll 82, figure 11, dispenses a sealable sheet, such as low temperature sheet 84, onto pre-perforated sealable sheet 1103 while roll 83 dispenses a sealable sheet, such as low temperature sheet 85, onto pre-perforated sealable sheet 1105. Sheets 84 and 85 may be made of LDPE and are sealable at a sealing parameter at a temperature of 225-275 degrees F. The sheets are brought together at sealing parameter station 88 where a seal, such as low temperature seal 86, is effected between sheet 84 and pre-perforated sealable sheet 1103 and a seal, such as low temperature seal 87, is effected between sheets 85 and pre-perforated sealable sheet 1105. These low temperature seals 86 and 87 also cross the sheets latitudinally and are spaced at interval 81. In other embodiments, sheet 84 and sheet 85 may be dielectrics layers having a sealing affinity between highest to zero. In forming the seals, the sealing parameters correlating to distinct sealing affinities may be based on employing various sealing techniques, such as constant temperature, impulse heat sealing, dielectric sealing, and/or ultrasonic sealing.
Pre-perforated sealable sheet 1103 and pre-perforated sealable sheet 1105, figure 11, have perforations latitudinally across the sheets at some interval 81° dependent upon the desired length of core film baffles 1200 and 1201, figure 16, to create perforated line 80' across the sheets, figure 14. Interval 81° may, for example, be one inch. Pre-perforated sheet 1103, pre-perforated sheet 1105, and sheet 1002 are brought together at sealing parameter station 1005, figure 11, where sheet 1002 is sealed between pre-perforated sheet 1103 and pre-perforated sheet 1105. Also at this station 1005, pre-perforated sheet 1103, pre-perforated sheet 1105, and sheet 1002 are brought together when a sealing parameter is introduced to create seal 1006, figure 14, latitudinally across the sheets at interval 81° and immediately following perforated line 80'.

Although specific features of the invention are shown in some drawings and not in others, this is for convenience only as each feature may be combined with any or all of the other features in accordance with the invention. The words "including", "comprising", "having", and "with" as used herein are to be interpreted broadly and comprehensively and are not limited to any physical interconnection. Moreover, any embodiments disclosed in the subject application are not to be taken as the only possible embodiments.

In addition, any amendment presented during the prosecution of the patent application for this patent is not a disclaimer of any claim element presented in the application as filed: those skilled in the art cannot reasonably be expected to draft a claim that would literally encompass all possible equivalents, many equivalents will be unforeseeable at the time of the amendment and are beyond a fair interpretation of what is to be surrendered (if anything), the rationale underlying the amendment may bear no more than a tangential relation to many equivalents, and/or there
are many other reasons the applicant cannot be expected to describe certain insubstantial substitutes for any claim element amended.

[0067] Other embodiments will occur to those skilled in the art and are within the following claims.
What is claimed is:

1. An article of manufacture comprising:

   at least three layers of sealable material;

   at least one first seal between at least two of said at least three layers

   in a first area having a first sealing affinity and effected at a first sealing

   parameter; and

   at least one second seal between at least two of said at least three

   layers,

   wherein at least one of the at least two layers joined by said second

   seal is distinct in sealing affinity from the at least two said layers joined by

   said first seal, in a second area having a second sealing affinity and effected

   at a second sealing parameter, wherein the second sealing parameter is
different than said first sealing parameter, thereby allowing for sealing of

discrete areas of the article in discrete steps.

2. The article of manufacture according to claim 1 wherein the at least

   three layers of sealable material comprise at least one laminate sheet, said

   sheet comprising a first face having the first sealing affinity sealable at the first

   sealing parameter and a second face having the second sealing affinity

   sealable at the second sealing parameter.

3. The article of manufacture according to claim 1 wherein said article is a

   flexible ported pouch, and wherein said at least three layers of sealable
material comprise two pouch layers with said first seal there between and two port layers with said second seal there between.

4. The article of manufacture according to claim 1 wherein said article is a dual layer baffle system, and wherein said at least three layers of sealable material comprise two exterior layers connected to a plurality of baffles by a plurality of said first seals and a plurality of two baffle layers with said second seal there between.

5. The article of manufacture according to claim 1 wherein said article is a core film baffle system, and wherein said at least three layers of sealable material comprise two exterior layers connected to a plurality of core film baffles by a plurality of said first seals and a plurality of two core film baffle layers with said second seal there between.

6. A method for forming an article of manufacture, the method comprising the steps of:

    providing at least three layers of sealable material;
    affecting at least one of said at least three layers and at least one opposing layer of said at least three layers at a first sealing parameter in a first area having a first sealing affinity to effect at least one first seal; and
    affecting at least one of said at least three layers and at least one opposing layer of said at least three layers at a second sealing parameter,
wherein the second sealing parameter is different from said first sealing parameter, in a second area having a second sealing affinity to effect at least one second seal, thereby allowing for sealing of discrete areas of the article in discrete steps.

7. The method for forming an article of manufacture according to claim 6 wherein the at least three layers of sealable material comprise at least one laminate sheet, said sheet comprising a first face having the first sealing affinity sealable at the first sealing parameter and a second face having the second sealing affinity sealable at the second sealing parameter.

8. A flexible ported pouch having an interior, said pouch comprising:

   a first pouch sheet and a second pouch sheet formed by a first seal at a first sealing parameter around a periphery of said first and second pouch sheets having a first sealing affinity, said first seal having at least one gap having an opening spaced from said first seal for providing a channel between said first pouch sheet and said second pouch sheet; and

   a port interposed between said first pouch sheet and said second pouch sheet, and in communication with said interior of said pouch, said port comprising a first port sheet and a second port sheet, and formed by a second and third seal along longitudinal edges, having a second sealing affinity, of said first and second port sheets, at a second sealing parameter, wherein the second sealing parameter is at a higher temperature, or correlates to a higher
or lower sealing affinity, than said first sealing parameter, and wherein said first and second port sheets are further sealed to said pouch where said first and second port sheets having the first sealing affinity intersect with said periphery of said first and second pouch sheets at said first sealing parameter.

9. The flexible ported pouch according to claim 8 wherein at least one of the first and second port sheets is a laminate comprising a first face having the first sealing affinity sealable at the first sealing parameter and a second face having the second sealing affinity sealable at the second sealing parameter wherein said first face forms an exterior face of said port.

10. The flexible ported pouch according to claim 8 wherein the first and second pouch sheets comprise a single pouch sheet folded about an axis to create a folded pouch edge, and at least two open pouch edges.

11. The flexible ported pouch according to claim 10 wherein the first seal around said periphery comprises a first seal along said at least two open pouch edges.

12. The flexible ported pouch according to claim 8 wherein the first and second port sheets comprise a single port sheet folded about an axis to create a folded longitudinal port edge and an open longitudinal port edge.
13. The flexible ported pouch according to claim 12 wherein the second and third seals comprise a single seal along said open longitudinal port edge.

14. The flexible ported pouch according to claim 12 wherein the single port sheet comprises a laminate comprising a first face having the first sealing affinity sealable at the first sealing parameter and a second face having the second sealing affinity sealable at the second sealing parameter wherein said first face forms an exterior face of said port.

15. A method of manufacturing a flexible ported pouch comprising the steps of:
   providing a first and second port sheet of sealable material in parallel;
   affecting said first port sheet and said second port sheet along the longitudinal edges, having a first sealing affinity, of said first and second port sheets at a first sealing parameter to effect a first and second seal forming a port with an exterior and an interior;
   providing a first and second pouch sheet of sealable material having a second sealing affinity in parallel;
   introducing said port by interposition between said first and second pouch sheets; and
   affecting a periphery of said first pouch sheet, said second pouch sheet and said exterior of said port where said exterior of said port intersects
with said periphery of said first and second pouch sheets at a second sealing parameter, wherein said second sealing parameter is at a lower temperature, or correlates to a lower or a higher sealing affinity, than said first sealing parameters, to effect a third seal.

16. The method of manufacturing a flexible ported pouch according to claim 15 wherein the first and second port sheets comprise a single port sheet of sealable material folded about an axis to create a folded longitudinal port edge and an open longitudinal port edge.

17. The method of manufacturing a flexible ported pouch according to claim 15 wherein the first and second pouch sheets comprise a single pouch sheet of sealable material folded about an axis to create a folded pouch edge, and at least two open pouch edges.

18. A dual layer film baffle system comprising:

a first and second sheet of sealable material; and

a plurality of baffle elements interposed between said first and second sheets having a first sealing affinity, said baffle elements comprising a third sheet of sealable material sealed at said first sealing parameter along one edge, having the first sealing affinity, of said third sheet and latitudinally across said first sheet and a fourth sheet of sealable material sealed at said first sealing parameter along one edge, having the first sealing affinity, of said
fourth sheet and latitudinally across said second sheet and further sealed to said third sheet at a second sealing parameter wherein said second sealing parameter is at a higher temperature, or correlates to a higher or lower sealing affinity, than said first sealing parameter, along a common edge, having a second sealing affinity, of said third sheet and said fourth sheet.

19. The dual layer film baffle system according to claim 18 wherein the first and second sheets of sealable material are low temperature, low affinity, or high affinity sealing material and the third and fourth sheets of sealable material are laminates comprising a first face having the first sealing affinity of high temperature, high affinity, or low affinity sealing material and a second face having the second sealing affinity of low temperature, low affinity, or high affinity sealing material.

20. The method of manufacturing a dual layer baffle system comprising the steps of:

- providing a first and second sheet of sealable material in parallel;
- affecting said first sheet and said second sheet at a first sealing parameter latitudinally across said first and second sheets, having a first sealing affinity, at a longitudinal interval to effect a plurality of first seals;
- perforating said first sheet and said second sheet latitudinally across said first and second sheets at said longitudinal interval effecting a plurality of perforated lines;
introducing a third sheet of sealable material to the exterior of said first sheet;

introducing a fourth sheet of sealable material to the exterior of said second sheet;

affecting said third sheet, said first sheet, said fourth sheet and said second sheet at a second sealing parameter, wherein said second temperature is at a lower temperature, or correlates to a lower or a higher sealing affinity, than said first sealing parameter, latitudinally across said first, second, third and fourth sheets, having the second sealing affinity, at said longitudinal interval, effecting a plurality of second seals between said fourth sheet and said first sheet and a plurality of third seals between said third sheet and said second sheet; and

spreading said fourth sheet away from said third sheet thereby separating said first and second sheet along said perforated lines to effect baffles between said fourth sheet and said third sheet.

21. A core film baffle system comprising:

a first and second sheet of sealable material;

a plurality of core baffle elements interposed between said first and second sheets having a first sealing affinity, said core baffle elements comprising a third sheet of sealable material sealed at a first sealing parameter along one edge, having the first sealing affinity, of said third sheet and latitudinally across said first sheet, a fourth sheet of sealable material
sealed at said first sealing parameter along one edge, having the first sealing affinity, of said fourth sheet and latitudinally across said second sheet, and a fifth sheet of sealable material interposed between the third sheet and the fourth sheet, and further sealed to said third sheet at a second sealing parameter wherein said second sealing parameter is at a higher temperature, or correlates to a higher or lower sealing affinity, than said first sealing parameter, along a common edge, having a second sealing affinity, of said third sheet, said fourth sheet, and said fifth sheet.

22. The core baffle system according to claim 21 wherein the first, second, and third sheets of sealable material are low temperature, low affinity, or high affinity sealing material and the fourth and fifth sheets of sealable material are laminates comprising a first face having the first sealing affinity of high temperature, high affinity, or low affinity sealing material and a second face having the second sealing affinity of low temperature, low affinity, or high affinity sealing material.

23. The method of manufacturing a core baffle system comprising the steps of:

   providing a first, second, and third sheet of sealable material;

   perforating said first and second sheets latitudinally across said first and second sheets at said longitudinal interval effecting a plurality of perforated lines;
introducing a third sheet of sealable material between said first and second sheets;

providing said first, second, and third sheets in parallel;

affecting said first sheet, said second sheet, and said third sheet at a first sealing parameter latitudinally across said first, second, and third sheets, having a first sealing affinity, at a longitudinal interval to effect a plurality of first seals;

introducing a fourth sheet of sealable material to the exterior of said first sheet;

introducing a fifth sheet of sealable material to the exterior of said second sheet;

affecting said fourth sheet, said first sheet, said fifth sheet and said second sheet to a second sealing parameter, wherein said second sealing parameter is at a lower temperature, or correlates to a lower or a higher sealing affinity, than said first sealing parameter, latitudinally across said first, second, fourth, and fifth sheets, having the second sealing affinity, at said longitudinal interval, effecting a plurality of second seals between said fifth sheet and said first sheet and a plurality of third seals between said fourth sheet and said second sheet; and

spreading said fifth sheet away from said fourth sheet thereby separating said first and second sheet along said perforated lines to effect core baffles between said fifth sheet and said fourth sheet.
**INTERNATIONAL SEARCH REPORT**

**A. CLASSIFICATION OF SUBJECT MATTER**

| IPC(8) | USPC - 428/34.3; 156/244.1; 493/190; 53/425 |

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)

| USPC - 428/34.3; 156/244.1; 493/190; 53/425 |

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

| USPC - 428/34.3; 156/244.1; 493/190; 53/425 (keyword delimited) |

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

PubWEST (USPT, PGPT, JPAB, EPA); Google (search terms below)

Search terms used: laminate, structure, pouch, port, seal, temperature, pressure, layers, bond, adhesive

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

<table>
<thead>
<tr>
<th>Category*</th>
<th>Citation of document, with indication, where appropriate, of the relevant passages</th>
<th>Relevant to claim No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>X</td>
<td>US 2010/0028649 A1 (Trouillet et al.) 04 February 2010 (04.02.2010), entire document especially Abstract, para [0044], [0068], [0076]-[0078], [0057], [0065], [0080]-[0081]</td>
<td>1, 2, 4-7, 18-23</td>
</tr>
<tr>
<td>Y</td>
<td>US 2006/0093765 A1 (Mueller) 04 May 2006 (04.05.2006), entire document especially Abstract, para [0009]-[0021]; Fig. 1-3</td>
<td>3, 8-17</td>
</tr>
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Further documents are listed in the continuation of Box C.

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**Date of the actual completion of the international search**


**Date of mailing of the international search report**

05 JAN 2012

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