

SHAPED SOAP BAR AND METHOD OF MANUFACTURING SHAPED SOAP BARS FOR BETTER STAMPING

Field of the invention

- 5 The invention relates to a soap bar shaped in such a way so as to allow better stamping. The invention more particularly relates to solid shaped soap bar and a method of manufacturing soap bars.

Background of the invention

- 10 Conventionally soap bars are shaped in cuboidal, ovoid, cuboid, disk shaped and generally shaped in a way to rest on a flat bottom. These shapes have been successful over the years and appealed to the consumers. However, with change in formulations sometimes problems are faced with these shapes and the existing molds do not work.

- 15 Solid soap bars often incorporate structurants which are important for the soap hardness and other consumer desirable properties of the soap. However, the structurants come with their own drawbacks, some enable high moisture content of soap and some like starch increase plasticity in a soap which means that the difference in soap composition may make it incompatible with the existing soap mold and the apparatus as the pressure to be applied for stamping may be different.

- 20 WO2009065766 discloses a detergent bar comprising: a. a first major side, an opposed second major side, a first minor side, an opposed second minor side, a first end and an opposed second end; b. wherein the first major side has a centrally disposed concave area separated from each of the opposed first and second ends by a flattened region; and c. wherein the concave area has a plurality of dimples.

Summary of the invention

- 25 First aspect of the present invention provides a shaped soap bar of substantially cuboidal shape, wherein the bar comprises:
- a. a top face,
 - b. a bottom face,
 - c. at least two long side faces,
 - 30 d. at least two short side faces,

- e. at least four rounded corners around the top face, and
- f. a horizontal center-line dividing the soap bar into top part with the top face of the soap having thickness and a bottom part with the bottom face of the soap having thickness;
wherein the horizontal center line has a bulge on the long side face, and wherein the
5 angle formed between the bulge on the long side face and tangent drawn along the bulge
in a direction perpendicular to the horizontal center line is between 5° to 30° .

Second aspect of the present invention provides a soap mould of substantially cuboidal shape for stamped a soap bar according to the first aspect, the mould comprising,

- a. a top cavity having a base and two long edges and two short edges for receiving the top
10 part of the soap bar during the stamping process,
- b. a bottom cavity having a base and two long edges and two short edges for receiving the
bottom part of the soap bar during the stamping process,
wherein the four corners of the base of the top cavity are rounded,
and wherein the long edges of the top and bottom cavity taper outwards away from the
15 base at an angle in the range of 5° to 30° .

Third aspect of the present invention provides a method of manufacture of soap bar according to the first aspect using mould according to the second aspect, the method comprising

- a. providing a soap billet,
- b. providing a mould according to the second aspect,
- 20 c. placing the billet in between the top cavity and the bottom cavity of the soap mould for
stamping the soap to obtain the soap according to the first aspect.

Fourth aspect of the present invention provides use of mould according to the second aspect for making soap bars comprising starch stamped at least at a rate of 100 bars per minute at factory scale.

- The inventors if the present invention were faced with a problem that when a structurant such as starch is used in the composition, the soap bars were not compatible with the mould die-set and due to plasticity of starch, there were always defects with the output soap bars, such as the soaps
25 were not cut properly by the stamping machine and/or there was an extra mass of soap left in the finished output soap.

The inventors tried many ways to solve this problem, however, finally surprisingly they found that making certain changes in the shape of the soap bar, the soap bars could be stamped without any defects and with a good stamping speed.

Brief description of the invention

5 Figure 1- shows a perspective view of the shaped soap bar (SB) of the present invention.

Figure 2 shows the top face (1) of the shaped soap bar (SB) with enlarged view of the corner radius (CR).

Figure 3 shows the long side face (3A) of the shaped soap bar (SB) of the present invention.

Figure 4 shows the short side face (4A) of the shaped soap bar (SB) of the present invention.

10 Detailed description of the invention

These and other aspects, features and advantages will become apparent to those of ordinary skill in the art from a reading of the following detailed description and the appended claims. For the avoidance of doubt, any feature of one aspect of the present invention may be utilized in any other aspect of the invention. The word "comprising" is intended to mean "including" but not necessarily "consisting of" or "composed of." In other words, the listed steps or options need not be exhaustive. It is noted that the examples given in the description below are intended to clarify the invention and are not intended to limit the invention to those examples per se. Similarly, all percentages are weight/weight percentages unless otherwise indicated. Except in the operating and comparative examples, or where otherwise explicitly indicated, all numbers in this description and claims indicating amounts of material or conditions of reaction, physical properties of materials and/or use are to be understood as modified by the word "about". Numerical ranges expressed in the format "from x to y" are understood to include x and y. When for a specific feature multiple preferred ranges are described in the format "from x to y", it is understood that all ranges combining the different endpoints are also contemplated.

25 Throughout the specification unless otherwise specified, wt% means weight % of the total weight of soap composition of the present invention.

Substantially for the meaning of the present invention means mostly with a slight variation.

Various components of the composition are described in greater detail below.

The present invention provides a shaped soap bar which is able to withstand the stamping pressure and is able to provide a neatly stamped bar without any defect even in the presence of fillers such as starch.

5 The inventors if the present invention were faced with a problem that when a structurant such as starch is used in the composition, the soap bars were not compatible with the mould die-set and due to plasticity of starch, there were always defects with the output soap bars, such as the soaps were not cut properly by the stamping machine and/or there was an extra mass of soap left in the finished output soap.

10 The inventors tried many ways to solve this problem, however, finally surprisingly they found that making certain changes in the shape of the soap bar, the soap bars could be stamped without any defects and with a good stamping speed.

Shaped soap bar

The present invention relates to a soap composition. By a soap composition it is understood to be a composition which may be used as a soap or a composition which is used to prepare a soap.
15 More preferably the present invention provides a soap composition which is used to prepare soap bars and more preferably extruded soap bars and furthermore preferably soap bars prepared by plough shear mixer. The soap composition of the invention is especially useful for personal cleansing.

20 The soap composition of the present invention provides a soap bar composition comprising 10 to 80 wt% total fatty matter; 0.1 to 5 wt% electrolyte; 10 to 45 wt% water; and 5 to 45 wt% starch.

The composition of the present invention is preferably used or used to prepare a shaped solid for example a bar. The cleaning soap composition is preferably used or used to prepare a wash off product that generally has sufficient amount of surfactants included therein that it is used for cleansing the desired topical surface e.g. the whole body, the hair and scalp or the face. It is
25 applied on the topical surface and left thereon only for a few seconds or minutes and washed off thereafter with copious amounts of water.

The soap composition may additionally comprise synthetic surfactants selected from one or more from the class of anionic, non-ionic, cationic or zwitterionic surfactants, preferably from anionic surfactants. These synthetic surfactants, as per the present invention, are included in less than
30 8%, preferably less than 4%, more preferably less than 1% and sometimes absent from the

composition. By “absent” it is meant that there is no deliberately added synthetic surfactant in the soap composition of the present invention.

The present invention shaped soap bar (SB) of substantially cuboidal shape, wherein the bar comprises: a top face, a bottom face, at least two long side faces, at least two short side faces,
5 at least four rounded corners around the top face, a horizontal center-line dividing the soap bar into top part with the top face of the soap having thickness and a bottom part with the bottom face of the soap having thickness; wherein the horizontal center line has a bulge on the long side face, and wherein the angle formed between the bulge on the long side face and tangent drawn along the bulge in a direction perpendicular to the horizontal center line is between 5° to 30°.

10 Substantially cuboidal shape means roughly cuboidal shape and may or may not have sharp corners or flat faces.

The top face of the soap bar is that face which is generally on the upper side of the soap bar and the bottom face of the soap bar is generally the face on which the soap bar is rested on a surface. When both the sides are same then either of them can be called as top or bottom face. In a
15 commercial soap bar usually the top face has the soap logo or a decorative artwork or indication and the bottom face is such that it forms a stable base for the bar to rest.

It is preferred that the long side face is the side face that is longer than the shorter side face in dimension.

The dimensions of the long and side faces can vary widely according to the grammage of the soap bar. The soap bar grammage could also range widely from 5 gm to 500 gm, more preferably
20 10 to 400 gm and most preferably from 10 to 300 gm. It is preferred that the long face may range in length from 200 mm to 30 mm, more preferably from 150 mm to 35 mm and most preferably from 130 mm to 40 mm and all the more preferably from 120 mm to 50 mm. It is preferred that the short face may range in length from 150 mm to 15 mm, more preferably from 130 mm to 20
25 mm and most preferably from 120 mm to 25 mm and all the more preferably from 100 mm to 30 mm.

The two long side faces are formed of the long sides of the cuboid and these are the edges where in bulge is seen around the center line. It is preferred that the said bulge gives an appearance of quonset-like shape at the long side faces.

30 The a horizontal center-line divides the soap bar into top part with the top face of the soap and a bottom part with the bottom face of the soap. The horizontal center line is mostly a result of the

stamping process and preferably formed when the soap billet is compressed between the top and the bottom cavity. The center line may or may not divide the top part of the soap and bottom part into equal halves. In other words, thickness of top part with the top face and the thickness of bottom part with the bottom face may or may not be equal.

- 5 It is preferred that the top face of the shaped soap bar is substantially flat, it may have some design on the top depicting logo or other adornments.

It is preferred that the bar comprises four rounded corners around the bottom face.

It is preferred that the bulge along the long faces along the center line is the result of the tapering of the long edges of the top and the bottom cavity of the mould.

- 10 It is preferred that the bar comprises four rounded corners around the bottom face.

- It is preferred that the bottom face of the bar is arched inwards with a center point of the arch equidistant from both the at least two short side faces, wherein thickness between the center point of the arch and the horizontal center line is about 5 to 70 %, more preferably 7 to 67% and most preferably 10 to 65 wt% less in thickness than thickness of the bottom part along the side face. It is preferred that bottom face is concaved because of the arch and a concave area is formed at the bottom face.
- 15

- It is preferred that the angle formed between a tangent drawn along the bulge on the long side face and an imaginary perpendicular line drawn along the bulge in a direction perpendicular to the horizontal center line is between 5° to 25°, more preferably between 7° to 20° and most preferably between 10° to 18°.
- 20

It is preferred that the rounded corners have a corner radius in the range of 3mm to 20mm, more preferably 3.5 to 18 mm, and most preferably between 4 to 15mm.

- It is preferred that the ratio of corner radius (CR) to the thickness of top part (H1) is in the range of 0.35:1 to 5:1, more preferably in the range of 0.4:1 to 4.5:1 and most preferably in the range of 0.5:1 to 4:1.
- 25

It is preferred that length of the long side face is at least 1.2 times longer than length of the short side face, more preferably at least 1.3 times and most preferably 1.5 times.

Soap

- When the Total Fatty matter (TFM) in soap composition of the present invention is for personal washing application it comprises 10 to 80 wt% total amount of soap, preferably 15 to 75 wt%, more preferably 20 to 75 wt% and most preferably 25 to 70 wt% by weight of the soap composition. When the soap composition of the invention is for laundering fabrics, it comprises
- 5 from 15 wt.% to 60 wt.% fatty acid soap. Preferred aspects of such soap compositions comprise at least 20 wt.%, preferably at least 25 wt.%, still preferably at least 30 wt.% and most preferably at least 35 wt.%, but typically not more than 58 wt.%, still preferably not more than 55 wt.%, still further preferably not more than 53 wt.%, still more preferably not more than 50 wt.%, and most preferably not more than 45 wt.% TFM by weight of the soap bar composition.
- 10 The term total fatty matter is used very widely and popularly in the field of soaps and detergents. The term Total Fatty Matter, abbreviated to "TFM", is used to denote the percentage by weight of fatty acid and triglyceride residues present in the personal wash composition without taking into account the accompanying cations. For a soap having 18 carbon atoms, an accompanying sodium cation will generally amount to about 8 percent by weight. Other cations may be employed
- 15 as desired, for example zinc, potassium, magnesium, alkyl ammonium and aluminium.
- The term soap means salt of fatty acid. Preferably, the soap is soap of C_8 to C_{24} fatty acids.
- The cation may be an alkali metal, alkaline earth metal or ammonium ion, preferably alkali metals. Preferably, the cation is selected from sodium or potassium, more preferably sodium. The soap may be saturated or unsaturated. Saturated soaps are preferred over unsaturated soaps for
- 20 stability. The oil or fatty acids may be of vegetable or animal origin.
- The soap may be obtained by saponification of oils, fats or fatty acids. The fats or oils generally used to make soap compositions may be selected from tallow, tallow stearins, palm oil, palm stearins, soya bean oil, fish oil, castor oil, rice bran oil, sunflower oil, coconut oil, babassu oil, and palm kernel oil. The fatty acids may be from coconut, rice bran, groundnut, tallow, palm, palm
- 25 kernel, cotton seed or soyabean.
- The fatty acid soaps may also be synthetically prepared (e.g. by the oxidation of petroleum or by the hydrogenation of carbon monoxide by the Fischer-Tropsch process). Resin acids, such as those present in tall oil, may also be used. Naphthenic acids may also be used.
- The soap compositions of the present invention preferably include low molecular weight soaps
- 30 (C_8 to C_{14} soaps) which are generally water soluble, which are in the range of 2 to 20% by weight of the composition. It is preferred that the soap composition includes 15 to 55 wt% of the soap of

C16 to C24 fatty acid, which are generally water insoluble soaps. Unsaturated fatty acid soaps preferably at 15 to 42% may also be included in the total soap content of the composition. Unsaturated soaps are preferably oleic acid soaps.

Water

- 5 The soap compositions of the present invention can hold high amount of moisture or water content. The soap compositions of the present invention have 10 to 45 wt% of water, preferably 15 to 45 wt%, more preferably 15 to 40 wt% and most preferably 18 to 38 wt% of water by weight of the soap composition.

Electrolyte

- 10 Inclusion of small amount of an electrolyte (other than soap) can influence the liquid and solid phase ratio. Increasing the electrolyte content lowers the solubility of soap thereby increasing the solid phase amount, on the other hand lowering the electrolyte levels make the bars softer.

- The soap composition generally comprises electrolyte and water. Electrolytes as per this invention include compounds that substantially dissociate into ions in water. Electrolytes as per
15 this invention are not an ionic surfactant. Suitable electrolytes for inclusion in the soap making process are alkali metal salts. Preferred electrolytes include sodium sulfate, sodium chloride, sodium citrate, potassium chloride, potassium sulfate, sodium carbonate and other mono or di or tri salts of alkaline earth metals, more preferred electrolytes are sodium chloride, sodium sulfate, potassium chloride and especially preferred electrolytes are sodium chloride and sodium sulfate
20 and combinations thereof. For the avoidance of doubt it is clarified that the electrolyte is a non-soap material. For the avoidance of doubt, it is clarified that the electrolyte is a non-soap material.

The present invention comprises an electrolyte in the range of 0.1 to 5 wt% electrolyte by weight of the extruded soap bar composition, more preferably 1 to 4 wt% and most preferably 1.5 to 3.5 wt% by weight of the soap bar composition.

- 25 Electrolytes could include Na-Chloride, Na-Sulphate, Na-Citrate, Na-Carbonate or the corresponding Potassium Salts.

It is most preferred that sodium sulphate and sodium chloride are used as electrolytes for the composition of the present invention.

It is preferred that sodium sulphate is present in the range of 0.1 to 6 wt% of the weight of composition, more preferably 0.5 to 5 and most preferably 0.7 to 4 wt%. It is preferred that sodium sulphate is at least 0.1 wt%, more preferably at least 0.5wt%, and most preferably at least 0.7 wt% and it is preferred that it is not more than 6wt%, more preferably not more than 5 wt%,
5 furthermore preferably not more than 4 wt% and most preferably not more than 3.5wt% of the total weight of composition of the present invention.

It is preferred that when sodium chloride is present in the range of 0.1 to 6 wt% of the weight of composition, more preferably 0.5 to 5 and most preferably 0.7 to 4 wt%. It is preferred that sodium chloride is at least 0.1 wt%, more preferably at least 0.5wt%, and most preferably at least 0.7 wt%
10 and it is preferred that it is not more than 6wt%, more preferably not more than 5 wt%, furthermore preferably not more than 4 wt% and most preferably not more than 3.5 wt% of the total weight of composition of the present invention.

Structurant

It is preferred that the soap bar composition has a structurants and preferably an organic
15 structurants such as starch, which may also be referred as filler.

It is preferred that the organic filler is a starch and preferably the starch is a native starch, pre-gelatinized starch, converted starch or its mixture.

It is preferred that the organic filler in the soap composition ranges from 5 to 45 wt%, more preferably from 8 to 35 wt% and most preferably from 10 to 30wt% by weight of the soap bar
20 composition.

It is preferred that when the organic filler is starch, the starch in the soap composition ranges from 5 to 45 wt%, more preferably from 8 to 40 wt% and most preferably from 10 to 35wt% and further more preferably from 10.5 wt% to 32 wt% by weight of the soap bar composition.

Suitable starch materials include natural starch (from corn, wheat, rice, potato, tapioca and the
25 like), pre-gelatinized starch, various physically and chemically modified starch and mixtures thereof. By the term natural starch is meant starch which has not been subject to chemical or physical modification – also known as raw or native starch.

A preferred starch is natural or native starch from maize (corn), cassava, wheat, potato, rice and other natural sources of it. Raw starch with different ratio of amylase and amylopectic: e.g. maize
30 (25% amylase); waxy maize (0%); high amylase maize (70%); potato (23%); rice (16%); sago

(27%); cassava (18%); wheat (30%) and others. The raw starch can be used directly or modified during the process of making the bar composition such that the starch becomes gelatinized, either partially or fully gelatinized.

5 Suitable starchy materials which may be used include natural starch (from corn, wheat, rice, potato, tapioca and the like), pregelatinized starch, various physically and chemically modified starch and mixtures thereof. By the term natural starch is meant starch which has not been subjected to chemical or physical modification – also known as raw or native starch. The raw starch can be used directly or modified during the process of making the bar composition such that the starch becomes gelatinized, either partially or fully gelatinized. Such starchy materials
10 are commercially available e.g. FARMAL® CS 3400 (corn starch) and FARMAL® WS 4400 (corn starch; waxy unmodified).

It is preferred that the organic filler is a starch and preferably the starch is a native starch, pregelatinized starch, converted starch or its mixture.

Mould

15 The present invention provides a soap mould of substantially cuboidal shape for stamped a soap bar according to the first aspect, the mould comprising, a top cavity having a base and two long edges and two short edges for receiving the top part of the soap bar during the stamping process, a bottom cavity having a base and two long edges and two short edges for receiving the bottom
20 part of the soap bar during the stamping process, wherein the four corners of the base of the top cavity are rounded, and wherein the long edges of the top and bottom cavity taper outwards away from the base at an angle in the range of 5° to 30°.

The mould could be of any material used in the industry, it is preferred that the mould is of metal.

25 The base of the cavity mould could be designed such that a logo of the soap or any indica is imprinted on the top or bottom face of the soap bar. It is preferred that a logo is designed on the base of the top cavity or bottom cavity of the soap, more preferably base of the top cavity. It is further preferred that the base of the top or bottom cavity is designed to provide dents, indentations, or grooves or dimples on the top or the bottom face of the soap, more preferably such indentations are provided on the base of the bottom cavity.

30 It is preferred that the base of top cavity is substantially flat.

It is preferred that the base of bottom cavity is arched such that the center of the arch is 5 to 70 wt%, more preferably 7 to 67% and most preferably 10 to 65 wt% more in height than the height of the bottom cavity. It is preferred that the height is the shortest dimension.

5 It is preferred that the corners of the base of the bottom cavity are rounded and further preferred that the rounded corners have a corner radius in the range of 3mm to 20mm, more preferably 3.5 to 18 mm, and most preferably between 4 to 15mm.

It is preferred that the long edges of the top and bottom cavity taper outwards away from the base at an angle in the range 5° to 30°, more preferably between 7° to 25° and most preferably between 10° to 22°.

The present invention also provides use of mould according to the second aspect for making soap bars comprising starch stamped at least at a rate of 100 bars per minute at factory scale.

10 Process

The present invention provides a method of manufacture of soap bar according to the first aspect using mould according to the second aspect, the method comprising providing a soap billet, providing a mould according to the second aspect, placing the billet in between the top cavity and
15 the bottom cavity of the soap mould for stamping the soap to obtain the soap according to the first aspect.

A billet refers to the pieces after cutting of a log of soap and a bar refers to the piece after it has been stamped from the billet.

20 It is preferred that the soaps are stamped at least at a rate of 100 bars per minute and preferably 200 bars per minute at factory scale.

It is preferred that the soap billets are extruded and then stamped to form soap bars of the present invention.

Figure 1- shows a perspective view of the shaped soap bar (SB) of the present invention a top face (1), a bottom face (2), at least two long side faces (3A, 3B), at least two short side faces (4A, 4B), at least four rounded corners (1A, 1B, 1C and 1D) around the top face (1), a horizontal
25 center-line (HCL), wherein at least the top face (1) is substantially flat; and wherein the horizontal center line (HCL) has a bulge on the long side face (3A, 3B).

Figure 2 shows the top face (1) of the shaped soap bar (SB) with the round four rounded corners (1A, 1B, 1C and 1D) around the top face (1) and the corner radius (CR) depicted in an enlarged circle.

5 Figure 3 shows the long side face (3A) with centre point of arch (CPA) and horizontal center line (HCL) dividing the soap bar into top part (TH) with the top face of the soap (1) having thickness (H1) and a bottom part (BH) with the bottom face (2) of the soap having thickness (H2). The figure also shows thickness (H3) between the center point of the arch (CPA) and the horizontal center line (HCL).

10 Figure 4 shows the short side face (4A) wherein the angle formed between a tangent (T1) drawn along the bulge on the long side face (3A, 3B) and an imaginary perpendicular line (L1) drawn along the bulge in a direction perpendicular to the horizontal center line (HCL).

Examples

15 While this invention has been described with respect to particular embodiments thereof, it is apparent that numerous other forms and modifications of the invention will be obvious to those skilled in the art. The appended claims and this invention generally should be construed to cover all such obvious forms and modifications which are within the true spirit and scope of the present invention.

Example 1

20 Soap bar samples comprising structurants such as starch were prepared according to Table A. The soap bar of WO2009065766 (WO'766) has a close looking soap shape as the present invention but the composition of WO'766 does not have starch. The control was taken as soap bar formulation with starch having three dimensional design of WO2009065766 with varying angles 'formed between a tangent drawn along the bulge on the long side face and an imaginary perpendicular line drawn along the bulge in a direction perpendicular to the horizontal center line';
25 and the bars were checked for neatness and stamping speed. The results are indicated in Table 1.

The compositions of WO'766 and control are given in Table A.

The examples E1 to E6 had the same composition as control but had a varying three dimensional shape with differing angles in Table 1 and differing corner radius in Table 2.

Table A

Ingredients	Control (Soap Bar Formulation with Starch having design of WO2009065766)	Composition of WO2009065766A
Anhydrous soap	52.3	74.52
Hydrated Magnesium silicate	0.0	8.0
Titanium dioxide	0.3	0.3
Glycerine	5	2.0
Starch	15	0.0
Trichlorocarbanilide	0.0	0.2
Perfume	1	0.7
Sodium Chloride	0.8	0.7
Water and Minors	Made upto 100	Made upto 100

Table 1

	Control	E1	E2	E3	E4
		Inside the scope of present invention			Outside the scope of present invention
Angle*	0°	13°	15°	14°	2°
Defect	The bar was not neat and extra mass across the horizontal line was seen.	The bar was neat and extra mass across the horizontal line was seen.	The bar was neat and extra mass across the horizontal line was seen.	The bar was neat and extra mass across the horizontal line was seen.	The bar was not neat and extra mass across the horizontal line was seen.
Stamping speed	Could not stamp	180 bars per minute	180 bars per minute	180 bars per minute	Could not stamp

5

* angle formed between the bulge on the long side face and tangent drawn along the bulge in a direction perpendicular to the horizontal center line.

The data from Table 1 shows that if there was no angle formed, which means there was no bulge or a bulge less than 7°, the bars could not be stamped.

- 10 The stamping rate of 180 tablets /min for this example at pilot scale is equivalent to speed more than 200 tablets/min at factory scale.

Example 2

Soap bar samples 65.3x43.7x16.9 (LxBxH(mm)), comprising structurants such as starch were prepared with varying corner radius; and the bars were checked for neatness and stamping speed. The results are indicated in Table 2.

- 5 Corner radius measurement- A radius gauge is a measuring instrument for measuring the radius of a curved part. It is used to measure the dimensions of workpieces, dies and wooden patterns. The gauge is applied directly to the object and dimensions are read visually.

Table 2

	Control (WO'766 soap bar design with soap bar formulation having starch)	E4	E5	E6
		Inside the scope of present invention		
Corner Radius (CR)	2.4 mm	5mm	7.5mm	10 mm
Top part height (TH)	7.7 mm	7.7 mm	7.7 mm	7.7 mm
Ratio (CR:TH)	0.31:1	0.64:1	0.97:1	1.29:1
Defect	The bar was not neat and extra mass across the horizontal line was seen.	The bar was neat and extra mass across the horizontal line was seen.	The bar was neat and extra mass across the horizontal line was seen.	The bar was neat and extra mass across the horizontal line was seen.
Stamping speed	Could not be stamped	180 bars per minute	180 bars per minute	180 bars per minute

- 10 The data from Table 1 shows that when Corner Radius (CR) of 65.3x43.7x16.9 (LxBxH(mm)), comprising starch was less than 3 mm, the soap bar could not be stamped.

Claims:

1. A shaped soap bar (SB) comprising 5 to 45 wt% starch, the shaped soap bar being of substantially cuboidal shape, wherein the bar comprises:
 - a. a top face (1),
 - b. a bottom face (2),
 - c. at least two long side faces (3A, 3B)
 - d. at least two short side faces (4A, 4B),
 - e. at least four rounded corners (1A, 1B, 1C and 1D) around the top face (1), and
 - f. a horizontal center-line (HCL) dividing the soap bar into top part (TH) with the top face of the soap (1) having thickness (H1) and a bottom part (BH) with the bottom face (2) of the soap having thickness (H2);wherein the horizontal center line (HCL) has a bulge on the long side face (3A, 3B),

wherein the angle (A) formed between a tangent (T1) drawn along the bulge on the long side face (3A, 3B) and an imaginary perpendicular line (L1) drawn along the bulge in a direction perpendicular to the horizontal center line (HCL) is between 5° to 30°; wherein the ratio of corner radius (CR) to the thickness of top part (H1) is in the range of 0.35:1 to 5:1.
2. A shaped soap bar (SB) according to claim 1, wherein the bar comprises four rounded corners (2A, 2B, 2C and 2D) around the bottom face (2).
3. A shaped soap bar (SB) according to claims 1 or 2, wherein the bottom face (2) of the bar is arched inwards with a center point of the arch (CPA) equidistant from both the at least two short side faces (4A, 4B), wherein thickness (H3) between the center point of the arch (CPA) and the horizontal center line (HCL) is about 5 to 70 % less in thickness than thickness of the bottom part (H2) along the side face (3A, 3B).
4. A shaped soap bar (SB) according to anyone of the preceding claims 1 to 3, wherein the top face (1) of the shaped soap bar (SB) is substantially flat.
5. A shaped soap bar (SB) according to anyone of the preceding claims 1 to 4, wherein the rounded corners (1A, 1B, 1C and 1D) around the top face (1) have a corner radius (CR) in the range of 3mm to 20mm.

6. A shaped soap bar (SB) according to anyone of the preceding claims 1 to 5, wherein the rounded corners (2A, 2B, 2C and 2D) around the bottom face (2) have a corner radius (CR) in the range of 3mm to 20mm.
7. A shaped soap bar (SB) according to anyone of the preceding claims 1 to 6, wherein length of the long side face (3A, 3B) is at least 1.2 times longer than length of the short side face (4A, 4B).
8. A soap mould of substantially cuboidal shape for stamped a soap bar (SB) according to anyone of the preceding claims from 1 to 7, the mould comprising,
 - a. a top cavity having a base and two long edges and two short edges for receiving the top part of the soap bar during the stamping process,
 - b. a bottom cavity having a base and two long edges and two short edges for receiving the bottom part of the soap bar during the stamping process,wherein the four corners of the base of the top cavity are rounded,

and wherein the long edges of the top and bottom cavity taper outwards away from the base at an angle in the range of 5° to 30°.
9. A soap mould as claimed in claim 8, wherein the base of top cavity is substantially flat.
10. A soap mould as claimed in claim 8 or 9, wherein the base of bottom cavity is arched such that the center of the arch is 5 to 70 % more in height than the height of the bottom cavity.
11. A soap mould as claimed in anyone of the preceding claims from 8 to 10, wherein the corners of the base of the bottom cavity are rounded.
12. A soap mould as claimed in anyone of the preceding claims from 8 to 11, wherein the rounded corners have a corner radius in the range of 2mm to 20mm.
13. A method of manufacture of soap bar as claimed in anyone of the preceding claims from 1 to 7 using mould as claimed in anyone of the preceding claims from 8 to 12, the method comprising steps:
 - a. providing a soap billet,
 - b. providing a mould as claimed in anyone of the claims from 8 to 12,

- c. placing the billet in between the top cavity and the bottom cavity of the soap mould for stamping the soap to obtain the soap as claimed in claims 1 to 7.
- 14. Use of mould of anyone of the preceding claims from 8 to 12 for making soap bars comprising starch stamped at least at a rate of 100 bars per minute at factory scale.