

SYSTEM AND METHOD FOR TWISTING HOLLOW BARS

TECHNICAL FIELD

[0001] The present disclosure relates generally to hollow metal bars used in architectural industry. Embodiments of the disclosure are related to a system and method for twisting hollow metal bars by altering the material shape memory of the hollow metal bars without distorting its physical structure and cross sectional shape.

BACKGROUND

[0002] In an architectural industry, a row of bars forms a grille, grating, divider, railing, and other metalwork pieces, openwork cover or barrier to doors and windows, louvre, lattice forms, sun shades, screens and the like. In particular, each of the bars may be purposely deformed, or so formed, into certain twisted pattern along its longitudinal axis resulting in a twisted or helical spiral for aesthetics or ornamentation.

[0003] International patent application, WO 2010096018 discloses a method for fabricating a hollow bar that forms elements of a grille or railing of a metalwork piece where the bar is twisted into a spiral form for decorative or ornamental purposes either manually or by utilizing machine-assisted or automated machinery. The hollow bar comprises separate longitudinal parts that are hinge joined to complementarily fasten each other to form the hollow bar. The longitudinal joints are amenable to increased torsional stress, such that each of the parts may be twisted without breaching the material's fatigue limit and the bar as a whole capable of being twisted with more spiral turns within its elasticity limits. The twisted bar may thus be released for re-working for adjustments or re-installation. A number of exemplary joint, internal and external bracing accessories are also disclosed to cater for the different longitudinal part fabrication, for example, by extrusion or roll-milling.

[0004] The hollow bars of different size and shape require different twisting torque. In smaller hollow bars, the twisting can be performed manually with the help of

simple hand tools, as it requires less twisting torque. Due to the stiffness of the metal, the bigger hollow bars require higher torque compared to the smaller hollow bars. Hence, it would be difficult to twist bigger hollow bars manually. Further, the hollow bars are capable of regaining its original shape after being twisted, as its shape memories are not changed during twisting process and hence needs to be fixed using bracing accessories.

[0005] A need, therefore, exists for a machine-assisted or automated machinery apparatus and method for twisting the bigger hollow metal bars that overcomes the above drawbacks.

SUMMARY

[0006] The following summary is provided to facilitate an understanding of some of the innovative features unique to the disclosed embodiment and is not intended to be a full description. A full appreciation of the various aspects of the embodiments disclosed herein can be gained by taking into consideration the entire specification, claims, drawings, and abstract as a whole.

[0007] It is, therefore, one aim of the disclosed embodiments to provide for a system for twisting a hollow bar comprising a supporting device for supporting and fixing one end of the hollow bar, at least one connector and a twisting device. One end of the connector is connected to other end of the hollow bar before being connected to the twisting device. The twisting device is configured to rotate at a predetermined speed for providing a twist force to the hollow bar. The twisting device has at least one shaft having at least one pivoting point into which the other end of the connector is connected such that the twist force applied to the other end of the hollow bar alters the shape memories of the hollow bar without distorting the physical structure and cross sectional shape of the hollow bar.

[0008] It is, therefore, one aim of the disclosed embodiments to provide for a system wherein the supporting device has at least one supporting portion comprising a lower support bracket and an upper support bracket into which the one end of the

hollow bar is inserted for support.

[0009] It is, therefore, one aim of the disclosed embodiments to provide for a system wherein the supporting device has one or more fixing elements for firmly fixing the one end of the hollow bar when inserted into the supporting portion.

[0010] It is, therefore, one aim of the disclosed embodiments to provide for a system wherein the supporting portion has a shape that is capable of holding the hollow bar of varying widths.

[0011] It is, therefore, one aim of the disclosed embodiments to provide for a system wherein the shaft of the twisting device is connected to at least one motor.

[0012] It is, therefore, one aim of the disclosed embodiments to provide for a system wherein the twisting force is applied to the connector and not directly to the hollow bar.

[0013] It is, therefore, one aim of the disclosed embodiments to provide for a system wherein the connector is an external connector comprising a pivoting bracket. The other end of the hollow bar is slotted into the pivoting bracket.

[0014] It is, therefore, one aim of the disclosed embodiments to provide for a system wherein connector is an internal connector comprising a pivoting bracket and a guide bar. The pivoting bracket and the guide bar are inserted into the other end of the hollow bar.

[0015] It is, therefore, one aim of the disclosed embodiments to provide for a method for twisting at least one hollow bar comprising fixing one end of the hollow bar in a supporting device, connecting other end of the hollow bar to one end of a connector, inserting other end of the connector to at least one pivoting point in a shaft of a twisting device and allowing the twisting device to rotate at a predetermined speed. The shaft of the twisting device is connected to a motor. The

twisting force is provided in a first direction to over twist the hollow bar and then provided in a direction to opposite to the first direction to obtain required twist of the hollow bar.

[0016] It is, therefore, one aim of the disclosed embodiments to provide for a method for twisting at least one hollow bar of bigger cross section in which over twisting the hollow bar alters its shape memories.

[0017] It is, therefore, one aim of the disclosed embodiments to provide for a method for twisting at least one hollow bar comprising over twisting the hollow bar in a first direction, changing shape memories of the hollow bar, twisting the hollow bar in a direction opposite to the first direction and achieving predetermined degree of twist without using supports to retain the twist.

BRIEF DESCRIPTION OF THE DRAWINGS

[0018] The summary above, as well as the following detailed description of illustrative embodiments, is better understood when read in conjunction with the appended drawings. For the purpose of illustrating the present disclosure, exemplary constructions of the disclosure are shown in the drawings. However, the disclosure is not limited to specific methods and instrumentalities disclosed herein. Moreover, those in the art will understand that the drawings are not to scale. Wherever possible, like elements have been indicated by identical numbers.

[0019] **FIG. 1** is an illustration of a perspective view of a supporting device having a supporting portion utilized for supporting one end of a hollow metal bar during a twisting process, wherein the position of the supporting device is aligned with an axis of rotation of the hollow metal bar, in accordance with the disclosed embodiments;

[0020] **FIG. 2** is an illustration of a perspective view of hollow bars of various cross sectional shapes, in accordance with the disclosed embodiments;

[0021] **FIG. 3** is an illustration of a perspective view of the supporting device

depicted in **FIG. 1** holding one end of a hollow bar depicted in **FIG. 2**, in accordance with the disclosed embodiments;

[0022] **FIG. 4** is an illustration of an perspective view of another supporting device having two supporting portions for holding two hollow bars depicted in **FIG. 2** of different cross sectional shapes, in accordance with the disclosed embodiments;

[0023] **FIG. 5** is an illustration of a perspective view of a twisting device utilized to hold and twist an end of one of the twisted hollow metal bars during the twisting process, in accordance with the disclosed embodiments;

[0024] **FIG. 6** is an illustration of an exploded view showing an internal mounting method of securing the hollow bars to the twisting device in which a guide bar and a pivoting bracket are inserted into to the hollow metal bar, in accordance with the disclosed embodiments;

[0025] **FIG. 7** is an illustration of an exploded view showing an external mounting method of securing the hollow bar to the twisting device in which the hollow bar is slotted to the pivoting bracket, in accordance with the disclosed embodiments;

[0026] **FIG. 8** is an illustration of a perspective view of the twisting device depicted in **FIG. 3** utilized for twisting the two hollow bars that are secured in the supporting device depicted in **FIG. 4** during the twisting process, in accordance with the disclosed embodiments;

[0027] **FIG. 9A-9C** illustrate a perspective view of the hollow bar twisted at various stages of the twisting process, in accordance with the disclosed embodiments;

[0028] **FIGS. 10A-10C** illustrates of a perspective view of the hollow bar depicted in **FIG. 7** at various stages of the twisting process, in accordance with the disclosed embodiments; and

[0029] **FIG. 11** is an illustration of a flow chart pertaining to a method of twisting the

hollow bar using the system depicted in **FIG. 7**, in accordance with the disclosed embodiments.

DETAILED DESCRIPTION OF ILLUSTRATIVE EMBODIMENTS

[0030] The particular configurations discussed in the following description are non-limiting examples that can be varied and are cited merely to illustrate at least one embodiment and are not intended to limit the scope thereof.

[0031] Referring to **FIG. 1**, a supporting device **100** for supporting and fixing one end of the hollow metal bar (not shown) is disclosed. The supporting device **100** utilized for holding/anchoring the hollow bar is only for illustration purpose and other similar devices that can hold/anchor the hollow bar can also be used without limitation. The supporting device **100** has a pair of vertically raised legs **102** and **104** to position a supporting portion **107** above the ground **114**.

[0032] A horizontal bar **105** fits over the vertically raised legs **102** and **104**. The supporting portion **107** is placed on the horizontal bar **105**. The supporting portion **107** comprises an upper support bracket **106** and a lower support bracket **108**. The lower support bracket **108** is fixed to the horizontal bar **105**, and the upper support bracket **106** is movable to enable insertion of a hollow bar (not shown) into the supporting portion **107**. The upper support bracket **106** and lower support bracket **108** are bolted, or otherwise clamped together by mechanical means, so that they can be separated and the metal hollow bar can easily be retrieved after twisting.

[0033] For example, the upper support bracket **106** can be easily moved up so that the hollow bar can be inserted into the supporting portion **107** and then the upper support bracket **106** can be lowered down to fit in the supporting portion **107**. The supporting portion **107** comprises an opening **109** substantially approximating the shape of the cross-section of the hollow bar, and the dimensions of the opening **109** approximate the cross-sectional dimensions of the hollow bar. The hollow bar is thus firmly fixed between the lower support bracket **108** and upper support bracket **106** by means of fixing elements **110** and **112** which allows the hollow bar to be firmly fixed after fitting the hollow bar in the supporting portion **107**. The fixing elements **110** and

112 can be bolts, for example, or any clamping device to hold hollow bars in position while a twisting force is being applied to the hollow bar.

[0034] **FIG. 2** is an illustration of a perspective view of hollow bars **300-305** of various possible cross sections, in accordance with the disclosed embodiments. The supporting portion **107** of the supporting device **100** depicted in **FIG. 1** can hold, and keep from being turned, any one end of the hollow bars **300-305**. The hollow bars **300-305** can be of various cross sectional shapes such as square, triangle, oval, rectangle, round, etc., and other cross sections are also applicable without limitation depending on the aesthetics or ornamentation requirement.

[0035] An end of any one of the hollow bars **300-305** is first inserted and positioned in the opening **109** of the supporting portion **107**. The fixing elements **110** and **112** may be tightened as required. After the end of the hollow bar **300, 301, 302, 303, 304, or 305** has been secured, the remaining length of the hollow bar **300, 301, 302, 303, 304, or 305** is “over twisted” in one direction, that is, twisted beyond the elasticity limit of the hollow bar material. The hollow bar is then twisted in the opposite direction, and released when a specified degree of twist has been reached in the opposite angular direction. It is to be noted that different hollow bars have different thresholds of twisting for “point of return”, wherein the hollow bar is permanently deformed. There is no certain angle to define “over twist”. It is observed that point of “over twisting” is very near to “point of destruction”. This retains the permanent twist of the hollow bar, even after twisting is no longer being applied. Accordingly, the disclosed method does not require the use of end supports or internal stiffener rods that are used to retain the twist, as disclosed in the International patent application: WO 2010096018.

[0036] **FIG. 3** is an exemplary illustration of a perspective view of the supporting device **100** depicted in **FIG. 1** holding one end of the hollow bar **300** depicted in **FIG. 2**, in accordance with the disclosed embodiments. The hollow bar **300** is inserted into the opening **109** of the supporting portion **107** of the supporting device **100**. The fixing elements **110, 112** are initially loosened such that the upper support bracket **106** can be positioned to hold one end of the hollow bar **300** that is inserted

into the supporting portion **107**. After inserting the hollow bar **300** inside the supporting portion **107**, the upper support bracket **106** is placed back over the lower support bracket **107** and the fixing elements **110** and **112** are tightened to fix the hollow bar **300** firmly in the supporting device **100**.

[0037] FIG. 4 is an illustration of a perspective view of an exemplary embodiment of a supporting device **120** having the supporting portion **107** and a second supporting portion **101** for holding two hollow bars **300** and **301** of different cross sections respectively, in accordance with the disclosed embodiments. The free ends of the hollow bars **300** and **301** may be connected to the shafts of a twisting machine (not shown), according to an exemplary embodiment, to show that the two supporting portions **101** and **107** can include openings (not shown) of different shapes conforming to the external cross-sectional shape of a hollow rod that is to be retained in the supporting device **120**. For example, the supporting portion **101** can include an opening of rectangular shape to hold the hollow bar **301** having a rectangular cross section, and the supporting portion **107** can include the opening **109** which is oval shape to hold the hollow bar **300** having an oval cross section.

[0038] FIG. 5 is an illustration of a perspective view of a twisting device **200** utilized to hold and twist one or two selected hollow bars during a twisting process, in accordance with the disclosed embodiments. The twisting device **200** has one or more rotating shafts **206** and **208** that are connected to a motor (not shown) housed inside the twisting device **200**. In an exemplary embodiment, the shafts **206** and **208** may both operate simultaneously, at a selected rotational speed or torque, and preferably rotating in the same direction. The device **200** has plurality of pivoting points for releasably attaching one of the rotating shafts **206**, **208** to the free end of a respective hollow bar. For example, in the embodiment shown, the shaft **208** has pivoting points **201** and **203**, and the shaft **206** has a pivoting point **204**. The selected hollow bar can be mechanically connected to the respective rotating shaft in various possible ways known and assumed by a person skilled in art, such as an external mounting method or an internal mounting method.

[0039] FIG. 6 is an illustration of an exploded isometric view showing an internal mounting method in which a guide bar **400** is sized and shaped for insertion into a

hole **212** in the pivoted point **204**, and in which a pivoting bracket **402** is sized and shaped for insertion into the hollow bar **300**, in accordance with the disclosed embodiments. It can be appreciated by one skilled in the art that (i) placement of the pivoting bracket **402** into the opening of the hollow bar **300**, and (ii) engagement with the guide bar **400** enables substantially all the torque produced by the twisting machine **200** (shown in **FIG. 8**) to be used in twisting the hollow bar **300**. This method produces a twisted configuration of the hollow bar **300** without damage to the end of the hollow bar **300**, as might result from a conventional method of grasping the end of the hollow bar **300**.

[0040] As shown in the illustration, the guide bar **400** has an outside configuration that enables a user to place the guide bar **400** into the hole **212** in the pivoted point **204**. The guide bar **400** has a non-circular cross section that prevents the guide bar **400** from rotating with respect to the pivoted point **204** after the guide bar **400** is placed into the hole **212**. In a preferred embodiment, the outside surface of the guide bar **400** is precisely the same size and shape as is the inside surface of the hole **212** and the inside surface of the hole **214**. In the configuration shown, the guide bar **400** and the hole **212** have substantially congruent rectangular (or square) cross-sectional shapes, but it should be understood that any non-circular cross-sectional shape can be used.

[0041] The shaft **206** uses the linked combination of the pivoted point **204**, the guide bar **400**, and a hole **214** in the pivoting bracket **402** to mechanically engage the hollow bar **300** such that, when the shaft **206** rotates and produces a torque, the mechanical engagement forces the free end of the hollow bar **300** to rotate, or twist, as well. The combination of the guide bar **400** and the pivoting bracket **402** form a connector which mechanically connects the free end of the hollow bar **300** to the pivot point **204**. As can be appreciated by one skilled in the art, the outside surface of the connector, that is, the outside surface of the pivoting bracket **402**, conforms to the inside surface of the hollow bar **300**.

[0042] An alternate external mounting method is shown in **FIG. 7**. The shaft **208** has two pivoted points **201** and **203** for holding a free end of a selected hollow bar,

such as the hollow bar **301** in the illustration. The hollow bar **301** is slotted into a pivoted bracket **401**, which is slotted into the pivoted points **201** and **203**. The pivoted bracket **401** includes a first guide tab **406** for engagement with a first hole **216** in the pivoted point **201**, and a second guide tab **408** for engagement with a second hole **218** in the pivoted point **203**. The guide tabs **406**, **408** are shown as having square cross-sectional shapes for respective insertion into the holes **216**, **218**, but any cross-sectional shape can be used, including circular cross sections.

[0043] The pivoted bracket **401** also includes a rectangular opening **404** sized and shaped to removably enclose the free end of the hollow bar **301** such that the hollow bar **301** is prevented from rotating with respect to the pivoted bracket **401** when the hollow bar **301** is inserted into the pivoted bracket **401**. It can be appreciated by one skilled in the art that placement of the pivoting bracket **401** into the openings **216** and **218** of the shaft **208** and enclosure of the hollow bar **300** with the pivoting bracket **401** enables substantially all the torque produced by the twisting machine **200** (shown in **FIG. 8**) to be used in twisting the hollow bar **301**. This method produces a twisted configuration of the hollow bar **301** without damage to or distortion of the end of the hollow bar **301**, as might result from a conventional method of grasping the end of the hollow bar **301**. The pivoted bracket **401** serves as a connector for mechanically connecting the hollow bar **301** to the pivoted point **201** and the pivoted point **203**. As can further be appreciated by one skilled in the art, the inside surface of the connector, that is, the inside surface of the rectangular opening **404**, conforms to the outside surface of the hollow bar **301**.

[0044] As can be appreciated by one skilled in the art, twisting a larger hollow bar requires a higher torque than twisting a smaller hollow bar. Accordingly, the twisting device **200** is preferably configured with a motor of sufficient power to provide such higher torque. Further, the twisting device **200** is also configured to rotate in both clockwise and counterclockwise directions at a constant predetermined speed. For example, the twisting device **200** may initially rotate the free end of the hollow bar at a predetermined speed or torque in one direction, such that the hollow bar is over twisted to change its metal memories. By changing the metal memories, a required twist upto a certain degree, of the hollow bar can be achieved without need for

supports to maintain the twisted configuration of the hollow bar. Then, the twisting device **200** rotates the free end of the hollow bar in the opposite direction until the required permanent twist is achieved.

[0045] Referring again to **FIG. 6**, the small rigid hollow guide bar **400** and pivoted bracket **402** may be utilized to removably connect the free end of the hollow bar **300** to the pivoted point **204** of the twisting machine **200**. One end of the guide bar **400** is fixed to other end of the hollow bar **300** via the pivoted bracket **402** while the other end of the guide bar **400** is fixed to the pivoted point **204** of the twisting device **200**. The guide bar **400** preferably has a cross section similar to that of the pivoted point **204** and the pivoting bracket **402** such that the guide bar **400** can be easily inserted into the pivoted point **204** and the pivoting bracket **240**. It should be noted that the hollow bar **300** can be formed by joining two or more longitudinal parts of similar cross section. The cross sectional shape and size of the guide bar **400**, the inner surface of the hollow bar **300**, and the size and shape of the hole **214** in the pivoted point **204** are selected such that the guide bar **400** can be firmly inserted into the hollow bar **300** and the pivoted point **204**. In this configuration, the twisting force provided by the twisting machine **200** is not directly applied to the hollow bar **300**, but is instead applied through the guide bar **400**. This retains the cross section and physical shape of the hollow bar **300** even when the hollow bar **300** is over twisted to change its shape memories.

[0046] The dual pivoting points **201** and **203** as shown in **FIG. 7** can also be utilized with two pivoting brackets **402**, depicted in **FIG. 6** for twisting operations on hollow bars (not shown) having larger internal openings than the internal opening of hollow bar **300**, to better capture the desired twisted shape without distorting the physical structure and the cross sectional shape of the hollow bar.

[0047] Internal pivoting brackets **402** depicted in **FIG. 6** can be inserted into the pivoting point **204** using the guide bar **400**, and the external pivoting bracket **401** depicted in **FIG. 7** can be slotted into the pivoting points **201** and **203**, in a non-permanent connections. Once the respective twisting operation is done, the respective pivoting brackets **401**, **402** and the guide bar **400** can easily be retrieved.

[0048] As shown in **FIG. 8**, the figure illustrates different mounting methods and configuration. Different shapes of the bars require different torque for twisting. According to the system **450** as shown in **FIG. 8**, more than one hollow bar can be twisted in the same operation. The hollow bars **300** and **301** are supported between the supporting device **100** and the twisting device **200**. The hollow bars **300** and **301** are rotated at a predetermined speed and torque in one direction (e.g., clockwise) using the twisting device **200**. It should be noted that one end of the hollow bars **300** and **301** are fixed/anchored at the supporting device **100** and the free ends are rotated at the twisting device **200**. The hollow bars **300** and **301** are twisted many times such that the respective shape memories are changed. **FIG. 9A** shows an angle of hollow bar **300** with respect to an axis of rotation of rotating shaft, beginning at zero degrees.

[0049] As shown in **FIG. 9B**, the angle of axis of hollow bar **300** with respect to axis of rotation shaft is initially over twisted, say at 450° , in one direction (clockwise) to change its shape memories. Then, as depicted in **FIG. 9C**, the over twisted hollow bar **300** is twisted in other direction (anti-clockwise), say 225° until the required twist of the hollow bar **300** is obtained. As the metal memories of the hollow bars **300** are changed, then the required twist of the hollow bar **300** is obtained, the twist of the hollow bar **300** is retained and the need for conventional end supports or internal stiffener rods to retain the twist configuration of the hollow bar **300** can be avoided.

[0050] It should be noted that any degree of twisting lesser than, as depicted in **FIG. 9B**, say lesser than 225° without the need for the supports to retain the lesser twist can still be achieved by further rotating at the opposite direction (i.e., anti-clockwise). Further, any degree greater than as depicted in **FIG. 9B**, say greater than 225° will require supports to retain the greater twist. The over twisting and releasing angles of hollow bars depends upon their size, length, thickness and shape.

[0051] It also should be noted that the parameters such as duration, speed, rotation degree and torque required for twisting the hollow bars depends on the length, size and shape of the hollow bars. The direction, speed, duration and torque required to over twist the hollow bar are different from the direction, speed, duration and torque

required to twist the over twisted hollow bars to obtain final twisted hollow bars.

[0052] Initially the untwisted shape of the hollow bar, say the hollow bar **300**, is similar to the untwisted shape shown in **FIG. 2**. Then, the hollow bar **300** is twisted in one direction as shown in **FIG. 10A**, to produce an initial twisted configuration, and then over twisted as shown in **FIG. 10B**, to produce a subsequent twisted configuration without distorting the physical structure and the cross sectional shape of the hollow bar **300**. The twist of the hollow bar **300** shown in **FIGS. 10A-10B** is in one direction. The over twisted of the hollow bar **300** shown in **FIG. 10B** will have the shape memories changed compared to the original hollow bar **300** depicted in **FIG. 2**. The over twisted hollow bar **300** is then twisted in the opposite direction until the required twist is obtained. **FIG. 10C** shows the final twisted hollow bar **300** that can be used for aesthetics or ornamentation purposes, without need for the conventional internal and/or external bracing accessories to retain the twist.

[0053] **FIG. 11** is an illustration of a flow chart **500** pertaining to a method of twisting a hollow bar, such as the hollow bar **300** of **FIG. 2**, using the system **450** depicted in **FIG. 8**, in accordance with the disclosed embodiments. At step **502**, one end of the hollow bar is supported and fixed using the supporting device **100** depicted in **FIG. 1**.

[0054] At step **504**, the other end of the hollow bar is releasably engaged with the twisting device **200**. The hollow bar can be connected to the twisting device **200** by using internal or external pivoting brackets **401**, **402** as depicted in **FIGS. 6-7**. The twisting device **200** rotates the hollow bar in one direction such that the hollow bar is over twisted, at step **506**. At steps **508** and **510**, the over twisted hollow bar is twisted in a direction opposite to the first direction until a required twist of the hollow bar is achieved.

[0055] Finally the hollow bar is removed from the supporting and twisting device **100**, and used for aesthetic purposes at step **512**. It should be noted that the twisted hollow bar does not require supports to retain the twist after twisting process. The physical structure and cross sectional shape of the final twisted bar is not changed after twisting process. After over twisting the hollow bar beyond the elasticity limit of

the hollow bar, the metal will spring back by itself to an opposite direction, due to the elasticity of the material, but will not return to the original position.

[0056] It will be appreciated that variations of the above disclosed and other features and functions, or alternatives thereof, may be desirably combined into many other different systems or applications. Also, various presently unforeseen or unanticipated alternatives, modifications, variations or improvements therein may be subsequently made by those skilled in the art which are also intended to be encompassed by the following claims.

[0057] Although embodiments of the current disclosure have been described comprehensively in considerable detail to cover the possible aspects, those skilled in the art would recognize that other versions of the disclosure are also possible.

CLAIMS

What is claimed is:

1. A system for twisting at least one hollow bar, comprising:
 - at least one supporting device for supporting and fixing one end of the hollow bar;
 - at least one pivoting bracket which is sized and shaped for insertion into the hollow bar; and
 - at least one twisting device configured to rotate at a predetermined speed and degree for providing a torque to the hollow bar;wherein the twisting device has at least one shaft having at least one pivoted point to which one end of at least one guide bar is mechanically connected such that the twist force applied to the other end of the hollow bar alters the shape memories of the hollow bar by maintaining a cross sectional shape of the hollow bar;
 - wherein the guide bar is sized and shaped for insertion into a hole in the pivoted point;
 - wherein the outside surface of the guide bar is the same size and shape as inside surface of a hole of the pivoting bracket; and
 - wherein during operation the pivoting bracket is placed into an opening of the hollow bar and engaged with the guide bar.
2. The system of claim 1, wherein the supporting device has at least one supporting portion comprising a lower support bracket and an upper support bracket, the supporting portion configured for supporting one end of the hollow bar.
 3. The system of claim 2, wherein the supporting device has one or more fixing elements for firmly fixing the one end of the hollow bar when inserted into the supporting portion.
 4. The system of claim 1, wherein the supporting portion has an opening which is shaped to hold a specified hollow bar.

5. The system of claim 1, wherein the shaft is connected to at least one motor.
6. The system of claim 1, wherein the twisting device functions to twist the hollow bar so that the hollow bar retains a twist shape after being twisted beyond the elasticity limit of the hollow bar.
7. The system of claim 1, wherein the twist force is applied to the connector.
8. The system of claim 1, wherein the connector is an external connector comprising a pivoting bracket, the external connector configured to enclose an end of the hollow bar.
9. The system of claim 8, wherein the other end of the hollow bar is slotted into the pivoting bracket.
10. The system of claim 1, wherein the connector is an internal connector configured for insertion into the hollow bar, the internal connector comprising a pivoting bracket and a guide bar.
11. The system of claim 10, wherein the pivoting bracket is configured for insertion into the hollow bar and the guide bar is configured for insertion into the pivoting bracket.
12. A method for twisting a hollow bar, comprising:
 - fixing one end of the hollow bar in at least one supporting device;
 - connecting the other end of the hollow bar to one end of at least one pivoting bracket;
 - connecting the other end of the pivoting bracket to one end of at least one guide bar;

connecting the other end of the guide bar to at least one pivoting point in a shaft of at least one twisting device, wherein the shaft is connected to a motor;

rotating the twisting device at a predetermined speed so as to produce a first twisting force in a first direction to over twist the hollow bar to change the shape memories of the hollow bar; and

providing a second twisting force in a second direction, opposite to the first direction so as to produce a required twist of the hollow bar.

13. The system of claim 12, wherein the step of connecting the other end of the hollow bar comprises the step of inserting the connector into the hollow bar.

14. The system of claim 13, wherein the outside surface of the connector generally conforms to the inside surface of the hollow bar.

15. The system of claim 12, wherein the step of connecting the other end of the hollow bar comprises the step of enclosing the other end of the hollow bar in the connector.

16. The system of claim 15, wherein the outside surface of the connector conforms to the inside surface of the hollow bar.