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Combining Raising And Spinning Techniques In Metal Hollow Ware Forming

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Abstract:

Over the years, studio metal artists have used various techniques in forming metal products to enhance their aesthetic and utilitarian values. These methods are often simple, ranging from skilful studio forming techniques to industrial techniques. Most of the techniques are being used intensively across the world. However, even though spinning is being used by most of the aluminium processing companies in the country for the production of aluminium bowls and utensils, a preliminary investigation of this study reveals that “raising” a studio technique in metal forming has not been given much attention. The artists have always lived with the belief that intellectual curiosity is the life blood of real civilization. With this curiosity in mind, a study of a ceramic piece that was produced by a combination of throwing and hand-forming technique one day triggered the idea that it could be possible to combine the raising and the spinning techniques to form metal vessels. With this idea, a studio-based research project was conducted to explore the possibilities of combining these two techniques (raising and spinning) in forming metal hollow ware. In sum, the research project revealed that it is possible and saves a lot of time compared to producing a hollow ware by just the raising process alone.

Key words: Raising, Spinning, Planishing, Hollow Ware, Soldering

1.Introduction

Raising is a metalworking technique whereby sheet metal is formed into a bowl or other hollow object by repeated sequences of hammering and annealing of the metal, thereby stretching it into the desired shape. McCreight (1991) and Knauth (1974) described raising as an ancient and basically unchanged technique which is a foundation stone of metal smithing in all cultures and all times. He added that it requires only a hammer and a solid form against which the metal is bent. Siegner (1961) further indicated that raising is a forming process in art metalwork where the sides of the metal are formed to give shape to the work.

Spinning is a process by which a disc or tube of metal is clamped in a lathe and rotated at high speed and formed into an axially symmetric part using specialized tools. According to Herman (2006), spinning as a technique that originated in the early 19th century and can be used for most metals. He further stated that a metal disc is set on a lathe behind an appropriately shaped metal or wooden chuck, and during rotation the metal is pressed onto the chuck with long-handled, polished steel tools. He contended that, Britannia metal was often spun and a typical, modern spun object is the aluminium saucepan. The process however has some limitations. For a complicated shape or design to be produced, the design will have to be made in different components which will mean that each component will have to be spun separately. The parts will then have to be soldered together to obtain the final design or object (Ventura, 2006).

Fraser-Lu (1989) and Yotkov (2007) however argued that because raising is such a time consuming and a tedious process, many bowls are now shaped by a spinning process which uses a lathe-mounted mould. It is based on this argument that it becomes necessary to find out a way of combining these two techniques so as to eliminate the stress associated with the raising process by using the spinning process to get a pre-form and then further enhancement with raising to add artistic form to the work.

2.Tools And Materials

Equipment used include lathe turning machine which was used for the wood turning and subsequently for the metal spinning processes. Tools like anvil, raising stakes and various hammer shapes were also used for the raising process. Simple jewellery tools such as cutting shears, callipers, jeweller’s saw frame and blade, brass scratch brush and metal files were also used at various stages of the work. The main materials used for the project included a block of wood which was used to produce the mould for the spinning process through wood turning, while copper sheet was used for spinning the main work before further raising.

3.Methodology

The experimental and descriptive research methods were the main methods used for the research project. These methods were based on the quantitative and qualitative research approaches. The experimental research method was used to assess the suitability of available tools, materials and equipment used for the project. Series of experiments were conducted to find out how well the spinning and raising techniques could be combined to form hollow ware with suitable metals. The results of the various experiments conducted by the researchers were recorded, described, analyzed and cogent conclusions drawn.

4.Design Development

Designs for the project were based on certain factors, since the principal target in this project was to be able to combine 'raising' and 'spinning' to form hollow wares or vessels. Having this in mind, the forming of each of the pieces to accept the two techniques became an important factor. The designs were developed based on knowledge acquired during experimentation with the two techniques and various materials in studio setting. Another crucial factor that shaped the idea development was the availability of materials, tools and equipment.

The artists also developed designs taking into consideration the number of pieces/parts that will have to be joined or soldered together to form the final work. In other words, a particular design had to be figured out, to find out the number of separate parts required to complete that particular design. Again, designs were based on functionality, technical / mechanical properties or qualities of materials being used as well as concepts such as fusion, oneness, mixing, adding, soldering, welding, binding and union.

The following section describes the procedures and processes used in the production of the hollow wares.

4.1.Project 1: "The Twist"

This design was based on the idea of a one part production. The work was made with a single metal piece by spinning a cylindrical container and then reforming it by the raising process. It has four diagonal lines that form the twist. The twisted lines run from a smooth bottom to a top whose edge is banded. This illustrates the artists' idea of the flexibility in the combination of the two techniques.

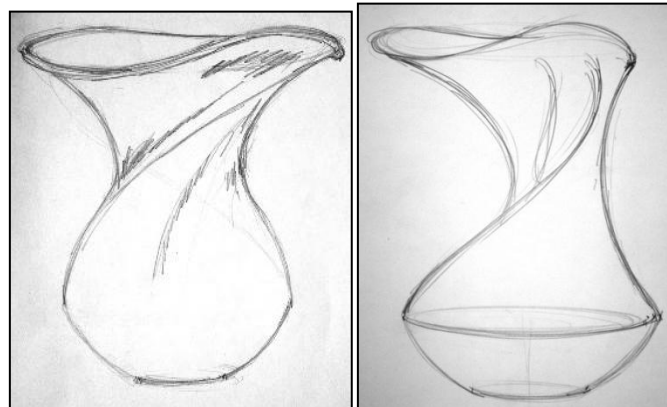


Figure 1(a)

Figure 1(b)

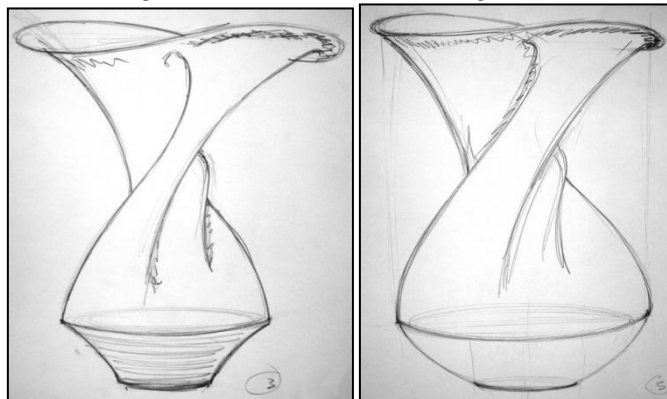


Figure 1(c)

Figure 1(d)

Figures 1(a) -1d: Different sketches of "The Twist".

4.1.1.Step 1

The first step after designing was the production of a wooden mould that was used to spin the pre-form to an approximate shape of the design before raising towards the final shape or form. This process is shown in Figures 2 to 4.



Figure : 2

Figure : 3

Figure : 4

Figure 2: Wood block for turning the mould

Figure 3: Turning the wood on the lathe

Figure 4: Wooden mould ready for spinning

4.1.2. Step 2

The next step is the production of the metal vessel which started from spinning on the lathe. The wooden mould was mounted in the chuck of lathe with a copper disc behind it and a wooden stopper to hold the metal in place. The lathe was rotated at about 1500rpm and pressure applied to the metal (Figure 5) to get the pre-form shape as shown in Figure 6.

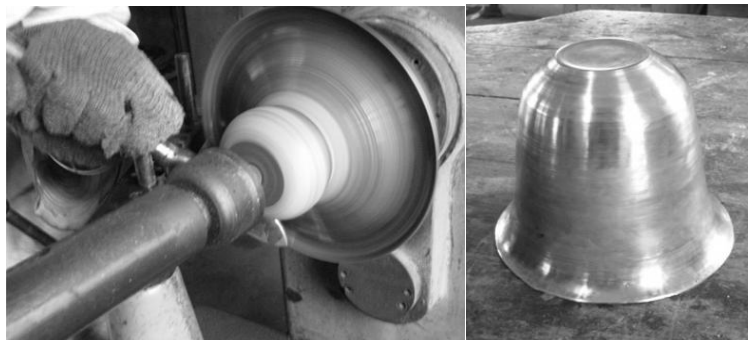


Figure 5: Spinning the metal on the lathe

Figure 6: Pre-form shape

4.1.3. Step 3

After obtaining the pre-form shape, the pre-form is marked according to the design and then raised into shape using the raising hammer (Figure 7). The rough surface created as a result of the raising is removed and refined by planishing using the planishing hammer (Figure 8). The work was completed by soldering a brass round rod at the edge to avoid sharpness at the edge and to strengthen the edge as well (Figure 9).



Figure 7

Figure 8

Figure 9

Figure 7: Raising the shape

Figure 8: Planishing to refine the surface

Figure 9: Soldering the edge.



Figure 10: The twist completed

4.1.4. Step 4

After forming and soldering, the work was cleaned using the brass scratch brush and then sanded to smoothen the surface. The work was finished by oxidizing the surface using sulphuric acid, sulphur powder and soda ash.

4.2. Project 2: "Gourdly Passion"

"Gourdly Passion" was fabricated in two parts by the spinning and raising techniques and then joined together by soldering. "Gourdly Passion" is a play on the word "Gourd/God" through resemblance and was made in two parts; a lower part and an upper part.

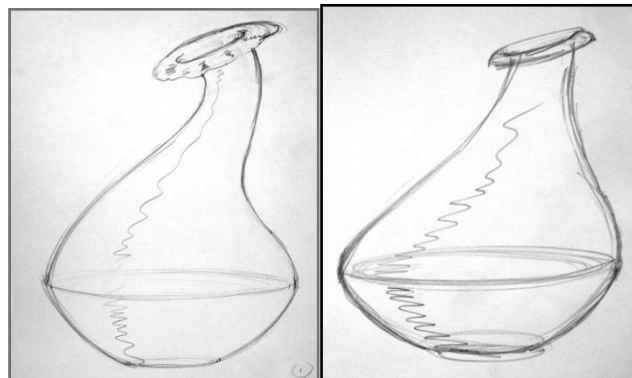


Figure: 11(a)

Figure: 11(b)

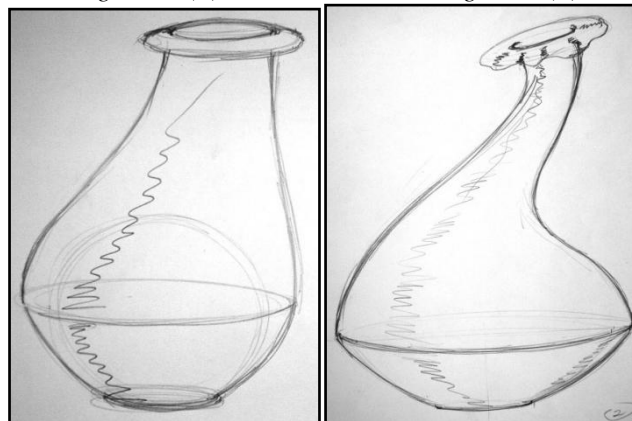


Figure: 11(c)

Figure: 11(d)

Figures 11(a)- 11(d): Different sketches of "Gourdly Passion"

4.2.1. Step 1

After the designing, a wooden mould to be used for the spinning of the pre-form was made through the wood turning process. For this design, two wooden moulds were produced because the design is in two parts. One for spinning the lower part (Figure 12) and the other for spinning the top (Figure 13).



Figure 12: spinning the mould for the bottom Figure 13: the mould for the top part

4.2.2. Step 2

After preparing the moulds, the two parts were spun separately using copper discs. The copper discs were cut according to the size of the works. The disc for the top part was bigger than that of the lower part. After separately spinning the two parts, the top part was then raised on a stake in order to achieve the desired results.



Figure 14: The Spun lower part



Figure 15: The spun top part

4.2.3. Step 3

Lines were drawn on the bowl to serve as guidelines for the raising process (Figure 16). After the guidelines were drawn, the work was put on a metal stake and raised. The raising continued amid intermittent annealing to soften the metal until the desired shape of the work was achieved (Figure 18). The work was then planished to smoothen the surface (Figure 19).



Figure 16: The guidelines



Figure 17: Raising the work on the stake



Figure 18: Raising continues



Figure 19: Planishing the work

After planishing the work, the edge of the top part was anti-clastically raised to curve that part downwards (Figure 20). The two parts were then soldered together (Figure 21). When the soldering was completed, the soldered joint was filed, sanded, pickled and scratch brushed. The whole work was then oxidized to give it an antique look (Figure 22).



Figure 20: anti-clastically raising the edge



Figure 21: soldering the two parts together.



Figure 22: "Gourdly Passion", the finished work.

5. Results And Discussion

5.1. Time Factor

The researchers observed that with regards to time, the combination of the raising and spinning processes is beneficial as it saves time compared to the use of the 'raising' process alone for a particular design. In the case of a complex design like "The Twist", if the researchers were to use the raising technique for the whole project that would mean that, extra work would have to be done by raising the cone that was produced by spinning. This would also mean that the walls of the cone would be quite thick which will eventually result in prolonged time of adding the twist to the cone because the thicker the metal, the more difficult it is to shape. Also, the two bowls that were spun to form the lower and top parts of the design "Gourdly Passion", would have had to be raised separately which obviously would have taken weeks to bring to a smooth finish. In view of the above, it is worth mentioning that success in hollow ware forming, so long as the technique of raising and spinning is combined, is efficient when time factor is considered.

5.2. Design Factor

Looking at the type of designs the combination of "raising" and "spinning" produced, one may ask, "Is it not possible to use any one of these two techniques to produce any one of the designs in the project?" The answer is "yes" and "no". To comment on the "no", spinning is a process used to produce a symmetrical and usually smooth tapered shape. This property of the technique defeats the idea of producing any of the designs in this project using the spinning technique alone. On the other hand, the answer

could be in the affirmative because the raising process will be able to produce any of the project pieces. If one should consider though, the amount of time that was required to produce, for instance the two works, one will decide not to use the raising technique alone for the object; a combination of the two techniques would be used. This means that, in the case of any design limitation for the spinning technique, the combination of the “spinning” and “raising” techniques removed that barrier. One can therefore say without a doubt that, a combination of the “raising” and “spinning” techniques knows no barrier as far as designs for decorative and functional hollow wares are concerned.

5.3. Other Factors

Spinning is a relatively simple process. The process allows the material to behave in a fluid and smooth manner. The process does not seem to be labour intensive once the technique has been mastered and experience gained. The process of Spinning results in fine concentric lines or a smooth finish on the surface of the work, depending on the type of spinning tool used. Contrary to this, raising is quite a tedious process and is labour intensive. The hammering process involved in the raising technique also triggers the idea of pain. The hammering process also gives some form of dotted effect on the surface of the work which in a way represents the “pain” that the work has undergone. Infact, the whole process seems to exude a feeling of pain. Consequently, due to the labour intensive nature of the raising technique, as opposed to spinning, the researchers were compelled, in making a fair analysis, to consider a fusion or rather a combination of the two techniques. In this regard, the researchers become the officiating minister who solemnises the union between two opposites; “pain and love” and the fruit of this matrimony is “passion for gourd” which became the theme for this project.

6. Conclusion

The results of the study have revealed that it is possible to use a combination of raising and spinning techniques for hollow ware forming. However, during the study it was realized that, aluminium is good for spinning but did not work for raising. This is because aluminium could not be compressed by hammering which is required if raising is to be successful.

The Spinning and raising processes resulted in fine concentric lines and dotted marks respectively on the surface of the works and this could be left on the surface of the work to create some form of textured surface finish if the necessary facilities are in place. The result of this study provides hope for the studio metal artists and students of inquiring minds who want to explore raising and spinning techniques to produce unique metal products.

7. References

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